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EDITORIAL

PUBLISHING SCIENCE IN DEVELOPING COUNTRIES: THE NEW PLAYERS IN THE BUSINESS

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Human cultural development owes a lot to three landmark revolutions: sometime around 3,000 BC, the **Sumerians** began to write; in 1447 **Johannes Gutenberg** invented the movable type press, and the written word became generally available; and in 1991 **Tim Berners-Lee** gave birth to the World Wide Web (WWW), and the virtual word became universally available.

But the time scale of the medical written word is somewhat different: from Hippocrates (BC 460-377) to the middle of the 19th Century, there wasn't much of it, even though it must be said that some of it was very, very important! Then things began to speed up. The **United States Library of the Office of the Surgeon General of the Army** (created in **1836)** began to publish **Index Medicus** in 1879. Those of us who are old enough surely remember the great many hours spent searching through the Index for essential information, writing reprint request postcards, then waiting for days (or weeks) until the precious (virtually unphotocopiable) things arrived through the mail (not e-mail if you please!). Eighty years went by, and the Index Medicus grew from a pretty little volume with barely 300 citations in 1879 to a volume of more than 100,000 citations in 1956, when the Army Library was renamed **National Library of Medicine (NLM)**. Eight years later, automation began when the NLM created **Medlars** (Medical Literature Analysis and Retrieval System), which evolved into **Medline** (Medlars online) 7 years later. Then, in 1997 Medline and the World Wide Web came together through **PUBMED**. All of a sudden, the title collection of the NLM, easily the world's largest medical library (more than 4,800 journals and 16 million citations), became universally accessible for free.

Accessibility in PUBMED comes in 3 different levels: (i) universally available titles, (ii) universally available abstracts, provided they exist, and (iii) full text, only universally available if published as free open access.

Not by sheer coincidence, in the same year of 1997, Brazil and Chile embarked on the joint venture of creating a totally new entity, the **Scientific Electronic Library Online,** acronym **SciELO**, which of course is the Spanish word for sky, or heaven. The site is www.scielo.org, and the idea was (and is) to put together a virtual collection of Latin American and Caribbean scientific journals.

To join SciELO, candidate journals must offer free open access, and this establishes SciELO's first goal, namely to increase visibility and accessibility of the Latin American and Caribbean scientific publications. Increased credibility, also one of the original goals, comes via the other rules for joining, ie, any PUBMED-indexed journal in the region is automatically eligible, while other applicants are required to meet rules that are basically molded on the PUBMED application format. The collection has gradually broadened, so that now it includes Brazil, Chile, Cuba, Spain, and Venezuela; indexed journals are currently approaching the 300 mark. Journals from Argentina, Colombia, Mexico, Peru, Portugal, and Uruguay are expected to join soon.

SCiELO was linked to PUBMED in 1999, opening its collection to the World Wide Web through the most used medical search engine, and almost instantly things began to change. But to understand why and how, those in the First World must learn a few details about habits and eti-

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quette governing science publication in Latin America in pre-SciELO days. Third World scientific journals had always been invisible to the rest of world. Even when printed in English, which they sometimes were, the actual physical journal was unavailable outside its country of origin. Consequently, competent Third World scientists never (repeat, never!) published in journals from their home country. Violation of this golden rule meant burying data where no one would ever even hear about it, never mind read it. It was a dumb thing to do, but even worse, it was degrading. Publishing in First World journals was sensible, fashionable, and a boost to your career, to your grant receiving hopes, to everything else that matters. Obviously, all of this still holds true. It is no surprise that such basic concepts were carefully hammered into the minds of generations of young, promising, would-be Third World scientists. I can not only assure First World readers of the truth of this, but I can actually confess to having been brought up with this catechism: "Son (used to say my famous pharmacologist father), never be caught red-handed publishing … you know where. Arghhhhh!"

This, of course, trapped local journals inside an infamous vicious circle: bad papers breed bad journals, which have low or no impact, which attract worse papers, making journals worse by the day, reducing impact steadily by the year, and so on and so forth. Unpleasant by-products are local reviewers, who may be either incompetent or lenient. Journal income is low (or nonexistent) so that your typical Third World journal is either subsidized or ugly, or both.

Fortunately, with the new century came light at the end of the tunnel. Figure 1 displays the effect of SciELO on the visibility/accessibility of its collection. In the first year, 2001, 750 thousand downloads were recorded, 52 thousand from First World countries. In 2005 this number had increased fifty-fold, to just over 40 million, 16 million by the First World. Preliminary figures for 2006 indicate that growth is still geometrical.

Impact has also improved, even if not quite so dramatically. Figure 2 displays the impact of SciELO journals in Brazil and Chile that are also registered in the ISI Web of Knowledge™. A substantial fourfold growth is evident, but not as dramatic as the increase in visibility. Neither are the absolute values quite so brilliant. But two points should be borne in mind: (i) it is only to be expected that quality can only improve at its own pace, necessarily slower than readership—after all old habits and etiquettes die slowly; (ii) even though impact is not great, neither is it small. Compared to the impact of the 60 ISI-indexed Australian journals for which the median of impact factors was 0.8, the impact of the 42 ISI-indexed journals throughout the whole of Latin America is not too bad at 0.6.

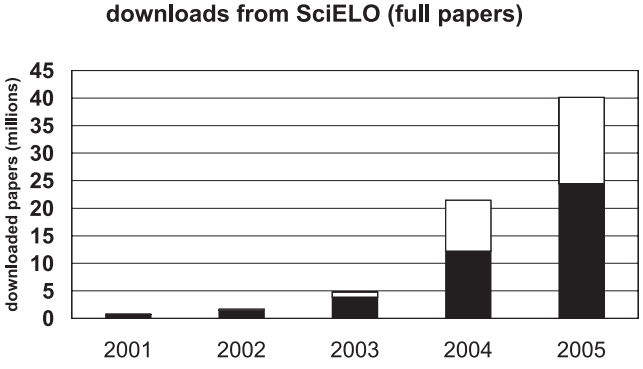

Figure 1 - Downloads from the SciELO site to Third World countries – solid histograms, and to First World countries – hatched histograms (adapted from Greene, LJ, unpublished data)

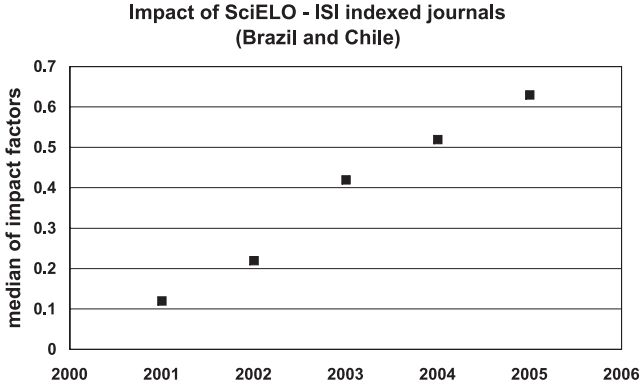

Figure 2 - Median impact of SciELO-ISI indexed Brazilian and Chilean journals (adapted from Meneghini, R, unpublished data)

An analysis of the factors associated with impact growth in the Third World produces some obvious results, but also a few that are surprising (Table 1). Impact increase correlates highly with the number of new ISI registrations from the region, but not at all with total existing registration. It also correlates with the percentage of journals published commercially, and interestingly, with the percentage of

Table 1 - Factors affecting impact of journals published in developing coutries (adpated from Meneghini R, unpublished data)

Increase of Impact Factor correlates with	r^2
Newly indexed ISI journals (1998 – 2004)	0.62
Existing ISI indexed Journals in 2004	0.25
% of Nation's Journals published by commercial publisers	0.42
% of Journals with "International Title"	0.41
% of Articles in English	0.25
% of Articles from foreign countries	-0.19

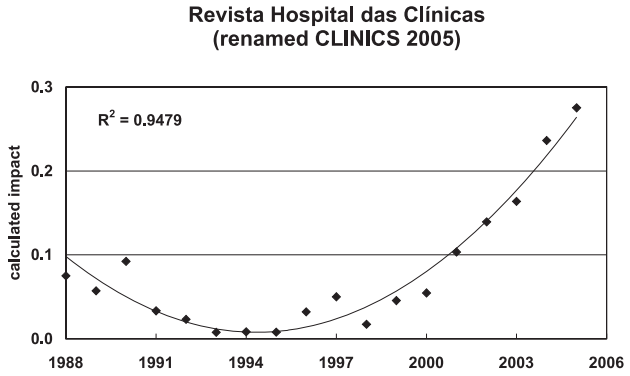

Figure 3 - Case study: calculated impact of the Revista do Hospital das Clínicas, (renamed CLINICS in 2005), in the immediate pre-SciELO and in the SciELO periods. The 2nd degree polynomial fit exhibits a highly significant correlation coefficient, with a minimum value for the year 1995

journals whose names do not reveal their national origin. It is far better to be called International Journal of so-and-so, than Brazilian (or Chinese for that matter) Journal of so-and-so. Being published in English is no guarantee of higher impact, and publishing "foreign" articles (ie, articles from countries other that the home country of the journal) correlates negatively with impact growth.

Figure 3 shows the impact from CLINICS (and its predecessor, Revista do Hospital das Clínicas) from 1988 to 2005. The vicious circle effect is clearly visible from 1988 to 1995, with the single exception of the year 1990, which was strongly influenced by citations of a single successful paper. The coming of SciELO, with its first full impact in 2001, is quite clear-cut. It would be interesting to investigate other Latin American journals to determine whether this is an isolated case or a general phenomenon.

In summary, it may be said that SciELO-PUBMED has radically altered the visibility and credibility of the regional journals, even though impact is still quite low, and in spite of the fact that local etiquette has not changed, or is only beginning to change. Therefore, the question that must be answered is, "Why do we want regional journals, when the First World journals not only are much better but are likely to remain so for the foreseeable future?"

Asked 10 years ago, this question received one unanimous answer from all the regional producers of good science: "No, thank you, we can live without local journals, they are nothing but a confounding factor in the system" But the newly acquired visibility, which is not likely to fade, has radically changed the predominant answer: "Yes, please, we do need local journals, for precisely the same reason First World nations need them; they are really a vital aspect of national sovereignty. No country capable of producing quality science, and Latin American nations are certainly capable of that, should be totally powerless when it comes to controlling its own publications. And this should be an essential aspect of our current and future respective scientific policies. Special thanks are obviously due to Tim Berners Lee, who made it all possible, and to SciELO, which should increasingly become an instrument of this act of sovereignty.