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How not to delimit taxa: a critique on a recently proposed "pragmatic classification" of jumping spiders (Arthropoda: Arachnida: Araneae: Salticidae)

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Modern taxonomy and systematics profit from an invaluable tool that has been developed in the course of more than a century by intense discussions and negotiations of generations of zoologists and palaeontologists: The International Code of Zoological Nomenclature (ICZN 1999, 2012). The main goal of the Code is "to promote stability and universality in the scientific names of animals and to ensure that the name of each taxon is unique and distinct" (Melville 1995, ICZN 1999: 2). The provisions of the Code are generally accepted and thoroughly applied by the scientific community. Exceptions, such as the one described below, are very rare.

The recent biodiversity crisis (e.g. Barnosky *et al.* 2011) and the insufficient number of taxonomists (e.g. Bacher 2012) lead to various approaches for improving the taxonomic procedure and for speeding up taxonomic progress intended to describe the world's species richness before large parts of it have become extinct, and to provide science-based strategies against the loss of biodiversity. The usage of a variety of methods, including textual differential diagnoses and descriptions, morphometrics, accurate illustrations, stacked photographs, SEM pictures and Micro-CT representations of taxonomically relevant structures, as well as a wide range of molecular data, has become good practice in taxonomy and systematics. As a consequence, modern taxon descriptions are much more comprehensive than in earlier times. However, sometimes the amplification of various methods and techniques may cause complications rather than enhancing good taxonomic practice. This may especially be true in cases where these tools are seen as exchangeable rather than complementary, and newer approaches completely replace the more time-consuming textual descriptions or pencil- and ink drawings (e.g., Coleman 2006; cf. Jäger 2016).

Recently, a new approach, termed "pragmatic classification" was suggested by Prószyński (2017a) in the taxonomy of salticid spiders. Prószyński has an enormous reputation in this field, and Salticidae is the most species-rich family of spiders, currently comprising more than 6100 extant and extinct species worldwide, representing ca. 13% of the global spider diversity (World Spider Catalog 2018). They inhabit almost all types of land ecosystems and are therefore a target group for describing, classifying and cataloguing the world's terrestrial biodiversity. **Prószyński considers word descriptions and diagnoses of salticid spider taxa as mostly superfluous and even misleading.** In a series of publications on salticid taxonomy, he stated that the "traditional system of Salticidae (…) is insufficient to accommodate hundreds of new taxa" (Prószyński 2016a: 4), and therefore, an "alternative classification of Salticidae" (Prószyński 2017a: 3) is needed. He based his approach on a large-scale "synthetic comparison of main diagnostic drawings" (Prószyński 2016a: 5), and he proposed to select diagnostic characters of genera and species "by precise drawings of palps, epigyne, spermathecae and ducts (…) and dismissal of translation of these drawings into words". Because such a

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set of drawings should not need further explanation, "dutifully made tedious descriptions of external appearances and measurements of body parts (…) are almost useless" while, in contrast, "graphic definitions appear unequivocal" (Prószyński 2017b: 37). He underlined his view several times as the "translation of appearance of characters into words is too imprecise and often misleading" (Prószyński 2017a: 9), "the traditional way of documenting species by descriptions with words and by routine measurements is particularly ineffective", "lengthy description could be replaced by color photographs of 3-4 key aspects of spider body appearance" (Prószyński 2018: 132−133), and so on. He further claims that his system is provisional and intended purely for identification purposes. This system should exist in "parallel to more theoretical system of affinities and phylogeny" (Prószyński 2017a: 4). Later (Prószyński 2018: 176), he extended the usage of "pragmatic classification" to help "explain presumable relationships between biological entities, such as species and genera", while further stating that his classification "does not accept changes based on supposed gene differences if they are not congruent with morphological premises" (Prószyński 2018: 177).

Based on his "pragmatic classification" approach, Prószyński created numerous new salticid genera in a series of papers (e.g., Prószyński 2016a, 2018). This dynamic intervention into taxonomic practice has caused intense discussions of the World Spider Catalog editorial team (most of them are co-authors of this contribution) with taxonomists from all over the world, including Prószyński himself. Thus, we address some problems with "pragmatic classification" that seem to us worthy of clarification.

(1) Disregard of ICZN rules. First of all, ICZN article 13.1.1 clearly states that, in order to be available, a new name published after 1930 must "be accompanied by a description or definition that states **in words** characters that are purported to differentiate the taxon" (emphasis by us; ICZN 1999, 2012). Therefore, a "pragmatic classification", with its disregard of textual descriptions and especially diagnoses, violates this article, or at least its meaning: There must be evidence justifying a taxon, and this evidence must be explained. If it is not, this is an appeal to authority, not to evidence. Furthermore, Prószyński's (2017b: 37) claim that "graphic definitions appear unequivocal" is not supported by facts — a glimpse on the different diagnostic figures for many European spider species in the database "Spiders of Europe" (Nentwig *et al.* 2018) demonstrates the opposite. Good scientific drawings are always abstractions of reality, underlining the relevant structures and neglecting the irrelevant ones. They do not only vary by their unique artistry, but their interpretation may be subject to "the eye of the beholder". Therefore, comparative illustrations (as important as they are) cannot be regarded as a scientifically sound substitute for textual diagnoses.

(2) Disregard of the need to explain evidence. With its refusal to explain the evidence that should be found in illustrations, Prószyński leaves it up to the reader to find this evidence by him- or herself. Therefore, the conclusions expressed in a "pragmatic classification" are literally unjustified, and we suspect that in many cases they are likely false. We do not know of any other field of science where simply presenting **any** evidence without explaining it, would be accepted by the community.

(3) Descriptive taxonomy vs systematics (an old story). With "pragmatic classification", an explicit classification is created in parallel with the one that aims to reflect the taxa's phylogeny. This reminds us of the long-lasting "Hennig vs Mayr" dispute, but this discussion was already decided decades ago in favour of the former. There is only a single objective base for a classification in systematics, and this is the unique process of phylogeny — thus, one could even discuss a violation of the basic principle of objectivity in natural science by Prószyński's "pragmatic classification". The creation of a parallel classification that disregards the information from molecular (and indeed, also morphological; Maddison & Hedin 2003; Maddison 2015) phylogenies is even more bizarre, as "pragmatic classification" should also shed light on the **relationships** of species and genera (Prószyński 2018). This procedure seems unacceptable, given the important progress in salticid phylogeny in recent years, exhibited in a series of excellent contributions summarized by Maddison (2015), which led to a comprehensive salticid classification, with placements for 96% of fossil and extant genera. With the "pragmatic classification" approach, a severely retrograde scientific step has occurred, and confusion and chaos in future salticid systematics seem to become an unavoidable outcome if such a system would be implemented or widely accepted.

(4) Disregard of modern scientific methods. Prószyński (2017b) also rejects new taxonomic methods other than molecular ones, in particular morphometrics (citations above). We cannot see any rational foundation for this, as modern morphometrics are successfully applied in numerous taxonomic groups (Zelditch *et al.* 2012), especially in arthropods. The enormous power of measurements and especially of ratios in connection with multivariate statistical methods has been shown convincingly (Baur & Leuenberger 2011). Morphometrics may even provide a satisfying "loophole" in diagnosing "cryptic" species by eye (e.g., Baur *et al.* 2014), that up till now could only be characterized by molecules (a drawback that Prószyński himself laments).

(5) Suprageneric names ending with -INES. Prószyński (2017a: 9) created numerous suprageneric names ending with "-INES" as "informal GROUPS OF GENERA" written entirely in capital letters to indicate that these are neither subfamilial nor other names ruled by the Code. In spite of this, Prószyński (2017a) attributed to these informal names his authorship with 2016 as year of publication, which does not correspond to the year of a valid publication concerning this

matter, but rather to his webpage (Prószyński 2016b). Examples for such names are ASTIAINES Prószyński, 2016 (compare Astieae Simon, 1901), CHRYSILLINES Prószyński, 2016 (compare Chrysilleae Simon, 1901), PELLENINES Prószyński, 2016 (compare Pelleninae Petrunkevitch, 1928), and so on. In contrast to his own publication (Prószyński 2017a), he uses the heading "subfamilies" at his webpage (Prószyński 2016b: Part I). It is obvious that the creation of these names brings nothing but chaos in salticid systematics, and they should therefore be ignored by the community, or at best, be considered as incorrect spelling of the respective available names. Furthermore, we do not understand how a journal mostly dedicated to taxonomy and systematics (in this case "Ecologica Montenegrina", https://www.biotaxa.org/em) can accept this type of papers, claiming to have passed them through a peer-reviewing process. Many of the basic errors highlighted above would have been pointed out by even a moderately competent reviewer familiar with basic salticid systematics and taxonomic principles. In our view, this is nothing but **scientific malpractice**.

In order not to be misunderstood, we want to point out that we consider Prószyński's lifework as truly exceptional and feel a deep respect for it. But we must conclude that his "pragmatic classification" approach brings only limited insights to salticid taxonomy and systematics. The editorial team members of the World Spider Catalog therefore already did and will make accessible all taxonomic and nomenclatural information from the cited papers (this is indeed the purpose of the Catalog; Nentwig *et al.* 2015; World Spider Catalog 2018), but we will reserve the right not to implement all of the suggested changes for the structure of the Catalog to promote taxonomic stability in the Salticidae.

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