SCIENTIFIC PERIODICALS IN LATIN AMERICA AND THE CARIBBEAN: A GLOBAL PERSPECTIVE

ANA MARÍA CETTO and OCTAVIO ALONSO-GAMBOA

In the 1660's, at the time when the first scientific journals were being printed in England and France, the Iberoamerican continent was living its second century of colonial regime, submerged in the obscure nights of the Spanish and Portuguese counterreform. No science was produced; no scientific documents would circulate. Since the early days of the Conquest the European friars had annihilated all but a few of the prehispanic codices, considered to be "demoniac works", and this destruction had become systematic and continuous. Any new document, during the colony, would be produced under close religious control and influence.

Only one century later, in the 1770's, the lights of a brighter intellectual atmosphere in Spain would dimly shine on the distant American territories. A few isolated figures dedicated themselves to study natural phenomena and write on scientific matters, mainly with the purpose of making them publicly known. This is how the first journals appeared in the New Continent: encyclopaedic publications of a very general content, written and published thanks to the personal effort of their authors. A remarkable example is *Mercurio Volante*, a weekly medical journal published by José Ignacio Bartolache, of which 16 issues came out between October 1772 and February 1773 (Naumis and García-Moreira, 1993).

In the newly independent nations, during the nineteenth century, scientific activity was still mainly encyclopaedic and descriptive, and basically oriented towards the natural sciences. Most of the scientific societies that were created along with this century, still influenced by the tradition of the colonial expeditions, were devoted to the study and classification of natural resources and the survey of the national territories. Publication of the findings was an important activity for these societies; thus, for instance, the *Anales* of the Royal Academy of Sciences of Havana published over 2,000 scientific papers between 1864 and 1898 (Pruna and Ortega, 1985). In most cases, these scientific societies were used by their members as a means for acquiring social and academic prestige and exerting political pressure rather than as a forum for scientific debate; and this, of course, is reflected in the publications. However, there is no doubt that these publications played an important role in disseminating scientific ideas and giving prestige to science among the local societies. Thus, for instance, in Mexico no less than 35 scientific societies carried out publishing activities during the nineteenth century and at least 140 journals were more or less regularly produced (Barberena and Block, 1986).

At the turn of the century, however, the societies lost prominence as scientific bodies, and universities and academic institutions started to play a central role in fostering scientific research. This phenomenon had already taken place decades earlier in Europe and in the United States, and had pushed the scientific societies towards a higher degree of specialization and professionalization. In Latin America some of the soci-

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eties managed to modernize, but the smaller or more traditional ones gradually disappeared, and their journals as well. There are only a few examples of scientific periodicals dating from the early nineteenth century that are still active today; notably, from Mexico, the *Boletín de la Sociedad Mexicana de Geografía y Estadistica* (1839).

During the first half of this century many universities in Latin America created schools, departments or research institutes in the basic scientific disciplines, and as these institutions became consolidated they felt the need to offer to their own scientists a channel for the systematic publication of their academic work. On the other hand, as the scientific communities grew larger and became more professional, they undertook to create their own learned or professional associations, of a local or national character, so that by 1940 there existed probably around 200 of them in the region (Capel, 1992) and many more were founded in the post-war period. They soon started to create their own periodical bulletins or journals, competing with those produced by the universities and governmental institutions. As a result, there was literally an explosion of new titles after 1940 (see Figure 2), especially in medicine and in the basic and social sciences.

According to a detailed and comprehensive study published in 1962 by the Unión Panamericana –Centro de Documentación Científica y Técnica, of a total of 950 active Latin American scientific periodicals (*excluding* the social sciences and humanities) the universities published 204 titles, scientific and professional bodies 365, governmental institutions 127, and another 127 were produced by other sources such as museums or industrial enterprises. These journals were in most cases of a local or national character, and their production was concentrated in a few countries: 60% originated in Argentina, Brazil and Mexico; Colombia, Peru and Venezuela contributed with another 18%. It is interesting to note that 51% of the titles pertained to the medical sciences and 13% to agriculture, whilst mathematics represented as little as 2%, as did physics and astronomy. From amongst those in the basic sciences, as much as 85% contained original material, and most of their articles include an abstract (in one or two languages) and bibliography.

These and other features indicate that, at least in some countries and in a few disciplines, there was in the early 1960´s a scientific community (or an established institution) capable of sustaining a publication of good standard and adhering to the international rules of the game. However, it must be recognized that many of these publications were sustained thanks to the personal efforts of one or a few scientists, with practically no technical support and very precarious financing. This contributed to the low periodicity and the irregularity of publication. Moreover, the journals were in most cases of a rather local character: a high percentage of them (especially in the applied sciences) did not accept contributions from non-members or for-

TABLE I
Selected data for Latin America and the Caribbean.

Country / territory	Population (mill.inh.)[1]	No. of ISSN registers[2]	No. of titles (Ulrich's)[3]	No. of titles (Inf. services)[4]	No. of titles (HELA)[5]
Antigua and Barbuda	.07	1	13	-	-
Argentina	34.2	3,204	607	127	204
Bahamas	.27	12	27	1	-
Barbados	.26	52	45	6	-
Belize	.21	9	19	2	-
Bolivia	7.2	58	94	5	1
Brazil	159.1	3,736	1,046	274	424
Chile	14.0	968	260	83	108
Colombia	34.5	1,024	345	87	140
Costa Rica	3.3	126	108	24	46
Cuba	11.0	247	325	121	234
Dominica	.07	1	14	-	-
Ecuador	11.2	134	137	17	35
El Salvador	5.6	45	33	5	16
Grenada	.09	2	16	-	-
Guatemala	10.3	63	62	10	23
Guyana	.82	43	28	6	-
Haiti	7.0	18	17	3	-
Honduras	5.5	22	48	7	9
Jamaica	2.4	82	90	21	3
Mexico	91.9	2,316	740	149	970
Nicaragua	4.3	27	50	5	2
Panama	2.6	92	83	3	17
Paraguay	4.8	44	48	7	4
Peru	23.3	322	221	52	41
Dominican Republic	7.7	81	67	9	9
St. Kitts and Nevis	.04	-	2	-	-
Saint Lucia	.14	12	17	-	-
St.Vincent and Granadines	.11	-	-	-	-
Suriname	.42	7	9	2	-
Trinidad and Tobago	1.3	64	55	4	-
Uruguay	3.2	654	186	23	55
Venezuela	21.4	943	262	65	124
Bermuda	.06	14	8	-	-
Dutch Antilles	.20	3	7	2	-
French Guiana	.14	112	2	-	-
Guadeloupe & Martinique	.79	388	15	-	-
Puerto Rico	3.6	89	92	23	21
Virgin Islands	.12	30	22	-	-
Total, LA&C	473.5	15,049	5,220	1,143	2,488
World total	5,629.6	517,025	143,723	...	...

[1] Midyear 1994. Source: UNESCO Statistical Yearbook 1996
[2] Active titles (includes all types of periodicals). Source: ISSN CD-ROM May 1996
[3] Active titles. Source: Ulrich's Plus CD-ROM Winter 1996-97
[4] Active titles covered by major indexing and abstracting services. Taken from Ulrich's Plus Winter 1996-97 CD-ROM
[5] All titles (active and ceased). Hemeroteca Latinoamericana (HELA), UNAM May 1997

eign authors; 89% of the journals published articles in one language only (Spanish or Portuguese, mainly), and their international distribution was in general very poor. A further problem associated with these publications, as noted in the above mentioned report, was their low profile in the international indices, since only 40% of the titles were covered by one or more of the 13 main indices that were consulted. *Biological Abstracts* and *Chemical Abstracts* were by far the most favourable indexing services for Latin American journals, covering 51% and 45%, respectively, of the serviced titles.

Latin American journals today

What has been the evolution of our journals during these last 35 years?

The production of scientific literature has impressively expanded in recent decades throughout the world, and every geopolitical region has contributed –to the extent of its possibilities– its share to this expansion. By 1963 the total number of scientific and technical periodical titles fluctuated around 35,000 (Gottschalk and Desmond, 1963); today, the Ulrich's International Database contains *ca.* 144,000 active titles, all disciplines included. All in all, the Latin American and Caribbean region has managed to maintain a fairly constant percentage of the total (registered) production, however this be measured: our journals represent between 3% and 4% of the world's total. This in itself is an interesting fact, considering the relative variations experienced by other countries in recent years: for instance, whilst those pertaining to the former Soviet Union have drastically decreased their contribution, the United States alone produce now around 35% of all titles.

Table I presents a list of the 33 countries and main territories that comprise Latin America and the Caribbean, with some relevant data. This region covers over 20 million square kilometers (13% of the solid Earth surface) and is inhabited by ca. 8% of the total world population; it contains a wealth of natural resources and an exceptionally rich animal and plant biodiversity. Its population, although predominantly *mestiza* (mixed), is pluricultural and multiethnic; Spanish and Portuguese are the main languages, but English, French and a variety of indigenous languages are also present as mother tongues. The total number of personnel engaged in R&D is estimated to be around 100,000; developed countries have on the average a *per capita* figure almost ten times as high. A striking feature is the diversity between countries, in terms of size, population, and a variety of other indicators, including those referring to scientific infrastructure and human resources (Cetto and Vessuri, 1998). A prolongued and generalized economical crisis during the last 15 years in most of the countries has had severe effects on the publishing industry, the academic institutions and the population at large; this of course affects the countries' capacities to produce, disseminate and have access to scientific literature.

In our discussion we refer in general to the whole of Latin America and the Caribbean (LA&C), even if sometimes we say "Latin American" for brevity. Further, the expression "Latin American journals" should not be taken to mean that the journals are of a *regional* character; they are in general locally produced, and only in very few instances do they have an international editorial board or contain a significant proportion of contributions from other countries. A further point of clarification concerns the type of journals considered: we try to refer as much as possible in our discussion to scientific journals, *i.e.* to journals that contain *inter alia* results of scientific research and material of scientific relevance in any discipline; however, this distinction is difficult to keep. In Table I, whereas the third column refers to *all* types of periodicals with an ISSN register, the fourth and fifth columns refer respectively to all journals registered in the Ulrich's Directory and to the Ulrich's subset included in an information service, and the last column refers to a collection of scholarly journals with emphasis on those of a scientific nature (the HELA catalogue).

No study as comprehensive as that of 1962 has been carried out in more recent times, that could give a detailed, updated perspective of our scientific periodicals; nevertheless there are a variety of interesting reports, analyses and accounts, referring normally to one country or sub-region, to specific aspects, to a certain selection of titles or to an individual journal[1] There is a relatively extensive collection of titles received by UNAM in Mexico (HELA), which has been systematically used as a source for bibliographical analysis for over 20 years; this is the most comprehensive and representative regional periodicals collection, although some countries or sub-regions are still misrepresented, as can be seen from Table I. There are of course also international databases and information services that provide useful information on the Latin American journals; but one must be careful in drawing conclusions from this information, since, as has been repeatedly stated and argued (Cano, 1995; Cetto and Hillerud, 1995; Gaillard, 1991, Moravcsik, 1988, Roche and Freites, 1982), our journals are generally underrepresented in the international scene. Such databases can be used as a source of bibliographical information about the so-called mainstream journals, yet they give an incomplete and inaccurate picture of the total scientific output, especially in countries that play a peripheral role in international science. In fact, as seen from Table I, the relative coverage of Latin American journals by these information services has *decreased* to less than 22% of the 5,220 titles included in the Ulrich's Directory.

A statistical portrait

Figure 1 gives a breakdown of disciplines of the journals, according to the two information services derived from the HELA collection: PERIODICA for science, medicine and engineering, and CLASE for the social sciences, arts and humanities; these services cover at present 1234 and 1254 titles, respectively, and are available in printed and electronic format (on CD-ROM and online, http://www.dgbiblio.unam.mx). Most of these scholarly journals (2,417 titles = 97%) are sent regularly to HELA by the editors for indexing purposes; the remaining 3% (71 titles) are received by subscription. As the databases are developed in Mexico, it is naturally easier to identify and retrieve titles from the home country; for this reason, Mexico is by far the best represented, with almost 40% of the titles, although Argentina, Brazil and Cuba are also fairly well represented, as can be seen in the last column of Table I. There is a clear predominance of the biological and medical sciences, reflecting the relative strength of these disciplines in the Latin American academic environment, whilst the whole of the engineering disciplines are comparatively very weak.

PERIODICA database

For comparison purposes, Table II shows the subject distribution of titles as given both by HELA (1997) and by Cano (1995). The contrasts in figures between the first and the second columns can be understood as due to the partly different sets of journals that constitute the HELA collection and the Boston Spa Serials collection. In contrast to LA&C, Iberoamerica includes

Portugal and Spain, but does not include the anglophone and francophone Caribbean, and there may be also variations in the field grouping of the disciplines. The reduction of the number of the world's total in the third column to 78,630 is due to the inclusion of only the seven subject categories listed.

Figure 2 shows the distribution of titles according to the date of the first issue (for 94% of the titles included in the HELA collection), created since 1900; only eight of the titles originated in the nineteenth century. Most of the journals are relatively young, having started between 1970 and 1989; the youngest ones are in the disciplines of information and communication sciences and international relations. The disciplines showing a stronger tradition are, again, medicine (with 17 titles older than 1930), biological and agricultural sciences and history.

Table III shows the distribution of titles according to the nature of the publisher. Academic publishers and scientific societies are (still) by far the most numerous group, and especially in the social sciences, universities play a leading role. The production of scholarly journals by commercial publishers is marginal; in sharp contrast to developed countries, journal publishing in this region is clearly not a good business. In the US and UK, for instance, 47% of the scientific journals are produced by commercial publishers (Cano, 1995), and also scientific societies make a good profit out of journal publishing.

From author affiliations of the documents analysed in CLASE and PERIODICA, one can obtain additional information on the characteristics of the publications. Figure 3 shows the distribution of countries of origin of the documents analysed between 1980 and 1994. In the social sciences and humanities a very high proportion of documents do not contain the country of origin. Of those documents that do contain the information, authors in Mexico are the main contributors, with 38%; as much as 13% of the authors live outside the region, half of them in the USA. In the sciences and engineering, however, the picture is quite different: only about 7% of the papers lack the country of origin. Brazilian authors are the most numerous; there is an important contribution from a few other Latin American countries and a smaller one from the rest of the world.

Finally, a breakdown per type of document is also very illustrative. In Table IV the major types of document are listed, again for the journals analysed between 1980 and 1994. In the scientific and technical journals the article is by far the most favoured type of document, whereas in the social sciences and humanities there is a much greater dispersion of document types. Traditionally, in contrast to journals from developed countries, scientific journals in Latin America do not publish book reviews and very seldom do they publish letters to the editor; also the proportion of conference papers and proceedings is comparatively low.

TABLE II
Subject distribution of journal titles, for Latin America and the Caribbean, Iberoamerica, and the world's total.

Subject group	LA&C[1] (%)	Iberoamerica[2] (%)	World[2] (%)
Social Sciences	23	28	24
Arts and Humanities	13	26	18
Nat.& Ex. Sciences	21	14	16
Agricultural Sciences	9	10	8
Engineering	5	8	16
Health Sciences	16	8	8
Multidisciplinary	13	5	10
Total	*2,488= 100%*	*3,369 = 99%*	*78,630 = 100%*

[1] Source: HELA May 1997; [2] Source: Serials Directory (from Cano, 1995).

Beyond the statistical portrait

When it comes to analysing the individual journals in detail, a much more complicated picture arises. Some journals (more than a few) are still strictly local: their editor and authors belong to the same reduced circle; they are limited in scope and of little interest to outside readers; they often do not even have an ISSN number assigned, and because of their irregular appearance they can be hardly said to be periodical, in fact it is often not clear whether a given title is still active. In the opposite extreme, other journals (very few) are of a rather more international character: by the composition of the editorial board, the editorial practices, the technical quality, the topics covered and the contents of

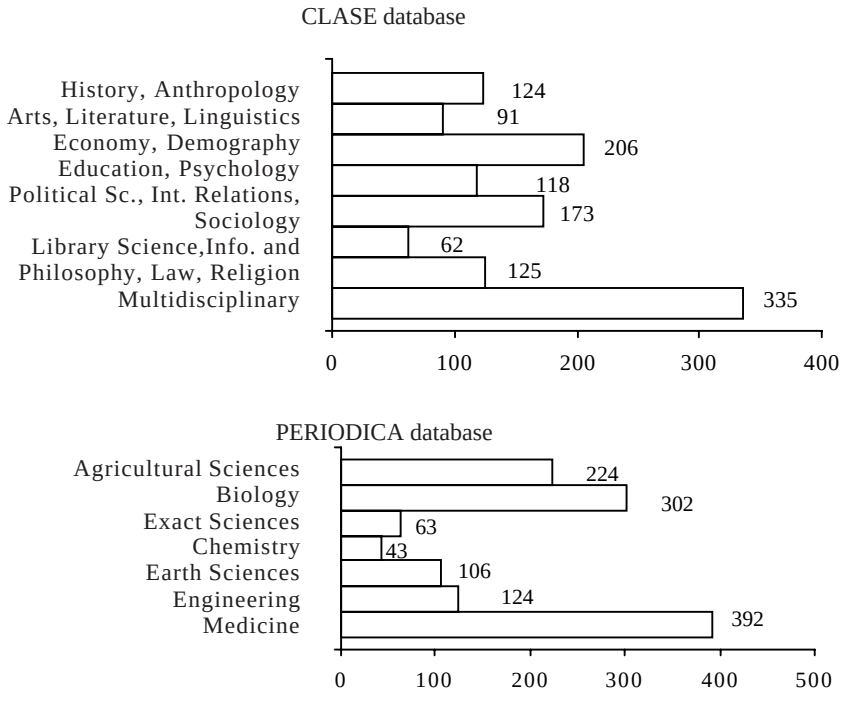

FIG. 1. Journals indexed in CLASE and PERIODICA (UNAM), according to discipline (HELA, May 1997)

the articles, the language(s) used, even the coverage in information services, these journals are not distinguishable from similar ones produced in other parts of the world. Which does not mean that these journals are free from the problems that beset in general our scholarly publications: restricted circulation and readership, a lack of stable financial support, a lack of technical staff and infrastructure, a limited appreciation both from the local and international community, etc.

These and other problems have become the subject of concern not just for the journal editors themselves, but for a growing proportion of the academic communities, as well as for government institutions and funding agencies. As a first result, there have been interesting efforts to diagnose the situation of the journals on a national level in various countries, starting with Brazil, Mexico, Venezuela and Colombia. In most cases these efforts relate to a specific purpose on the part of governmental institutions, namely to financially support a reduced list of titles. This has meant a pre-selection of titles and the exclusion of the majority of them: roughly of those that belong to the first group mentioned in the above paragraph. There is, therefore, very scarce knowledge about them; this is unfortunate, because it is very probable that many of them represent valuable and legitimate publications which, by not being duly known or taken into consideration, are dismissed –and perhaps thus doomed– by the system.

On the other hand, the information that has been gathered through these studies on the "pre-selected" titles is very valuable and useful in itself. A particularly relevant experience in this regard is the Brazilian one, for various reasons: it is the oldest, having started around 1980; it is the largest, as Brazil is the major journal publisher in the region; it is the most representative, as the scientific editors were already starting to organize themselves in the late 1970's and systematically playing an active role, along with the government agencies (FINEP and CNPq), in the process that has led to the assessment and selection of journals. It is also the most documented, in terms of official reports, synopses, guidelines, studies, proposals, critical analyses, etc., from a variety of authors. As the situation and the conditions of the Brazilian journals are apparently in many respects similar to those of other countries in the region –at least of those that have a similar scientific development–, it seems appropriate to highlight some aspects of this particular experience[2]

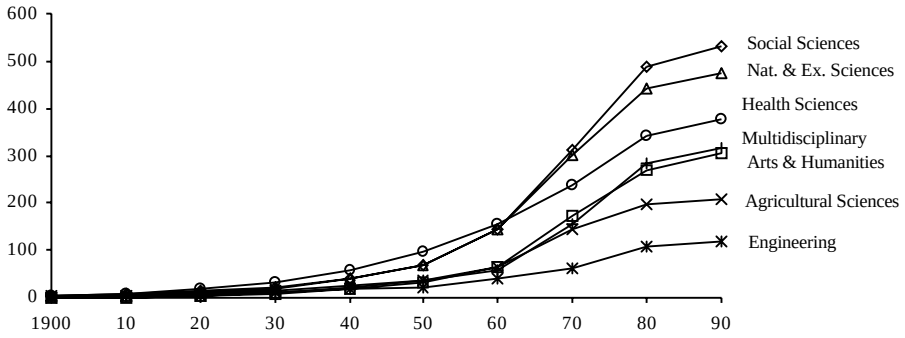

FIG. 2. Distribution of titles according to date of first issue. (HELA, May 1997)

In a first study carried out in 1982, a total of 2,500 technical and scientific journals were identified; but it was considered that less than 100 (4%) could be properly called "scientific journals of international competence", because the rest of them were not published regularly and did not follow international editorial norms and practices. About 85% of all journals were being directly or indirectly financed with public funds; hence the need was felt to revise their performance and to devise a policy for their improvement. The official Program of Support to S&T Publications started to operate in 1983, with only 15 titles, and this number rose gradually until it reached 35 in 1988; financial support was guaranteed to these journals for a period of five years. For the selection of titles a combination of extrinsic and intrinsic factors was used, where the term "extrinsic" refers to formal aspects that

TABLE III
Distribution of titles according to publisher type.
Source: CLASE and PERIODICA catalogue, 1996.

Publisher type	CLASE (%)	PERIODICA (%)
University institutes and departments	38.7	28.4
University publishers	10.9	3.8
Academic and professional societies	6.6	22.2
Other research centres	12.5	14.0
Government institutions	14.3	19.8
Private enterprises	9.8	8.0
International bodies	6.2	3.8

TABLE IV
Breakdown per type of document, 1980-1994.
Source: CLASE and PERIODICA journals catalogue, 1996.

Document type	CLASE	Document type	PERIODICA
Articles	51%	Articles	78%
Book reviews	15%	Brief notes	5%
Brief notes	9%	Technical reports	3%
Conf., lectures	7%	Conf., lectures	2%
Essays	5%	Review papers	2%
Statistics	4%	Statistics	2%
Others	9%	Others	10%

are easily measurable, such as technical norms, periodicity, distribution, coverage by information services, etc., and "intrinsic" refers to quality of contents, refereeing procedures, editorial board, etc.

A detailed study of 17 of these 35 titles was made in 1989, with the following results: the majority of titles pertain to the natural and exact sciences; they were first published in the 1970's, and are produced by scientific societies, either in São Paulo or Rio de Janeiro. They follow fairly closely international technical norms and editorial procedures. However, despite their low frequency –quarterly, in most cases– the editors have great difficulties to maintain schedules; only five of them could comply with the established publication dates. This was seen as due mainly to the short supply of manuscripts and to the delays in the reviewing process and in the provision of funds.

The selected journals publish an average of 80% original research articles and only few short communications and review papers. Most authors are members of the corresponding scientific society or, more generally, Brazilian scientists. Editors, referees and authors often belong to the same group or community. The journals are intended primarily for the national and international community of researchers in the field, and to a lesser extent for graduate students and professionals. Most journals use Portuguese as the main language but will accept papers written in Spanish, French, or preferentially English. For some editors publication in English is a basic condition for international circulation. Abstracts in English have almost become the norm. In this regard it is interesting to note that those journals published exclusively in Portuguese are at least as well covered by the international databases as those that use other languages. Finally, most journals have very few technical personnel, equipment and budget, and these restraints are seen to directly affect the timeliness of the publication. The editors have not yet found a satisfactory mechanism for distribution of the journals; not even the local researchers subscribe to them, and their inclusion in information services is compromised by their failure to appear regularly[3]

In 1993, a similar exercise was initiated in Mexico by the National Research Council (CONACYT) with the purpose of creating an "Index of Mexican Scientific Journals of Excellence" (Bonilla, 1996). Of 127 journals that applied, 68 were finally admitted for an initial period of two years; in this case, however, inclusion in the Index implied no specific financial commitment initially. The most important factors that were considered by the assessment committee (constituted by academic peers) were: composition of the editorial board, refereeing procedures, inclusion in international indices, and, to a lesser degree, the time lags in the editorial process, frequency, regularity, inclusion of abstracts in English, and the diversity of institutions represented by the authors. A brief analysis of the approved list of journals reveals the following: as much as 60% pertain to the social sciences and humanities and only 4% to the health sciences. At least on paper, the editorial board is inter-institutional or even international and rigorous refereeing procedures are applied. Seventy-eight percent are produced in Mexico City, the National University (UNAM) being the main producer, followed by scientific societies. The average age of the journals was 22 years (in 1995), the older ones being those in the life sciences and economy; 37% of the journals were less than 10 years old. The frequency is very low: 56% appear annually or twice annually, and only two titles are bi-monthly.

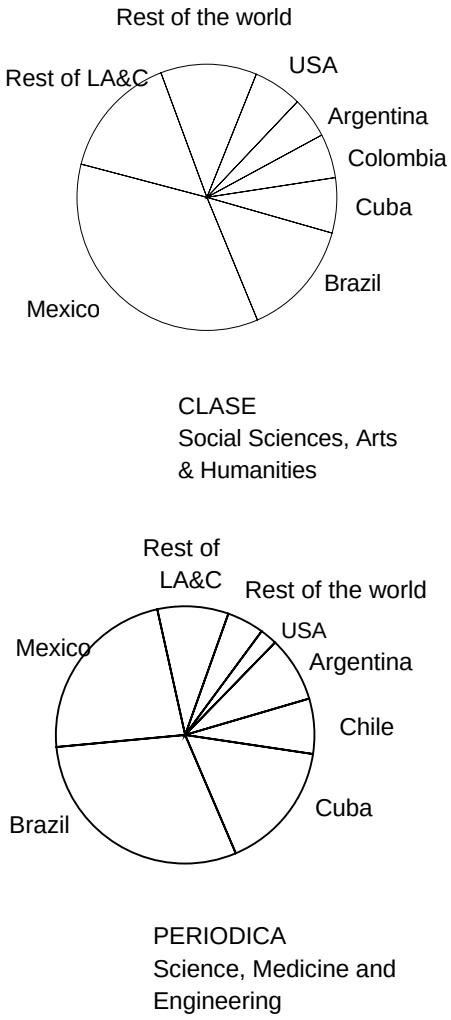

FIG. 3. Author affiliations of the documents analysed in CLASE and PERIODICA, 1980-1994.

Where do our journals go?

A major problem for Latin American journals, as evidenced in all reports and analyses, is their limited circulation. International distribution of scholarly journals is particularly difficult: postal services are expensive, deficient and unreliable, and there is no specific infrastructure for journal distribution. It is easier (though much more costly) to receive journals produced in North America or Europe than it is to get a journal published in a Latin American country. So despite the reasonable volume of printings –which are of the order of 1,500 and up to 3,000 copies for the more established journals– their international dissemination is rather poor.

Moreover, there is little demand for these journals. Apart from the centres for Latin American studies that subscribe regularly to some titles in the disciplines of the social sciences and humanities, the number of subscribers is low. As the head librarian of a major university in Europe confessed, "there is too little space left on the shelves to use it up with journals that are not relevant, even if they are received for free". Also within the region itself the circulation of Latin American journals is very limited. The selection of titles of scientific periodicals to be bought by university libraries is mainly determined by the requests of the research staff, and it is a fact –particularly in the natural and exact sciences– that researchers are much more interested in the journals produced in the USA and Europe.

In this regard the following data pertaining to UNAM, a major client of scholarly periodicals, are significant (Rovalo, 1997): in 1996 the total amount of subscriptions was 15,151, representing an expenditure of almost US $8.8 million, a very significant fraction of the university budget; 27% of the subscriptions (but 45% of the budget) went to the research centres in the natural and exact sciences and 15% of the subscriptions (and only 5% of the budget) went to the research centres in the social sciences and humanities, the rest went to the school libraries. As to the origin of the journals, 47% came from the USA and Canada, 40% from Europe, 9% from Mexico, 2.5% from Asia and Africa and

only 2.3% from other Latin American countries. The subscription prices for Latin American journals are in general low. The bulk of the purchase, including some Latin American titles, is made through North American or European distributors, so as to ensure as far as possible, safe and regular delivery–even though at considerable extra cost.

Within the countries the circulation patterns of journals vary according to the publisher. Scientific societies distribute their publication mainly by membership, subscription, donation or exchange; sales and marketing are entirely unknown concepts for them, especially among the natural and exact sciences. As to the journals edited by universities, a high proportion are distributed free of charge or sold at a low price. University students and professionals are important users of the journals produced in the country, especially when their language is Spanish or Portuguese. This is, in fact, the experience with the HELA collection at UNAM: it provides a useful service to a large number of students who do not consult scholarly journals in English or French.

A further problem facing the Latin American journals that is well known but not well studied is their fragility. Some partial data have been collected: for instance in Brazil, of the 751 new titles that appeared in the biomedical sciences between 1960 and 1970, only 18% were still current in 1979 (Valerio, 1994). The 17 selected Brazilian titles studied in 1989 had an average age of 16 years; the 68 selected Mexican titles had an average age of 22 years. We recall that in the study published in Mexico, (Unión Panamericana – Centro de Documentación Científica y Técnica, 1962) a total of 950 Latin American titles were reported (excluding the social sciences and humanities); yet the HELA collection contains only 222 such titles created earlier than 1960 and still active in the 1990's.

It is, however, difficult to quantify the turnover, since often one finds it impossible to tell whether a title is still active: journals are born and disappear, sometimes to reappear after a considerable time. As mentioned earlier, a major factor contributing to this fragility of the journals is the lack of financial resources and the instability of the funding, in addition to the insufficient flow of articles, in many cases. Other, more external factors can also play a role: for instance periodicals published by government institutions may have a lifetime that depends on the term of office of the respective government authorities.

TABLE V
Coverage of Latin American journal titles by the ISI indices (Social Sciences Citations, Arts and Humanities and Science Citations Indices), 1995-96.

Country	SSCI, A&HI, # of titles	SCI, # of titles
Argentina	1	4
Barbados	1	-
Brazil	3	2
Chile	1	2
Colombia	1	-
Jamaica	1	-
Mexico	7	2
Peru	1	-
Trinidad and Tobago	-	1
Venezuela	-	1
Total	16	12

Whose quality criteria? Journals for whom?

The above descriptions of the Brazilian and Mexican experiences refer to carefully selected samples of journals, those few that already had or were close to having the highest standards before they were admitted into the respective Index or Program of Support; they constitute the elite of national scientific journals as recognized by the academic community itself. They are therefore very much a reflection of this community: its scientific capacity and concerns, its interests and aspirations, its research habits and working style. Some of these journals explicitly have as primary aim to compete internationally in quality and visibility; a clear example is the *Brazilian Journal of Medical and Biological Research*, a bimonthly publication founded in 1981 by seven biomedical societies, which is published only in English, covered by most information services, and keen on maintaining an ISI-impact factor in the range 0.3-0.5. It is, as stated by its editors, "a Third-World journal attempting to reach the First World" (Greene *et al*., 1995).

In various countries the assessment of local scientific journals has acquired an additional significance in recent times, due to the creation of governmental programs to improve the financial conditions of scientific researchers. An important indicator of the academic performance of the scientists benefitted by these programs is the "quality" and "prestige" of the journals where they publish their articles, and a sometimes significant proportion of the scientists' income is thus made to depend on the journals' qualifications. By the criteria applied, the so-called mainstream journals from Europe and the USA are placed at the top of the list, and in the best of cases, some few titles belonging to the local elite referred to above are also taken into consideration. This of course has exerted considerable pressure on such journals and on their editors: specifically, to be included in one of the citation indices of the ISI and have an ISI-impact factor assigned, has become a matter of utmost importance. But at the same time, the researchers tend to respond to the pressure by trying to publish their best papers in the non-local journals as they are more prestigious; hence our journal editors have to contend with the double-edged effect of this evaluation process.

The coverage of Latin American journals by the ISI citation indices is known to be very poor: in 1995-96 there were only 28 active titles registered (see Table V), 0.5% of a world total of approx. 5,600 fully covered titles. Without entering into a discussion of the criteria applied, this is obviously the result of an extreme selection. It is clear that the prevailing conditions for scientific research in our countries and the incipient or recent development in most disciplines contribute directly to many of the deficiencies of our journals, and to this one must add their lack of prestige and credibility within the local communities themselves. This presents the journal editors with a difficult contradiction: the journals must be a product of our scientific communities and respond to the needs of their readership, yet they are made to compete with an externally de-

fined selection of journals of international circulation. Local journals constitute (or should constitute) in many cases the natural channels for the publication of relevant and valuable research work that by its content and scope is not of interest to the main clients of scientific research literature worldwide; yet they are, for this same reason, dismissed by our own scientific communities and institutions. Under pressure to become part of the global community, we disregard our specificities. This is an expression of a more profound contradiction, inherent–since the times of the colony– in our societies: to a great extent, we still look to the North to find out what we should be doing and how well we are performing; we adopt and apply measuring standards defined abroad, regardless of whether or not they correctly measure performance according to our objectives, needs and conditions. As a result, we do contribute with our efforts to international science–considerable efforts as measured from within, and rather meagre when seen from outside; it is not so clear, however, if in trying to attend in this way to the international sphere we are paying the best service to science and to our own societies.

An awareness is slowly starting to grow among the scientific community and institutions in some Latin American countries, of the need to revise the criteria used to promote, qualify and support the local publications. It is gradually being recognized that a diversity of journals must be produced, in order to respond to a variety of requirements and interests of the readers. Journal editors of course have known this for a long time, especially when the aims and objectives of their publications have been far from those considered legitimate by the evaluators. Sometimes contrary to their stated objectives, a number of journals are basically responding to the needs of academic researchers as authors, because of the pressure on them to publish research articles as a proof of their productivity. The editorial community, and the authors as well, must now also turn to the needs of the readership–or rather the potential readership, since the reading habits also need to be promoted. To the extent that this is achieved, there will be a naturally growing demand for these journals and a better appreciation of their value.

Initiatives to enhance the visibility of Latin American journals

It is clear that one of the main difficulties faced by the scientific periodicals produced in LA&C is their lack of visibility and their poor inclusion in international databases and information services. Various initiatives have been taken to address this problem from within the region. A particularly successful one has been the establishment of BIREME (Rodríguez Alonso, 1992), a cooperative network involving 31 countries and territories that provides access to the literature and a wide spectrum of bibliographical services relating to more than 650 titles in the health sciences produced in LA&C. As a result of this effort, since 1985 the region is served by one of the most complete databases on health and biomedical sciences, LILACS, but in addition BIREME has had other important outcomes, such as the modernization of the associated libraries, the implementation of new information technologies, the training of professionals in librarianship, computing and information services, etc. (URL: http://www.bireme.br).

There are other well-established regional information networks dealing with bibliographical material of various types, some of which have specialized databases covering a selection of periodical publications; such is the case with REDUC in the area of education, INFOPLAN in planning and REPIDISCA in sanitary engineering and environmental sciences. On the other hand, there exist in LA&C a myriad of databases of all sorts, though mainly bibliographical, most of which are the result of non-cooperative work. A regional directory of databases published in Mexico (DIBALC, 1992) reports the existence of 655 such databases, most of which are highly specialized per discipline or geographically localized.

Outside the region, academic interest in Latin American studies has promoted the creation of specialized information services covering mainly the social sciences and humanities. Two examples are the Hispanic American Periodicals Index, HAPI, a selective database covering 400 titles (most of them from LA&C) produced by UCLA, and the smaller database *Amérique Latine*, produced by the University of Toulouse.

It is clear, however, that all these and other information services taken together do not offer a proper coverage of the scientific journals produced in the region; we recall from Table I that only 1,143 Latin American titles are covered by (one or more) such services. The need for a comprehensive and reliable information system that duly gives account of the production of scientific periodicals, is evident. This has been the motivation behind LATINDEX, a regional information system based on a network of national resource centres that operate in coordinated form for the gathering of bibliographical information. The main products that it intends to offer are: a comprehensive directory of all active scientific periodical publications produced in the region, a catalogue covering a selection of titles classified according to previously defined criteria, and an index containing bibliographic material pertaining to the titles included in the catalogue. In addition, the system is expected to provide both editors and scientists with an efficient channel for the rapid production, dissemination and retrieval of research material in a standardised format, to promote electronic and regional publishing in LA&C, and to contribute to the standardisation of scientific and technical vocabulary in Spanish. (URL: http://www.cichcu.unam.mx).

A project of a different kind, also designed to address the poor visibility of the scientific journals produced in the region, consists in the setting up of an ISI-type index for the Latin American journals. This project is being developed in Chile by Manuel Krauskopf, Instituto de Bioquímica, Universidad Austral de Chile (personal communication) and is still in the planning stage.

Electronic publishing has started to develop at very dissimilar paces in different parts of LA&C, and new developments are proceeding more swiftly than what the authors have been able to trace. Whilst Brazil, Cuba and Mexico are already offering a few online titles, in Chile a more fully fledged policy for electronic journal publishing is being designed and the first properly electronic title is about to be launched. Other countries, like Argentina and Colombia, offer limited online information about some of their journals. In Brazil and Mexico the efforts have been aimed at producing electronic versions of print-on-paper journals. In the case of Brazil these journals are mounted in Internet sites that provide a wide variety of services; good examples are Base de Dados Tropical, a bioinformatics facility which includes *Bioline Publications* (joint UK-Brazil venture providing online access to a growing number of journals and other documents, http://www.bdt.org.br/bioline) and *Ciência Hoje*, which offers various products including its well-known science journals for the general public and for children (http://www.ciencia.org.br). More recently, eleven Brazilian editors along with FAPESP and BIREME have started to develop a methodology for the preparation, storage, dissemination and evaluation of scientific journals in electronic format (http://www.bireme.br/scielo).

In Cuba the scarcity of paper has been a strong incentive for the adoption of electronic publishing; in many cases the print-on-paper versions are still produced thanks to external support, however for some titles electronic publishing is the only alternative for survival. A major effort has been invested in the biomedical sciences, with the publication of 24 journal titles in digitized format, one of which, the *Revista Cubana de Plantas Medicinales*, is exclusively electronic (http://www.infomed.sld.cu).

Most countries in LA&C, however, especially the smaller ones, do not have the communications infrastructure needed to support these online services; as in so many other aspects, the Latin American landscape is that of First-World islands embedded in a Third-World environment (Voutssas and Cetto, 1996). In these circumstances the CD-ROM is still a viable alternative for the production, storing and diffusion of publications. This technology entered into LA&C almost immediately after its appearance in the industrialized world, and was adopted and applied successfully by various institutions, notably BIREME in Brazil and the University of Colima and UNAM in Mexico.

The CD-ROM still presents various important advantages, such as that of having a storable product, locally accessible and not depending on (telecommunications) resources over which there is not direct control. The successful adoption of these and other novel electronic technologies by Latin American editors and publishers will depend to a large extent on whether a solid informatics and communications infraestructure and expertise become effectively widespread throughout the region; otherwise the lack of access to these elements will only contribute to widen the gap between the centres of science and the periphery.

Conclusions

The picture derived from this global analysis of the journals produced in LA&C is that of a very heterogenous universe, beset with the traditional problems of instability, lack of visibility, insufficient material of good quality, precarious resources and limited readership. In lack of institutional policies of recognition, support and promotion of the journals produced "at home", and against the continuing pressure on scientists to publish their best papers abroad, many efforts are made by individual editors to keep their publications going, with varying success. In those countries where institutional editorial policies have been implemented, the benefits have been for a reduced choice of journals; for the remaining titles the situation becomes thus even more challenging.

It is clear that more thorough studies need to be carried out before arriving at definite conclusions, and especially before applying drastic measures that do not properly address the problems faced by our journals in general. In addition to evaluation purposes, the results of such studies provide useful elements for a diagnosis of the state of research in the various scientific disciplines, and of the capacity of our scholarly communities to communicate the results of scientific endeavour and thus attend the needs of different readerships: colleagues working in the same field –at home and abroad–, scientists from related disciplines, other scholars, teachers, professionals, technicians, students,... . Such studies would also hint at key areas where valuable and relevant local research is done but not properly disseminated for lack of a publication, and also at possible duplications of efforts that could be avoided by the combination or fusion of titles. There are obvious reasons for such a revision to be carried out on the regional level.

A further quite straightforward conclusion, that relates to the former, is on the need to elaborate on standards and criteria that can realistically be used to "measure" or qualify our journals and the documents published in them. It is difficult to justify, for instance, the use of ISI figures as official statistical indicators of national scientific productivity, or as indicators of performance of our researchers; yet this is still the norm in most of our countries. The recent efforts to construct appropriate indicators for Latin American science are an important step forward, as are also the initiatives to set up electronic information systems for the compilation and dissemination of the scientific literature produced in the region, and for the systematization of our scientific bibliography. Also here, a special effort needs to be made to break a vicious cycle that exists among scientists, editors, policy makers and even some information specialists, who virtually ignore or dismiss the whole range of existing information services in favour of certain ISI products, notably the citation indices, incorrectly considered as a source of bibliographical information. Ironically, mainly in response to the pressures resulting from the evaluation criteria currently in vogue in most of the region, our scientists have fallen into the perverse habit of consulting bibliometric sources rather than bibliographical ones.

Finally, although printed journals will probably continue to be important in Latin America for a longer time than in the industrialized world, electronic publishing must and will play an important role at least in some countries. The first steps can be seen already, and many scientific journal editors hope to solve through electronic publishing at least two of their most important problems, namely high production costs and low circulation rates. Still, although our scientific communities have readily adopted the modern technologies for personal scholarly communication, the use of these new technologies for the development of our own publications has been rather modest and little innovative.

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NOTAS

1 ..here is an ample and scattered bibliography on the subject. An interesting account of the state of Latin American journals in the natural and exact sciences was prepared by the study group set up in 1962 by the UNESCO regional office in Montevideo (UNESCO, 1964). For some recent references see, e.g., the relevant chapters in Cetto and Hillerud (1995); see also Cano (1995), Narvaez-Berthelemot (1995), Gaillard (1991), Moravcsik (1988) and the bibliography cited therein.

2 .. comprehensive account of the Brazilian experience can be seen in Valerio (1994) and references cited therein. See also Vessuri (1995).

3 ..s an independent initiative, in 1985 the Supporting Foundation for the Research of São Paulo State (FAPESP) created a committee for the evaluation of Brazilian periodicals to obtain a "basic nucleus of relevant titles" that would deserve support from financial agencies. In 1988, 669 titles out of a total of 2311 were selected by specialists as being relevant; in 1990, only 372 out of 2215 were selected. *See* Krzyzanowski *et al*. (1991).

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Looking at the biogeographic distribution of biotechnology and biodiversity, a very clear and often-noted pattern emerges. Most biodiversity is found in developing countries, and most biotechnology is found in the developed countries.

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