

# Canadian Journals Are Better Than Some Think\*

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One reason why it has been difficult to develop good scientific journals in Canada is that Canadian scientists are reluctant to publish in them. They give various reasons: that the journals are not well enough known, that they do not have high enough standards, or that they are ignored internationally.

Yet this attitude sets up a vicious circle, because no journal can become well known, have high standards, or attract international attention if it cannot publish at least some of the best work being done in the country.

What are the facts about Canadian scientific journals? Are they in fact inferior? Recent evidence suggests not. In fact, it shows that some rank relatively high in the world's scientific literature.

Until recently there has been no objective way to evaluate scientific journals. Any assessments made were, of necessity, largely subjective and were based upon such criteria as circulation, the scientific prestige

of editorial boards, and the stature of authors. By these means, it was easy to identify a few of the most highly respected journals in various fields of science, but there was no quantitative measure of the impact or influence of any individual journal.

The advent of *Journal Citation Reports* (to be included on an annual basis as a separate volume of *Science Citation Index*, published by the Institute for Scientific Information, Philadelphia) now provides a quantitative measure of journal performance and may be expected to have considerable influence on journal publication.

*Journal Citation Reports* analyzes the 2,630 source journals of the *Science Citation Index* data base. These include all journals referred to in 4,248,065 citations contained in the reference lists of some 400,000 articles. Analysis of these citations reveals that 85% of them are from only some 2,000 or so journals. Al-

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TABLE 1  
Citation analysis of Canadian scientific journals

Journal	Citations			Impact factor		
	Rank in this list	Times cited (1974)	World rank	Rank in this list	Impact factor	World rank
Can. J. Chem. (NRC)	1	9,142	63	2	1.396	502
Can. J. Phys. (NRC)	2	4,656	147	9	1.038	718
Can. Med. Assoc. J.	3	3,115	252	3	1.249	586
Can. J. Bot. (NRC)	4	2,897	273	6	1.069	689
Can. J. Biochem. (NRC)	5	2,696	293	1	1.671	387
J. Fish. Res. Board Can.	6	2,505	317	8	1.053	711
Can. J. Microbiol. (NRC)	7	2,397	336	7	1.065	695
Can. J. Zool. (NRC)	8	1,559	466	13	0.788	936
Can. J. Physiol. Pharmacol. (NRC)	9	1,507	479	4	1.242	587
Can. Entomol.	10	1,119	613	24	0.473	1,357
Can. J. Earth Sci. (NRC)	11	1,004	657	5	1.092	676
Can. J. Genet. Cytol.	12	804	764	11	0.936	805
Can. J. Chem. Eng.	13	727	824	19	0.593	1,165
Can. J. Math.	14	649	878	27	0.366	1,685
Can. J. Psychol.	15	608	915	18	0.636	1,104
Can. J. Plant Sci.	16	601	922	26	0.341	1,629
Can. Anaesth. Soc. J.	17	432	1,114	14	0.767	954
Can. J. Anim. Sci.	18	428	1,119	17	0.701	1,033
Can. J. Comp. Med.	19	416	1,133	21	0.562	1,208
Can. J. Surg.	20	390	1,176	20	0.564	1,206
Can. J. Soil Sci.	21	358	1,235	22	0.524	1,266
Rev. Can. Biol.	22	346	1,257	16	0.723	1,008
Can. Vet. J.	23	209	1,555	30	0.301	1,727
Clin. Biochem.	23	209	1,555	15	0.757	963
Can. J. Ophthalmol.	24	198	1,590	23	0.515	1,278
Can. Met. Quart.	25	173	1,655	28	0.313	1,694
Can. J. Pub. Health	26	170	1,663	31	0.299	1,732
Can. Psychiat. Assoc. J.	27	122	1,854	35	0.095	2,184
Can. J. Pharm. Sci.	28	120	1,864	10	0.958	789
Arctic	29	110	1,911	33	0.225	1,897
Can. J. Food Sci. Tech.	30	106	1,946	37	0.061	2,260
Can. Math. B	31	94	2,023	36	0.083	2,222
Can. J. Spect.	32	65	2,154	12	0.891	840
Can. J. Behav. Sci.	33	58	2,192	25	0.351	1,610
Can. Psychol.	34	48	2,247	32	0.269	1,798
Can. J. Med. Technol.	35	30	2,359	29	0.304	1,717
J. Can. Petrol. Tech.	36	15	2,465	34	0.167	2,034
Can. Aeronaut. Space J.	37	9	2,524	38	0.051	2,279

though the fourth edition of the *World List of Scientific Journals* contains 59,961 titles, it is clear that only some 5-6% of them are being cited and that the 'core' group of 2,630 journals covered by *Journal Citation Reports* are those that participate effectively in the transfer of scientific information.

Table 1 lists those journals published in Canada that are included in *Journal Citation Reports*. The data reproduced here are limited to 'Citations' and 'Impact Factors.' The journals are listed in order of the total number of times each was cited in 1974 (middle column under Citations). The World Rank column under Citations shows the standing of the journal (by total citations in 1974) in the complete listing of all 2,630 journals covered. The Impact Factor is the ratio of the number of 1972 and 1973 items (cited in 1974 in all 2,630 source journals) published by the journal divided by the total number of articles published by that journal in 1972 and 1973. The first and third columns under Impact Factor show respectively the ranking of each journal (a) relative to the other Canadian journals listed, and (b) relative to all 2,630 journals.

To put these rankings in perspective it is necessary to look at the distribution of citations and impact factors among the total 2,630 journals. Figure 1 shows these distributions in terms of numbers of journals and figure 2 presents them on a percentage basis. Thus, from figure 1 we can see that less than 100 journals were

cited 10,000 times or more in 1974, another approximately 100 journals were cited 5-10,000 times, and, even at 1-2,000 citations there are less than 300 journals. Similarly, there are fewer than 25 journals with an impact factor higher than 10, about 50 journals with impact factors between 5 and 10, and even at impact factors of 1-2 there are only some 500 journals.

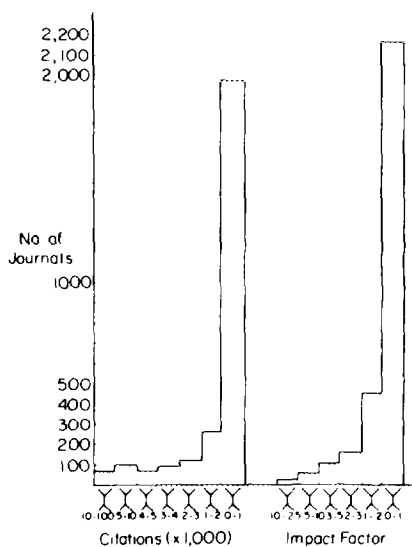


FIGURE 1

This concentration of high citation rate and high impact factor is even more apparent on a percentage basis, as shown in figure 2. Here we can see that only 25% of the journals are cited 1,000 or more times and that

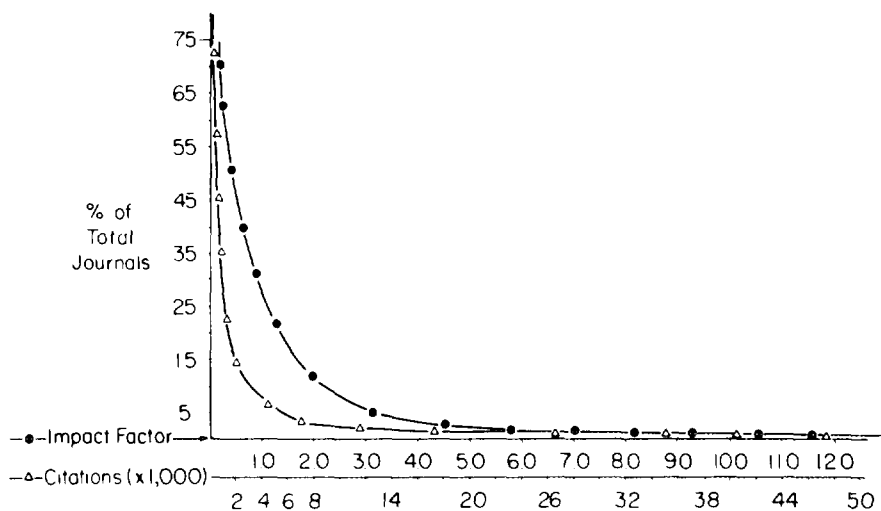


FIGURE 2

just 5% are cited 5,000 or more times. The curve of impact factor as a percentage of journals shows that 2.1% of the journals have impact factors of 5 or higher and that 28% of them have impact factors of 1 or more.

From the data obtained and the presentations in figures 1 and 2 it is possible to see where individual Canadian journals rank in relation to the world's cited literature. E. Garfield, in his introduction to *Journal Citation Reports* (Science Citation Index, Vol. 9, 1975 Annual, Institute for Scientific Information, Philadelphia), has pointed out the limitations of these analyses for comparing journals, particularly those from different disciplines. He has also emphasized

that citation analysis cannot be the sole factor in evaluating a journal's performance.

As the National Research Council publishes the largest group of scientific journals in Canada, it was of interest to us to see how those journals rated. Other Canadian journals are included for the interest of their publishers and to provide a perspective of scientific publishing in Canada.

It is interesting to note that by citations, the first 11 journals in table 1 rank in the top 25% of the world's cited literature and that the first 22 are in the top 50%; the first 7 journals listed rank in the top 12% of all 2,630 journals covered. By impact factor, the first 5 ranked journals are in the top 25%, the first 13 ranked

are in the top 35%, and the first 23 ranked journals are in the top 50% of the world's cited literature.

As indicated above, comparisons of individual journals in table 1 are neither appropriate nor meaningful. The only really valid relationship of a journal is to other similar journals in the same field. Lists of related journals have been compiled for each of the journals published by NRC and will be circulated through the appropriate scientific societies by the individual editors.

What, then, can be learned from the listing in table 1, and how could it be used? First of all, it is clear that there are some excellent journals being published in Canada, with a significant number falling in the top 25% or so of rated journals, comparable with the best in the world. This should help those editors who are trying to raise standards and improve their journals. The record shows that the vicious circle previously referred to can be broken provided that there is sufficient activity in a field and a number of good scientists who can be persuaded to support a journal by submitting papers to it.

The information available in *Journal Citation Reports* may also be useful in considering other questions about scientific publications in Canada. For example, are there too many or too few journals published in Canada for the size of our scientific

community? Should some journals be combined, realigned, or eliminated, or should new ones be started? Should a journal be continued if it does not receive sufficient support (in the form of submitted papers) to make it internationally competitive? How did the highly ranked journals get that way? What steps can be taken to maintain or improve their positions and to improve others?

Finally, in times of restricted science budgets, including those for publications, there is the important question of journal economics: how many journals can we or ought we to afford? Should their management be centralized, decentralized, or somewhere in between? What is the most efficient and economical way of financing good journals? How does financing affect the performance of a journal in citation rankings?

Citation analysis *alone* will not provide answers to these questions but it does make available an objective assessment of a journal's performance among its peers. It is certainly in the best interests of the Canadian scientific community to strengthen and improve its journals wherever possible. The highly ranked journals in table 1 are circulated throughout the world, are cited heavily in the scientific literature, and reflect a credit to Canadian science that is an excellent return on the time, effort, and money spent in producing them.

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