

## BRAZILIAN PRODUCTION IN BIOCHEMISTRY INTERNATIONAL VERSUS DOMESTIC PUBLICATION

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### ABSTRACT

This work describes a bibliometric survey on scientific production in biochemistry originated from 19 Brazilian institutions, which comprised 487 staff investigators, 70-80% of active investigators biochemists. These investigators published about 3000 papers in international journals in the period 1970-1985, which generated about 17000 citations from 1983 to 1987, according to the Institute for Scientific Information data base. In this survey we distinguished what we called endogenous articles (produced in Brazil) from exogenous articles (produced abroad by Brazilian biochemists), in terms of

*même effort de publication internationale. A partir de ces observations nous discutons la pertinence de la publication locale par opposition à la publication internationale.*

## INTRODUCTION

In Brazil different scientific fields present rather distinct trends in terms of the audiences to which the publications are aimed. If we consider the data base

lenient or no editorial policy at all. From these considerations several questions

basic sciences in Brazil (1) and probably meets no parallel in other sub-areas of Brazilian science.

Presently, the best way of detecting the repercussion of international publications is through the rate of citations they earn through the SCI survey. Table 2 shows the citation rates surveyed in a 5 year period (1983-1987) of the papers published in the period 1970-1985. The first point that comes to our

Table 4. Journals that most published endogenous papers

| Journals              | Publications | Citations | Citations/<br>Publications | Impact<br>Factor |
|-----------------------|--------------|-----------|----------------------------|------------------|
| Acad Bras Cienc *     | 96           | 73        | 0.76                       | 0.115            |
| Biochim. Biophys Acta | 87           | 668       | 7.91                       | 2.739            |
| Comp Biochem Phys     | 86           | 237       | 2.76                       | 0.784            |

Table 5. Journals that most published exogenous papers

| Journals             | Publications | Citations | Citations/<br>Publications | Impact<br>Factor |
|----------------------|--------------|-----------|----------------------------|------------------|
| Exp Neurol           | 34           | 259       | 7.62                       | 1.224            |
| P Natl Acad Sci USA  | 31           | 622       | 20.06                      | 9.165            |
| Mol Pharmacol        | 30           | 429       | 14.30                      | 2.183            |
| J Biol Chem          | 25           | 734       | 29.36                      | 6.315            |
| J Pharmacol Exp Ther | 23           | 197       | 8.57                       | 3.547            |

journal? To answer this question we took as reference for citation survey the year of 1986 and considered the publications of 1984 and 1985. A total of 460 papers were published in ISI indexed journals in these two years, divided into 353 endogenous papers and 107 exogenous papers (Table 6). The average impact factors were 1.278 and 3.300, for the endogenous and exogenous papers, respectively. This again reflects the trend of publishing the exogenous papers in more prestigious journals. If we now compare these impact factors with those expected if the Brazilian articles had the same citation rates that the overall articles in each of these journals the results are 1.278 versus 1.911 for endogenous papers and 3.300 versus 3.716 for exogenous papers. The difference between the two figures in the latter case is not significant ( $p > 0.1$ ) which would mean that Brazilian biochemists working abroad, and counting on the prestige of the institution and better material facilities, are doing as well as central world biochemists. Back home they keep making a great effort to publish in international journals but have on average to content themselves with less prestigious journals. Moreover, when the endogenous papers are published in international journals their impact (1.278) is lower than the expected from the journals where they were published (1.911) and in this case the difference is significant ( $p < 0.05$ ). If we raise the reasonable hypothesis that the editors of these journals are not lenient and on average accept papers of comparable quality, independently of the geographic origin, then some bias might be occurring in the process of citing science which disfavors less renowned groups from Third World countries. However it should be pointed out that this difference is not exaggerated: on average Brazilian biochemists achieved a citation rate corresponding to 67 % of that achieved by their colleagues from central countries, a figure which is just slightly higher than 0.64, the average ratio of direct citation counts to expected citation rates for all Brazilian papers (4). This figure is not

more careful analysis . The fact is that large differences can be found in terms of international impact among different areas of Brazilian science and in, a given area, among different investigators. It is certainly not expected that the areas tending to publish in domestic journals achieve any significant citation rate. Among the areas in which a clear effort is identified towards all international output, the results may vary significantly. For instance, the 272 international papers in biochemistry published in 1982 by Brazilian scientists earned 8.8 citations per paper over the period 1983-1987, or 1.76 citation per year per paper. If we consider only the endogenous papers of 1982, the publications were 207 and the citation rate was 1.00 citation per year per paper, or 0.82 if we discount the self-citations. This is a much more expressive figure than the 0.30 value for the average Brazilian chemistry paper (3), another area in which a major effort is conducted towards an international output.

In addition, it should be mentioned that these figures are rather distinct among different institutions (7). In the case of the department of Biochemistry of the University of Rio de Janeiro, for instance, each international publication of 1982 earned 1.6 "real" citations per year, in the period 1983-1987. Finally, 85 endogenous papers (3.9 % of the total ) earned 20 or more citations in the period 1982-1985. These most cited papers earned 32 % of all citations for endogenous papers and were published by only 28 senior authors (5.6 % of the total). This denotes a concentration effect whereby a relatively small number of Brazilian biochemists is responsible for most of the impact generated by Brazilian biochemistry papers.

If we try to delineate the general characteristics of these investigators we see that they are all recognized scientific leaders in Brazilian biochemistry, have published a large number of papers, have been responsible for the training of many young scientist and have kept close contact with First World colleagues, participating in meetings as invited speakers, visiting laboratories, etc. In other words, they constitute a group of scientists who have somehow overwhelmed the intrinsic difficulties of doing science in Brazil and would be classified by international standards as important contributors in their areas.

These investigators learned very soon the challenge of publishing in the best



