CALIDAD E IMPACTO DE LA REVISTA IBEROAMERICANA

QUALITY AN IMPACT OF THE IBERO-AMERICAN JOURNALS

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I.3 THE EVALUATION OF RESEARCHERS AND THE FUTURE OF LATIN AMERICAN SCIENTIFIC JOURNALS

EVALUACIÓN DE INVESTIGADORES Y EL FUTURO DE LAS REVISTAS CIENTÍFICAS LATINOAMERICANAS.

Javier Laborde[*]

Abstract: Scientific papers published in Latin American journals are usually assigned a very low or null value in current evaluation systems. Consequently, our scientists are publishing their most relevant work elsewhere, mainly in journals in ISI's Citation Index (CI) that have a high Impact Factor (IF). Latin American journals literally are being deprived of the best contributions from the region, making it increasingly difficult for them to acquire international visibility and attract authors and evaluators. If this continues, our journals will be relegated to a secondary role and may well disappear. Several scientists have examined the main limitations of ISI's CI and the IF as indicators of 'good science' and I review these here. I briefly describe recently developed alternatives that should at least complement these indicators. Finally, I reflect on current research evaluation practices and propose measures to break the cycle in which our journals are trapped. Hopefully this analysis will enliven the debate on the indicators employed in our evaluation systems and stimulate discussion of the far reaching consequences that their use is having on the development of science in Latin America and on the future of our journals.

Keywords: *Bibliometric indicators, Citation analysis, Impact factor, ISI, Journal indexes*.

Resumen: A un investigador latinoamericano que actualmente tenga un artículo interesante por publicar, no le conviene enviarlo a una revista latinoamericana, debido al poco valor que se le otorga a nuestras revistas en las evaluaciones. La situación anterior, priva literalmente a estas revistas de las mejores contribuciones de la región y con ello difícilmente ganarán la visibilidad internacional que las convertiría en más atractivas para investigadores y evaluadores. Bajo estas condiciones, nuestras revistas quedarán destinadas a desempeñar un papel secundario en el avance

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del conocimiento o de plano a desaparecer. En esta contribución analizo los principales problemas y limitantes del "*Citation Index*" y del 'Factor de Impacto' de la compañía "ISI" como indicadores de 'buena ciencia' y describo alternativas recientes que podrían complementarlos o sustituirlos. Finalmente, presento algunas reflexiones sobre el sistema de evaluación actual basado en indicadores de ISI y propongo algunas medidas para romper el círculo vicioso en el que están atrapadas nuestras revistas. Mi objetivo es contribuir al debate sobre los indicadores empleados en nuestras evaluaciones, además de que espero estimular la discusión de las profundas consecuencias que el uso de tales indicadores tiene sobre el desarrollo científico regional y el futuro de nuestras revistas.

***Palabras clave*:** *Análisis de citación, Factor de impacto, Indicadores bibliométricos, Índices de revistas, ISI*

1. Introduction

If a Latin American researcher or group of researchers writes an interesting paper, it is not in their best interest to submit it to a Latin American journal because under current evaluation practices these journals are rated very poorly, if at all. Publication in 'mainstream' journals is presently regarded as an indicator of good science. Over at least the last five decades, the only journals that have been considered mainstream are those in the Citation Index (CI) owned by the Institute for Scientific Information (ISI), now part of the transnational consortium Thomson Reuters. The Latin American researcher or group of researchers may submit a paper to one of the few Latin American journals included in the CI, however the Impact Factor (IF) values of these journals are considerably lower than those of similar journals edited in the USA and Western Europe. It is the latter that are the most highly rated when we are being evaluated for contract renewal, promotion or membership in national scientific systems (which often offer a much needed monthly stipend), and when applying for grants in order to continue our research. This situation literally deprives Latin American journals of the best contributions from their own region, making it even more difficult to acquire the international visibility needed for our journals to become more attractive to researchers and evaluators. If this vicious cycle continues, our journals will be condemned to a secondary role in the advancement of science and may even disappear.

In spite of the major role that ISI's Citation Index and the Impact Factor both play in science today, scientists have an alarmingly superficial knowledge of their origin and essential characteristics. It is not unusual to encounter a colleague who is perplexed to have discovered that ISI is not, and has never been an academic institution, but is a private company with a clearly stated profit motive. By definition, such an organization must put the interests of its investors before those of the scientific community, even though it is the latter to which the company provides its valuable products and services at a high price. The employees of ISI are professionals in the management of information and databases, but they are not active researchers; thus the widespread interpretation of the word 'Institute' in ISI as an academic institution is wrong. In addition, the letter 'S' in ISI refers to the type of information that the company handles, not the type of analysis performed. In fact, their criteria and methods do not differ much from those employed in the elaboration of 'best seller' book lists or the 'top 10' songs of radio stations.

ISI collects and manages information for all the papers published by the journals included in its own CI, generating a huge database to obtain different bibliometric statistics that summarize the number of times that papers and journals are being cited. Those who promote this type of analysis claim that the evaluation process based on such statistics is highly objective. However, it is the interpretation of the statistics which should drive the evaluation, and such an interpretation relies on the meaning of the citation, which ultimately rests on the reasons that motivated the author (or authors) to cite a given paper or publication (Smith 1981). The latter can be as subjective as or even more subjective than the evaluation of our work by peers. Because the subjectivity in quantitative citation analysis is less apparent, it is crucial to understand the characteristics and limitations of the numerical indicators derived from this type of analysis (Adler *et al*. 2008). Otherwise we will cause undesirable consequences to the journals, projects, researchers, disciplines and institutions that we are evaluating. With this essay I hope to stimulate the discussion of the consequences that the current use of citation statistics —as indicators of quality, instead of the measures of quantity that they are— in our evaluation systems is having on the development of science in Latin America and on the future of our journals.

2. ISI's Citation Index (CI) and Impact Factor (IF)

The impact factor was first proposed in 1955 by Eugene Garfield, founder, shareholder and Chairman Emeritus of ISI, who also elaborated the first Citation Index in 1961 (Garfield 1963, 2006). Garfield and his co-workers were pioneers in the construction and computerization of relational databases for secondary literature sources (*i.e.* abstracts). They also pioneered the creation of multidisciplinary abstracts, including in a single product several fields or disciplines. This product, *Current Contents*, became one of the main commercial successes of ISI and a great aid to scientists. The researcher with access to this resource was kept updated about new publications, and institutions that subscribed to *Current Contents* also benefited, since they only had to acquire one product to cover several disciplines and only had to deal with one company. The incorporation into their database of the complete reference lists of all the documents published by the journals included in *Current Contents* allowed ISI to create the first Science Citation Index.

The CI was originally conceived as a tool to help locate information, literally to track articles using reference lists. To do this, it is first necessary to have a relevant article as the starting point for the search. The fundamental question addressed by the CI is, what has happened in the scientific literature since the publication of this article? Specifically, where has this article been cited and by whom? Extensive and specialized bibliographies can be compiled in this way, but would be impossible by other means (Garfield 1963). It did not escape Garfield's attention that the CI might be used to evaluate scientists and their work, however, he emphatically warned that such an application would only be legitimate if used as a tool to learn the opinions held by researchers on the publications of another researcher.

The impact factor (IF) of a journal is a numerical indicator created by ISI, which is published every summer in the Journal of Citation Reports (JCR). Annually the JCR provides the IF of the preceding year for the journals indexed in the CI. This information is currently displayed in the Web of Knowledge (WoK) owned by ISI Thomson Reuters, an internet service that requires a subscription, the cost of which is unaffordable for most Latin American universities and research institutions. The ISI IF is a measure of the frequency with which the 'average article' published in a given journal has been cited over a particular

period (Thomson Reuters, 2008a). The ISI IF of a journal is calculated by dividing the number of citations in the JCR year of the articles published the previous two years by the total number of articles published during the same two years. According to Thomson Reuters (*Op. cit.*), a journal IF of 5.0 means that, on average, the articles published in that journal within the past three years were cited five times. Note that the only citations taken into account are those made in journals indexed in the CI. Scientific books and book chapters are excluded, as are scientific journals of excellent quality that for a diversity of reasons – examined below – are not indexed in ISI's CI.

3. The origin and evolution of ISI's Citation Index

It is generally assumed that the inclusion of a journal in the CI is a reliable indicator of scientific quality. In order to weigh the validity of this, we need to know about the criteria and selection process applied by ISI, from the first CI to subsequent editions; in other words, we need to know the origin and evolution of the CI. The first science CI was that of 1961 and included 613 journals on different subjects published in 28 countries. This first CI included 1.4 million citations of documents published up to 1961. This colossal number of references came from the nearly 20 thousand journals cited by the 613 of the first CI, and this database was used by ISI to determine which journals to include in future editions of the CI (Garfield 1963). Nowadays the CI includes close to 10 thousand titles, and each year the IF of a subset of this collection is calculated and published in the JCR (ISI-WoK-JCR 2009). Even though ISI includes aspects of academic and editorial quality in its selection criteria (Garfield 1990; Thomson Reuters 2009), these are secondary to the number of times the journal is cited according to the index that the journal aspires to enter. Journals edited by scientists who have a high number of citations in the CI are regarded as top candidates for ISI's index. These circular criteria and the founder effect of the initial CI on subsequent editions have had far reaching consequences on the development of science and deserve careful attention (for a revealing analysis, see Archambault & Lariviére 2009). To varying degrees, this has had a detrimental effect on the scientific journals that are published outside the USA and Western Europe, particularly those not published entirely in English (Gibbs 1995; Cetto & Alonso 1999; Archambault & Lariviére 2009). Garfield definitely made a conscious effort to fulfill the needs of the largest scientific libraries in the USA, and

his economic relationship with and dependency on them modeled ISI's later decisions regarding the content of the CI. Their interests, rather than the goal of selecting the best scientific journals regardless of country of origin or language, drove his decisions. This has had very strong, negative repercussions on education and the dissemination of science in Latin America, and therefore on the advance of science.

In my opinion, there is not much disagreement about the merits and quality of the journals included in the CI, rather the problem arises with several that have not yet been accepted. Contrary to what most scientists assume, this crucial decision is not made by researchers who are experts on the subject and would base their verdict on the careful and academic analysis of the documents published by the journal. Instead, the decision is made by employees and editorial advisors at ISI (Garfield 1990), people whose names and curricula are not available to the scientific community, and who are not active scientists.

4. Limitations of the ISI IF as an evaluation tool

The numerous criticisms of using the ISI IF in the evaluation of research tend to mention two aspects: the first is related to problems inherent to the IF formula and the second to its misuse by evaluators. I will address these two criticisms, with an emphasis on the problem of using the ISI IF as an indicator of the quality of journals, papers, researchers and even institutions or countries.

5. Problems with the ISI IF impact indicator

The creators of the ISI IF formula claim that this indicator represents an average, however, they have never attempted to describe the frequency distribution of the data supposedly represented by that average. Every single analysis of the citation frequency of the papers published by any given journal, from any discipline for any given period of time after its publication (*e.g.* 2, 5, 10 years, etc.) reveals that the frequency distribution of 'received citations per paper *vs.* time' has the shape of an inverted "J" highly skewed to the right. Several of the papers published in a journal do not receive any citations, most receive very few (well under the IF value of the journal), and only a few papers receive a very high number of citations and contribute disproportionately to the IF value (Seglen 1997;

Colquhoun 2003; Adler *et al*. 2008). The supposed average is, in reality, a quotient, and as such does not provide any information about the variability of the data. Therefore its use for comparative purposes is incorrect because with the information contained in this quotient it is impossible to determine whether the impact of a journal (*i.e.* its citation frequency) is statistically different from that of another journal.

Ideally, a paper or scientific document of good quality will receive an increasing number of citations within the two years after its publication, reach its maximum number of citations per year after a few years, after which the number of yearly citations declines. The shape of this idealized citation curve is different for different scientific disciplines (Seglen 1997; Amin & Mabe 2003; Adler *et al*. 2008), and this alone should preclude any comparison of the IF of journals in different disciplines. This variability results from differences in the citation and publication dynamics among disciplines and has nothing to do with scientific quality. Garfield's adoption of a two-year period for his IF formula was based on papers in molecular biology and biochemistry: 25% of their references corresponded to the publication year and the two previous years (Garfield 2003). The founder of ISI acknowledges that when he created his formula, researchers in molecular biology and biochemistry were the best clients of his *Current Contents*, and therefore he was more familiar with their needs. The shape of the citation curves also varies widely for different types of scientific documents. Journals that specialize in reviews consistently have the highest IF of their subject, leaving journals in same subject that specialize in publishing original work far behind (Amin & Mabe 2003; PLoS Medicine Eds. 2006; Rossner *et al*. 2007).

To the limitations already mentioned it is necessary to add that the ISI IF formula, *i.e*. the quotient, is not free of problems. As with any quotient it is essential to strictly define what is being counted above and below the fraction, and to apply the same criteria to the numerator and the denominator. The ISI IF does not comply with this because some of the documents counted in the numerator are not counted in the denominator (Seglen 1997; Amin & Mabe 2003; Adler *et al*. 2008). Although the latter would not be expected to have any impact on academia *sensu stricto*, the fierce competition prompted by the JCR has

become a trigger for manipulating the quotient by those interested in raising the IF of their journal (PLoS Medicine Eds. 2006; Rossner *et al*. 2007; Archambault & Lariviére 2009).

The denominator in the ISI IF formula was included in order to make valid comparisons among journals that differ in the number of documents published annually (Garfield 2006). However, on analyzing the IF of four thousand journals over 12 years (1987-1998), Amin & Mabe (2003) found that the annual oscillation of the IF value in journals that publish fewer than 35 articles per year was enormous (> ±40%), in comparison with that of journals publishing more than 150 articles per year (< ±15%). In contrast to large journals, those that only publish a few articles per year have a much lower probability of including at least one article every year that will be highly cited during the two years after its publication (Amin & Mabe 2003; Adler *et al*. 2008; Laborde 2009). Therefore, the wide yearly oscillations in the IF of small journals are the result of random factors, rather than inconsistencies in the quality of their contents.

6. Distorted use of the ISI IF

The use of the ISI IF with no consideration of the differences in citation dynamics between disciplines leads us to the absurd conclusion that mathematicians write articles of much lower quality than those written by cell biologists. In 2007 the 156 journals included by ISI's JCR in the category of Cell Biology had much higher IF values than the 207 Mathematics journals, as shown by the median values of each category: 2.98 *vs*. 0.52 respectively (Table 1). The number of articles published by each discipline (21,226 *vs*. 16,141) does not explain the enormous difference in median values, but the total number of citations received in 2007 does: the Cell Biology journals were cited more than one million times while Mathematics journals were cited fewer than 213,000 times. In addition, the distribution of citations over time for each discipline is very different, as revealed by their respective 'cited half-life' which ISI defines as "the number of years, going back from the current year, that account for 50% of the total citations received by the cited journal in the current year." In 2007 the cited half-life for Cell Biology journals was 6.1 years and for Mathematics journals it was >10 years (JCR does not calculate cited half-life when it is greater than 10 years). These factors bear no relationship to the quality of the science

published by each discipline but do reflect the different citation dynamics of the disciplines and are the underlying causes of the notorious differences in the IF. Thus any comparison of the IF between such disciplines is invalid.

Discipline	# Journals	Median ISI IF	# Articles published	Cited half-life[18]	Total citations[19]
Cell Biology	156	**2.984**	21,226	6.1	1'199,167
Developmental Biology	37	**2.805**	4,152	6.3	213,018
Genetics & Heredity	132	**2.595**	16,059	6.0	675,463
Evolutionary Biology	35	**2.524**	4,178	7.7	182,850
Behavioral Sciences	45	**2.355**	4,500	7.9	165,109
Ecology	116	**1.532**	12,742	8.0	451,081
Anatomy & Morphology	17	**1.423**	1,486	8.0	36,463
Biodiversity Conservation	27	**1.295**	2,409	6.9	60,510
Biology	70	**1.292**	6,608	7.5	217,563
Environmental Sciences	160	**1.280**	23,123	6.5	494,853
Marine & Freshwater Biol.	86	**1.155**	8,724	8.7	234,921
Soil Science	30	**1.099**	3,343	9.4	90,514
Plant Sciences	152	**1.081**	14,684	7.8	487,368
Zoology	124	**0.940**	9,043	9.9	221,537
Ornithology	19	**0.745**	1,135	>10.0	23,864
Entomology	73	**0.739**	5,064	9.2	90,575
Veterinary Sciences	133	**0.646**	12,674	7.6	182,009
Statistics & Probability	91	**0.787**	6,512	>10.0	178,807
Mathematics	207	**0.525**	16,141	>10.0	212,467

Table 1. Variation in the median Impact Factor (ISI) and other citation parameters for different disciplines (data from the Journal of Citation Reports – JCR 2007; ISI WoK 2009). Some disciplines related to ecology are presented, together with two of the highest and two of the lowest ranking disciplines in terms of median IF for comparative purposes.

The latter not only happens between very different disciplines, but also within the same field among subdisciplines. For example, if in a biology department an ornithologist were to publish in 2007 a paper in a journal with an IF = 1.0, the department head might encourage him or her to increase the impact and quality of future publications, while an evolutionary biologist in the same department who published in a journal with an IF = 2.0 would be congratulated and held up as an example. In this scenario, what has not been taken into account is that the ornithologist's article was published in a journal with an IF well above the median value (0.75) of the 19 ornithology journals indexed in the JCR (Table 1). In fact, in this subdiscipline only six journals (32%) have an IF > 1.0. In contrast, the median IF of the 35 evolutionary biology journals indexed in the JCR was 2.52, and at

[18] Number of years, going back from the current year, that account for 50% of the total citations received by the journals of the discipline in the current year (ISI WoK 2009).

[19] Total number of citations of the journals in each discipline during 2007 according to ISI's database.

least 22 of its journals (63%) had an IF higher than that of the journal in which our hypothetical evolutionary biologist published. Again, the differences in IF between the ornithology and evolutionary biology journals are explained by differing citation dynamics (≈ 24,000 *vs*. ≈ 183,000 citations and cited half-life >10 *vs*. <8 years, respectively), not by the quality of the documents. Which of our hypothetical researchers deserves more credit? The only sensible thing to do is read the studies done by each; not all of their publications but the two or three they regard as their most relevant contributions.

Under current evaluation systems, most academic institutions give more value to articles published in journals with a higher IF, because supposedly they will receive more citations, however, the mathematicians Adler, Ewing & Taylor (2008) have shown that this is far from the truth. They convincingly argue that when comparing two articles published in different journals, rather than asking a question about averages, we need to ask about probabilities. They compared three widely known mathematical journals that differ in their IF (0.43, 0.85 and 2.63, in 2005). Based on the entire frequency distribution of the citations received by all the articles in each journal between 2000 and 2004, they calculated how many times a randomly selected article from the journal with the lowest impact (IF= 0.43) was actually cited as many times as, or more than a randomly selected article from the journal with double the impact (IF= 0.85). They found that it occurred 62% of the time, and was also true 32% of the time when the journal with the lowest impact (IF= 0.43) was compared to that with the highest (IF= 2.63). Therefore in this last comparison we would be wrong one third of the time if we were to assert that an article published in the low IF journal would receive fewer citations than one published in the journal with an IF six times higher. The mathematicians state that "most people find this surprising, but it is a consequence of the highly skewed distribution and the narrow window of time used to compute the IF. ... It shows the value of precise statistical thinking rather than intuitive observation." Adler and coworkers conclude that the information provided by the IF is surprisingly vague and can be dramatically misleading. They also state that "using the impact factor alone to judge a journal is like using weight alone to judge a person's health" (Adler, Ewin & Taylor 2008).

The incorrect use and even abuse of the ISI IF in the evaluation of research has already had negative consequences for some scientific disciplines and subdisciplines, because in some institutions low IF values result in these subjects being treated as if they were of lower quality or relevance (Valdecasas *et al*. 2000; Archambault & Lariviére 2009). Even the ISI company, now owned by Thomson Reuters, has insisted that their proprietary IF not be used for comparisons like those described above (Thomson Reuters 2008a). They single out the need to avoid comparing oranges with apples as the most important rule for the correct use of their numeric indicators (Pendlebury 2008), and the only way to avoid falling into this trap is to acknowledge the differences in citation dynamics among disciplines. Since 2005 the JCR website has included several useful tools that allow for the analysis and identification of differences in citation patterns between disciplines (ISI WoK 2009), but access to these is limited to users who belong to an institution that has subscribed to the expensive service.

7. Some repercussions of misusing the ISI IF

Since the 1990s several Latin American researchers and journal editors have been warning us about the dangers of the excessive and often exclusive use of the ISI IF in the assessment of our journals, researchers and institutions (see the more than 40 contributions in Cetto & Alonso 1999). The situation has been analyzed in great detail, particularly for Mexico (Gibbs 1995, Ibarrola 2004, Cereijido 2005, among others) and the general conclusion is that there is both widespread frustration owing to the current evaluation systems and agreement by most scientists that a fundamental shift in evaluation criteria is badly needed.

This situation is not limited to Mexico or Latin America. The authors and editors of scientific journals published in developed countries and indexed in the CI, but which are highly specialized or under consolidation (*i.e.* recently emerged), have also protested the enormous disadvantage of their journals against more generalized ones which include a higher diversity of subjects and reach higher ISI IF values (Statzner *et al*. 1995; Barot *et al*. 2007; Postma 2007). Not long ago, without hesitation these researchers would have submitted their papers to the specialized journal that guaranteed the strictest and most expert refereeing on the subject, however they now feel forced to submit their articles to the

more generalist journals with higher IF that only publish a few articles on their subject. This way, while they meet the demands of their evaluators, they deprive the specialized journal of the best material in the field and put the long term existence of these journals at risk.

Peter Lawrence at the University of Cambridge, UK has been an editor at the journal *Development* since 1976 and a member of the editorial committees of *Cell* and *EMBO Journal*. Not long ago he published a comment in *Nature* (Lawrence 2003) in which he convincingly argued that scientific authors, reviewers and editors must act to protect research quality, which he feels is being damaged by the excessive emphasis on the ISI IF in the evaluation of research. Several scientists supported Lawrence's conclusions in subsequent comments and responses published in the same journal (Brookfield 2003), under such revealing titles as: "Challenging the tyranny of impact factors" (Colquhoun 2003) and "Impact factors: a tool of the sterile audit culture" (Tuck 2003). In this animated debate a single researcher, Lomnicki (2003), defended the use of the ISI IF when evaluating research, arguing that this numeric indicator rewards and promotes academic excellence, in spite of being an unkind system of evaluation. He wrote, "…thousands of books have been written on the evils of capitalism, and now we have articles on the evils of evaluations derived from citation indices". This statement was written before the current crisis of capitalism, and highlights the need for a thorough examination of the possibility that using ISI IF and the ISI CI as indicators of good science, may have consequences for science that are as dire as those caused by the financial indicators and bank strategies which burst the speculative bubble and precipitated the global economical crisis in which we are immersed today.

There are scientific fields in which most of the researchers agree that the widespread popularity of ISI's CI and IF as indicators of good science is damaging. Such is the case in basic taxonomic research, without which at the very least the study of biodiversity would simply not be possible (Valdecasas *et al*. 2000; Thorsten 2002; Carvalho *et al*., 2008; House of Lords UK 2008; Ricker *et al*. 2009). At the same time the scientists and officials on the evaluating committees of academic institutions and funding agencies categorically deny

having harmed any particular discipline. In their defense they argue that their decisions are always based on internationally recognized indicators and standards of quality (*i.e.* ISI IF) that favor the best projects and researchers. Taxonomists rightly insist that this is precisely where the problem resides, and most agree that in recent decades the biology departments and faculties of research institutes and universities have marginalized them, awarding greater preference to the experimental biologists who pursue the trendiest disciplines and monopolize both institutional resources and new positions (House of Lords UK 2008; Ricker et al. 2009; Laborde 2009).

8. Some alternatives to the ISI CI & IF

The Scimago group of the University of Granada and other Spanish universities, together with the company Elsevier's *Scopus*, a proprietary database of scientific publications, has recently presented the academic community with a new tool for comparing the impact of scientific journals, called the Scimago Journal Ranking (SJR). This new service is provided free via the Internet and includes the largest and most representative collection of mainstream journals, with a concerted effort to include the best journals from different countries. The SJR uses an improved formula to calculate the IF (SJR-IF) which, among its other virtues, assigns a weight to the quality of the source of each citation (*sensu* Scimago 2009). In 2008 ISI's JCR included 8,583 journals whereas Scimago-Elsevier's SJR had 17,124 (including all those of JCR). ISI's JCR listed 80 Latin American journals that year, accounting for 0.9% of the collection (ISI WoK 2009); while the Scimago SJR had 443 Latin American journals, representing 2.6% of the collection (Scimago 2009). This service is too new to evaluate its value and consequences, however because of the more representative construction of its index it is worth following its repercussions in academia.

Shortly after the launch of the SJR website, ISI Thomson Reuters announced in mid-2008 the inclusion in their CI of an additional 700 journals from developing countries. These new titles are indexed in the CI as 'regional' journals, which according to Thomson Reuters (2008b); "…are journals typically published outside the US or UK. Their content often centers on topics of regional interest or that are presented with a regional perspective (*sic*)". Among these journals there are 80 from Latin America that were not previously indexed by

ISI, including 18 from Mexico. In Mexico the quality of these journals was not in dispute; for over a decade they have been part of the national index of excellence in scientific journals managed by CONACyT (see below). Curiously, with no notable changes in the quality of their contents or in their editorial policy, these journals have been included in the ISI CI, right after the appearance of the only commercial competitor that ISI has had since its creation 50 years ago. This is even more astonishing when we consider that many of these same journals – at least the ones from Mexico, with which I am more familiar – have in recent years (< 5 years ago) been officially denied inclusion in ISI CI because they did not meet the criteria of this index. On its website Thomson Reuters (2008b) states that these 'regional' journals were included after a careful selection process that lasted more than two years; however, they give no clear or specific details about the academic criteria they applied or about the evaluators involved in the selection. This company has yet to produce a convincing explanation of why so many journals from developing countries were suddenly included in their index.

9. Latin American initiatives

Some interesting initiatives have been developed in Latin America to increase the accessibility and visibility of the scientific publications of its countries. One of them is Latindex, a multi-institutional effort coordinated by the *Universidad Nacional Autónoma de México* (UNAM) which, after an exhaustive inventory compiled a directory of 17,623 scientific journals published in Latin America, the Caribbean, Spain and Portugal. After a rigorous selection process, with the participation of professional librarians, experts on biblio-informatics and active researchers from different disciplines, Latindex produced a catalog of the best 3,897 journals for these countries; journals whose editorial quality and peer-review standards meet international criteria and norms (Latindex 2009). Two other praiseworthy initiatives are Redalyc (Network of scientific journals from Ibero-America) and SciELO (Scientific Electronic Library Online), the first was developed and hosted by the *Universidad Autónoma del Estado de México* (UAEM) and the second by a consortium of Brazilian universities and institutions. Each initiative has a website where the entire content of all their journals is offered for free in portable document format (PDF) in accordance with the Open Access philosophy. They also provide a variety of statistics and

indicators of how many times their articles are being downloaded and from which country, and SciELO also calculates an annual impact factor for each of its journals. RedALyC has 550 journals in its catalog with over 114,000 articles (RedalycC 2009) and SciELO has 628 journals with over 200,000 articles (SciELO 2009), all free to download.

10. National Journal Indexes, Mexico's CONACyT index

In 1993, the *Consejo Nacional de Ciencia y Tecnología* (CONACyT, National Council of Science and Technology) of Mexico established the index of Mexican journals (hereafter, CONACyT index) in recognition of the journals that meet international standards of excellence and deserve to be funded. Renowned researchers from different disciplines participate in the selection process. Once a year the evaluation process is open for any national journal to apply, and every 3 or 5 years each journal is re-evaluated to determine whether it will continue to be listed or must go. Today the CONACyT index includes 109 journals (CONACyT 2009). Not unreasonably, Mexican researchers expect that the articles they publish in these journals will be taken into consideration when their academic trajectory is being evaluated for hiring, contract renewal or promotion purposes (Bazdrech, in Cetto & Alonso 1999). However, some evaluation committees in certain areas of science do not take into account the journals indexed by CONACyT or by any organization other than ISI.

A national index of high quality journals, which is frequently reviewed by experts in the different disciplines of science and recognized by all the researchers of the country is, in my opinion, an unmistakable sign of scientific strength and confidence. To me it is clear that Mexico and several Latin American countries have had the critical mass of internationally renowned scientists needed to bring this about for some time now. Biases that may have been a problem in the past, such as the publication of a scientific journal by a given institution or society with the sole purpose of promoting their own researchers or members – vices from which, incidentally, our colleagues in developed countries are not exempt – have now virtually been eradicated at least in Mexico, under the new and very strict rules of the CONACyT index (CONACyT 2009). Official documents are required to ensure that these rules are met and failure to do so leads to the removal of the journal from

the index.

When analyzing the relevance of Latin American journals, differences between scientific disciplines must be carefully weighed. For some subjects, such as physics, mathematics, cell physiology, molecular biology, etc., the main justification for the existence of a national journal rests upon the fact that its researchers feel they represent a particular school of thought that has important things to say about their subject. When the emergence of such a journal is controlled entirely by scientists, this does not diminish or damage the scientific quality of the disciplines on the international level, but rather enriches the discussion. However, in another set of disciplines that includes zoology, botany, geology, oceanography, etc., the justification for creating a national journal resides precisely in the fact that the subject matter is particular to that country. This is what makes it relevant. Not surprisingly, the internationally renowned experts in this type of discipline are precisely the researchers who work in that country. It is through their sustained efforts, supported by national funding, that the scientists who study the botany, geology, etc. of their country have created a vast and solid body of knowledge.

It is important to identify the disciplines for which Latin American countries produce scientific journals as good as those with the highest international reputation, while weighing at the same time the importance of the journal to its home country and the advancement of science. If we want to take control of the development of science in our countries, there is no better way than by publishing national scientific journals of excellent quality, and to do this it is crucial that our evaluation systems acknowledge the value of publishing in national journals. To further encourage this debate, I cite the Mexican poet and critic Gabriel Zaid (2009; translation, mine): "*The books and articles published in New York (or in Paris) mainly cite books and articles published in New York (or in Paris). There is something natural in the provincial behavior of metropolises: the development of a creative conversation, the energy that animates it, has at its center a local discussion. In contrast, a clear sign of underdevelopment are the publications that do not cite local authors in order to not be perceived as provincial. … For the underdeveloped, important discussions are followed from afar, as if they were a show. Being on the periphery means*

precisely not inhabiting ourselves, but rather believing that 'true life' takes place elsewhere".

11. Conclusion

Although the ISI IF may continue to be used for the evaluation of science in the foreseeable future, it is absolutely clear that we cannot use this indicator in isolation. The information provided by this number should be complemented by other bibliometric indicators in addition to others of quality and relevance. Should an evaluation committee decide to ignore the new international indexes of journals and respective citation indicators (*i.e.* those not owned by ISI), then the committee must provide a concrete, academic justification for why these new indicators are being ignored, and the same should hold if they decide to ignore national indexes, such as that of CONACyT in Mexico. We should also take into account the recommendations made by Lehman *et al.* (2006) and Adler *et al.* (2008); who state that it is extremely important for every scientist and academic institution to understand the dangers resulting from the unthinking use of simple numerical indicators which, while very attractive to evaluators, in reality perform very poorly when compared with the careful analysis of the whole citation record of a scientist. In fact, even this type of analysis is not a valid substitute for the critical reading of the documents published; the latter continues to be our most reliable and accurate method for evaluating the quality and relevance of a researcher's body of work.

The duty of breaking the vicious cycle in which our journals are trapped is in our hands and by making the right decisions we can transform this cycle into a virtuous ascending spiral. This is crucial not only for the development of science in Latin America, but also for the advancement of scientific knowledge worldwide. In order to start moving in this direction, I suggest the following:

- Use the ISI IF as a true indicator; *i.e.* as a diagnostic tool and not as the decisive factor in evaluation (*sensu* Cereijido 2005).
- The ISI IF must be complemented by other bibliometric indicators, not only those recently developed by Thomson Reuters, such as 'citation density' and 'cited

half-life', but also by others developed by different companies and organizations, such as the SJR IF of Scimago-Elsevier. In Latin America we must also include indicators that measure and show how much our work is being read and cited by other Latin American researchers.

- Avoid comparing apples and oranges; the different citation dynamics of each discipline and subdiscipline must be explicitly acknowledged and understood, and that knowledge applied to the task of evaluation.
- Scientific publications not indexed in ISI CI (*e.g.* taxonomic monographs, book chapters, scientific reports, etc.) must be taken into account and evaluated (demanding high standards of quality) regardless of whether or not they have an impact factor.
- It is essential for our evaluation systems to officially recognize the indexes or catalogs of national journals whose quality is being constantly evaluated by active scientists who are experts in the subject of each journal (*e.g.* CONACyT index, Mexico).
- In spite of the difficulties involved in achieving the following, we must always attempt to evaluate a publication based on its content and contribution not by its external appearance – *i.e.* the cover of the journal in which was published.

When discussing the relevance and future existence of our journals it is also very important to explicitly recognize that scientific journals are not only a means of communication between scientists, they also play a crucial role 1) in the evaluation of researchers and science (long before the appearance of ISI); 2) as instruments for teaching and continuity in the education of scientists; 3) in structuring scientific projects and in consolidating disciplines; and 4) they are also important scientific records and repositories of knowledge, *i.e.* they play a key documentary role for posterity (Cetto & Alonso 1999).

Finally, I must insist that we need to take a closer look at the methods by which we have been evaluating science in recent decades, particularly regarding the consequences for the quality of research. Of late, science has been strongly shaped by a competitive frenzy where colleagues have become fierce competitors and the main point of the game is no longer to

advance knowledge, but to pursue recognition and citation by competitors, where the most highly cited, rather than the most original or relevant, prevails. Science reaches its highest expression when nurtured by researchers with different realities, idiosyncrasies, and cultures, and when other scientists are perceived as collaborators or companions on an odyssey of discovery to the farthest reaches of our knowledge. To do so, I cannot think of a better vehicle than scientific journals that are carefully and rigorously produced by experts on the subject, who frequently communicate with each other and contribute to the development of their discipline, regardless of where they come from or in which language they communicate. The content of published documents and the weight of their contribution must form the core of any academic evaluation. This philosophy of evaluation, free of bias and based on academic criteria, can only benefit science.

12. References

Adler, R., J. Ewing, & P. Taylor, 2008, *Citation Statistics. A report from the Joint Committee on Quantitative Assessment of Research (IMU, ICIAM, IMS).* Retrieved March 23, 2008, from: http://www.mathunion.org/fileadmin/IMU/Report/CitationStatistics.pdf

Amin, M., & M. Mabe, 2003, "Impact factors: use and abuse", *Medicina(Buenos Aires), 63*, 347-354.

Archambault, E., & V. Lariviére, 2009, "History of the journal impact factor: contingencies and consequences", *Scientometrics, 79*, 635-649.

Barot, S., M. Blouin, S. Fontaine, P. Jouquet, J. C. Lata, & J. Mathieu, 2007, "A tale of four stories: soil ecology, theory, evolution and the publication system", *PLoS ONE, 11*, e1248.

Brookfield, J., 2003, "The system rewards a dishonest approach", *Nature, 423*, 480.

Carvalho, M. R., F. A. Bockmann, D. S. Amorim & C. R. F. Brandao, 2008, "Systematics must embrace comparative biology and evolution, not speed and automation", *Evolutionary Biology, 35*, 150-157.

Cereijido, M., 2005, "Reflexiones sobre la evaluación de investigadores", *Ciencia, (abril-*

junio), 82-89.

Cetto, A. M., & O. Alonso, 1999, *Revistas científicas en América Latina*, México DF: ICSU – UNAM – CONACyT – FCE.

Colquhoun, D., 2003, "Challenging the tyranny of impact factors", *Nature, 423*, 479.

CONACyT, 2009, *Criterios generales de evaluación para el índice de revistas mexicanas de investigación científica y tecnológica del CONACyT, 2008*. Retrieved May, 18, 2009, from: http://www.conacyt.mx/Indice/ Convocatorias/ Indice-de-Revistas_Criterios-Evaluacion _Convocatoria-2008.pdf

Garfield, E., 1963, *"Science Citation Index". SCI 1961, 1, p.v-xvi, 1963*. Retrieved August, 2008, from: http://garfield.library.upenn.edu/ papers/ 80.pdf

Garfield, E., 1990, "How ISI selects journals for coverage: quantitative and qualitative considerations", *Current Contents, 22,* 5-13.

Garfield, E., 2003, "The meaning of the Impact Factor", *International Journal of Clinical and Health Psychology, 3,* 363-369.

Garfield, E., 2006, "The history and meaning of the Journal Impact Factor", *JAMA, 295,* 90-93.

Gibbs, W. W., 1995, "Lost science in the third world", *Scientific American,* 273: 76-82.

House of Lords UK, 2008, *Systematics and taxonomy: follow-up. Report with evidence. House of Lords Science and Technology Committee, 5th Report of Session 2007-08.* Retrieved May 20, 2008, from: http://www.publications.parliament.uk/pa/ld200708/ ldselect/ldsctech/ 162/162.pdf

Ibarrola, M., 2004, "Evaluación de investigadores. Diálogo entre disciplinas e instituciones", *Avance y Perspectiva, 24,* 9-17.

ISI WoK JCR, 2009, *ISI Web of Knowledge – Journal of Citation Reports.* Retrieved October 14, 2009, from (subscription required): http://admin-apps.isiknowledge.com/JCR/...

Laborde, J., 2009, "La evaluación científica y las revistas nacionales". *Acta Zoológica*

Mexicana, 25, 683-717.

Lawrence, P., 2003, "The politics of publication", *Nature, 422*, 259-261.

Latindex, 2009, "Sistema regional de información en línea para revistas científicas de América Latina, el Caribe, España y Portugal". Retrieved June 18, 2009, from: http://www.latindex.unam.mx/

Lehman, S., A. D. Jackson, & B. E. Lautrup, 2006, "Measures for measures: are some ways of measuring scientific quality better than others?", *Nature, 444*, 1003-1004.

Lomnicki, A., 2003, "Impact factors reward and promote excellence," *Nature*, *424*, 487.

Pendlebury, D. A., 2008, *White Paper: Using bibliometrics in evaluating research*. Philadelphia, USA: Thomson Reuters.

PLoS Medicine Editors, 2006, "The impact factor game", *PLoS Med*, 3(6):e291. DOI:10.1371/ journal.pmed.0030291

Postma, E., 2007, "Inflated impact factors? The true impact of evolutionary papers in non-evolutionary journals", *PLoS ONE*, 2(10):e999. DOI:10.1371/journal.pone.0000999

Redalyc, 2009, *Red de revistas científicas de América Latina, el Caribe, España y Portugal* – Universidad Autónoma del Estado de México. Retrieved June 29, 2009, from: http://redalyc.uaemex.mx/

Ricker, M., H. M. Hernández & D.C. Daily, 2009, "Measuring scientists' performance: a view from organismal biologist", *Interciencia*, 34, 830-835.

Rossner, M., H. Van Epps, & E. Hill, 2007, "Show me the data", *Journal of Cell Biology*, *179*, 1091-1092.

SciELO, 2009, *Scientific Electronic Library Online*. Retrieved June 29, 2009, from: http://www.scielo.br/

Scimago, 2009, *SJR: SCImago Journal and Country Rank.* Retrieved October 14, 2009, from: http://www.scimagojr.com/

Seglen, P. O., 1997, "Why the impact factor of journals should not be used for evaluating research", *BMJ*, *314*, 497-502.

Smith, L., 1981, "Citation analysis", *Library Trends, 30,* 83-106.

Statzner, B., V. H. Resh, & N. G. Kobzina, 1995, "Scale effects on impact factors of scientific journals: ecology compared to other fields", *Oikos, 72,* 440-443.

Thomson Reuters, 2008a, *Preserving the integrity of the Journal Impact Factor guidelines from the scientific business of Thomson Reuters.* Retrieved September 9, 2008, from: http://science.thomsonreuters.com/ citationimpactcenter/

Thomson Reuters, 2008b, *Regional content expansion in web of science: opening borders to exploration*. Retrieved August 26, 2008, from: http://thomsonreuters.com/products_ services/science/free/essays/ regional_content_expansion_ wos/

Thomson Reuters, 2009, *The Thomson Reuters journal selection process*. Retrieved July 20, 2009, from: http://thomsonreuters.com/products_services/ science/free/essays/ journal_selection_process/

Thorsten, F., 2002, "Why impact factors don't work for taxonomy", *Nature, 415,* 957.

Tuck, A., 2003, "Impact factors: a tool of the sterile audit culture", *Nature, 424,* 14.

Valdecasas, A. G., S. Castroviejo & L. F. Marcus, 2000, "Reliance on the citation index undermines the study of biodiversity", *Nature, 403,* 698.

Zaid, G., 2009, *El secreto de la fama*. México, DF: Lumen.

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