



MOVING FINGERS

COMING OF AGE: ISI & GOOGLING

William R. Riedel, P. David Polly, and Whitey Hagadorn

Palaeontologia Electronica has taken two major steps this past year: contributors have been actively probing the potential of the World Wide Web to further paleontology, and ISI began indexing the journal in its Science Citation Index and Web of Science.

In our editorial pages, Warren Allmon (2004) recently reported that he located research information with Google® that he could not have found by any other means: he learned about seven fossil localities yielding turrilline-dominated assemblages that had not been reported in standard research literature. The clues came from pictures on museum websites, from fossils-for-sale sites, from the site of a public park in Germany, and from geological field trip guides. Use of an Internet search engine is now the most effective way to locate information in today's "grey" literature. The pearls in this seething source of information can be ephemeral, however: pages from non-institutional sources frequently move or go extinct.

In a subsequent editorial, Johnson, Filkorn and Stecheson (2005) described how to harness the power of search engines to make institutional information, such as collections catalog data, accessible through the same searches. By engineering web-based links, they made the catalog of paleontological collections in the Natural History Museum of Los Angeles County accessible to search-engines so that the catalog's contents appear along with standard websites in lists of search hits. Moreover, they have encouraged researchers to add data themselves using secure web forms. This is not an isolated example: the

Entomology Department of London's Natural History Museum uses a similar system to gather information about the association of butterfly species and host plants. These are insightful developments, harnessing the expertise of specialist users and adding to the value of the output of inevitably limited curatorial staff.

Since its inception, *Palaeontologia Electronica* has tried to position itself within the world of Internet searching. PE is an academic research journal, but one whose pages are all freely accessible to academics, the public, and search engines. If we repeat Allmon's experiment today, Googling *Turrillina* brings up Allmon's own editorial as the fourth hit. Putting quality research information into the public domain is increasingly important as politically motivated attacks on science, especially evolution and historical geology, mount (the University of California Museum of Paleontology and the US National Science Foundation were recently named in a lawsuit aimed at their evolution website, for example). Misinformation on these subjects dominates the Internet, a situation that could easily lead astray those people who try to use the web to come to their own informed opinions. Because the journal is so easily accessible, we try to make the content understandable by providing plain-English summaries of the papers and technical abstracts in nine languages.

The rise of searchable digital information has had another impact on paleontology: within academic circles, research "quality" is increasingly judged by the impact factor of the journal in which it is published. A journal's impact factor is the aver-

age number of times articles published in the journal are cited within the first two years after their publication. The impact factor is now inappropriately used to make decisions ranging from library subscriptions to academic hires and to the closure of whole departments. The impact factor is one of several indexes published by the Institute for Scientific Information (ISI; Thomson Scientific) as part of their Journal Citation Reports database*. The importance of the impact factor is illustrated by the Research Assessment Exercise (RAE) that happens every five years in the UK. Research funding to university departments for five years hinges on the rating they are given in each RAE. A department is judged based on the grant income and publications of its academic members, each of whom puts forward his or her four "best" publications. Generally, the RAE review panel judges the quality not by reading the papers or knowing something about the field, but by looking up the impact factors of the journals in which the papers were published. Departments judge the worth of their academics by impact factors; hiring and firing decisions are often influenced by the index of the journal rather than the quality of the work.

Consequently, young researchers are increasingly conscious of impact factors when choosing where to submit their papers. This is bad news for the field of paleontology. In order to have an impact factor, much less a high one, a journal must first be indexed by ISI. In 2004, only thirty-two paleontology journals, in the broadest sense, were indexed by ISI. Accurate figures on the number of journals that are not indexed are difficult to get, but we can make a conservative estimate from data in the Bibliography of Fossil Vertebrates, which indexed all vertebrate paleontology papers until 1993. In 1992, vertebrate paleontology papers were published in 244 journals, of which only 37, or 15% are now indexed by ISI. Presuming that these figures are representative of other paleontological subdisciplines and presuming that most of the journals in the BFV are still active—both presumptions seem reasonable from looking at the titles—then 85% of paleontology journals are not indexed and do not have impact factors, forcing them into second-tier status as venues for publishing new work. Irregularly appearing publications, such as monograph series, also have no official impact factor, although monographs would frequently count as citation classics had they been indexed.

The many publication series that do not have ISI impact factors are having increasing difficulty getting quality submissions, while the manuscript backlog in journals with impact factors has been growing phenomenally. This situation has at least three negative effects on the field: it is more difficult to get work published in "quality" journals (i.e., those with impact factors), thus decreasing the apparent productivity of individual paleontologists; it causes non-indexed journals to fail because of lack of submissions or subscriptions, thus further reducing the number of possible venues for publishing paleontology and potentially concentrating those that remain in the hands of commercial publishers rather than professional academic societies; and it decreases the total volume of paleontology papers published and the length of time between submission and publication, which has a negative effect on the impact factors of those paleontology journals that are indexed. For example, some of our field's top journals have waits of twelve months or more between the time a paper is accepted and the time it is published. If we presume an additional six months between submission and acceptance, the interval between the writing a paleontology paper and having it published is 1.5 years. Logically, the most recent papers cited in a paleontology journal are at least 1.5 years old, leaving only a six month window in which an author can decide to cite a paper after it is published and having that citation count towards a journal's impact factor, which is based on citations within two years of publication! This, combined with the fact that citations in papers published in the many non-indexed journals are not counted at all, means that there are very few citations considered by ISI towards paleontology journal impact factors. In a recent editorial published in the Genetics Society Newsletter (Brookfield, 2003), John Brookfield noted that the top impact factor (for the year 2001) noted among journals in the field of biochemistry and molecular biology was 31.639, dramatically higher than the top impact factors in the fields of geology (3.05), paleontology (3.177), mathematics (2.65), zoology (5.25), and mathematical physics (2.235). He presented quantitative data from genetics journals that the total volume of citations was critical to the impact factor within a field. Paleontology as a discipline has a problem with volume of citations that are included in the ISI database because of the small number of paleontology jour-

* ISI also publishes another index, the cited half-life of papers. This index is based on the median age of articles cited during a given year, making it a measure of the enduring relevance of a journal's papers. Fifty-five percent of paleontology journals have a cited half-life greater than 10, which is the maximum reported by ISI. By comparison, only 11% of biochemistry and molecular biology journals have a cited half-life greater than 10.

nals that are indexed. Presuming that citations in the 85% of journals that are not indexed are as numerous as those that are, the vast majority of citations to paleontological work are not considered by ISI in their calculation of impact factors for paleo journals. All things being equal, we can expect from these statistics that paleo impact factors would increase dramatically if all of our journals were considered.

In this context, we consider it an important milestone that PE will now be included in the ISI citation index. An impact factor will be good for the journal because publications in PE will count in the eyes of university administrators as "good" papers. This should result in more submissions to PE, something that will increase the quality of the journal and, thus, to its long-term viability. Furthermore, PE being included in the index will be good for the field. From now on, citations made in PE articles will contribute to the total volume of citations in the field, and the rapid time to publication afforded by our electronic medium means that more of those citations will get out within two years of when the cited paper was published. In the five papers published in our last issue alone, there were twenty-nine citations to papers published in the previous two years, a significant number. The net effect of our inclusion in the Science Citation Index will be to lift the impact factors of all paleontology journals.

PE Editorial Number: 9.1.1E
Copyright: Coquina Press February 2006

Getting more journals indexed would be a great benefit to our field. ISI accepts recommendations for journals to include, and we urge the editorial boards of all paleontology journals to seek indexing.

Palaeontologia Electronica has a great advantage over traditional literature in that its contributors constitute the subset of paleontologists who are more than comfortable with the electronic medium. They are willing and able to exploit it imaginatively, and to push the envelope. ISI certification is just one tangible acknowledgement of more widespread acceptance of these efforts. Our dream, in establishing this journal, is being realized.

REFERENCES

- Allmon, Warren D., 2004. Googling Turritella, or The Present and Future Value of the Web for Paleontological Research. *Palaeontologia Electronica*, Vol. 7, Issue 2, Editorial 2: 9pp, 171KB.
http://palaeo-electronica.org/2004_2/toc.htm
- Brookfield, J. 2003. A Taxi-driver writes - Impact Factors. *Genetics Society Newsletter*, 48: 24-25.
- Johnson, Kenneth G., Filkorn, Harry F., and Stecheson, Mary. 2005. Into Focus: Paleontology Collections on the World Wide Web: The Missing Link. *Palaeontologia Electronica*, Vol. 8, Issue 2; Editorial 5:4pp., 109KB.
http://palaeo-electronica.org/2005_2/toc.htm