

evangelistic initiative, I took along a rather densely branched dead shrub about two feet in height. About four inches of one terminal twig was painted bright red.

After acknowledging my introduction, I commenced the presentation by brandishing the plant with the announcement: “Behold, the Animal Kingdom!” Allowing a brief pause for this to sink in, I then broke off the red twig and flung it onto the table beside the podium. “**That** was the phylum Chordata, in terms of overall numbers and diversity! Is **this** [a flourish of the shrub] the equivalent taxon?” The following 45 minutes were devoted to an examination, and emphatic denial, of that very question, and should have been the opening shot in a campaign that sought to establish a perception of animal groupings commensurate with their actual pragmatic status in the world. The road to Hell being paved with good intentions, the potential crusade promptly fell flat on its face owing to the intervention of a morass of routine responsibilities and distractions. But late is always better than never, and insofar as I can tell, attitudes and perceptions in the scientific community have changed not one iota since the night of my well-intended shot (which was not heard outside the confines of one conference room, much less around the world). Perhaps an attempt to address a larger and more diverse audience will find targets receptive to my appeal for the just treatment of about 90% of known animals.

In a review of arthropod classification as it stood in the mid-1890s, Orator Fuller Cook (1896: 49)² lamented the tendency of contemporary zoologists for “... describing together the indiscribably [sic] diverse.” That succinct phrase could encapsulate nicely (magnified by a factor of ten) the elements of what I consider to be the real “trouble with invertebrates.” Ironically, the problem started in 1801 when my own hero and role model, Jean-Baptiste Pierre Antoine de Monet, Chevalier de Lamarck³, divided the then-known animal kingdom into two primary categories and introduced the term “Invertebres” for those members of the less popular and less studied of the two. At the time, such a dichotomy was not especially disproportionate, but unfortunately, to use modern terms, while the concept “Vertebres” was supported by a substantial apomorphy, its cognate group was not, and was defined by negative conditions only.

Of course, everybody is now aware that numerically at least, the tables have turned, and even primary school science texts observe that beetles alone far outnumber the vertebrates collectively. In fact, even the single beetle family Curculionidae accomplishes that feat, with over 50,000 known species and probably several times that number yet to be documented. The number of phyla of what would now be considered as multicellular animals without a spinal column currently runs about 28. A recent

Banisteria, Number 40, pages 91-92
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Abolish Invertebrates!

Richard L. Hoffman¹
Virginia Museum of Natural History
21 Starling Avenue
Martinsville, Virginia 24112

Some years ago, I was invited to address a meeting of wildlife management biologists on the status of invertebrate animals *vis-a-vis* the primary concerns of the conference. With a title like “The Trouble with Invertebrates” and the opportunity to launch a major

¹Deceased. Editor’s note: This essay (without footnotes) was prepared by Dr. Hoffman in 2000. I believe that he considered submitting it to a national journal, but apparently never did so. The essay is published here for the first time.

classification of living organisms (Parker, 1982)⁴ lists 85 classes of “invertebrates” against seven such taxa of Chordata/Vertebrata. The disparity inherent in this two-way division of animals has become generally understood, but the problems thus embodied are rarely addressed.

An extreme, if fairly insignificant example, may be found in the organization of the scientific staff at the small museum where I am employed. It was set up by the original administrator (an anthropologist with no concept of animal classification beyond the catarrhinine primates) with a curator for each of the four major vertebrate disciplines, and a fifth for “Invertebrates”. Under such conditions, a person so disadvantaged would normally be able to keep up with the local fauna of perhaps one class, or even just one order. A division of labor more commensurate with actual numbers and diversity would reasonably dictate 50 curators of invertebrate taxa to enjoy the same work-load and capabilities expected of, may we say, a mammalogist. Larger national museums do recognize these realities, but even though nearly every one still employs mammalogists, ornithologists, herpetologists, and ichthyologists, none even attempt to encompass the remainder of animal life. In fact, taxon-specialization has now become common: museum A sends all its holdings in arthropod taxon A to museum B, and B transfers its material of taxon C to museum F, despite maintaining large staffs in the systematically well-studied vertebrate classes (how many times can a field be plowed?).

It has been many years since I qualified for an NSF grant, but in the pre-DNA era, when I was quite successful getting support for old-fashioned descriptive taxonomy, the National Science Foundation used to split its budget for animal taxonomy right down the middle: 50% for Vertebrates, 50% for Invertebrates. I hope this ratio has changed, but I am confident it has not reached the 1%: 99% that the actual situation requires. One of the worst side effects of administrative ignorance (well, unawareness) is the unrealistic expectation that the kind of research now in vogue for birds and mammals, involving the holy trinity of molecules, computers, and cladistics, is appropriate for groups in which maybe 25% of the extant fauna is so far known, and the limits of families and even orders are still in dispute. One result is discrimination - amounting to censorship - against the least-known (all invertebrate!) taxa, because the flashy modern approaches just don't work well on any group that has not already been worked out and classified by traditional methods. One downside of this partiality for redundantly restudying the already well-known, is that far more money is poured into fine-tuning vertebrate taxa (“Is taxon A a subspecies

of taxon B, or a distinct sibling species?”) than in getting a start made on huge taxa (in many non-vertebrate phyla) that have never been classified for the first time, but can be studied for a fraction of the cost of DNA analyses.

People who are conducting biological inventories are still, by and large, afflicted with the idea of “invertebrates” as a mammal-sized group. The misconception is fostered by the prevalence of university-level textbooks entitled “Invertebrate Zoology” or some permutation thereof. Even though such books often achieve majestic size, they can at best reflect the futility of attempting to describe, between two covers, the indescribably diverse, and in so trying, perpetuate the illusion of an invertebrate unity.

I think the time is long past due, that this indefensible, unscientific perception of a zoological taxon equivalent to “Vertebrata” be purged from any form of use, even in the “popular” contexts. The way to begin is to abolish the word “invertebrate” from the language. It is a meaningless word, it does not reflect any kind of objective reality, it is in fact denigrative in implying an inferior status (“in-” = without, lacking, less than), it is an oversimplification that does injustice to immense diversity and leads to inadequate recognition. Most zoologists are aware of these facts, but continue to preserve the old status quo, the meaningless dichotomy. Botanists do not oppose angiosperms to all other plants; geologists do not insist that the Quaternary is equivalent to all that preceded it. I realize that traditional mindset is difficult to correct, but it should be kept in mind that a deposed concept does not HAVE to be replaced if it was inadequate or incorrect to begin with. I therefore do NOT suggest an alternative name to “Invertebrates”, when the proposed correction requires no name at all.

Surely Lamarck himself would deplore the excesses imposed on his originally useful taxon, and might gladly lead a worldwide movement to propose in its stead a more precise frame of reference for the multitudes of taxa for so long mutilated on the Procrustean Bed “Invertebrates”. In his absence, and in respect to his contribution, I venture to suggest a call to arms: “*Écrasé le nom Invertebrés!*”

²Cook, O. F. 1896. The larvae of *Stemmatoiulus*. Brandtia [A Series of Occasional Papers on Diplopoda and Other Arthropoda] 11: 47-50.

³Lamarck, J.-B. 1801. *Système des animaux sans vertèbres*. Paris.

⁴Parker, S. P. (ed.). 1982. *Synopsis and Classification of Living Organisms*. 2 volumes. McGraw-Hill, New York.