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INFLUENCE OF LATIN AMERICAN JOURNALS COVERAGE BY INTERNATIONAL DATABASES

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The coverage of Latin American journals by international databases influences the visibility of these countries' scientific output, and has a direct effect in their activity index per scientific discipline. Local, regional and international character of the most visible Latin American journals in SCI expanded and restricted databases is analysed, as well as its influence in the percentage share of each country in certain disciplines. Suggestions to enhance visibility of local journals are presented.

Introduction

International databases have a regular coverage of main stream science and journals of the most advanced countries, but journals from peripheral countries, as Spain and Latin America (LA), are very scarcely covered, partly due to language reasons. The impact factor of these journals is low, so many of them are not included in a restricted database as is SCI.[1] This gives them less visibility and diffusion. Therefore, scientific output of peripheral countries, and even that of certain non-English speaking European countries may be under-represented when using SCI database, while the output of English-speaking countries such as UK and USA may be (relatively) over-represented.[2]

In previous studies we have observed that the scientific production of the countries is strongly related to the number of national journals covered by the database.[3] In the same way, the activity indexes of countries by scientific discipline is influenced by the inclusion or not of specialised national journals in the case of non-central countries.[4,5]

In this paper we analyse the differences observed in the scientific production of Latin American countries through the SCI restricted and expanded databases. Our aim is to study the characteristics of the most visible journals covered by these databases, how they influence the visibility of the scientific production of the editing country as well as

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that of the other countries of the same region and language, and also their influence on the activity indexes per scientific discipline.

Methods

Data were obtained from SCI CD-ROM version (restricted coverage of only 3400 source journals) and SciSearch on-line (expanded version covering 5300 world-wide journals). The publication year was limited to 1996.

LA journals' coverage, in both versions, was analysed. Each of the titles was searched to determine language of publication and countries of the authors publishing in them. Some thematic disciplines in which the journals are classified by the database were also analysed in the SCI expanded database.

Results

The scientific production of LA countries in the expanded and restricted SCI databases is compared in Table 1. The increase observed in expanded database versus the more restricted one, is 28.5% on average (900303 doc. vs. 700000 doc.), but it is not homogeneously distributed among the countries. While the larger LA countries (Brazil, Argentina, Mexico, Chile and Venezuela) increase around 20–25%, some middle-sized countries behave as the large ones, while others increase by 40% and up to 180%. We considered that this difference could be related to the different coverage of national or regional journals in both databases, but it is not directly so, as shown in the last two columns of Table 1, where the number of LA journals in these databases is presented.

Table 2 lists the titles of 38 LA journals found in 1996 in SCI expanded version, together with the discipline in which they are classified. These journals are predominantly from Life Sciences disciplines (66%). In the area of Physics, Mexico is the only active country with three journals, and in Chemistry five journals from different countries are present. Their frequency of publication is usually low. The predominant document type is article (>90%). Twenty journals of the 38 analysed have impact factor (IF), but only 10 of them are covered in 1996 by the SCI restricted version. Their coverage in previous years is shown in the last column. IF are generally low, in the fourth quartile of their category, being only in three cases in the third quartile. The editors of these journals are mostly from the public sector (universities, research institutes and scientific associations), while only two commercial enterprises are involved.

Table 1
Scientific output and journals of Latin American countries in SCI 1996

	Number of documents				Number of journals		
	SciSearch expanded	SCI restricted	Δ exp.vs. res.	% increase	SciSearch expanded	SCI restricted	Δ exp.vs. res.
Argentina	3820	3180	640	19.6	5	3	2
Bolivia	60	50	10	20.0	0	0	0
Brazil	7401	5895	1506	25.5	14	2	12
Chile	1739	1460	279	19.1	5	2	3
Colombia	459	392	67	17.1	0	0	0
Costa Rica	249	154	95	61.7	1	0	1
Cuba	421	285	136	47.7	1	0	1
Ecuador	82	63	19	30.2	1	0	1
El Salvador	14	5	9	180.0	0	0	0
Guatemala	62	57	5	8.8	0	0	0
Honduras	20	14	6	42.9	0	0	0
Mexico	3693	2977	716	24.1	7	2	5
Nicaragua	21	17	4	23.5	0	0	0
Panama	144	61	83	136.1	0	0	0
Paraguay	28	23	5	21.7	0	0	0
Peru	180	157	23	14.6	0	0	0
Dominican Rep.	34	22	12	54.5	0	0	0
Uruguay	245	201	44	21.9	0	0	0
Venezuela	886	737	149	20.2	4	1	3
Total database	900303	700000	200303	**28.5**	38	10	28

The scientific output of Latin American countries retrieved from SciSearch was compared to the number of nationally edited journals present in SCI. As shown in Fig. 1, Brazil, the most productive country, has 14 journals covered by the database, followed by Mexico with 7 journals, Argentina and Chile with 5 each, and Venezuela with 4. The rest of Latin American countries have one or no journal covered in the database.

For each journal, a series of characteristics were determined: size of the journal, country addresses of the authors and language of publication. With these parameters, the endogamy of national journals and their international character through the frequency of use by other countries of the same or other geographic region were analysed. Journals were thus classified in "local" (L), "regional" (R) or "international" (I), depending on the country profile of their publications (Table 3).

Table 2
Latin American journals included in 1996 in SciSearch grouped by ISI disciplines, Frequency, Impact Factor, and Time Coverage as source SCI journals

Discipline Journal	Frequency	IF	Quartile	Time coverage
Agriculture				
Cuban Journal of Agricultural Science	3 issues	0.165	4	–
Pesquisa Agropecuaria Brasileira	Monthly	–	–	–
Astronomy & Astroph.				
Revista Mexicana de Astronomía y Astrofísica*	2 issues	0.938	3	1983–96
Meteorology & Atmos.				
Atmosfera	Quarterly	–	–	–
Physics				
Revista Mexicana de Física*	Bimonthly	0.199	4	1992–96
Mathematics Applied				
Computational and Applied Mathematics	–	–	–	–
Biology				
Revista de Biología Tropical	3 issues	0.076	4	–
Arquivos de Biologia e Tecnologia	Quarterly	0.093	4	–
Cell Biology				
Biocell*	3 issues	0.264•	4	1995–96
Marine & Fresh. Biology				
Ciencias Marinas	Quarterly	–	–	–
Biochem & Mol. Biology				
Acta Bioquímica Clínica Latinoamericana	Quarterly	–	–	–
Plant Sciences				
Phyton – International J. of Experimental Botany*	2 issues	0.275	4	1981–96
Microbiology				
Revista de Microbiología	Quarterly	0.150	4	–
Chemistry				
Ecletica Química	Annual	–	–	–
Journal of the Brazilian Chemical Society	Bimonthly	–	–	–
Quimica Nova	Bimonthly	–	–	–
Anales de la Asociación Química Argentina	Quarterly	0.136	4	1981–95
Boletín de la Sociedad Chilena de Química *	Quarterly	0.370	3	1987–96
Engineering Civil				
Ingeniería Hidráulica en México	3 issues	–	–	–
Engineering Petroleum				
Visión Tecnológica	Irregular	–	–	–
Geology				
Revista Geológica de Chile	Irregular	0.270	4	–
Medicine Gen.& Internal				
Medicina - Buenos Aires*	Bimonthly	0.172	4	1981–96
Revista de Investigación Clínica	Bimonthly	–	–	1981–85
Revista Médica de Chile *	Monthly	0.161	4	1981–96

Table 3. (cont.)

Discipline Journal	Frequency	IF	Quartile	Time coverage
Medicine Res. & Exper.				
Memorias do Instituto Oswaldo Cruz *	Bimonthly	0.314	4	1989–96
Brazilian J. of Medical and Biological Research *	Monthly	0.455	4	1981–96
Archives of Medical Research	Quarterly	–	–	1981–90
Genetics & Heredity				
Brazilian Journal of Genetics	Quarterly	0.321	4	–
Neurosciences				
Revista Ecuatoriana de Neurología	3 issues	–	–	–
Arquivos de Neuro–Psiquiatria	Quarterly	–	–	–
Nutrition & Dietetics				
Archivos Latinoamericanos de Nutrición	Quarterly	0.052	4	–
Multidisciplinary Sci.				
Revista Chilena de Historia Natural	2 issues	0.202	3	–
Interciencia*	Bimonthly	0.070	4	1981–96
Veterinary Sci.				
Rev. Sociedade Brasileira de Zootecnia –				
Journal of the Brazilian Society of Animal Science	Bimonthly	–	–	–
Pesquisa Veterinaria Brasileira	3 issues	–	–	–
Archivos de Medicina Veterinaria	2 issues	0.041	4	–
Rev. Científica. Fac.de Ciencias Veterinarias	2 issues	–	–	–
Arquivo Brasileiro de Medicina Veterinaria e Zootecnia	Quarterly	–	–	–

* present as source publication in SCI restricted version; •1997 data

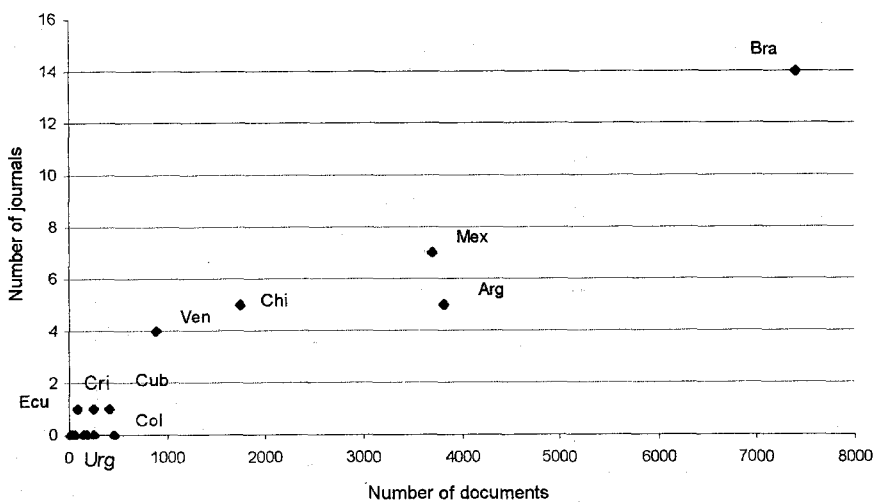

Fig. 1. Latin American documents in SCI expanded versus number of edited journals

Table 3
Latin American journals, country of authors and language profile

	Doc.	Address %				Profile	Language %		
		Country	Region	all LA	Foreign		Span.	Port.	Engl.
ARGENTINA									
Acta Bioquímica Clínica Latinoamericana	29	65.5	10.3	75.9	17.2	LRI	100.0	0.0	0.0
Anales de la Asociación Química Argentina	109	89.0	3.7	92.7	16.5	L	42.2	0.0	53.2
Biocell *	51	62.7	17.6	80.4	17.6	LRI	0.0	0.0	100.0
Medicina - Buenos Aires *	154	77.9	5.2	83.1	11.0	L	84.4	0.0	14.9
Phyton – International J. of Experi. Botany *	49	28.6	49.0	77.6	26.5	RI	38.8	2.0	57.1
BRAZIL									
Arquivo Brasileiro de Med. Veterinaria e Zootec	40	100.0	0.0	100.0	0.0	L	0.0	80.0	20.0
Arquivos de Biologia e Tecnologia	102	92.2	5.9	98.0	2.0	L	23.5	76.5	0.0
Arquivos de Neuro–Psiquiatria	114	86.0	1.8	87.7	5.3	L	19.3	38.6	35.1
Brazilian Journal of Genetics	112	86.6	5.4	92.0	8.0	L	0.0	0.0	100.0
Brazilian J. of Med. and Biolog. Research *	241	78.8	6.6	85.5	22.4	L	0.0	0.0	100.0
Computational and Applied Mathematics	17	41.2	0.0	41.2	76.5	I	0.0	0.0	100.0
Ecletica Química	14	92.9	0.0	92.9	7.1	L	0.0	78.6	21.4
Journal of the Brazilian Chemical Society	89	73.0	4.5	77.5	36.0	LI	0.0	0.0	100.0
Memorias do Instituto Oswaldo Cruz *	150	66.7	28.7	95.3	24.7	RI	0.7	2.7	96.7
Pesquisa Agropecuaria Brasileira	121	95.0	2.5	97.5	0.0	L	7.4	75.2	17.4
Pesquisa Veterinaria Brasileira	7	85.7	0.0	85.7	0.0	L	0.0	100.0	0.0
Quimica Nova	110	84.5	7.3	91.8	11.8	L	5.5	85.5	9.1
Rev.Soc. Brasi. de Zootecnia, J.Br. Soc Animal	19	84.2	0.0	84.2	10.5	L	0.0	100.0	0.0
Revista de Microbiología	53	94.3	3.8	98.1	3.8	L	0.0	0.0	100.0
CHILE									
Archivos de Medicina Veterinaria	41	70.7	26.8	97.6	17.1	R	90.2	0.0	9.8
Boletín de la Sociedad Chilena de Química*	66	78.8	21.2	100.0	27.3	LI	48.5	0.0	51.5
Revista Chilena de Historia Natural	56	51.8	14.3	66.1	39.3	I	35.7	0.0	64.3
Revista Geológica de Chile	16	43.8	25.0	68.8	18.8	R	81.3	0.0	18.8
Revista Médica de Chile *	238	92.4	1.3	93.7	3.4	L	99.6	0.0	0.4

Table 3. (cont.)

	Doc.	Address %				Profile	Language %		
		Country	Region	all LA	Foreign		Span.	Port.	Engl.
COSTA RICA									
Revista de Biología Tropical	144	37.5	43.1	80.6	18.1	R	26.4	0.0	41.7
CUBA									
Cuban Journal of Agricultural Science	55	100.0	0.0	100.0	0.0	L	0.0	0.0	100.0
ECUADOR									
Revista Ecuatoriana de Neurología	16	62.5	25.0	87.5	6.3	R	87.5	0.0	12.5
MEXICO									
Archives of Medical Research	99	85.9	6.1	91.9	21.2	L	0.0	0.0	100.0
Atmosfera	15	53.3	20.0	73.3	46.7	I	20.0	0.0	80.0
Ciencias Marinas	34	88.2	8.8	97.1	20.6	L	32.4	0.0	67.6
Ingeniería Hidráulica en México	21	81.0	9.5	90.5	19.0	L	100.0	0.0	0.0
Revista de Investigación Clínica	76	88.2	1.3	89.5	3.9	L	88.2	0.0	11.8
Rev. Mexicana de Astronomía y Astrofísica*	16	68.8	37.5	106.3	25.0	RI	0.0	0.0	100.0
Revista Mexicana de Física *	116	65.5	23.3	88.8	31.0	I	27.6	0.0	72.4
VENEZUELA									
Archivos Latinoamericanos de Nutrición	63	22.2	61.9	84.1	6.3	R	79.4	0.0	20.6
Interciencia *	52	34.6	26.9	61.5	30.8	RI	53.8	3.8	42.3
Rev. Científica. Fac. de Ciencias Veterinarias	9	88.9	22.2	111.1	0.0	L	66.7	0.0	33.3
Visión Tecnológica	23					L	91.3		8.7

* present as source publication in SCI restricted version

In spite of the journals presenting a high percentage of local production, with very few exceptions, we have considered a journal as local only when more than 73% of its documents had the address of the editing country, regional when the presence of other LA countries was over 25%, and international when the number of documents from non LA countries was over 25%. With these criteria, 21 journals were totally local, 5 were regional and 4 international; 4 journals were considered as R-I and 2 as L-I. Two other journals did not fulfil any of the fixed criteria, so they could be considered as belonging to the three types (L-R-I).

Considering the thematic discipline, international journals are mostly from the areas of Physics and Mathematics, while regional journals are from the Life Sciences area.

As for the language, 11 journals are written in English (>80% of their documents), 14 in Spanish or Portuguese (>80% of their documents) while the rest have a mixed character. The language does not coincide with the international character according to addresses of the authors. A considerable presence of documents in English is observed in many journals, even when local authors are publishing. Considering both language and address, the following disciplines were always local: Medicine General & Internal, Veterinary, Engineering and Marine Biology.

In Fig. 2 we present the publication country profile of three LA journals. *Medicina – Buenos Aires* is considered as a local journal (78% addresses from Argentina) written mostly in Spanish (84%). Few documents from foreign authors are present. *Revista de Biología Tropical* is considered as a regional journal edited in Costa Rica, with only 37.5% documents from this country and 43% documents from the rest of Latin America. Only 18% come from other geographic areas. It is written partly in English and partly in Spanish. *Computational and Applied Mathematics* is a small typical international journal edited in Brazil and written totally in English, with 41% of Brazilian participation and no presence of other LA countries. More than half of the documents are signed by extra-regional countries.

The difference between some LA countries output in SciSearch expanded vs. restricted version (=Δ in column 3, Table 1) is analysed in Fig. 3. The proportion of this increase due to the presence of more LA journals covered is shown. The journals of each LA country are responsible for an important proportion of the observed increase. In Brazil nearly 50% of the increase is originated by its own journals. In Costa Rica more that 50% comes from the introduction of its only journal *Revista de Biología Tropical.* Similarly, nearly 50% of Cuba's increase comes from its journal *Cuban Journal of Agricultural Science.* Countries predominantly publish in their own journals and only occasionally in regional journals, except for Mexico, Argentina and Brazil.

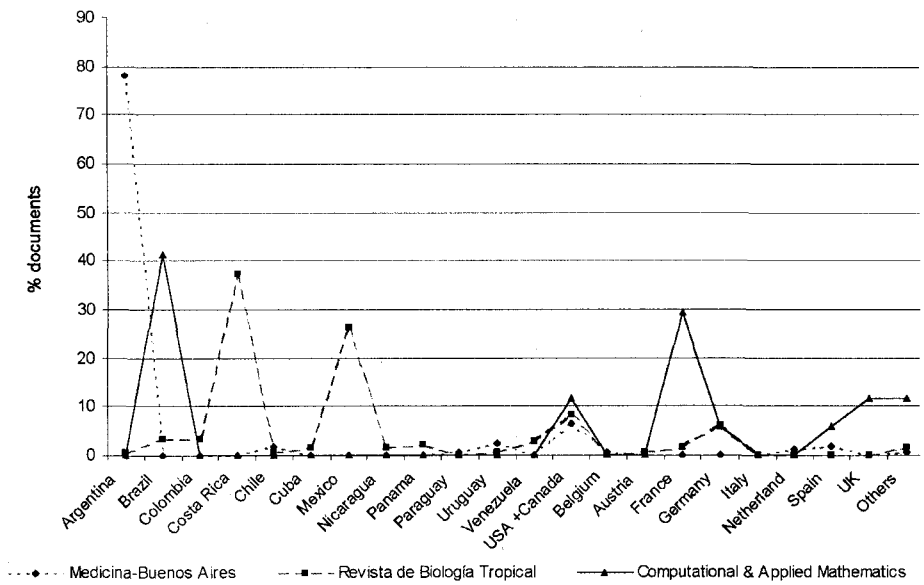

Fig. 2. Country profile of three Latin American journals

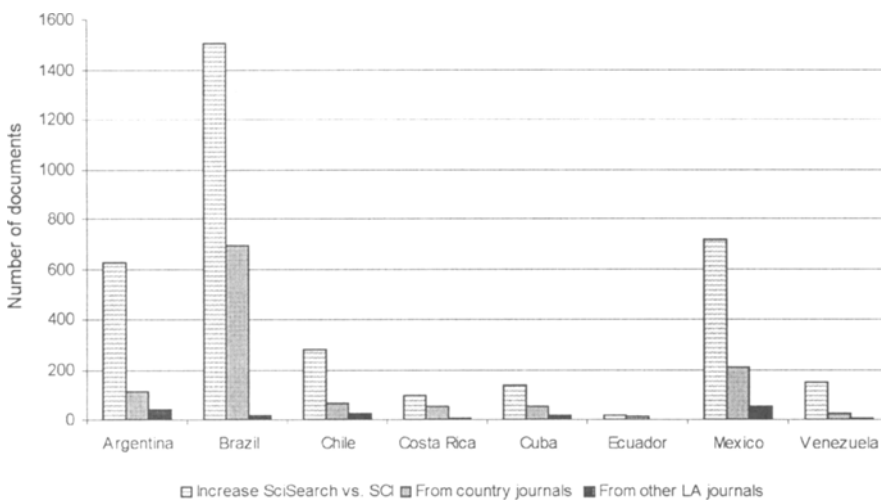

Fig. 3. Origin of the output increase on Latin American countries in SciSearch vs. SCI

Table 4
Analysis of the output of LA countries in three disciplines

	Total output		Chemistry			Biology			Med. Gen. & Int.		
	Doc.	% world	Doc.	% world	Doc. from LA Journals	Doc.	% world	Doc. from LA Journals	Doc.	% world	Doc. from LA Journals
Total DB	**900303**		**34146**			**13640**			**36741**		
Argentina	3820	0.42	168	0.49	106	60	0.44	1	148	0.40	126
Brazil	7401	0.82	256	0.75	173	188	**1.38**	99	41	0.11	–
Chile	1739	0.19	69	0.20	57	27	0.20	5	239	**0.65**	229
Colombia	459	0.05	11	0.03	4	19	0.14	2	13	0.04	1
Costa Rica	249	0.03	7	0.02	–	58	**0.43**	55	1	0.00	–
Cuba	421	0.05	22	0.06	12	3	0.02	2	–	0.00	–
Mexico	3693	0.41	60	0.18	9	118	**0.87**	38	98	0.27	67
Peru	180	0.02	–	0.00	–	10	0.07	–	4	0.01	1
Uruguay	245	0.03	5	0.01	1	8	0.06	–	–	0.00	–
Venezuela	886	0.10	28	0.08	2	14	0.10	4	11	0.03	–

The output in some disciplines covering a certain number of LA journals is analysed, to determine the percentage of documents published in LA edited journals and its influence in the share of the editing country in that discipline (Table 4). The percentage share of some LA countries in SciSearch in 1996 in all areas and in three selected disciplines is shown. Chemistry (General) is a discipline in which five LA journals (3L, 2LI) are covered by SciSearch. The relative activity of the countries is not higher than average. In this discipline the presence of these LA countries would not be visible if no locally edited journals were present. In Medicine General & Internal all three journals are local, and only the large Chilean journal *Revista Médica de Chile* originates for its country a percentage share much higher than expected (0.65%). Argentina and Chile are only seen through their own journals in this discipline, while Mexico is also publishing in extra-regional journals. In Biology (General), a local journal of Brazil, *Arquivos de Biologia e Tecnologia* and a regional one of Costa Rica, *Revista de Biología Tropical* originate high activities in Brazil (1.38%), Costa Rica (0.43%) and Mexico (0.87%).

Discussion

A decrease has been observed in the coverage of Latin American journals by SCI in the last years. The 21 LA journals in 1980-84 SCI restricted version diminished to 10 in 1996, according to SCI data.[6] These 10 journals have been source journals for almost 10 years. LA journals not only have difficulties to get accepted as source by SCI, but also to maintain themselves. They are fragile and fall off easily. Their lack of punctuality[7] is sometimes due to financial problems or lack of originals, because of the pressures received by the researchers to publish their results in journals of higher international visibility disregarding the local journals. The country journal set varies along the years, so time series studies are always incomplete. In our analysis of the 38 LA journals covered by SciSearch expanded in 1996 we have found 55% of domestic journals, 13% of regional journals and 10% of international journals, while another 21% are mixed international journals.

Considering the total output of LA countries in "main stream" science, their presence in SCI grows in international publications up to 51% from 1991 to 1995.[8] Conversely, *Gil-Arnao* et al.[9] detect a constant decrease in the number of articles written in Spanish and covered by SCI in the period 1981–1995, in spite of the inclusion in 1992 of a large Spanish journal totally written in Spanish: *Medicina Clínica*. Local LA journals are not always written in Spanish or Portuguese; we have found five such journals written only in English, what we interpreted as an effort to enhance international visibility. If we follow the evolution in the language used by LA journals

present in SCI for some years, we find a trend towards English language. Spanish and Portuguese are currently being used in clinical and local topics, while English is taking its place in other more basic topics of possible international interest, as has also been observed for Spanish journals. The Mexican *Archivos de Investigación Médica* has even changed its title to *Archives of Medical Research.*

Impact factor as a measure of journals' use is important for the ISI selection of source journals. But it has to be noted that in developing countries, lack of citations in SCI is not always directly related to quality.[10] Several circumstances can influence it. Local journals are often the channels used for the diffusion of valuable research results with a local scope and therefore not easily accepted in international journals. Domestic journals are chosen to reach local audiences, particularly in the applied or clinical sector.[11] We can observe that 74% of LA journals in SCI are from the Life Sciences area. When publishing in Spanish or Portuguese, the language strongly limits the use of the literature to a smaller scientific community and creates closed environments; possible citing authors diminish and therefore citation results are low. This is not the case for English speaking countries that benefit from a large English-speaking scientific community. In spite of their increasing use of English, most LA journals are in the fourth quartile of their discipline, only three in the third quartile. The case of *Revista Chilena de Historia Natural,* a journal born in 1897, is uncommon: although its IF=0.202 corresponds to the third quartile, it is not considered as SCI source journal.

Elite journals will always belong to the source publications of SCI. But the selection of those from peripheral countries is influenced by different factors.[12] As the selection of journals by SCI and SciSearch is based in the citations they receive from source journals, if the self-citations from all LA journals were considered together with their cross-citations, the situation might be different. We have studied the influence of both cross-citations and self-citations for the Spanish journal *Medicina Clínica.* When SCI considered it as source journal in 1992 its self-citations produced an increase in its impact factor by a factor of 7, and cross-citations were observed to benefit another Spanish journal of the same scientific discipline, *Revista Clínica Española.*[13]

If science is not visible, it is somehow lost. In Latin America different initiatives have taken place particularly in Brazil and Mexico to select a list of high quality local journals independently of their presence in SCI, in order to give them financial support. The quality criteria have being discussed and revised according to the needs and characteristics of the region itself, as both local and international journals are necessary. At a regional level, BIREME's database LILACS enhances the visibility and access of the LA health and biomedical journals and PERIODICA covers LA science and technology journals (although with a national bias). Other national and regional

initiatives have also taken place. Amongst them, LATINDEX is a regional information system based on a network of national resource centres that is presently producing a comprehensive directory of all active scientific periodicals published in the region.[14] Different indirect quality indicators are used to filter the scientific quality of the journals into three levels: lowest level considers the presence of identification criteria required by international standards, regularity and 40% of original articles, notes, letters or congress presentations; medium level requires identification of Editor and Editorial Committee, abstract of papers and yearly index, as well as 60% of original articles, notes, letters or congress presentations; highest level should also include external refereeing evaluation, instructions to the authors, external participation to avoid endogamy, English abstracts, date in which papers were received and two years minimum of existence. As this evaluation assessment project is not yet completed, we cannot include its classification for the journals studied in the present paper.

More than half of the 38 LA journals covered by SciSearch publish less than 60 documents per year and furthermore most documents come from authors of the editing country. A small presence of other LA countries was found. We therefore suggest that small local journals should merge together into larger and regional journals, where scientists from the different LA countries could publish. Perhaps this can be feasible, as most editors are public institutions related to universities or research institutes. The role of those LA journals is important and has to be consolidated and strategic measures should be taken in order to enhance their periodicity and financial support.[1] Larger size, higher frequency and stability of these regional journals are related to higher visibility and acceptance in databases. This could lead LA authors to publish part of their best results in them, and cite them when publishing abroad, so that publications in these journals would be better considered in the assessment by science managers and evaluators.

Bibliometric indicators are much more reliable and representative for industrialised countries that are mainly publishing in international journals. The SCI bias in favour of journals of Anglo-American origin has to be taken into account when bibliometric indicators are obtained for peripheral countries, particularly in the case of applied or clinical disciplines.[15] High activity indexes in certain disciplines that could be interpreted as an indicator of special dedication or success of experts in that discipline can be due, at least in part, to slight coverage changes in the database in favour of national journals. This is particularly important for small countries (as is the case of Costa Rica in Biology). The wider the coverage of the database, the nearer to reality the results will be, so the use of several databases for evaluation purposes, including national databases, gives the most accurate information.[16] Other alternative channels of

communication should also be considered, particularly in disciplines where reports or other vehicles are frequently used. The need to design special indicators suitable to measure scientific activity of peripheral countries is stressed, as has already been proposed in previous debates.[17,10]

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