

The impact factor and taxonomy

Citation as a tool for 'evaluating' scientific research was first proposed by Eugene Garfield in 1955. *Science Citation Index (SCI)* and *Journal Citation Reports (JCR)* published by Thomson Reuters have become popular for easy accessibility and indicative applicability in quality evaluation and decision-making. However, there is some reservation on evaluation among scientists working in disadvantaged areas, such as taxonomy. In spite of defences and protests¹⁻⁴ and also precautions recommended by Thomson Reuters, impact factor (defined later) has remained a vivid player often affecting the prospects in taxonomy. Various reasons were put forward to substantiate how this measure is inappropriate for assessing quality work in taxonomy. Citation rates are known to be influenced by multiple factors and we have reviewed and suggested possible options.

The impact factor of a journal in a given year is the average number of citations received for the citable papers published in that journal in the previous two years. *JCR 2008* covered more than 8000 journals from 66 countries. Its production included analysis of more than 44 million references. Thus, citations are core in the whole process of impact evaluation. Citing an article by specialists may imply its relevance with the article under publication or for conveying appreciation or deliberating lapses. Further, impact factor was used ignoring many extraneous situations and features specific to taxonomy.

The quantum of citing depends on the research areas. Analysis of *JCR* reports suggests that mathematicians seldom cite more than one or two papers, whereas molecular biologists cite many. This causes a wide variation in impact factors even among seemingly comparable journals serving different disciplines. Uniqueness in presentation style places taxonomy in a more deprived situation. Taxonomic names with citations are referred to in the text, unlike at the end in most papers. These citations, though are referred publications, are not considered in citation count. New species published by taxonomists have no citation potential at least for two years, the period limit in *JCR* counting. These publications are otherwise significant contributions.

Journals that publish articles on taxonomy may also have lower impact factors because the citable papers more often are connected to older works than more recent publications. Besides, publications

often turn voluminous enhancing the cost with no proportional rank enhancement through accepted impact factor. The Indian journals that have worthwhile impact factor rarely publish articles in taxonomy and the journals that publish taxonomy papers have found no place in the *JCR* listing thus far. There are 25 journals completely devoted to taxonomy out of 120 listed journals under biology, and not a single one of them is published from India. Another face of taxonomy is that the subject is local or regional in nature but universal in application. These divergent aspects place taxonomy and taxonomists in a disadvantaged situation.

Taxonomists engaged in explorations rarely come out with publications of limited pages. There are many professionally dedicated researchers who have spent a life time on a particular genus/family. These works may not be quoted by specialists from other groups. Further the number of taxonomists is dwindling rapidly and as less specialists work, there shall be fewer interactive publications and citations.

JCR and journal performance report (2008) published results that compare the citation impact of journals in zoology as measured over three different time-spans. Journals were ranked based on their cumulative citations over the previous two years and over 5 and 28-year period. The journal, *Systematic Zoology* that has not appeared in the rankings based on citations-per-paper impact score in 2 or 5-year period, has gained first position when it was calculated for 28-year period.

The impact of a publication need not necessarily be determined by peers. It can have an influence on public/academic institutions/local governments, as it happens with publications of flora of a region and its use by non-taxonomists to identify/conservate species. Hence a crucial impact of taxonomy is missed out in this exclusive citation analysis. Databases built over drawn from floras are often utilized by a wide spectrum of users, but go unacknowledged.

Journal inclusion in Thomson Reuters databases is based on defined criteria. If a journal is not admitted, it has no way of being evaluated. Citation number is influenced by the inclusion/exclusion of related journals. Assuming its evaluation as universal is not correct unless all the journals are admitted.

Established estimations only project low impact factor scores for taxonomy

journals for any given year when compared with those of molecular biology, biotechnology, etc., thereby eliminating taxonomists from recognition and awards. A solution might be to calculate integrated impact factor of all the journals in a specific discipline (in this case taxonomy) and normalize the figure for 100%. Then the relative contributory factor of each one of them in the said discipline per hundred cumulative score can be computed. This relative contributory factor may be used to compare with relative contributory factor of another journal from a different discipline. For example, if the cumulative citation of all 25 indexed journals in taxonomy is 50, then to normalize the cumulative score per hundred journals gives a value of $100 \times 50/25 = 200$. If the individual score of one, say, *Adansonia*, in the listed 25 journals is 5, then its relative contribution on the basis of a cumulative score of 100 can be calculated as $100 \times 5/200 = 2.5$. Such a calculation and comparison of % relative contributory factor in different disciplines negates subjective influence and normalizes advantages/disadvantages, and also disparities in inclusions/exclusions. A second corrective measure is to include floras/revisions/monographs published all over the world (say, in the last three decades) and evaluate cumulative citations for each one of them earned over the years (performance index) as such works are considered the best contributions of taxonomists and we regard them as life time achievements. The citations of these publications gain over years with no limits of period scaling may be tagged to individual's performance credit.

1. Krell, F.-T., *Nature*, 2000, **405**, 507-508.
2. Garfield, E., *Nature*, 2001, **413**, 107.
3. Adam, D., *Nature*, 2002, **415**, 726-729.
4. Krell, F.-T., *Nature*, 2002, **415**, 957.

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