Tribune

A PROPOSAL FOR BETTER DIAGNOSES

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It has been my experience as a taxonomist, and as a reviewer of taxonomic articles, that some diagnoses and descriptions of new species fail to provide a clear understanding of the uniqueness of the new taxa. Too often the reader does not know what the author is talking about, and too often also it seems that the author himself does not know it either.

I would like to comment on these two aspects of the failure of some published diagnoses and then propose a few guidelines for correct diagnoses. All quotes are from published descriptions. However, to avoid controversy, I have deleted the names of the species involved. It will be easy for the reader to fill the blanks with species names from his/her preferred genus. My own favorite genus is *Helicotylenchus* and most examples are taken from descriptions of its species. Similar examples may easily be found in any other genus.

We don't know what the author is talking about!

*« *** sp. nov. comes close to [or resembles, or is similar to, is closely related, very closely related, most closely related, etc.] species xxx and species yyy. From species xxx the present species differs by... »*

In this very common form of diagnosis, it is not said why the new species is close to xxx and yyy, and why is it different from the rest of the species. The reader is asked to trust the author. He cannot easily check the accuracy of such statements because the facts behind the author's decision are not clearly given.

*« *** n. sp. keys out at species xxx. From species xxx it differs by... »*

Here the author used a key to try to identify an unknown population. The key led him to species xxx. The author decided that his population did not quite fit the description of xxx and he concluded that it represents a new taxon.

A key is an identification device and, as such, it should not be used in systematics and classification (identification is the reverse process of classification). On a practical point of view, no key is perfect and neither are key users. The reader is asked to follow the decisions made by the author of the key when he selected the identification characters, and to accept the interpretation of these decisions made by the author of the new species when he attempted to identify his population. In both cases, the reader has no control and no understanding of the facts behind these decisions, and behind these interpretations.

The descriptor of a new species may use a key (provided it includes *all* nominal species) during his preliminary study, so that he is confident he has compared his new taxon to all related species. However, a complete statement of the differentiating characters that make the new species unique must be given in the published article. At most, keys may be used in a discussion following the diagnosis proper, as an help for practical identification of the species.

*« ... from species xxx, *** n. sp. can be differentiated by (...) a longer tail... »*

No measurement for tail length is given in descriptions of both xxx and the new species, but only ratio c. Tail length does enter in the computation of ratio c but cannot be reliably calculated from it. If the author means *" ratio c "*, he should write his diagnosis accordingly. In the given example, the reader cannot be sure of exactly what the author had in mind.

A similar uncertainty arises from expressions such as *" robust stylet "*. Actual strength of stylet is certainly not in case, and the reader has to assume that this expression means stylet thicker or squatter. Even then, the reader will find no measurement of the diameter of the stylet in the species being compared.

*"*** n. sp. differs from species xxx by the shape of the head... "*

The shape of the head is not defined in the diagnosis. In the description of the new species, the head is given as slightly offset. In the original description of xxx, the corresponding shape is not described.

Here the reader will have to assume that the author did intend to use the character *" head slightly offset "* and that he found a way to assess this character in the old species xxx. The reader will never know if this assess-

ment was made from the original illustration of the head of xxx or if the author had the opportunity to study type material of this species.

Does the author really know what he is talking about?

" This species differs from species xxx in (...) absence of hemizonid, ... "

When the hemizonid is not seen, it is highly probable that the specimens are badly fixed, the microscope is not correctly set-up, or the observer is inexperienced. Absence of a feature, such as the hemizonid, should not be lightly used as a diagnostic character. In a similar manner, spermatheca should not be described as *" absent "*, but as empty and difficult to see.

*" Species xxx resembles *** n. sp. in (...) position of hemizonid anterior to excretory pore, ... "*

In the genus in question, as in most tylenchid nematodes, all the species have hemizonid anterior to excretory pore. Use of this character to indicate a resemblance between two out of the 200 species in the genus is misleading because the same could have been said of the other 198 species.

*" *** n. sp. resembles species xxx in the shape of the tail, ... "*

Tail shape is highly variable in the genus to which belong these two species. A variable character can be used only with caution to indicate a resemblance or a dissimilarity. If it needs to be used at all, the author must comment on the character while describing the new taxon. Particularly, he must prove that the observed resemblance or dissimilarity cannot be explained by the intraspecific variability of the character in the genus. This observation must be specially heeded when the author uses morphometric characters in a diagnosis. Successive descriptions of many nontype populations of a species must be compared to obtain a good idea of the intraspecific variability of differentiating characters in a genus. However, caution must be exercised because it can never be certain that a nontype population belongs to the species with which it is identified.

*" *** n. sp. can be differentiated from species xxx by distinct lip annulation, ..."*

The original description of species xxx gives this species head as *" marked by four transverse striae "*, which make five annules. The corresponding figure shows five well-marked annules. One can wonder if the author of the new species ever bothered to check the original description of species xxx.

In this instance, a redescription of species xxx has been published by another author who indicated the presence of *" four or five indistinct annules "*. Subsequent descriptions of type material are generally better and more complete than the corresponding original descriptions. Any good redescription of species xxx must certainly be considered for the differentiation of the new taxon. However, if a discrepancy exists between the successive descriptions of species xxx, the author of the new species should have explained why he choose to follow one author rather than the other. His decision should rely on a study of the original type material, topotypes or neotypes. Even when there is no uncertainty about the description of a nominal species, comparisons with type specimens is always to be preferred to study of published descriptions.

*" From species xxx, *** n. sp. differs in the absence of lip annulations, ... "*

In the specific description, the lips of *** n. sp. are said to be *" with indistinct striations "*. In this case, the author did not check what he had himself written a few lines above. Something cannot be at the same time indistinct and absent.

*" From species xxx, *** n. sp. differs due to (...) truncate lip region, ... "*

Here the description of the new species does mention a lip region truncate, but the illustration shows a well-rounded anterior end, without any hint of terminal flattening. The reader does not know what to believe, the description, the figure, or neither.

*" *** n. sp. resembles species xxx in the mean body length (...) but the new species differs in being of larger size... "*

No comments...

Guidelines for a good diagnosis

First, a clear distinction should be made between *" Diagnosis "* and *" Relationships "*. A diagnosis is a concise statement of all the characters that make the taxon unique. The paragraph " Relationship " explains why it is so.

The diagnosis

The diagnosis is placed after the description of the species. In the paragraph *" Description "*, as many characters as possible are described in as much details as possible. In the diagnosis, oncly the characters that are needed to differentiate the new species are repeated. It is evident that the descriptions of the characters in Description, Diagnosis, and Figure must correspond.

Ideally, the characters used in the diagnosis are not intraspecifically variable, are easy to see, and are accepted as good taxonomic criteria by all nematologists. The number of lateral field lines in *Tylenchorhynchus s. l.;* the number of esophageal gland nuclei in *Hoplolaimus;* the number of female genital branches in *Xiphinema;* the presence of a star-shaped mucro on the tail tip of *Aphelenchoides,* are such good diagnostic characters. In reality such perfect characters are rare, none exist in some genera like *Helicotylenchus,* and it is often necessary to use less than perfect characters. The author of a new species must be well aware of the variability of the diagnostic characters in the known species of the genus. He must also describe at length the variability he observed for these characters in the new taxon.

RELATIONSHIPS

The paragraph " *Relationships* " explains how the characters selected in the diagnosis differentiate the new species from all other species in the genus. In most cases, it should be composed of two parts : *i)* what characters make the new species different from all except a few related species, and *ii)* what characters differentiate the new taxon from these related species.

The characters used in the first part must be the best of the available characters, the less variable, the most clearly seen, and the better accepted of all diagnostic characters. It is important that all readers accept this first statement and the selection of the related species. If successful, this opening statement will get rid of several dozen species and leave only a manageable group of related taxa to be studied in detail. As far as possible, no measurement should be used in this first part because measurements are questionable as taxonomic criteria, because they often vary under external factors, and because measuring nematodes is a bore and slow down routine identifications.

In the second part, the rest of the diagnostic characters are used to differentiate the new taxon from the related species. This second part constitutes what is named " *diagnosis* " in many specific descriptions. The differentiation routine is well known, but the errors and improprieties listed above should be avoided.

A few species are differentiated by their author by the possession of a unique character. In such case, the diagnosis and the two parts proposed for the paragraph *relationships* can be blended into a single statement such as " **** n. sp. is unique by the presence of subcuticular refractive dots or punctations most apparent beneath the inner lines of the lateral fields* ". However in this case, the presence of punctations was later proved to be en artefact. It was fortunate that the author (A. C. Tarjan) did not rely entirely on this unique character, but prudently added a discussion on related species. This makes the original diagnosis still usable.

In conclusion, no one should attempt to describe a new species unless he/she is : *i)* in possession of all the original descriptions, and as many reliable redescriptions as possible, of the species in the genus; *ii)* using this material to become familiar not only with the specific descriptions but also with the specific variability of the characters in the genus; *iii)* able to recognize these characters in the new taxon and to set the limits of their variability; and *iv)* in possession of all available type material of the species related to the new taxon. Only then can an objective diagnosis and reliable relationship be proposed that will be acceptable by all readers.

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