Esteemed Carolus Linnaeus,

Let me start by saying that it's an honor to have the opportunity to write to you, one of the founders of systematic biology, my chosen field of study. I imagine that you're really busy with the preparations for the big anniversary of your *Systema Naturae* (10th edition), so please don't feel obliged to reply. As you certainly haven't heard of me, please allow me to introduce myself. I'm a research zoologist and curator of the collection of amphibians and reptiles (we now treat these taxa as mutually exclusive rather than nested) at the National Museum of Natural History of the Smithsonian Institution (which is old and respected in my country but did not yet exist in your time). I hope you won't hold it against me that I've chosen to study what you considered "pessima tetraque Animalia" (foul and loathsome animals).

I'd like to take this opportunity to clarify some things about a new approach to biological nomenclature with which I've been involved, because this approach is commonly but misleadingly characterized as an assault on conventions that you introduced. Contrary to this inaccurate characterization, the new approach is highly compatible with your own practices, particularly with regard to the function of taxonomic ranks. The approach I'm talking about is called *phylogenetic nomenclature* (I'll assume that other correspondents have filled you in on the concepts of evolution and phylogeny). It's based on the idea that taxon names can be defined with reference to common ancestry relationships, thus providing an objective method for applying names in the context of alternative phylogenetic hypotheses. Although this approach is commonly characterized as an alternative to the 'Linnaean system', nothing could be further from the truth. The reason for this misleading characterization is that the approach to which phylogenetic nomenclature is truly an alternative, which I prefer to call 'rank-based' rather than 'Linnaean', relies on the taxonomic ranks that you introduced (though dozens of additional ranks have been added to your original five). Nonetheless, calling the rank-based approach 'Linnaean' is highly misleading because it uses the ranks in a way that you never did and therefore causes names to be applied in ways that are at odds with the manner in which you and your immediate followers applied them. I should add that the rank-based approach was developed almost 100 years after the publication of the 10th edition of your *Systema Naturae*.

As an example of how the rank-based system works, consider the termites, which people have recently determined are nested phylogenetically within roaches. Because roaches (*Blattodea*) and termites (*Isoptera*) were previously considered mutually exclusive and ranked as orders,

The termite was classified by Linnaeus in his "Aptera", an insect group without wings

it's been proposed that termites be demoted in rank to a family of roaches (I'll italicize all scientific names, following the lead of both the rank-based botanical code and the draft phylogenetic code, commonly referred to as the *PhyloCode*). When this is done, the rank-based nomenclatural system requires that the name of the group of all termites be changed from *Isoptera* to *Termitidae* and thus also that the name *Termitidae* change its reference from a subgroup of termites to the group of all termites—even though the hypothesized composition of both of these groups has remained unchanged. And that's just the tip of the iceberg, because now all the former termite families have to be demoted in rank to subfamilies, and all of the former termite subfamilies have to be demoted in rank to tribes, etc., and all of these changes in rank necessitate changes in the names of the taxa that they designate (in particular, their rank-specific endings). With examples such as this in mind, it's hard to believe that the rank-based code used in zoology has a stated objective of promoting stability in the scientific names of animals!

Of course, you and your immediate followers had the good sense to use ranks solely for taxonomic purposes (as opposed to nomenclatural ones), so that ranks had no effect on the application of names. As an example, consider the case of reptiles, which is more or less the reverse of the termite example. You had considered reptiles (*Reptilia*) to be a subgroup of amphibians (*Amphibia*) with the former ranked as an order and the latter as a class. In contrast, some of your followers (e.g., Macleay, 1821[1]; Blainville, 1822[2]; Latreille, 1825[3]) considered these taxa (albeit with some compositional changes) to be mutually exclusive and therefore elevated *Reptilia* to the rank of class. However, because ranks had no bearing on the application of names, no changes in the names of these taxa or the references of the names were required, and in fact, none occurred. (Some critics of phylogenetic nomenclature might argue that even today these names would not be affected by changes in ranks, but that's because the ranked-based approach hasn't been extended to ranks above superfamily, at least in zoology. On the other hand, there

"Lacertilia" or Lizards (Table 79) in Ernst Haeckel's *Kunstformen der Natur* (1899)

have been proposals to extend the rank-based approach to higher ranks. Let's hope that such proposals never gain significant support!)

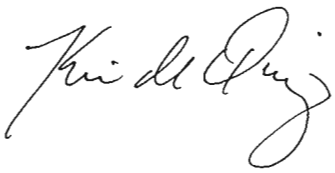
Phylogenetic nomenclature applies names similarly to the way in which you and your immediate followers did, because it uses methods that function independently of taxonomic ranks. By the way, I should point out that contrary to a common misconception, phylogenetic nomenclature does *not* attempt to eliminate your taxonomic ranks (and should not, therefore, be confused with proposals for rank-free taxonomy). It simply doesn't use ranks for applying names, thus effectively returning ranks to the strictly taxonomic role that they played when you introduced them. As a result, phylogenetic nomenclature eliminates nomenclatural instability that results solely from changes in ranks, though it permits (even requires) changes in taxon composition when hypotheses about phylogenetic relationships change. Consider the termite example, but this time let's suppose that the names *Blattodea* and *Isoptera* (and those of the various subgroups of *Isoptera* formerly ranked as families, subfamilies, etc.) had been defined using phylogenetic definitions based on previously hypothesized composition (e.g., *Blattodea* = the least inclusive clade containing the species previously considered roaches). In the context of the new phylogenetic hypothesis, these definitions would require only a single change in hypothesized composition and *no* name changes. The clade of roaches (*Blattodea*) would now be considered to include termites (*Isoptera*), but there would be no change in the name of the termite clade (*Isoptera*), nor would there be any changes in the names of its subgroups (i.e., those previously ranked as families, subfamilies, etc.).

These examples illustrate that phylogenetic nomenclature applies names to taxa similarly to the way that you (and your immediate followers) applied them. In both cases, taxon names have their primary associations with taxa (groups) rather than with ranks. The reason is that ranks function *solely* as *taxonomic* devices for representing hierarchical relationships (e.g., orders are included within classes) that have no influence on *nomenclature*, the application of taxon names (so that changing the rank of a taxon does not require changing its name). Of course, phylogenetic nomenclature also differs from your approach in using methods based on the principle of evolution (common descent). This difference seems highly appropriate given that most 21st-century systematic biologists consider the principle of evolution the unifying theory of our discipline.

I hope I've been able to convince you that phylogenetic nomenclature (and therefore the *PhyloCode*) is not at all an attempt to do away with your taxonomic innovations. Instead, phylogenetic nomenclature embraces your eminent wisdom in restricting the use of categorical

ranks to the taxonomic function of representing hierarchical relationships. It frees ranks from their (later acquired) nomenclatural function by embracing the most important theoretical development since your time—the principle of evolution—which it uses to formulate precise and explicit statements concerning the references of taxon names without involving ranks. Thus, far from representing a challenge to your nomenclatural practices, phylogenetic nomenclature is more appropriately viewed as representing your own basic approach updated with evolutionary principles. Long live Linnaean wisdom!

I remain your humble disciple,



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Notes:

[1] Blainville, H.-M. Ducrotay de. 1822. *De L'Organisation des Animaux, ou Principes D'Anatomie Comparée.* F. G. Levrault, Paris.

[2] Latreille, P. A. 1825. *Familles Naturelles du Règne Animal.* J.-B. Baillière, Paris.

[3] Macleay, W. S. 1821. *Horae Entomologicae,* Vol. I. Part II. S. Bagster, London.