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RECENT STRATEGIES FOR ADDING VALUE TO SCIENTIFIC JOURNALS IN LATIN AMERICA

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A recent initiative in some Latin American countries, to define the *basic core* of credited titles of domestic scientific journals in the different knowledge fields, is reviewed. The policy aim is to strengthen the best journals and to minimize the noise produced by the great number of journals that do a disservice to the authors who publish in them either because of their low quality or because even if they are reasonably good, have a very low impact. It is argued that if the exercise were carried out in a rigorous and systematic way in the countries of the region that publish scientific journals, one might eventually obtain a depurated list of Latin American periodical publications. Such list might be useful as a supplement to the catalogues of mainstream journals registered by ISI and other international databases, and could provide "valid" alternatives of publication of results for Latin American researchers and for authors of other regions active in subjects in which the countries of the region have significant scientific contributions. It might also help to provide a better indication of the total publishing activity of Latin American countries.

Introduction

Scientific journals are the means *par excellence* of scientific communication. They also serve to register achievements attained and to mobilize audiences behind the results of individual research projects. It is assumed that a researcher seeks the journal that may bring the best opportunity of visibility to his results. This implies that there is a problem of differential "visibility" or "impact" of the vehicles of diffusion of the scientific knowledge produced. The concern for the visibility and impact of scientific periodical publications, has given rise to the notion of "mainstream", the main current of international scientific production, as gathered and diffused by the most important journals in the world. The criteria of selection of these journals, the kinds of quality filters they apply in the evaluation process, insure that they serve to a reasonable extent as quality indicators of the papers they publish. It is more likely that through the increased circulation value of such journals,

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research results reported in them are not ignored, get a better coverage in data bases and imply a greater potential readership.[1]

On the other hand, scientific publications that do not belong to the *mainstream* constitute a huge heterogeneous lot, in which a variety of different situations and problems pack together. They are often evaluated differently or they are simply not evaluated. Sometimes a researcher tries to publish in domestic journals with the aim of creating a local space for specialized debate. Often small journals are associated to a given language, either to defend the possibility of doing science in that particular language, or as an attempt to defeat what is visualized as the "language" barrier at a time when English is taken to be the *lingua franca* of science. On other occasions, the journal outside the *mainstream* is the result of repeated failures by authors to get access to more competitive contexts, with the deleterious consequences that low quality articles cause to local journals and to science in a particular setting.[2]

The main problem in connection with this mass of less known periodical publications is the proliferation of low quality journals of very poor circulation and short life-span, side by side with journals that constitute valuable initiatives that should be reinforced as strategic channels for the development of research in specific fields in specific regions. The undifferentiation in which Latin American scientific journals find themselves because of lack of sufficient knowledge about them by the Latin American scientific community, has a negative effect upon regional science. It worsens the figures of the already low productivity of Latin American research, as results from the different international bibliometric bases, that ignore almost completely these publications.[3] With globalization of communications and information under way, the networks of databases are getting to be organized in such a way that increasingly the journals that are not included in them give no visibility, impact, prestige, recognition or credit to authors.

Science policy implications

How to face the problems which these non mainstream local journals involve? The appeal to the elimination of *non-mainstream* journals simply because they are not in SCI or any such other similar data bases – as seem to think some scientists and officers of the National Science Councils (the ONCYTs) of Latin American countries – is absurd. The very idea of *mainstream* is relational. In analogy with sports where in order for there to be winners there must also be necessarily a mass of practitioners of varying quality, preparation and level of performance and in

connection with whom the larger the base from where to extract more talents the better, *mainstream* journals involve the existence of a large quantity of publications of varying worth and visibility which in different ways feed the mainstream and keep complex relationships with it.

Thus the existence of domestic scientific journals in the different countries is not in itself a bad idea; on the contrary, it may be a welcome presence. Most of these journals are not included in international indexes because their interest is exclusively a local one. They may reflect peculiar domestic circumstances, including the learning processes, monitoring and adaptation characteristic of countries in the process of "catching up" the most advanced ones, or simply reflecting specific "scientific" or "national" agendas. At different times, the region's ONCYTs defined actions of financial support to scientific journals, with the main aim of fostering science and insuring a communication channel for the diffusion of the research funded by the countries themselves. The basic principle was the symbolic value attributed to the domestic scientific journal and its assumed agglutinating power of a community of specialists.

But despite the existence of support mechanisms for scientific journals in almost all the region's ONCYTs, in broad segments of the Latin American scientific communities there is an unsufficiently developed culture of scientific publishing and results are dispersed in journals and other local publications of scarce or no impact, which affect negatively the visibility of the national scientific activity leading to losses of intellectual and material efforts that could be avoided.[4] The palliative measures so far applied by the ONCYTs of subsidysing the journals that asked for help while funds were available, started to enter in contradiction with the recommendations or demands – according to the discipline – of the evaluators of the research projects funded by the same agencies. The current system of evaluation of scientific activity in the region today has adopted the criteria common in industrialized countries, consisting basically in the recognition of certain eminently stratified (and biased) publication patterns. But despite adopting such criteria, no complementary effort has so far been made to revise and produce a generalized and accessible catalogue of the region's accumulated scientific production, as registered in local scientific journals, so as to add it to the pool of international scientific information.[5] On the contrary, because of mimetism and ready compliance, citation indexes or databases such as *Science Citation Index* (SCI) and the *Journal Citation Reports* (JCR) are adopted as practically the only measuring sticks, especially for the basic sciences. In such

evaluations, the points received by works published in domestic journals are usually very low or nil.

The effects of this state of affairs are very complex and I am not going to analyse them here.[6] But their implications upon the functioning and direction of science in the countries concerned, are not necessarily favourable to all disciplines and circumstances.[7] The contradiction between the policy followed by public administration of fostering the improvement of Latin American journals, and the policy advocated by the same administration that gives greater weight to the papers published in foreign journals, must be resolved. As in other domains, the contradiction is to a good extent the result of confusing things. Neither all disciplines, and within them specialties, have the same requirements of "internationality", nor the quality can be measured by the same set of parameters.

It is obvious that a definition of a coherent strategy for the development of scientific research is called for in the countries of the region, a strategy that take into account not only the production of knowledge but also its communication, use and visibility, as a function of the ultimate interest of that country. The key point, from the perspective of a national science policy, is that *simultaneously* to the support of good domestic journals, the national scientific community must be stimulated to express itself also in the international domain, subjecting itself to a broader set of peers. It is crucial that the scientists of a given country gain some degree of recognition from the international scientific community not so much because of the greater visibility they or their country may obtain, but because of what such a confrontation implies in terms of quality control of the science produced in that particular country. Otherwise, the habit of publishing *exclusively* in the domestic domain may become an alibi for low standards of scientific work. It is important that a country has a means of assessing how the scientific activity carried our locally is placed in connection with what is going on in the rest of the world.[8] To the extent that Latin American domestic journals receive works from abroad, that they include members of the international domain in their editorial boards, and adopt more internationalized patterns of production and circulation, they will be contributing to increase the visibility of local production. If this is accepted, then domestic or international publishing ought no longer be posed as a dilemma.

The problem is not new

Already in 1964 at a UNESCO meeting in Río Piedras, Puerto Rico, a group of specialists analized the problem of scientific journals in the Latin American region.[9] They excluded a little over half the periodical publications because they belonged to the clinical medical field, and worked on some 500 journals. The 1964 diagnose was that parochialism and the amateur character of publishing practices was largely responsible for the difficulties faced by local institutions in the publication of scientific journals, and resulted in their scarce economic power. The formation of editorial bodies constituted by distinguished men of science with little time available to devote to the editing process, irregular publishing, limited edition, scarce offer of articles from which to choose, reduced distribution and difficulties for reaching scientists in other regions of the world were some of the common features of Latin American scientific journals. Latin American publications were locked up in a classic vicious circle: domestic journals did not gain prestige and international circulation because the region's scientists published their best results abroad, but Latin American researchers published abroad because domestic journals did not take their results to the scientific world. The conclusion was that there were too many scientific journals in Latin America by comparison to the worthwhile local scientific production.

The panel of specialists found that agriculture, chemistry and biology, with a longer tradition and greater development in the region, surpassed the other sciences in the number of journals and in the quality of editorial features.[10] It selected 96 journals (17%) as being the ones that constituted the best vehicles for publication of research results produced in the region and deserving special attention in any program that could be prepared in the future for the support or coordination of scientific journals (See *Annex 1*). It recommended UNESCO to give the most resolute support to the scientific and technical Latin American journals sustained by scientific associations or groups, in order to achieve their gradual transformation into international or regional journals; that whenever possible, journals in similar specific fields be fusioned, with the aim of concentrating editorial efforts and get the financial resources to publish a single high quality journal;[11] that in each specialty there be a journal that would gather most of the good Latin American production to facilitate the diffusion of the best works within and outside the region on that particular subject; that a list of Latin American scientific and technical journals be published and kept updated; that the possibility of editing a publication similar to *Current*

Contents of selected Latin American journals be explored; and that a study be made of the causes for the failure and premature death of Latin American scientific journals.

These recommendations made thirty years ago, continue to be valid today. Only that given the quantitative explosion and the diversification of the information generated in the different fields of knowledge in recent decades, the nature of the problem is today much more complex.

Two strategies for adding value to domestic journals

Given the situation I have described and in view of the "increasing need of the scientific community to rely on more concrete foundations for evaluating the papers published in domestic scientific journals,"[12] the ONCYTs of Brazil and Mexico have started to select the basic core of domestic scientific journals of good quality that deserve financial support, aiming at their achieving the active support of the national scientific community. In both cases, a selective list of domestic scientific journals was made with the purpose of serving as guidelines for the actions of the respective ONCYTs, the different research evaluating committees and the authors of scientific works in search of valid options for the publication of their research results.

For the establishment of the "Basic Core of Brazilian Scientific Journals", the procedure was the following:[13] a list was made of current domestic titles, which was then organized by means of the application of the National Council for Scientific Research (CNPq)'s General Index of Knowledge Fields, Sub-fields and Specialties. In the initial phase it was decided not to exclude popularisation journals so as to produce as broad a list as possible for each field. Next the list of codified titles according to field an sub-field was sent to specialists together with a guide of procedures. Specialists were asked to analyze and classify the journals according to relative merit. Each specialist examined all the titles in his field of expertise included in the list, completed the list if he found that there were titles missing, and classified them according to his personal appraisal of degree of relevance, writing down his assessment in pre-elaborated forms. In those forms categories were defined for the degree of relevance of the journals (prioritary, important, and of relative importance). In the case of prioritary journals, one was also asked to specify the degree of decreasing priority.

The evaluation carried out in 1990, showed that 83.21% of the domestic titles *was not considered to be relevant*. Of the relevant titles (16.78%), 118 were judged as

prioritary, 134 as important and 120 as being of relative importance. Of the 12 fields of knowledge distinguished in the Brazilian case, three had percentual indexes of relevant titles above 50% (Architecture and Urbanism, Astronomy and Chemistry), although they were the ones they had a lesser number of current titles (17, 8 and 25 titles respectively) and nine fields had percentual indexes below 25% (Agricultural Sciences, Biological Sciences, Health Sciences, Economics and Administration, Human and Social Sciences, Engineering, Physics, Geosciences and Mathematics). The field of Agricultural Sciences, with the largest number of published journals (23.3% of the existing total) turned out having the lowest index of relevant journals (6.68%). The field of Human Sciences (in the Brazilian usage it also includes the Social Sciences) was in second place among the fields with the largest number of published journals (22.63%); however, it had an index of 23.60% of relevant journals. Analysts estimated that this number of journals was derived from the subdivision of the human sciences in 17 sub-fields. On average, this meant some 7 journals per subfield as against 276 for each one of the 8 agricultural subfields. The field of Human Sciences presented the greatest number of titles considered prioritary (24.88%), followed by the fields of engineering (19.27%).

In Mexico, a similar process took place more recently, under the auspices of CONACYT, producing an Index of 68 "Mexican Journals of Excellence", evaluated by specialists from the scientific community. In this case, the official call for submissions emphasized the provision of statistical information by the journals themselves, asking them to include the number of articles received *per year*, percentage of rejected papers, the number of foreign articles that are accepted, data about the impact factor, list of international indexes where the journal is covered. The call also indicated explicitly that the results of the process would serve as one of the bases for the evaluation of research projects and for applications to the National System of Researchers (SNI). There was clearly a will to solve or at least reduce the tension between the two policies, admitting that domestic journals are a central component in the establishment of an academic research system with a relative degree of autonomy. This need was felt to be obvious considering the fact that only five Mexican journals are included in the SCI, and that therefore such parameter could not be the only measuring stick for the performance of the Mexican scientific community. Since it was the first time this exercise was made. critical remarks were voiced immediately. Discrepancies of quality among many of the journals selected was noticed; apparently a number of them were accepted on a conditional basis. The demand in this case was to have a public indication of the journals accepted on a trial

basis and of the degree of their conditional acceptance.[14] Besides, it was argued that not all the good journals joined the competition in the first call. There are fears that discrepancies such as these may have negative repercussions in the acceptance of the Index by the research evaluating committees.

Of the 68 journals included in the Index, 53 are produced by educational institutions, while 15 are published by scientific associations. UNAM publishes 23 (33.3%) of the listed journals, distributed between its Subsystem of the Humanities (52.1%) and its Scientific Subsystem (47.9%).[15] Although the "15 journals produced by the scientific associations are in better condition to favour the organizational freedom and autonomy required for the impartial publication of scientific research results and among them are the best journals produced by the Mexican scientific system,"[16] they are in a vulnerable financial situation, while the first group tends to rely on the institutional support. Since the Index appeared in 1994, there has already taken place the fusion of *Optica*, the journal of the Academia Mexicana de Optica, with the *Revista Mexicana de Física*, in a kind of operation that it is expected to become more common in the near future.

This type of exercise, which has just started in Mexico, is intended to be iterative, trying to gradually approach a more truthful and just picture of the situation. At least, it seems to reflect a will to face, with the aim of solving it, the tension between the contradictory incentive policies of domestic scientific journals and of evaluation of research activity according to exclusively "international" criteria.

Conclusion

The development of bibliometric and scientometric studies has allowed different scientific communities to carry out a range of studies helping to define public policies better adjusted to a country's state of the art in scientific research. The qualification of journals and the establishment of a ranking between them has constituted an obligatory step in this process. When the situation of Latin American journals registered by SCI and JCR is analyzed, the differences in the order of magnitude between what is included in such indices and the total number of existing journals in the region are so great, that it becomes necessary to study separately the Latin American production not indexed by those bases.[17] It is in this direction that the actions taken by Brazil and Mexico aim.

It would seem desirable that in the case of the Latin American countries that have a considerable number of scientific journals, mechanisms be established for their

evaluation as well as for the evaluation of those that may be created in the future, consistent with the criteria of research evaluation followed in those countries. This implies that domestic scientific journals will have to be submitted to rigorous evaluation of their quality, profile, and strategy.[18] For this, it is necessary: (1) To establish the basic core of domestic scientific journals in the different fields of knowledge, making it possible that they get priority of funding; (2) to obtain informational data about the quality pattern of journals, facilitating the appreciation of the requests for funding of the journals submitted to the Science Councils and other support agencies; (3) to raise the awareness of journal publishers about the importance of adopting quality patterns that may allow them to improve the level of their publications and that, consequently, may contribute to a greater diffusion and acceptability of the journals in the national and international scientific-technical domains; (4) to have the leading members of the scientific community accept the good domestic scientific journals as valid complementary options for publication of research results.

In a second stage, the Science Councils of the several countries in the region could pursue a series of studies about evaluation criteria of the journals, enabling a broader and more uniform judgement of the region's scientific journals. It will then be possible to seek a regional dimension for scientific publications in some fields where there may be advantages for that and define more effective strategies of international collaboration. The diversity of situations of scientific development offers interesting elements with regard to the fields in which a country may have greater relative strength and to the journals that have possibilities of becoming truly international. Regionally focused international publications in selected fields of science would probably find receptive audiences. One could envisage the possibility that in a not too distant future it might be possible to have a set of not only local but truly Latin American journals, strengthened and recognised by the committees in charge of evaluating the quality of the mechanisms for the diffusion of results of the scientific research produced in those countries, thus increasing the visibility of the national and regional scientific activity.

Annex 1

List of selected scientific and technological Latin American journals. 1964[19]

AGRONOMY

1. **Agronomía Tropical**, Maracay, Centro de Investigaciones Agronómicas, Instituto Nacional de Agricultura.
2. **Anales Científicos**, Lima, Universidad Agraria.
3. **Boletim de Industria Animal**, Sao Paulo, Secretaria da Agricultura. Depto. de Producao Animal.
4. **Boletim da Superintendencia dos Servicos do Café**. Sao Paulo, Secretaria da Fazenda do Estado de Sao Paulo.
5. **Bragantia**, Campinas, Secretaria da Agricultura, Instituto Agronomico.
6. **Revista de la Facultad de Agronomia**, La Plata, Universidad Nacional de la Plata.
7. **Revista de Investigaciones Agrícolas**, Buenos Aires, Instituto Nacional de Tecnología Agropecuaria, Secretaría de Agricultura y Ganadería de la Nación.
8. **Revista Peruana de Entomología Agrícola**, Lima. Sociedad Entomológica Agrícola del Perú.
9. **Turrialba**, Turrialba. Instituto Interamericano de Ciencias Agrícolas.

ANTHROPOLOGY

10. **Revista de Antropología**, Sao Paulo, Universidade de Sao Paulo, Faculdade de Filosofía, Ciencias e Letras.
11. **Runa**, Buenos Aires, Universidad de Buenos Aires, Instituto de Antropología.

ASTRONOMY

12. **Boletín de los Observatorios de Tonantzintla y Tacubaya**, México, Universidad Nacional Autónoma de México.
13. **Serie Astronómica**, La Plata, Universidad Nacional de La Plata, Observatorio Astronómico.

BIOLOGY

14. **Acta Biológica Venezuélica**, Caracas, Universidad Central de Venezuela, Facultad de Ciencias Matemáticas y Naturales, Sección de Biología.
15. **Acta Neurológica Latinoamericana**, Montevideo.
16. **Acta Physiologica Latinoamericana**, Buenos Aires.
17. **Acta Zoológica Lillolana**, Tucumán, Universidad Nacional de Tucumán, Instituto Miguel Lillo.
18. **Acta Zoológica Mexicana**, México.
19. **Anais de Microbiología**, Rio de Janeiro, Instituto de Microbiología da Universidade do Brasil.

20. Anales de la Escuela Nacional de Ciencias Biológicas, México, Instituto Politécnico Nacional.
21. Anales del Instituto de Biología, México, Universidad Nacional Autónoma de México.
22. Archivos Venezolanos de Nutrición, Caracas. Instituto Nacional de Nutrición.
23. Arquivos do Instituto Biológico, Sao Paulo.
24. Arquivos do Museu Nacional, Rio de Janeiro.
25. Arquivos de Zoologia do Estado Sao Paulo, Sao Paulo, Secretaría de Agricultura, Departamento de Zoología.
26. Biológica, Santiago de Chile, Universidad de Chile, Facultad de Medicina.
27. Boletim do Museu Nacional do Rio de Janeiro, Serie Zoología.
28. Boletin del Instituto de Estudios Médicos y Biológicos, México, Universidad Nacional Autónoma de México.
29. Boletin de la Sociedad de Biología de Concepción, Universidad de Concepción, Instituto Central de Biología.
30. Boletín do Instituto Oceanográfico, Sao Paulo.
31. Boletín de la Sociedad Botánica de México, México.
32. Caldasia, Bogotá. Universidad Nacional de Colombia, Instituto de Ciencias Naturales.
33. Darwiniana, Buenos Aires. Instituto de Botánica "Darwinion", Academia Nacional de Ciencias Físicas y Naturales.
34. Folia Entomológica Mexicana, México. Sociedad Mexicana de Entomología.
35. Investigaciones Zoológicas Chilenas, Santiago de Chile. Universidad de Chile, Centro de Investigaciones Zoológicas.
36. Lilloa, Tucumán, Universidad Nacional de Tucumán, Instituto Miguel Lillo.
37. Memorias do Instituto Butantan, Sao Paulo.
38. Memorias do Instituto Oswaldo Cruz, Rio de Janeiro.
39. Montemar, Montemar. Instituto de Biología, Estación de Biología Marina.
40. Physis, Buenos Aires. Asociación Argentina de Ciencias Naturales.
41. Phyton, Buenos Aires.
42. Revista de Biología Tropical, San José, Universidad Nacional de San José de Costa Rica.
43. Revista Brasileira de Biología, Rio de Janeiro, Sociedade de Biologia do Brasil.
44. Revista Brasileira de Entomologia, Sao Paulo, Sociedade Brasileira de Entomologia.
45. Revista Latinoamericana de Microbiología, México, Asociación Mexicana de Microbiología.
46. Revista de la Sociedad Argentina de Biología, Buenos Aires.
47. Revista de la Sociedad Entomológica Argentina, Buenos Aires.
48. Revista de la Sociedad Uruguaya de Entomología, Montevideo.

49. Studia Entomologica, Rio de Janeiro.

50. (Recommended the fusion of:
Arquivos do Jardim Botánico do Rio de Janeiro,
Rodriguesia, Rio de Janeiro, Ministerio de Agricultura, Jardim Botanico do Rio de Janeiro,
Sellowia, Anais Botanicos do Herbário "Barbosa Rodriguez", Itajaí.

PHYSICS AND MATHEMATICS

51. Revista de Matemática y Física Teórica, Universidad Nacional de Tucumán, Facultad de Ciencias Exactas y Tecnología.
52. Revista Mexicana de Física, México. Universidad Nacional Autonoma de México, Instituto de Física.
53. Revista de la Unión Matemática Argentina y de la Asociacion Física Argentina, Buenos Aires. Unión Matemática Argentina.
54. Suma Brasiliensis Mathematica, Rio de Janeiro. Instituto Brasileiro de Educacao, Ciencia e Cultura, Instituto de Matemática Pura e Aplicada.

GEOPHYSICS

55. Anales de Geofísica, México.
56. Geofísica Internacional, México.
57. Serie Geofísica, La Plata, Universidad Nacional de La Plata, Observatorio Astronómico.

GEOLOGY

58. Acta Geológica Lilloana, Tucumán, Universidad Nacional de Tucumán, Instituto Miguel Lillo.
59. Boletin de la Sociedad Geológica del Peru, Lima.
60. Revista de la Asociación Geológica Argentina, Buenos Aires.

GEOGRAPHY

61. Revista Brasileira de Geografía, Rio de Janeiro, Instituto Brasileiro de Geografia e Estatistica.

ENGINEERING

62. A.B.M. Boletim da Associacao Brasileira de Metais, Sao Paulo.
63. Boletin de Técnicas y Aplicaciones del Muestreo, México, Secretaría de Industria y Comercio.
64. Engenharia e Quimica, Rio de Janeiro.
65. Estrutura, Revista Técnica das Construcoes Civis, Rio de Janeiro.
66. Industria Química, Buenos Aires, Asociación Química Argentina.
67. Ingeniería Mecánica y Eléctrica, Caracas.

68. Metalurgia Moderna, Buenos Aires, Sociedad Argentina de Metales.
69. Plásticos y Resinas, México.
70. Revista Argentina de Grasas y Aceites, Buenos Aires, Instituto Argentino de Grasas y Aceites.
71. Revista Electrónica, Buenos Aires, Asociación Argentina de Electrotécnicos.
72. Revista del IDIEM, Santiago de Chile, Universidad de Chile, Facultad de Ciencias Físicas y Matemáticas, Instituto de Investigaciones y Ensayo de Materiales.
73. Revista Latinoamericana de Siderurgia, Santiago de Chile.
74. Revista de Química Industrial, Rio de Janeiro.
75. Revista de Química e Ingeniería Química, Monterrey, Instituto Tecnológico y de Estudios Superiores.

PALEONTOLOGY

76. Ameghiana, Buenos Aires, Asociación Paleontológica Argentina.
77. Paleontología Mexicana, México, Universidad Nacional Autónoma de México, Instituto de Geología.

CHEMISTRY

78. Anais da Associacao Brasileira de Quimica, Rio de Janeiro.
79. Anales de la Asociación Química Argentina, Buenos Aires.
80. Boletin del Instituto de Química, México, Universidad Nacional Autónoma de México.
81. Revista de la Asociación Bioquímica Argentina, Buenos Aires.
82. Revista de la Sociedad Química de México, México.

INTERDISCIPLINARY JOURNALS

83. Acta Científica Venezolana, Caracas, Asociación Venezolana para el Avance de la Ciencia.
84. Anais da Academia Brasileira de Ciencias, Rio de Janeiro.
85. Anales de la Sociedad Científica Argentina, Buenos Aires.
86. Boletín de la Facultad de Filosofía, Ciencias e Letras de Sao Paulo.
87. Boletin del Instituto Oceanográfico de la Universidad de Oriente, Cumaná.
88. Boletín de la Sociedad Venezolana de Ciencias Naturales, Caracas.
89. Ciencia, México.
90. Ciencia e Cultura, Sao Paulo. Sociedade Brasileira para o Progresso da Ciencia.
91. Ciencia e Investigación, Buenos Aires, Asociación Argentina para el Progreso de la Ciencia.
92. Revista de la Academia Colombiana de Ciencias Exactas, Físicas y Naturales, Bogotá.
93. Revista de la Facultad de Humanidades y Ciencias, Montevideo, Universidad de la República.
94. Revista del Museo de la Plata, Universidad Nacional de La Plata.
95. Revista del Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" e Instituto Nacional de Investigación de las Ciencias Naturales, Buenos Aires.
96. Revista de la Sociedad Mexicana de Historia Natural, México.

Annex 2

Basic core of priority current Brazilian journals[20]

FIELD: ARCHITECTURE AND URBAN STUDIES

Subfield: Architecture and Urban Studies (General)

Arquitetura e Urbanismo
Arquitetura:Revista do Instituto de Arquitetos do Brasil
Boletim Paulista de Geografia
Cadernos "Pur" (Planejamento Urbano Regional)
Espaco e Debates
Módulo: Revista de Qrquitetura e Artes Plásticas
Projeto
Revista "SPAM"
Revista de Administracao Municipal
Revista do "MDU" (Mestrado en Desenvolvimento-SUDENE)

FIELD: ASTRONOMY

Subfield: Astronomy (General)

Anuário Astronomico do Observatório Nacional
Anuário Astronomico
Boletim da Sociedade Astronomica Brasileira
Contribuicoes do IAG/USP
Publicacoes do Observatório Nacional

FIELD: AGRICULTURAL SCIENCES

Subfield: Food Science and Technology

Boletim da Sociedade Brasileira de Ciencia e Tecnologia
Ciencia e Tecnologia de Alimentos

Sub-field: Agricultural Sciences (General)

Pesquisa Agropecuária Brasileira
Revista Brasileira de Genética
Revista de Microbiologia

Sub-field: Soil Sciences

Revista Brasileira de Ciencia do Solo

Sub-field: Agricultural Engineering

Engenharia Agrícola

Sub-field: Phyto-Sanitation

Anais da Sociedade Entomológica do Brasil
Fitopatologia Brasileira
Summa Phytopathologia

Sub-field: Veterinary Medicine and Zootechnics

Arquivo Brasileiro de Medicina Veterinária e Zootecnia
Boletim del Centro Panamericano de Febre Aftosa

Pesquisa Veterinária de Reproducao Animal
Revista da Faculdade de Medicina Veterinária e Zootécnia da USP

FIELD: BIOLOGICAL SCIENCES

Sub-field: Biology
Brazilian Journal of Medical and Biological Research
Revista Brasileira de Genética

Sub-field: Botany
Revista Brasileira de Botánica

Sub-field: Zoology
Revista Brasileira de Entomologia

FIELD: HEALTH SCIENCES
Sub-field: Physical Education
Artus: Revista de Educacao Física e Desportos
Corpo e Movimento: Educacao Física, Esportes, Recreacao e Danca
Revista Brasileira de Educacao Física e Desportos

Sub-field: Nursing
Revista Brasileira de Enfermagem
Revista da Escola de Enfermagem

Sub-field: Medicine
Anais da Academia Brasileira de Ciencias
Brazilian Journal of Medical and Biomedical Research
H.C.: Revista do Hospital das Clínicas
JAMB: "Jornal da AMB"
Memórias do Instituto Oswaldo Cruz
Revista Brasileira de Educacao Médica
Revista da Sociedade Brasileira de Medicina Tropical
Revista do Instituto de Medicina Tropical de Sao Paulo

Sub-field: Nutrition
Alimentacao e Nutricao

Sub-field: Odontology
Revista de Odontologia da UNESP
Revista de Odontologia da Universidade de Sao Paulo

Sub-field: Health
Revista Brasileira de Malariologia e Doencas Tropicais
Revista de Saúde Pública

FIELD: HUMAN SCIENCES

Sub-field: Anthropology

Boletim do Museu Nacional. Nova Série. Antropologia
Revista Brasileira de Ciencias Sociais

Sub-field: Information Science

Ciencia da Informacao

Sub-field: Political Science

Novos Estudos CEBRAP
Revista Brasileira de Ciencias Sociais
Revista Brasileira de Estudos Políticos

Sub-field: Human Sciences (General)

Dados. Revista de Ciencias Sociais
Revista Brasileira de Ciencias Sociais

Sub-field: Demography

Informe Demográfico
Revista "DOCPOP"

Sub-field: Law

Ajuris
Revista dos Tribunais

Sub-field: Education

Ande
Cadernos "CEDES"
Cadernos de Pesquisa
Educacao Brasileira
Educacao e Realidade
Educacao e Sociedade (Centro de Estudos Educacao e Sociedade)
Proposicao: Rev. da Fac. Educacao da UNICAMP
Revista Brasileira de Estudos Pedagógicos
Revista da Faculdade de Educacao da USP

Sub-field: Philosophy

Discurso
Journal of Non-Classical Logic
Manuscrito

Sub-field: History

Revista Brasileira de História
Revista de História

Sub-field: Letters and Linguistics

ALFA: Revista de Lingüística
Cadernos de Estudos Lingüísticos
DELTA: Documentacao de Estudos em Lingüística Teorica e Aplicada
EPA: Estudos Portugueses e Africanos
Estudos Lingüísticos e Literários
Remate de Males

Sub-field: Psychology
Arquivos Brasileiros de Psicologia
Psicologia
Psicologia: Teoria e Pesquisa

Sub-field: Sociology
Dados: Revista de Ciencias Sociais
Novos Estudos CEBRAP
Revista Brasileira de Estudos Sociais

FIELD: ECONOMICS AND ADMINISTRATION
Sub-field: Administration
Cadernos da "FIAP"
Estudos
Relacoes Humanas
Revista de Administracao da "FEA"
Revista de Administracao de Empresas
Revista de Administracao Pública

Sub-field: Sectoral Development
IDORT

Sub-field: Economics
Estudos Economicos
Literatura Economica
Pesquisa e Planejamento Economico
Revista Brasileira de Economia
Revista de Economia Politica

Sub-field: Government Policy
Revista de Economia Política

FIELD: ENGINEERING
Sub-field: Engineering (General)

Revista de Ensino de Engenharia
RBE: Revista Brasileira de Engenharia. Cadernos de Eng.Biomedica

Sub-field: Civil Engineering
RBE: Revista Brasileira de Engenharia. Cadernos de Recursos Hídricos.

Sub-field: Transport Engineering
Pesquisa Rodoviária
Revista da ANPET

Sub-field: Electric Engineering
RBE: Revista Brasileira de Engenharia.
Revista SBA. Controle e Automacao.

Sub-field: Mechanical Engineering
Revista Brasileira de Ciencias Mecanicas

Sub-field: Metallurgic Engineering
Metalurgia (Sao Paulo)

Sub-field: Naval and Oceanic Engineering
RBE: Revista Brasileira de Engenharia. Cadernos de Engenharia Naval.

Sub-field: Chemical Engineering
RBE: Revista Brasileira de Engenharia. Cadernos de Engenharia Química

Sub-field: Sanitary Engineering
Aguas Subterraneas (Sao Paulo)
Limpeza Pública

Sub-field: Operational Research
Pesquisa Operacional

FIELD: PHYSICS
Sub-field: Physics (General)
Revista Brasileira de Física

FIELD: GEOSCIENCES
Sub-field: Geosciences (General)
Revista Brasileira de Geociencias

Sub-field: Geophysics
Revista Brasileira de Geofísica

Sub-field: Physical Geography
Revista Brasileira de Geociencias

Sub-field: Geology

Geochimica Brasiliensis

Sub-field: Meteorology
Revista Brasileira de Meteorologia

Sub-field: Oceanography (Physisc, Geology and Chemistry)
Revista Brasileira de Geociencias
Revista Brasileira de Geofisica

FIELD: MATHEMATICS
Sub-field: Computer Science
RBC: Revista Brasileira de COmputacao

Sub-field: Mathematics (General)
Boletim da Sociedade Brasileira de Matemática
Matemática Aplicada e Computacional

Sub-field: Probability and Statistics
REBAPE: Revista Brasileira de Probabilidade e Estatística

FIELD: CHEMISTRY
Sub-field: Chemistry (General)
Ciencia e Tecnologia de Alimentos
Química Nova
Revista Brasileira de Engenharia Química

Annex 3

Mexican scientific journals of excellence, 1994[21]

	Year of creation
Applied Sciences	
INSTRUMENTACION Y DESARROLLO	1980
OPTICA	1991
Exact Sciences	
REVISTA DE LA SOCIEDAD QUIMICA DE MEXICO	1956
BOLETIN DE LA SOCIEDAD MATEMATICA MEXICANA	1956
REVISTA MEXICANA DE ASTRONOMIA Y ASTROFISICA	1974
REVISTA MEXICANA DE FISICA	1952
MATHESIS	1982
Human Sciences	
ALTERIDADES	1988
ESTUDIOS JALICIENSES	1990
REVISTA LITERARIA MEXICANA	1991
NUEVA ANTROPOLOGIA	1975
CRITICA	1966
ESTUDIOS DE CULTURA NAHUATL	1958
CUADERNOS DEL SUR	1991
DIANOIA	1956
HISTORIA MEXICANA	1951
NUEVA REVISTA DE FILOLOGIA HISPANICA	1947
ESTUDIOS DE HISTORIA NOVOHISPANA	1966
SALUD MENTAL	1977
ESTUDIOS SOBRE CULTURAS CONTEMPORANEAS	1990
QUIPU	1984
Natural Sciences	
ACTA ZOOLOGICA MEXICANA (NUEVA SERIE)	1984
HIDROBIOLOGIA	1991
FOLIA ENTOMOLOGICA MEXICANA	1961
REVISTA MEXICANA DE MICOLOGIA	1968
AGROCIENCIA	1966
REVISTA LATINOAMERICANA DE MICROBIOLOGIA	1958
ACTA BOTANICA MEXICANA	1987
MICOLOGIA NEOTROPICAL APLICADA	1989
FITOTECNIA MEXICANA	1984
ANALES DEL INSTITUTO DE BIOLOGIA	1976
BOLETIN DE LA SOCIEDAD BOTANICA MEXICANA	1978
TERRA	1983
Health Sciences	
GACETA MEDICA DE MEXICO	1863

ARCHIVOS DEL INSTITUTO NACIONAL DE CARDIOLOGIA	1944
ARCHIVES OF MEDICAL RESEARCH	1970
REVISTA DE CANCEROLOGIA	1986
REVISTA DE SALUD PUBLICA DE MEXICO	1969
LA REVISTA DE INVESTIGACION CLINICA	1948
Social Sciences	
REVISTA INTERNACIONAL DE FILOSOFIA POLITICA	1992
ANALES DEL INST.INV.ESTETICAS	1938
ARGUMENTOS	1989
RELACIONES INTERNACIONALES	1973
REV. MEX.DE CIENCIAS POLITICAS Y SOCIALES	1956
CUADERNOS DE ARQUITECTURA MESOAMERICANA	1974
INVESTIGACION BIBLIOTECOLOGICA	1987
COMUNICACION Y SOCIEDAD	1985
FRONTERA NORTE	1989
IZTAPALAPA	1979
REVISTA SOCIOLOGICA	1986
SECUENCIA	1985
FORO INTERNACIONAL	1960
ESTUDIOS DE ASIA Y AFRICA	1966
ESTUDIOS ECONOMICOS	1986
ESTUDIOS SOCIOLOGICOS	1983
ESTUDIOS DEMOGRAFICOS Y URBANOS	1964
REVISTA MEXICANA DE SOCIOLOGIA	1964
ANUARIO DE LA HISTORIA DEL DERECHO MEXICANO	1988
REVISTA DE DERECHO PRIVADO	1990
BOLETIN MEXICANO DE DERECHO COMPARADO	1968
CRITICA JURIDICA	1992
Earth Sciences	
CIENCIAS MARINAS	1974
GEOGRAFIA Y DESARROLLO	1987
REVISTA DEL INSTITUTO DE GEOLOGIA	1977
ATMOSFERA	1988
GEOFISICA INTERNACIONAL	1963
REV.SOC. MEXICANA DE PALEONTOLOGIA	1986
REVISTA INTERNACIONAL DE CONTAMINACION	1984

Notes and references

1. C. A. MACIAS-CHAPULA, Análisis de citas de cuatro revistas biomédicas latinoamericanas, *Rev. Esp. Doc. Cient.*, 14, 4 (1991) 420–427.
2. L. FERREIRO, S. UGENA, Citation mechanics in journals covered by the Journal Citation Reports, *Scientometrics*, 24 (1992) 149–162.
3. Independently of the criticisms that can be raised against such bases, as an example of this invisibility it is enough to mention that upon a total of over 3000 registers, the SCI includes only 49 Latin American journals. See also E. GARFIELD, Journal citation Studies, 26. Latin American journals. In: E. GARFIELD (Ed.), *Essays of an Information Scientist*, Institute for Scientific Information, Philadelphia, PA, (1974–1976), 577–583.
4. The endogamic diffusion of results, i.e. the publication by the same person of all his works in the same institutional journal, often from his own Department, and the limited number of contributions published in journals of the international domain, is a typical feature of underdeveloped structures. For a Spanish case, see A. VILLAGRÁ RUBIO, Scientific production of Spanish universities in the fields of social sciences and language, *Scientometrics*, 24 (1992) 3–19.
5. In English there are databases such as EXTRAMED, which gives coverage with complete image of journals outside the MEDLINE world, in a range of subjects that the journals of the medical mainstream (i.e. MEDLINE) do not cover adequately, such as tropical diseases, traditional medicine and biodiversity, AIDS, cholera and other diseases associated to water, transmissible diseases in general, and studies of health development. In Spanish there is no equivalent service either in that or any other field of knowledge.
6. A recent analysis of this situation in Spain is that of C. ORTEGA, L. M. PLAZA, M. J. MARTIN, M. C. URDIN, Spanish scientific and technical journals, state of the art, *Scientometrics*, 24 (1992) 21–42. The diversity of situations of scientific development in different countries is analysed, among others, by S. ARUNACHALAM, S. MARKANDAY, Science in the middle-level countries: a bibliometric analysis of scientific journals of Australia, Canada, India and Israel, *Journal of Information Science*, 3 (1981) 13–26. The analysis of these authors offers interesting elements with regard to the fields where a country has greater relative strength and the journals that have a possibility to become international.
7. Through case studies of Latin American journals I have studied some of these problems. H. VESSURI, Una estrategia de publicación científica para la fisiología latinoamericana: "Acta Physiologica Latinoamericana", *Interciencia*, 14, 1 (1989) 9–13; H. VESSURI, La revista científica periférica. El caso de "Acta Científica Venezolana", *Interciencia*, 12, 3 (1987) 124–134; H. VESSURI, "Ciencia Hoje" o en América Latina también se puede, *Interciencia*, 16, 6 (1988) 317–318; H. VESSURI, M. SAFAR, Elementos para la historia social de la química en Venezuela: la Sociedad Venezolana de Química, In: E. DIAZ, Y. TEXERA, H. VESSURI, *La ciencia periférica*, Caracas, Monte Avila Edtores, 1993, pp. 121–166.
8. C. FREEMAN, Recent developments in science and technology indicators: a review. Science Policy Research Unit, Brighton: Sussex University, 1982, mimeo.
9. UNESCO, *Grupo de Trabajo, para la Selección de Revistas Científicas Latinoamericanas*, April 28 – May 1, 1964, University of Puerto Rico, Centro de Cooperación Científica de la UNESCO para América Latina, Montevideo, 1964.
10. A few years later, from a country by subject count of the serial periodical collection at the British Library Lending Division, a similar proportion of Latin American journals was established. M. P. CARPENTER, F. NARIN, The subject composition of the world's scientific journals, *Scientometrics*, 2 (1980) 53–63.

11. Although there is evidence that the traditional role of scientific societies as journal publishers is being reconsidered by them in response to economic, social and professional pressures, it would seem that it is nonetheless valid that they continue to be among the largest publishers of specialized journals, contributing significantly to scientific communication. K. B. LEVITAN, Scientific societies and their journals: Biomedical scientists assess the relationship, *Social Studies of Science*, 9 (1979) 393–400.
12. CONACYT, Call for the evaluation of Mexican scientific journals, published in the Mexican daily press, April 18th, 1993.
13. R. F. KRZYZANOWSKI, E. M. KRIEGER, F. A. DA MOURA DUARTE, Programa de apóio as revistas científicas pela FAPESP, *Ciencia da Informacao*, 20, 2 (1991) 137–150.
14. R. LISKER, A. LORÍA, Letter to the editor, *Boletin de la AIC*, 21, Nov.–Dec., 1994, p. 38.
15. J. RIOS, Las revistas de excelencia que publican los Institutos y Centros de Coordinación de Humanidades de la UNAM, de acuerdo con el Indice de Revistas Mexicanas de Excelencia, publicado por el CONACYT el 18 de abril de 1994, UNAM, México, May 1994, mimeo.
16. M. A. PÉREZ ANGÓN, Indice de revistas científicas mexicanas (editorial note), *Boletín de la AIC*, 20, Sept.–Oct. 1994, p. 4.
17. Some recent examples of studies of Latin American sciences using international databases are published in *Scientometrics*, 23, 1 (1992), among them J. GAILLARD, Use of publication lists to study scientific production and strategies of scientists in developing countries, pp. 57–73; H. DELGADO, J. M. RUSSELL, Impact of studies published in the international literature by scientists at the National University of Mexico, pp. 75–90; J. E. RABINOVICH, Publications of scientists of developing countries in international journals: are they channels to the international circuit for colleagues that only publish in national journals?, pp. 91–104. These and other papers were included in the Proceedings of the International Conference on *Science Indicators for Developing Countries*, edited by R. ARVANITIS, J. GAILLARD, ORSTOM/CNRS, Paris, 1992. See also M. KRAUSKOPF, R. PESSOT, R. VICUÑA, Science in Latin America. How much and along what lines? *Scientometrics*, 10 (1986) 199–206.
18. A similar exercise is being started at present by the Venezuelan CONICIT and the System for the Promotion of Researchers (SPI).
19. *Op. cit.* (1964).
20. Krzyzanowski et al., *op. cit.* (1991).
21. CONACYT, *op. cit.* (1994).