



A reply to Páll-Gergely's suggestions to improve the taxonomy index (T-Index) introduced by Valdecasas (2011)

ANTONIO G. VALDECASAS

Museo Nacional de Ciencias Naturales, CSIC. c/José Gutiérrez Abascal, 2. 28006-Madrid. Spain. E-mail: valdeca@mncn.csic.es

In a letter to *Nature*, Valdecasas *et al.* (2000) criticised the Impact Factor (IF) which calculates the number of citations in scientific publications, particularly within biodiversity studies. Subsequently, even though Krell (2000, 2002) claimed that IF was not relevant to taxonomy, however, IF has continued to play and increasingly important role in evaluations of scientists, taxonomists not excepted (Meier & Lim, 2009).

Valdecasas (2011) introduced the T-Index as a quantitative evaluation of taxonomic work that is based on content rather than on citations. However a recent commentary by Páll-Gergely (2014) suggests three inconsistencies in Valdecasas (2011). I outline these criticisms below.

1. The problem of synonyms

I agree with Páll-Gergely that similar amounts of work in a publication could lead to different values of T-Index if *new synonyms* are not accounted for in the denominator. The denominator in $T = \sum(N_i^2 / S_i)$ (N_i , number of taxa discovered or revised with rank i ; S_i , number of taxa in that clade and rank as a result of the study), should take into account *new synonyms*.

2. The meaning of revised

I also agree that the variable N should include the number of new species and those included in any differential diagnosis, even if not fully revised. Differential diagnosis implies homology statements regarding the taxa compared, and as Páll-Gergely points out, such statements should be accounted for in the T-Index.

3. Focusing on geographic areas

Discovering and adequately documenting a new species in a genus with few species requires less effort than doing so in one with many. The *content* of publications by specialists is evaluated by the T-Index; *quality* is assumed to have been guaranteed by referees, namely *The journal has unbiased editor and referee system* (point 3 of Valdecasas, 2011, page 59). In the 18th century species could be described with a line, paragraph or a page. By the 20th century, several pages were usually devoted to each new taxon. It is the work of the editorial team to secure the level of excellence that is standard at the time of printing.

However, in my opinion, the T-Index should reflect the comprehensiveness of a work, and I find it logical to devalue a work that leaves out a substantial portion of the taxa in a certain rank. For example, table 2 in Páll-Gergely (2014) is very illustrative as it shows that the T-Index assigns a lower value to those publications that leave out an increasingly higher number of taxa, as it should.

Non-standard but well-defined ranks such as species-groups could form the basis of the T-Index calculation. The important question is to evaluate publications at the taxonomic level wherever they are calculated, regardless whether they are species-group, subgenera or genera.

The T-Index avoids biogeographical consideration, because of the growth in the number of exotic, invasive and introduced species. The identification and discovery of new taxa is more reliable in worldwide monographs than in local ones. Even more, as pointed out by Wheeler (2014): "The gold standard in taxonomic work remains the revision, monograph, or flora in which all species of a higher taxon are simultaneously compared and tested, accumulated material in herbaria identified, and, not infrequently, large numbers of new species discovered (Wheeler 2014: 371)."

Those monographs are the best reference material for systematic, ecological and evolutionary studies, and their value is so recognized in the T-Index. However, differential biogeography (Fontaneto, 2011; Valdecasas *et al.* 2006) the geographic restriction of the distribution of organisms smaller than 1 mm (Finlay, 2002) is still a matter of discussion. As a consequence, full treatment of a clade should be the goal of present-day taxonomy.

Acknowledgements

Malte C. Ebach allowed me to comment on Barana Páll-Gergely's contribution. I thank them both for their comments. James Cerne helped with this English version.

References

- Finlay, B.J. (2002) Global Dispersal of Free-Living Microbial Eukaryote Species. *Science*, 296, 1061–1063.
<http://dx.doi.org/10.1126/science.1070710>
- Fontaneto, D. (2011) *Biogeography of Microscopic Organisms: Is Everything Small Everywhere?* Cambridge University Press, Cambridge, 384 pp.
- Krell, F.-T. (2000) Impact factors aren't relevant to taxonomy. *Nature*, 405, 507–508.
- Krell, F.-T. (2002) Why impact factors don't work for taxonomy. *Nature*, 415, 957–957.
<http://dx.doi.org/10.1038/415957a>
- Meier, R. & Lim, G.S. (2009) Conflict, convergent evolution, and the relative importance of immature and adult characters in endopterygote phylogenetics. *Annual Review of Entomology*, 54, 85–104.
<http://dx.doi.org/10.1146/annurev.ento.54.110807.090459>
- Páll-Gergely, B. (2014) Suggestions to improve the Taxonomy Index (T-Index) introduced by Valdecasas (2011). *Zootaxa*, 3780 (2), 399–400.
<http://dx.doi.org/10.11646/zootaxa.3780.2.11>
- Valdecasas, A.G. (2011) An index to evaluate the quality of taxonomic publications. *Zootaxa*, 2925, 57–62.
- Valdecasas, A.G., Camacho, A.I. & Pelaez, M.L. (2006) Do small animals have a biogeography? *Experimental and Applied Acarology*, 40, 133–144.
<http://dx.doi.org/10.1007/s10493-006-9030-5>
- Valdecasas, A.G., Castroviejo, S. & Marcus, L.F. (2000) Reliance on the citation index undermines the study of biodiversity. *Nature*, 403, 698–698.
- Wheeler, Q. (2014) Are reports of the death of taxonomy an exaggeration? *New Phytologist*, 201, 370–371.
<http://dx.doi.org/10.1111/nph.12612>