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Zoological vs. botanical nomenclature: a forgotten 'BioCode' experiment from the times of the Strickland Code*

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Abstract

A code intended to apply to both zoological and botanical nomenclature was drafted in 1842–43 by a commission appointed by the fourth Congress of Italian Scientists on request of the zoologist Carlo Luciano Bonaparte, as a reaction to the recently published Strickland Code (1842). Large excerpts from the latter document and an English translation of documents related to the Italian initiative are presented in appendices.

Key words: Bonaparte (Carlo Luciano), Congresses of Italian scientists, History of nomenclature, Italian zoology

The Strickland Code

Next to Linnaeus' own principia enumerated in his *Philosophia Botanica* (Linnaeus 1751), and more rightly than that work, the earliest document having the nature of a code ruling the scientific nomenclature for living organisms is the so-called Strickland Code (Strickland *et al*. 1842). Some acquaintance with this document is required to get an adequate historical setting for the little known episode in the history of biological nomenclature I present in this article. As Strickland *et al.*'s document is very frequently cited but, arguably, very seldom read, I present ample excerpts from this publication as Appendix 1 below.

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The divorce between zoological and botanical nomenclature

When Hugh Strickland and his colleagues were working at the document eventually published as a *Series of propositions for rendering the nomenclature of zoology uniform and permanent* (Strickland *et al.* 1842), zoological and botanical nomenclature had already gone along different paths to a sizeable extent.

Some aspects of this divergence were merely linguistic, such as different attitudes in respect to the admissible kinds of names to be employed in scientific literature. For example, following the example of Linnaeus, botanists used extensively generic names derived from persons, while this was quite rare in zoology and even occasionally rejected as legitimate. But other differences between the zoological and the botanical tradition were more technical and eventually became fixed in the internationally adopted Codes, starting with de Candolle (1867) for plant names and the 'Paris Rules' (International Commission on Zoological Nomenclature 1905) for animal names.

In a lucid comparison of a modern version of the zoological and botanical codes (International Commission on Zoological Nomenclature 1985; Voss *et al.* 1983), Jeffrey (1986) identified twelve main differences, including the nature of the link between names and taxa through the adoption of types and the provisions for conservation and rejection of names, that is, the rules limiting the scope of application of the principle of priority. In addition, botanists have name for hybrids as such, while this is excluded from the zoological code. There are also different criteria for what in zoology is the availability of names (the concept is called valid publication in botany). Tautonyms are rejected in botany, but not in zoology (well known examples are *Gorilla gorilla* and *Bufo bufo*); the principle of coordination (cf. Dubois 2008) has wider scope in zoology than in botany, and different in the two codes are the works and dates adopted as starting points for scientific nomenclature, zoology uniformly adopting the tenth edition of *Systema naturae* (Linnaeus 1758), while botanists' main reference is *Species Plantarum* (Linnaeus 1753), but with many exceptions, for selected groups, e.g. mosses, whose nomenclature starts officially with Hedwig (1801). There are also differences in the requirements for orthography, in the treatment of secondary homonyms, and in the use of names adopted for fossil taxa.

By the time the British Association for the Advancement of Science appointed the Strickland committee, another direct consequence of the independence *de facto* of zoological and botanical nomenclature was already evident, that is, the growing number of identical names used for animal and plant genera.

The BioCode

The latter circumstance, anyway, was long ignored in practice and generally proved to be of little consequence until plant and animal names begun to be stored together in large data bases.

But in the long run, the problem of cross-kingdom homonymy was eventually to emerge as one of the main reasons suggesting the importance of harmonization (Ride 1988), if not even a straight unification of zoological and botanical nomenclature. Another and arguably more critical reason behind this move was the problem of regulating nomenclature of the so-called ambiregnal organisms, that is of taxa that have been treated sometimes as protozoans, and thus named according to the rules of zoological nomenclature, sometimes as algae, and thus named in accordance to the botanical nomenclature. This twofold treatment has been often applied to closely related taxa, sometimes even to one and the same taxon. Cross-kingdom homonyms and the nomenclature of ambiregnal organisms have thus prompted efforts at what has become known as the BioCode (Greuter *et al.* 1996, 1998; Hawksworth 1997). This initiative and its eventual fate have been briefly summarised by Greuter (2003) and also by Kraus (2008) in this volume.

A 'Draft BioCode' dated 1842–43

A circumstance that has as much as ignored to date is that an effort largely similar to the recent BioCode initiative had been produced exactly at the time the Strickland Code was written. This effort, eventually fated to failure within short, was energetically launched by a prominent figure whose undisputed authority in zoological matters was likely increased by his social status (Stroud 2000). This man, Charles Lucien [=Carlo Luciano] Bonaparte, Prince of Canino, was indeed the son of a brother of Napoleon. Among the zoologists he was renowned for his studies on vertebrates, especially birds. By 1842 Bonaparte had already published the four-volume *American Ornithology* (Bonaparte 1825–33) and a lavishly illustrated monograph of Italian vertebrates (Bonaparte 1832–41). His most lasting contribution to zoology, however, is perhaps his later synopsis of world bird genera (Bonaparte 1850–7).

In the late 1830s, Bonaparte launched a successful series of congresses of the Italian scientists. At that time, Italy was divided into many political units, including parts under foreign rule. The congresses provided good opportunities for people of different Italian states to exchange their views, political as well as scientific: those events thus were instrumental in helping the eventual unification of Italy into a single national state. But Bonaparte's own strong Italian nationalistic feelings combined with the indisputably international character of his research and his Europe-wide network of acquaintances. Thus, at the fourth meeting of the Italian scientists, held in Padova in 1842, he was able to illustrate the document freshly produced by the Strickland Committee and to offer it in Italian translation (Anon. 1843).

In Bonaparte's view, the British document was a useful contribution towards a scientific nomenclature less deregulated than this was at the time, but he was not completely happy with the proposal. He was well aware of the differences between zoological and botanical traditions in nomenclature and regarded the latter as much closer to the Linnaean standards. Zoological nomenclature should thus converge towards the current praxis in botany and in order to get this result, he proposed to set up a Commission with the charge of producing a set of rules to be applied to zoological and botanical names alike. The chronicle of this interesting episode in the history of bionomenclature occupies many pages of the proceedings (*Atti*) of the 1842 congress: a long excerpt from that text is given here, in translation, as Appendix 2.

One year later, during the fifth meeting of the Italian scientists, held this time in Lucca, members of the Commission appointed in Padova presented long analytical reports and a draft of code, but against the proposal for a unified code, or its individual articles, were also raised strong objections, some of them by the dean of the Italian botanists Giuseppe Moretti, others, and harsher, by the entomologist Marquis Massimiliano Spinola. A short excerpt from the published chronicle (Anon. 1844) is given below, also in translation, as Appendix 3.

Following the Lucca meeting, the issue of a unified code with rules for the scientific names of organisms disappeared suddenly from the public debate, never to appear again seriously, to the best of my knowledge, before the start of the BioCode initiative.

Divorce, but with advantageous continuing exchange

To be sure, zoological and botanical traditions in nomenclature were often discussed comparatively, but highlighting the difference was not a stimulus to renovate the efforts towards unification. We can suggest that authors, if sensible to the issue, were regarding a single nomenclatural code as an opportunity already lost for ever. Significant, in this respect, are the words of Dall (1877, p. 9): "A serious mistake appears to have been committed at the outset by divorcing Zoological from Botanical nomenclature, as was done by the committee of the British Association. The signal success which has attended the efforts of botanists to unify their nomenclature, when compared to the confusion reigning in some departments of zoology, is sufficient proof of this."

A few pages later, commenting on the general principles, at that time quite recently expressed by de Candolle (1867) in his *Lois de la nomenclature botanique*, Dall (1877, p. 23) added the following remark: "The manner in which Botany and the different branches of zoology have reached their present state, being far from uniform, and the nature of the organisms treated of being dissimilar, an absolute identity in the application of nomenclature is impracticable even if it were wholly desirable. The fundamental principles, however, and the end to be attained, are the same in both branches of study."

The difficulties experienced during the 1990s by the BioCode initiative demonstrate that Dall's judgement was not much off the mark, but his own efforts in comparing zoological and botanical traditions were not without virtue, and this is demonstrated again by the BioCode. Even if a unified code could not be eventually produced, it is certainly as a consequence of the dialogue stimulated by the BioCode initiative that the current edition of the zoological code (International Commission on Zoological Nomenclature 1999) was eventually to include a new Recommendation 1A. stating that "Authors intending to establish new genus-group names are urged to consult the *Index Nominum Genericorum (Plantarum)* and the *Approved List of Bacterial Names* to determine whether identical names have been established under the International Codes of Nomenclature relevant to those lists and, if so, to refrain from publishing identical zoological names." Existing cross-kingdom homonyms will remain, but their number, at least, should not increase – exactly one of the targets Prince Bonaparte intended to reach by his well intended, though now largely forgotten effort.

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Appendix I

Excerpts from Strickland et al. (1842)

SERIES OF PROPOSITIONS FOR RENDERING THE NOMENCLATURE OF ZOOLOGY UNIFORM AND PERMANENT

PREFACE.

[..] The world of science is no longer a monarchy, obedient to the ordinances, however just, of an Aristotle or a Linnæus. She has now assumed the form of a republic, and although this revolution may have increased the vigour and zeal of her followers, yet it has destroyed much of her former order and regularity of government. The latter can only be restored by framing such laws as shall be based in reason and sanctioned by the approval of men of science; and it is to the preparation of these laws that the Zoological Section of the Association have been invited to give their aid. [...]

Among the numerous rules for nomenclature which have been proposed by naturalists, there are many which, though excellent in themselves, it is not now desirable to enforce[1]. The cases in which those rules have been overlooked or departed from, are so numerous and of such long standing, that to carry these regulations into effect would undermine the edifice of zoological nomenclature. But while we do not adopt these propositions as authoritative laws, they may still be consulted with advantage in making such additions to the language of zoology as are required by the progress of the science. By adhering to sound principles of philology, we may avoid errors in future, even when it is too late to remedy the past, and the language of science will thus eventually assume an aspect of more classic purity than it now presents.

Our subject hence divides itself into two parts; the first consisting of *Rules* for the rectification of the present zoological nomenclature, and the second of *Recommendations* for the improvement of zoological nomenclature in future.

PART I.

RULES FOR RECTIFYING THE PRESENT NOMENCLATURE.

[*Limitation of the Plan to Systematic Nomenclature*.]

In proposing a measure for the establishment of a permanent and universal zoological nomenclature, it must be premised that we refer solely to the Latin or systematic language of zoology. We have nothing to do with vernacular appellations. [..]

[*Law of Priority the only effectual and just one*.]

It being admitted on all hands that words are only the conventional signs of ideas, it is evident that language can only attain its end effectually by being permanently established and generally recognized. This consideration ought, it would seem, to have checked those who are continually attempting to subvert the established language of zoology by substituting terms of their own coinage. [..] Now in zoology no one person can subsequently claim an authority equal to that possessed by the person who is the first to define a new genus or describe a new species; and hence it is that the name originally given, even though it may be inferior in point of elegance or expressiveness to those subsequently proposed, ought as a general principle to be permanently retained. To this consideration we ought to add the injustice of erasing the name originally selected by the person to whose labours we owe our first knowledge of the object; and we should reflect how much the permission of such a practice opens a door to obscure pretenders for dragging themselves into notice at the expense of original observers. Neither can an author be permitted to alter a name which he himself has once published, except in accordance with fixed and equitable laws. It is well observed by Decandolle, "L'auteur même qui a le premier établi un nom n'a pas plus qu'un autre le droit de le changer pour simple cause d'impropriété. La priorité en effet est un terme fixe, positif, qui n'admet rien, ni d'arbitraire, ni de partial."

For these reasons, we have no hesitation in adopting as our fundamental maxim, the "law of priority," viz.

§ 1. The name originally given by the founder of a group or the describer of a species should be permanently retained, to the exclusion of all subsequent synonyms (with the exceptions about to be noticed). [..]

1. See especially the admirable code proposed in the 'Philosophia Botanica' of Linnæus. If zoologists had paid more attention to the principles of that code, the present attempt at reform would perhaps have been unnecessary.

[*Not to extend to authors older than Linnæus*.]

As our subject matter is strictly confined to the *binomial system of nomenclature*, or that which indicates species by means of two Latin words, the one generic, the other specific, and as this invaluable method originated solely with Linnæus, it is clear that, as far as species are concerned, we ought not to attempt to carry back the principle of priority beyond the date of the 12th edition of the 'Systema Naturæ.' Previous to that period, naturalists were wont to indicate species not by a *name* comprised in one word, but by a *definition* which occupied a sentence, the extreme verbosity of which method was productive of great inconvenience. It is true that one word sometimes sufficed for the definition of a species, but these rare cases were only binomial by accident and not by principle, and ought not therefore in any instance to supersede the binomial designations imposed by Linnæus.

The same reasons apply also to generic names. Linnæus was the first to attach a definite value to genera, and to give them a systematic character by means of exact definitions; and therefore although the *names* used by previous authors may often be applied with propriety to modern genera, yet in such cases they acquire a new meaning, and should be quoted on the authority of the first person who used them in this secondary sense. It is true, that several of the old authors made occasional approaches to the Linnæan exactness of generic definition, but still these were but partial attempts; and it is certain that if in our rectification of the binomial nomenclature we once trace back our authorities into the obscurity which preceded the epoch of its foundation, we shall find no resting-place or fixed boundary for our researches. [..]

We therefore recommend the adoption of the following proposition:—

§ 2. The binomial nomenclature having originated with Linnæus, the law of priority, in respect of that nomenclature, is not to extend to the writings of antecedent authors. [..]

[*Generic names not to be cancelled in subsequent subdivisions*.] [..]

§ 3. A generic name when once established should never be cancelled in any subsequent subdivision of the group, but retained in a restricted sense for one of the constituent portions.

[*Generic names to be retained for the typical portion of the old genus*.]

When a genus is subdivided into other genera, the original name should be retained for that portion of it which exhibits in the greatest degree its essential characters as at first defined. Authors frequently indicate this by selecting some one species as a fixed point of reference, which they term the "type of the genus." When they omit doing so, it may still in many cases be correctly inferred that the *first* species mentioned on their list, if found accurately to agree with their definition, was regarded by them as the type. A specific name or its synonyms will also often serve to point out the particular species which by implication must be regarded as the original type of a genus. In such cases we are justified in restoring the name of the old genus to its typical signification, even when later authors have done otherwise. We submit therefore that

§ 4. The generic name should always be retained for that portion of the original genus which was considered typical by the author. [..]

[*When no type is indicated, then the original name is to be kept for that subsequent subdivision which* first *received it*.] [..]

§ 5. When the evidence as to the original type of a genus is not perfectly clear and indisputable, then the person who first subdivides the genus may affix the original name to any portion of it at his discretion, and no later author has a right to transfer that name to any other part of the original genus.

[*A later name of the same extent as an earlier to be wholly cancelled*.]

When an author infringes the law of priority by giving a new name to a genus which has been properly defined and named already, the only penalty which can be attached to this act of negligence or injustice, is to expel the name so introduced from the pale of the science. It is not right then in such cases to restrict the meaning of the later name so that it may stand side by side with the earlier one, as has sometimes been done. For instance, the genus *Monaulus*, Vieill. 1816, is a precise equivalent to *Lophophorus*, Tem. 1813, both authors having adopted the same species as their type, and therefore when the latter genus came in the course of time to be divided into two, it was incorrect to give the condemned name *Monaulus* to one of the portions. To state this succinctly,

§ 6. When two authors define and name the same genus, *both making it exactly of the same extent*, the later name should be cancelled *in toto*, and not retained in a modified sense. [..]

This rule admits of the following exception:—

§ 7. Provided however, that if these authors select their respective types from different sections of the genus, and these sections be afterwards raised into genera, then both these names may be retained in a restricted sense for the new genera respectively. [..]

[*A later name equivalent to several earlier ones is to be cancelled.*]

§ 8. If the later name be so defined as to be equal in extent to two or more previously published genera, it must be cancelled *in toto*.

[*A genus compounded of two or more previously proposed genera whose characters are now deemed insufficient, should retain the name of one of them.*] [..]

§ 9. In compounding a genus out of several smaller ones, the earliest of them, if otherwise unobjectionable, should be selected, and its former generic name be extended over the new genus so compounded. [..]

[*A name should be changed when previously applied to another group which still retains it.*]

It being essential to the binomial method to indicate objects in natural history by means of *two words* only, without the aid of any further designation, it follows that a generic name should only have one meaning, in other words, that two genera should never bear the same name. For a similar reason, no two species in the same genus should bear the same name. When these cases occur, the later of the two duplicate names should be cancelled, and a new term, or the earliest synonym, if there be any, substituted. […] It is, we conceive, the bounden duty of an author when naming a new genus, to ascertain by careful search that the name which he proposes to employ has not been previously adopted in other departments of natural history[2]. […] We submit therefore, that

§ 10. A name should be changed which has before been proposed for some other genus in zoology or botany, or for some other species in the same genus, when still retained for such genus or species.

[*A name whose meaning is glaringly false may be changed.*]

Our next proposition has no other claim for adoption than that of being a concession to human infirmity. If such proper names of places as Covent Garden, Lincoln's Inn Fields, Newcastle, Bridgewater, &c., no longer suggest the ideas of gardens, fields, castles, or bridges, but refer the mind with the quickness of thought to the particular localities which they respectively designate, there seems no reason why the proper names used in natural history should not equally perform

2. This laborious and difficult research will in future be greatly facilitated by the very useful work of M. Agassiz, entitled "Nomenclator Zoologicus.

the office of correct indication even when their etymological meaning may be wholly inapplicable to the object which they typify. But we must remember that the language of science has but a limited currency, and hence the words which compose it do not circulate with the same freedom and rapidity as those which belong to every-day life. The attention is consequently liable in scientific studies to be diverted from the contemplation of the thing signified to the etymological meaning of the sign, and hence it is necessary to provide that the latter shall not be such as to propagate actual error. Instances of this kind are indeed very rare, and in some cases, such as that of *Monodon*, *Caprimulgus*, *Paradisea apoda* and *Monoculus*, they have acquired sufficient currency no longer to cause error, and are therefore retained without change. But when we find a Batracian reptile named in violation of its true affinities, *Mastodonsaurus*, a Mexican species termed (through erroneous information of its habitat) *Picus cafer*, or an olive-coloured one *Muscicapa atra*, or when a name is derived from an accidental monstrosity, as in *Picus semirostris* of Linnæus, and *Helix disjuncta* of Turton, we feel justified in cancelling these names, and adopting that synonym which stands next in point of date. At the same time we think it right to remark that this privilege is very liable to abuse, and ought therefore to be applied only to extreme cases and with great caution. With these limitations we may concede that

§ 11. A name may be changed when it implies a false proposition which is likely to propagate important errors.

[*Names not clearly defined may be changed*.]

[..] Two things are necessary before a zoological term can acquire any authority, viz. *definition* and *publication*. Definition properly implies a distinct exposition of essential characters, and in all cases we conceive this to be indispensable, although some authors maintain that a mere enumeration of the component species, or even of a single type, is sufficient to authenticate a genus. To constitute *publication*, nothing short of the insertion of the above particulars *in a printed book* can be held sufficient. [..] Therefore

§ 12. A name which has never been clearly defined in some published work should be changed for the earliest name by which the object shall have been so defined.

[*Specific names, when adopted as generic, must be changed*.]

The necessity for the following rule will be best illustrated by an example. The *Corvus pyrrhocorax*, Linn., was afterwards advanced to a genus under the name of *Pyrrhocorax*. Temminck adopts this generic name, and also retains the old specific one, so that he terms the species *Pyrrhocorax pyrrhocorax*. The inelegance of this method is so great as to demand a change of the specific name, and the species now stands as *Pyrrhocorax alpinus*, Vieill. We propose therefore that

§ 13. A new specific name must be given to a species when its old name has been adopted for a genus which includes that species.

[*Latin orthography to be adhered to*.]

§ 14. In writing zoological names the rules of Latin orthography must be adhered to. [..]

When a name has been erroneously written and its orthography has been afterwards amended, we conceive that the authority of the original author should still be retained for the name, and not that of the person who makes the correction.

PART II.

RECOMMENDATIONS FOR IMPROVING THE NOMENCLATURE IN FUTURE. [..]

[*The best names are Latin or Greek characteristic words*.] [..]

§ A. The *best* zoological names are those which are derived from the Latin or Greek, and express some distinguishing characteristic of the object to which they are applied.

[*Classes of objectionable names*.]

It follows from hence that the following classes of words are more or less objectionable in point of taste, though, in the case of *genera*, it is often necessary to use them, from the impossibility of finding characteristic words which have not before been employed for other genera. We will commence with those which appear the least open to objection, such as

a. Geographical names.—These words being for the most part adjectives can rarely be used for *genera*. As designations of *species* they have been so strongly objected to, that some authors (Wagler, for instance) have gone the length of substituting fresh names wherever they occur; others (*e. g.* Swainson) will only tolerate them where they apply *exclusively*, as *Lepus hibernicus*, *Troglodytes europæus*, &c. We are by no means disposed to go to this length. It is not the less true that the *Hirundo javanica* is a Javanese bird, even though it may occur in other countries also, and though other species of *Hirundo* may occur in Java. The utmost that can be urged against such words is, that they do not tell the *whole truth*. However, as so many authors object to this class of names, it is better to avoid giving them, except where there is reason to believe that the species is chiefly confined to the country whose name it bears.

b. Barbarous names.—Some authors protest strongly against the introduction of exotic words into our Latin nomenclature, others defend the practice with equal warmth. We may remark, first, that the practice is not contrary to classical usage, for the Greeks and Romans did occasionally, though with reluctance, introduce barbarous words in a modified form into their respective languages. Secondly, the preservation of the trivial names which animals bear in their native countries is often of great use to the traveller in aiding him to discover and identify species. We do not therefore consider, if such words have a Latin termination given to them, that the occasional and judicious use of them as scientific terms can be justly objected to.

c. Technical names.—All words expressive of trades and professions have been by some writers excluded from zoology, but without sufficient reason. Words of this class, *when carefully chosen*, often express the peculiar characters and habits of animals in a metaphorical manner, which is highly elegant. We may cite the generic names *Arvicola*, *Lanius*, *Pastor*, *Tyrannus*, *Regulus*, *Mimus*, *Ploceus*, &c., as favourable examples of this class of names.

d. Mythological or historical names.—When these have no perceptible reference or allusion to the characters of the object on which they are conferred, they may be properly regarded as unmeaning and in bad taste. Thus the generic names *Lesbia*, *Leilus*, *Remus*, *Corydon*, *Pasiphae*, have been applied to a Humming bird, a Butterfly, a Beetle, a Parrot, and a Crab respectively, without any perceptible association of ideas. But mythological names may sometimes be used as generic with the same propriety as technical ones, in cases where a direct allusion can be traced between the narrated actions of a personage and the observed habits or structure of an animal. Thus when the name *Progne* is given to a Swallow, *Clotho* to a Spider, *Hydra* to a Polyp, *Athene* to an Owl, *Nestor* to a grey-headed Parrot, &c., a pleasing and beneficial connexion is established between classical literature and physical science.

e. Comparative names.—The objections which have been raised to words of this class are not without foundation. The names, no less than the definitions of objects, should, where practicable, be drawn from positive and self-evident characters, and not from a comparison with other objects, which may be less known to the reader than the one before him. Specific names expressive of comparative size are also to be avoided, as they may be rendered inaccurate by the after-discovery of additional species. The names *Picoides*, *Emberizoides*, *Pseudoluscinia*, *rubeculoides*, *maximus*, *minor*, *minimus*, &c. are examples of this objectionable practice.

f. Generic names compounded from other genera.—These are in some degree open to the same imputation as comparative words; but as they often serve to express the position of a genus as intermediate to, or allied with, two other genera,

they may occasionally be used with advantage. Care must be taken not to adopt such compound words as are of too great length, and not to corrupt them in trying to render them shorter. The names *Gallopavo*, *Tetraogallus*, *Gypaetos*, are examples of the appropriate use of compound words.

g. Specific names derived from persons.—So long as these complimentary designations are used with moderation, and are restricted to persons of eminence as scientific zoologists, they may be employed with propriety in cases where expressive or characteristic words are not to be found. But we fully concur with those who censure the practice of naming species after persons of no scientific reputation, as curiosity dealers (e. g. *Caniveti*, *Boissoneauti*), Peruvian priestesses (*Cora*, *Amazilia*), or Hottentots (*Klassi*).

h. Generic names derived from persons.—Words of this class have been very extensively used in botany, and therefore it would have been well to have excluded them wholly from zoology, for the sake of obtaining a *memoria technica* by which the name of a genus would at once tell us to which of the kingdoms of nature it belonged. Some few personal generic names have however crept into zoology, as *Cuvieria*, *Mulleria*, *Rossia*, *Lessonia*, &c., but they are very rare in comparison with those of botany, and it is perhaps desirable not to add to their number.

i. Names of harsh and inelegant pronunciation.—These words are grating to the ear, either from inelegance of form, as *Huhua*, *Yuhina*, *Craxirex*, *Eschscholtzi*, or from too great length, as *chirostrongylostinus*, *Opetiorhynchus*, *brachypodioides*, *Thecodontosaurus*, not to mention the *Enaliolimnosaurus crocodilocephaloides* of a German naturalist. It is needless to enlarge on the advantage of consulting euphony in the construction of our language. As a general rule it may be recommended to avoid introducing words of more than five syllables.

k. Ancient names of animals applied in a wrong sense.—It has been customary, in numerous cases, to apply the names of animals found in classic authors at random to exotic genera or species which were wholly unknown to the ancients. The names *Cebus*, *Callithrix*, *Spiza*, *Kitta*, *Struthus*, are examples. This practice ought by no means to be encouraged. The usual defence for it is, that it is impossible now to identify the species to which the name was anciently applied. But it is certain that if any traveller will take the trouble to collect the vernacular names used by the modern Greeks and Italians for the Vertebrata and Mollusca of southern Europe, the meaning of the ancient names may in most cases be determined with the greatest precision. It has been well remarked that a Cretan fisher-boy is a far better commentator on Aristotle's 'History of Animals' than a British or German scholar. The use however of ancient names, *when correctly applied*, is most desirable, for "in framing scientific terms, the appropriation of old words is preferable to the formation of new ones[3]."

l. Adjective generic names.—The names of genera are, in all cases, essentially substantive, and hence adjective terms cannot be employed for them without doing violence to grammar. The generic names *Hians*, *Criniger*, *Cursorius*, *Nitidula*, &c. are examples of this incorrect usage.

m. Hybrid names.—Compound words, whose component parts are taken from two different languages, are great deformities in nomenclature, and naturalists should be especially guarded not to introduce any more such terms into zoology, which furnishes too many examples of them already. We have them compounded of Greek and Latin, as *Dendrofalco*, *Gymnocorvus*, *Monoculus*, *Arborophila*, *flavigaster*; Greek and French, as *Jacamaralcyon*, *Jacamerops*; and Greek and English, as *Bullockoides*, *Gilbertsocrinites*.

n. Names closely resembling other names already used.—By Rule 10 it was laid down, that when a name is introduced which is *identical* with one previously used, the later one should be changed. Some authors have extended the same principle to cases where the later name, when correctly written, only approaches in form, without wholly coinciding with the earlier. We do not, however, think it advisable to make this law imperative, first, because of the vast extent of our nomenclature, which renders it highly difficult to find a name which shall not bear more or less resemblance in sound to some

3. Whewell, Phil. Ind. Sc. v. i. p. lxvii.

other; and, secondly, because of the impossibility of fixing a limit to the degree of approximation beyond which such a law should cease to operate. We content ourselves, therefore, with putting forth this proposition merely as a recommendation to naturalists, in selecting generic names, to avoid such as too closely approximate words already adopted. So with respect to species, the judicious naturalist will aim at variety of designation, and will not, for example, call a species *virens* or *virescens* in a genus which already possesses a *viridis*.

o. Corrupted words.—In the construction of compound Latin words, there are certain grammatical rules which have been known and acted on for two thousand years, and which a naturalist is bound to acquaint himself with before he tries his skill in coining zoological terms. One of the chief of these rules is, that in compounding words all the radical or essential parts of the constituent members must be retained, and no change made except in the variable terminations. But several generic names have been lately introduced which run counter to this rule, and form most unsightly objects to all who are conversant with the spirit of the Latin language. A name made up of the first half of one word and the last half of another, is as deformed a monster in nomenclature as a Mermaid or a Centaur would be in zoology; yet we find examples in the names *Corcorax* (from *Corvus* and *Pyrrhocorax*), *Cypsnagra* (from *Cypselus* and *Tanagra*), *Merulaxis* (*Merula* and *Synallaxis*), *Loxigilla* (*Loxia* and *Fringilla*), &c. In other cases, where the *commencement* of both the simple words is retained in the compound, a fault is still committed by cutting off too much of the radical and vital portions, as is the case in *Bucorvus* (from *Buceros* and *Corvus*), *Ninox* (*Nisus* and *Noctua*), &c.

p. Nonsense names.—[..] The following are examples: *Viralva, Xema, Azeca, Assiminia, Quedius, Spisula*. To the same class we may refer *anagrams* of other generic names, as *Dacelo* and *Cedola* of *Alcedo*, *Zapornia* of *Porzana*, &c. Such verbal trifling as this is in very bad taste, and is especially calculated to bring the science into contempt. It finds no precedent in the Augustan age of Latin, but can be compared only to the puerile quibblings of the middle ages. It is contrary to the genius of all languages, which appear never to produce new words by spontaneous generation, but always to derive them from some other source, however distant or obscure. And it is peculiarly annoying to the etymologist, who after seeking in vain through the vast storehouses of human language for the parentage of such words, discovers at last that he has been pursuing an *ignis fatuus*.

q. Names previously cancelled by the operation of § 6.—Some authors consider that when a name has been reduced to a synonym by the operations of the laws of priority, they are then at liberty to apply it at pleasure to any new group which may be in want of a name. We consider, however, that when a word has once been proposed in a given sense, and has afterwards sunk into a synonym, it is far better to lay it aside for ever than to run the risk of making confusion by re-issuing it with a new meaning attached.

r. Specific names raised into generic.—It has sometimes been the practice in subdividing an old genus to give to the lesser genera so formed, the names of their respective typical species. Our Rule 13 authorizes the forming a new specific name in such cases; but we further wish to state our objections to the practice altogether. Considering as we do that the original specific names should as far as possible be held sacred, both on the grounds of justice to their authors and of practical convenience to naturalists, we would strongly dissuade from the *further continuance* of a practice which is gratuitous in itself, and which involves the necessity of altering long-established specific names. [..]

[*Families to end in* idæ, *and Subfamilies in* inæ.] [..]

§ B. It is recommended that the assemblages of genera termed *families* should be uniformly named by adding the termination *idæ* to the name of the earliest known, or most typically characterized genus in them; and that their subdivisions, termed *subfamilies*, should be similarly constructed, with the termination *inæ*.

These words are formed by changing the last syllable of the genitive case into *idæ* or *inæ* as *Strix*, *Strigis*, *Strigidæ*, *Buceros*, *Bucerotis*, *Bucerotidæ*, not *Strixidæ*, *Buceridæ*.

[*Specific names to be written with a small initial*.]

A convenient *memoria technica* may be effected by adopting our next proposition. It has been usual, when the titles of species are derived from proper names, to write them with a capital letter, and hence when the specific name is used alone it is liable to be occasionally mistaken for the title of a genus. But if the titles of *species* were *invariably* written with a *small* initial, and those of *genera* with a *capital*, the eye would at once distinguish the rank of the group referred to, and a possible source of error would be avoided. It should be further remembered that all species are *equal*, and should therefore be written all *alike*. We suggest, then, that

§ C. Specific names should *always* be written with a small initial letter, even when derived from persons or places, and generic names should be always written with a capital.

[*The authority for a species, exclusive of the genus, to be followed by a distinctive expression*.]

The systematic names of zoology being still far from that state of fixity which is the ultimate aim of the science, it is frequently necessary for correct indication to append to them the name of the person on whose authority they have been proposed. When the same person is authority both for the specific and generic name, the case is very simple; but when the specific name of one author is annexed to the generic name of another, some difficulty occurs.

For example, the *Muscicapa crinita* of Linnæus belongs to the modern genus *Tyrannus* of Vieillot; but Swainson was the first to apply the specific name of Linnæus to the generic one of Vieillot. The question now arises, Whose authority is to be quoted for the name *Tyrannus crinitus*? The expression *Tyrannus crinitus*, Lin., would imply what is untrue, for Linnæus did not use the term *Tyrannus*; and *Tyrannus crinitus*, Vieill., is equally incorrect, for Vieillot did not adopt the name *crinitus*. If we call it *Tyrannus crinitus*, Sw., it would imply that Swainson was the first to describe the species, and Linnæus would be robbed of his due credit. If we term it *Tyrannus*, Vieill., *crinitus*, Lin., we use a form which, though expressing the facts correctly, and therefore not without advantage in particular cases where great exactness is required, is yet too lengthy and inconvenient to be used with ease and rapidity. Of the three persons concerned with the construction of a binomial title in the case before us, we conceive that the author who *first* describes and names a species which forms the groundwork of later generalizations, possesses a higher claim to have his name recorded than he who afterwards defines a genus which is found to embrace that species, or who may be the mere accidental means of bringing the generic and specific names into contact. By giving the authority for the *specific* name in preference to all others, the inquirer is referred *directly* to the original description, habitat, &c. of the species, and is at the same time reminded of the date of its discovery; while genera, being less numerous than species, may be carried in the memory, or referred to in systematic works without the necessity of perpetually quoting their authorities. The most simple mode then for ordinary use seems to be to append to the original authority for the species, when not applying to the genus also, some distinctive mark, such as (*sp*.) implying an exclusive reference to the *specific* name, as *Tyrannus crinitus*, Lin. (*sp.*), and to omit this expression when the same authority attaches to both genus and species, as *Ostrea edulis*, Lin.[4] Therefore,

§ D. It is recommended that the authority for a specific name, *when not applying to the generic name also*, should be followed by the distinctive expression (*sp*.).

[*New genera and species to be defined* amply *and* publicly.]

A large proportion of the complicated mass of synonyms which has now become the opprobrium of zoology, has originated either from the slovenly and imperfect manner in which species and groups have been originally defined, or from their definitions having been inserted in obscure local publications which have never obtained an extensive circulation. Therefore, although under § 12, we have conceded that mere insertion in a printed book is sufficient for *publication*, yet we would strongly advise the authors of new groups always to give in the first instance a full and accurate definition of their characters, and to insert the same in such periodical or other works as are likely to obtain an immediate and extensive circulation. To state this briefly,

4. The expression *Tyrannus crinitus* (Lin.) would perhaps be preferable from its greater brevity.

§ E. It is recommended that new genera or species be *amply* defined, and *extensively* circulated in the first instance.

[*The names to be given to subdivisions of genera to agree in gender with the original genus.*]

In order to preserve specific names as far as possible in an unaltered form, whatever may be the changes which the genera to which they are referred may undergo, it is desirable, when it can be done with propriety, to make the new subdivisions of genera agree *in gender* with the old groups from which they are formed. This recommendation does not however authorize the changing the gender or termination of a genus already established. In brief,

§ F. It is recommended that in subdividing an old genus in future, the names given to the subdivisions should agree in gender with that of the original group.

[*Etymologies and types of new genera to be stated.*]

It is obvious that the names of genera would in general be far more carefully constructed, and their definitions would be rendered more exact, if authors would adopt the following suggestion:—

§ G. It is recommended that in defining new genera the etymology of the name should be always stated, and that one species should be invariably selected as a type or standard of reference.

In concluding this outline of a scheme for the rectification of zoological nomenclature, we have only to remark, that almost the whole of the propositions contained in it may be applied with equal correctness to the sister science of botany. We have preferred, however, in this essay to limit our views to zoology, both for the sake of rendering the question less complex, and because we conceive that the botanical nomenclature of the present day stands in much less need of distinct enactment than the zoological. The admirable rules laid down by Linnæus, Smith, Decandolle, and other botanists (to which, no less than to the works of Fabricius, Illiger, Vigors, Swainson, and other zoologists, we have been much indebted in preparing the present document), have always exercised a beneficial influence over their disciples. Hence the language of botany has attained a more perfect and stable condition than that of zoology; and if this attempt at reformation may have the effect of advancing zoological nomenclature beyond its present backward and abnormal state, the wishes of its promoters will be fully attained.

(Signed)	H. E. STRICKLAND.	J. S. HENSLOW.
June 27, 1842.	JOHN PHILLIPS.	W. E. SHUCKARD.
	JOHN RICHARDSON.	G. R. WATERHOUSE.
	RICHARD OWEN.	W. YARRELL.
	LEONARD JENYNS.	C. DARWIN.
	W. J. BRODERIP.	J. O. WESTWOOD.

Appendix 2

Excerpts from Anon. (1843), pages 305 through 315, translated by Alessandro Minelli

Proceedings of the Fourth Meeting of Italian Scientists held in Padova, September 1842

Session of 27 September [1842]

The Botanical Section and the Zoological Section are jointly meeting under the Presidency of Prof. [Giuseppe L.] Moretti, to discuss the plan intended to provide these sciences with uniform and lasting nomenclature.

His Excellence the Governor of the Venetian Provinces honours the assembly of his presence.

The minutes of the previous session are approved.

The President invites Prince [Carlo Luciano] Bonaparte to illustrate the plan, as announced.

Prince Bonaparte narrates that the distinct British ornithologist Mr. [Hugh] Strickland first drafted this plan and circulated it among friends including Prince Bonaparte himself, to get their comments and suggestions; that he reformulated it in the light of these friendly comments and subsequently submitted it to the British Association for an evaluation. The latter body delegated the examination of that plan to a Committee that modified it slightly, eventually presenting the document to that Society's meeting held earlier this year in Manchester. The text now newly published as an expression of that Assembly will now be presented by Prince Bonaparte to the Botanical and Zoological Sections meeting together today, on the basis of still unpublished page proofs he has been sent precisely to this aim. However, before starting reading the plan, on behalf of the [Zoological] Section of which he is the President, Mr. Prince kindly asks botanists for help, as their discipline has been more respectful of the rules of nomenclature and has kept strict to the principles established by Linnaeus, just an exceptional minority being those authors who from time to time abandoned that track, while zoologists have quite often abused of nomenclature in the most different ways. Thus the Prince is pleased with the idea first conceived by himself, to look at botany for inspiration – an idea completely overlooked by the British colleagues responsible for this new plan for reforming zoological nomenclature. By unifying in these matters the procedures of botanists and zoologists, he much hopes eventually to provide a good service to the latter. Further, he announces that he will limit himself to present the most fundamental rules of his new plan, and also asks the President to established a Commission with the duty of examining and discussing it. To aptly introduce matters he illustrates the need, widely felt in zoology especially, to reform nomenclature in order to limit the increasing flood of abuse by fixing invariant and indisputable rules. He points out that the hope that these rules will be eventually observed by everybody can only rest on their promulgation by a body of scientists such as a scientific Congress, currently the only authority to be universally obeyed. Then, after fixing the principle that such a reform should only deal with Latin systematic nomenclature, he fixes the principle of priority as its only right and effective guide. In this context he remarks on the purely conventional nature of scientific names, to the exclusion of any current or possible meaning of names as such; and that the only authority to be respected in accepting and conserving a name should be that of the scientist who first used it as the name of an object previously devoid of systematic denomination. On this background he presents the rules as follows.

I. The name originally given by the student who first established a group or a species is to be permanently retained, to the exclusion of any later synonym.

Marquis [Massimiliano] Spinola [entomologist] objects that such a rule would fix the errors of those who created false species or groups, just because they were the first to introduce those names. The Prince replies by providing a more complete explanation of the rule. Marquis Spinola believes that the case when a given group proposed by someone must be suppressed to divide it into a number of smaller groups must be kept outside the domain of application of that rule, but the Prince replies that in that case one of the newly established smaller groups must retain the original denomination previously given to the larger group. Prof. [Filippo] Parlatore [professor of botany in Florence] raises the objection that even [Augustin Pyramus] de Candolle [Swiss botanist] who first established the rule of priority as the most important fundament of nomenclature, nevertheless acknowledged that in some cases exceptions have to be accepted. The Prince agrees that such exceptions must be accepted and anticipates that a paragraph to be discussed later (para. IX) deals precisely with those exceptions. Marquis Spinola remarks that to determine the principle of precedence, simple name priority is

not enough, as such an authority has only to be acknowledged to the first student who actually described a given object in scientific terms. On this point the Prince also remarks that a later paragraph (para. XII) is specifically devoted to it. [..]

Continuing reading, the Prince established a limit to this otherwise undefined anteriority, and in agreement to the previously accepted principle to only deal with binomial names used for systematic purposes, as first done by Linnaeus, introduces a second principle, as follows.

II. As binomial nomenclature originated with Linnaeus, the rule of priority should not be extended to pre-Linnaean authors.

Marquis Spinola, while agreeing with the principle of setting a temporal beginning to the botanical and zoological nomenclature, nevertheless remarks that Linnaeus himself did often mix more than one species under one name, especially in the case of animals of the latter classes; as a consequence, it would be advisable to go back in time only to authors more recent than Linnaeus. President Moretti, only speaking for plants, remarks that previous to Linnaeus, [the French botanist Joseph Pitton de] Tournefort had already defined many genera with wonderful exactitude and that Linnaeus himself in the second edition of *Systema Naturae* changed many genus names he had used in the first edition, replacing them with those of Tournefort that have been subsequently retained in the later editions. To the first objection the Prince replies by offering a zoological example, as illustrated in his own written document. This example is about the generic names exquisitely introduced by [the French zoologist Mathurin Jacques] Brisson at the same time as Linnaeus. These names should be retained, but substituting the specific names provided by Linnaeus for the specific phrases, or the first word of these, as provided instead by Brisson. Same way should be treated the analogous examples where with the first word of the specific phrase one can form an accidental binomen: in all these instances, he argues, the Linnaean specific name must be retained even if another author's generic name is adopted. President prof. Moretti gives examples of genera aptly defined by [the Italian botanist Pier Antonio] Micheli and Tournefort prior to Linnaeus; and also reminds that Linnaeus himself in his earlier works employed descriptive phrases to designate individual species, and only by the second edition of *Flora suecica* he begun using binomials. As a consequence, he suggest that 1753, rather than [a specified edition of] *Systema Naturae*, should be accepted as the official starting point of scientific nomenclature. Prince Bonaparte remarks that the same might be said of *Fauna suecica*. On the other hand, the founding father of systematic botany and zoology could well enjoy the privilege of changing the rules. Finally, the Prince expressed the view that it is advisable to accept the universally followed principle to fix *Systema Naturae* as nomenclature's starting point. As for the genera established before him, Linnaeus partly accepted them, partly rejected as invalid, partly finally accepted but changed their name. In this last case it could be possible to favour Linnaeus by accepting, as an exception, his names rather than the older ones.

Subsequently, by distinguishing the different groups of organisms, that is, genera, families, tribes etc. as successively higher levels of generalization, he forms for these groups the third rule.

III. The rule of priority, despite its usefulness as a guide in respect to the names of higher groups, should not be rigorously applied except in the case of genus and species names. [..]

IV. Once established, a generic name should not be cancelled whenever the genus is subsequently split into narrower genera, but retained instead as the name of one of these parts.

V. The original generic name should be reserved to that part of the original genus that the author regarded as typical. [..]

VI. When the original type of a genus is not perfectly clear and unquestionable, the researcher who first subdivides it is free to restrict the original name to one or the other of its sections. His action should not be reversed by any subsequent work.

VII. When two independent authors define and provide with different names the same genus, by giving it the exactly same extension, the younger name must be wholly cancelled.

VIII. If a younger name is introduced to exactly cover the joint extension of two or more previously published genera, that name must be definitely cancelled.

IX. When many smaller genera are combined into one, the oldest of their names must be retained as the name of the whole larger genus thus obtained. [..]

President Prof. Moretti asks about any possibly different treatment for names already in existence vs. those still to be introduced. The Prince explains that the plan he has the honour to present today includes for the two sets of names separate provisions in two distinct articles. [..]

X. A name must be changed if it has already been used as the name of a different genus of either animals and plants, or of another species in the same genus [..]

XIII. A new specific name is to be provided for a species if its older name has been later adopter for a genus including that species.

XIV. The rules of the Latin grammar should be followed in writing zoological and botanical names. [..]

The Prince invites the President to ask the jointly meeting Sections to vote on the general principles of this plan, irrespective of the fact that the same will be subjected to the critical evaluation of the Commission the President will eventually appoint. President Prof. Moretti however disagrees, as the objections raised witness the lack of universal agreement on the plan's general principles, and also because he does not believe that such a vote could be universally binding for all naturalists. On behalf of the zoologists, Prince Bonaparte repeats that he will mainly rely on the evaluation to be expressed by botanists, as more advanced than zoologists in matters of nomenclature. He also expresses his satisfaction as, whilst he expected to find among them the strongest opposition to the basic principle of priority, he found instead that botanists go even further in that direction than his plan itself, discussion being limited to the few exceptions to the rules accepted in his document. Subsequently, President Prof. Moretti fixes the membership of the Commission, following consultation with the Prince about the most suitable names among the zoologists. He thus indicates the following: Marquis Spinola, Cav. [Carlo] Bassi, C[arlo] Porro, [Filippo] de Filippi and Prince Bonaparte [..]. Of botanists, Prof. [Gaetano] Savi, Prof. Parlatore, Prof. [Roberto de] Visiani, Mr. [Vittore Benedetto Antonio] Trevisan, Prof. Moretti as President and Prof. [Giuseppe] Meneghini as the Commission's Secretary. [..]

Signed – President Prof. G. Moretti
Secretaries Prof. G. Meneghini and Prof. F. Parlatore

Appendix 3

Excerpts from Anon. (1844), pages 761 through 763; 792, translated by Alessandro Minelli

Proceedings of the Fifth Meeting of Italian Scientists held in Lucca, September 1843

Session of day 20 September [1843]

[..] The Secretary reads Marquis Spinola's report, who is almost contrary to this project so warmly cherished by many naturalists. President Prince of Canino will later rebut one by one the arguments of the illustrious Entomologist, while limiting himself at the moment to remark that it is easier to destroy a house than to build it; he also expresses his hope that Marquis Spinola will eventually help with the project rather than doubt its success. The next reading is by Mr. Porro, who presents a document written by himself also on behalf of Cav. Bassi and Dr. De Filippi. [..]

This is followed by a discussion, from which an agreement emerges on accepting the XII edition of *Systema Naturae* as the most sensible starting point when establishing priority. [..] The President [..] disagrees on the principle that a name used for an animal genus cannot be used also for a plant genus. [..] De Visiani, Meneghini and Trevisan comment on the point, previously also made by Prince Bonaparte, that botanists, who have not shared the many errors of zoologists in matters of nomenclature, would be ill-advised if they would part from the rules established by Linnaeus. Nevertheless, their document also remarks that "De Candolle has added some useful change to those rules, and others are required by the current state of science and by the recurrence of abuse. Nevertheless, what is most deeply felt by Botanists is the need to rigorously follow the set of rules established by Linnaeus". Furthermore, this Commission regards as insufficient the plan proposed by the British zoologists, while, with suitable modifications, the Linnaean code could be adapted to zoology too. Therefore, they propose:

"1. To examine and whenever required to update the Linnaean rules as pertaining to Botany.

2. To examine with mature judgement the possible application of these same rules to Zoology too. To this aim the work done by British zoologists will provide help, but cannot be taken as the real starting point to reform nomenclature." [..]

Signed – The President Carlo Principe Bonaparte

The Secretaries of the Botany Sections—Dott. L. Masi and L. E. Celi

The Secretary of the Zoology Section—Dott. T. Riboli