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Last year in *Nature* B.J. Walby published a short history of scientific journal publication in Australia since the Second World War.<sup>1</sup> He made special reference to the role of the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in the creation, funding, and running of a group of nine national journals. Walby cited two of ISI®'s citation studies in his short evaluation.<sup>2,3</sup> In passing he took a justifiable swipe at postal services everywhere. "The general decline in the world's postal services has ensured that a scientific contribution from Australia is noted in current awareness documents like *Current Contents*® long before the journal itself reaches the ultimate reader. Requests for reprints often arrive before the reprints have left the publishers."

Walby seems to imply that the postal services are doing well enough with those premature reprint requests, if with nothing else. But I must gladly admit that ISI does indeed do much better with *Current Contents* (CC®) than if we relied solely on the postal services for its timely delivery on distant shores.

The days are long gone since someone (I think it was Sir William Osler) remarked that Australian medical journals could be dismissed as containing mostly case reports on snake bite. Walby's article, and this analysis as well I believe, show how outdated that aspersion now is. Perhaps the most interesting aspect of Walby's report on Australian journals is that it could be applied to almost any national group of journals anywhere. The problems he discusses--costs, timing, refereeing, specialism--are universal, not just Australian.

The journals examined in this study are listed in Figure 1. They include the 28 journals published in Australia and the 8 published in New Zealand covered by the *Science Citation Index*® (SCI®) in 1974. The Australian journals include all but one (*Australian Journal of Plant Physiology*) sponsored by CSIRO. It has since been added to SCI®'s coverage. We are well aware that New Zealanders and Australians do not always like to be lumped together, but the titles of several of the journals warrant this regional approach.

The 36 journals listed in Figure 1

**Figure 1. Journals from Australia and New Zealand (A/NZ) covered by the *Science Citation Index* in 1974. Journals are listed in alphabetic order. **A** = total 1974 citations of the journal. **B** = total 1974 citations of articles published by the journal in 1972 and 1973. **C** = total articles published by the journal in 1972 and 1973. **D** = impact factor.**

<b>Journal</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
1. Appita	52	16	91	0.176
2. Atomic Energy Australia	13	2	28	0.071
3. Australasian Radiol.	84	18	125	0.144
4. Austral. J. Agr. Res.	1171	148	196	0.755
5. Austral. J. Biol. Sci.	1974	379	281	1.349
6. Austral. J. Botany	244	40	50	0.800
7. Austral. J. Chem.	3453	658	654	1.006
8. Austral. J. Dairy Technol.	116	33	89	0.371
9. Austral. J. Exp. Biol. Med.	1451	209	153	1.366
10. Austral. J. Instr. Control	5	4	26	0.154
11. Austral. J. Marine Freshw. Res.	171	20	33	0.606
12. Austral. J. Physics	1117	166	157	1.057
13. Austral. J. Psychology	91	13	70	0.186
14. Austral. J. Soil Res.	136	17	37	0.459
15. Austral. J. Statistics	39	5	57	0.088
16. Austral. J. Zoology	409	47	71	0.662
17. Austral. NZ J. Med.	220	155	142	1.092
18. Austral. NZ J. Obst. Gyn.	117	40	97	0.412
19. Austral. NZ J. Surg.	214	41	213	0.192
20. Austral. Paediatric J.	148	51	58	0.879
21. Austral. Vet. J.	887	185	245	0.755
22. Chem. New Zealand	2	2	25	0.080
23. J. Austral. Inst. Agr. Sci.	131	23	108	0.213
24. J. Austral. Inst. Metals	104	13	42	0.310
25. J. Royal Soc. New Zealand	14	6	—	—
26. Med. J. Australia	2893	805	1110	0.725
27. NZ J. Agr.	94	9	452	0.020
28. NZ J. Agr. Res.	444	77	210	0.367
29. NZ J. Geol. Geophysics	414	52	116	0.448
30. NZ J. Science	255	24	122	0.197
31. NZ Med. J.	438	97	240	0.404
32. Pathology	187	72	70	1.029
33. Proc. Austral. Biochem. Soc.	89	55	—	—
34. Proc. Univ. Otago Med. Sch.	85	20	65	0.308
35. Search	92	57	147	0.388
36. Tasmanian J. Agr.	3	0	108	0.000

**Figure 2. Journals that were Cited by Australia and New Zealand (A/NZ) Journals.**

Journals are listed in order of their citation by the A/NZ group. **A** = total citations by all journals. **B** = total citations by A/NZ journals. **C** = self-citations.

**D** =  $B/A$  (A/NZ citations in terms of total citations). **E** =  $C/A$  (self-citations in terms of total citations, the self-cited rate). **F** =  $C/B$  (self-citations in terms of A/NZ citations). **G** = impact factor

Journal	A	B	C	D	E	F	G
1. J. Amer. Chem. Soc.	98995	936	—	0.9	—	—	4.383
2. Med. J. Australia	2893	842	599	29.1	20.7	71.1	0.725
3. Lancet	37047	800	—	2.2	—	—	6.677
4. Brit. Med. J.	20748	641	—	3.1	—	—	3.556
5. Austral. J. Chem.	3453	576	566	16.7	16.4	98.3	1.006
6. Nature	59206	446	—	0.8	—	—	3.636
7. New Engl. J. Med.	26726	421	—	1.6	—	—	8.364
8. Austral. J. Agr. Res.	1171	381	297	32.5	25.4	78.0	0.755
9. Austral. Vet. J.	887	370	340	41.7	38.3	91.9	0.755
10. J. Chem. Soc.	19955	341	—	1.7	—	—	—
11. J. Org. Chem.	20539	324	—	1.6	—	—	1.495
12. Austral. J. Biol. Sci.	1974	279	136	14.1	6.9	48.7	1.349
13. J. Amer. Med. Assoc.	17211	263	—	1.5	—	—	3.068
14. J. Chem. Physics	62041	254	—	0.4	—	—	2.918
15. NZ J. Geol. Geophysics	414	241	229	58.2	55.3	95.0	0.448
16. Tetrahedron Lett.	16509	216	—	1.3	—	—	1.777
17. Science	47505	203	—	0.4	—	—	5.412
18. NZ J. Agr. Res.	444	190	149	42.8	33.6	78.4	0.367
19. Annals Internal Med.	10231	186	—	1.8	—	—	4.828
20. J. Clin. Invest.	24768	186	—	0.8	—	—	6.992
21. Amer. J. Obst. Gynecol.	8890	182	—	2.0	—	—	2.100
22. Inorganic Chem.	14310	175	—	1.2	—	—	2.457
23. Austral. J. Exp. Biol. Med.	1451	172	128	11.9	8.8	74.4	1.366
24. NZ Med. J.	438	167	137	38.1	31.3	82.0	0.404
25. Circulation	14461	155	—	1.1	—	—	6.834
26. Vet. Record	2116	154	—	7.3	—	—	0.872
27. Austral. J. Physics	1117	153	151	13.7	13.5	98.7	1.057
28. Gastroenterology	8693	149	—	1.7	—	—	5.394
29. J. Exp. Med.	20699	146	—	0.7	—	—	11.874
30. Amer. J. Med.	9779	145	—	1.5	—	—	4.411
31. J. Chem. Soc. Chem. Comm.	14454	144	—	1.0	—	—	2.096
32. Tetrahedron	8903	143	—	1.6	—	—	1.576
33. J. Amer. Vet. Med. Assoc.	2272	141	—	6.2	—	—	0.677
34. J. Biol. Chem.	81354	137	—	0.2	—	—	5.843
35. Austral. J. Exp. Agr. & Anim. Husb.	—	136	—	—	—	—	—
36. Biochem. J.	31563	129	—	0.4	—	—	3.627
37. J. Obst. Gyn. Br. Comm.	2747	127	—	4.6	—	—	1.922
38. J. Pediatrics	7183	124	—	1.7	—	—	2.600
39. Physical Review	50828	124	—	0.2	—	—	—
40. Phytopathology	4842	114	—	2.4	—	—	1.155
41. J. Chem. Soc. A.	7407	109	—	1.5	—	—	—
42. Proc. Nat. Acad. Sci. USA	46917	109	—	0.2	—	—	8.989
43. Canad. J. Chem.	9142	108	—	1.2	—	—	1.396
44. Proc. Soc. Exp. Biol. Med.	18171	108	—	0.6	—	—	1.471
45. Cancer	9497	107	—	1.1	—	—	2.361
46. J. Animal Sci.	4116	105	—	2.6	—	—	1.311
47. Gut	3726	103	—	2.8	—	—	3.336
48. Austral. J. Zool.	409	102	97	24.9	23.7	95.1	0.662
49. Chem. Berichte	12629	102	—	0.8	—	—	1.493
50. J. Agr. Sci.	1512	102	—	6.7	—	—	0.622

**Figure 3. Journals that Cited Australian and New Zealand (A/NZ) Journals.** Journals are listed in order of their citation of the A/NZ group. **A** = total citations of other journals. **B** = total citations from journals in the A/NZ group. **C** = self-citations. **D** = B/A (A/NZ citations in terms of total citations). **E** = C/A (self-citations in terms of total citations, the self-citing rate). **F** = C/B (self-citations in terms of A/NZ citations). **G** = impact factor.

Journal	A	B	C	D	E	F	G
1. Med. J. Australia	5418	724	599	13.4	11.1	82.7	0.725
2. Austral. J. Chem.	5959	575	566	9.6	9.5	98.4	1.006
3. Austral. J. Agr. Res.	1620	431	297	26.6	18.3	68.9	0.755
4. Austral. Vet. J.	1897	392	340	20.7	17.9	86.7	0.755
5. NZ J. Geol. Geophysics	1015	237	229	23.3	22.6	96.6	0.448
6. NZ J. Agr. Res.	852	211	149	24.8	17.5	70.6	0.367
7. NZ Med. J.	1732	202	137	11.7	7.9	67.8	0.404
8. Austral. J. Biol. Sci.	1342	172	136	12.8	10.1	79.1	1.349
9. Austral. J. Physics	1133	151	151	13.3	13.3	100.0	1.057
10. J. Chem. Soc. Perkin.	20327	150	—	0.7	—	—	1.348
11. Austral. J. Exp. Biol. Med.	1561	143	128	9.2	8.2	89.5	1.366
12. J. Organomet. Chem.	22699	130	—	0.6	—	—	2.392
13. Austral. J. Zool.	1125	128	97	11.4	8.6	75.8	0.662
14. J. Agr. Sci.	1804	119	—	6.6	—	—	0.622
15. Austral. J. Botany	1051	112	61	10.7	5.8	54.5	0.800
16. J. Anim. Sci.	5755	112	—	1.9	—	—	1.311
17. Inorganic Chem.	15048	106	—	0.7	—	—	2.457
18. Astrophysical J.	18589	101	—	0.5	—	—	4.063
19. Lancet	19020	97	—	0.5	—	—	6.677
20. Austral. & NZ J. Med.	1959	95	25	4.8	1.3	26.3	1.092
21. Phytochemistry	8374	94	—	1.1	—	—	1.103
22. J. Amer. Chem. Soc.	46267	92	—	0.2	—	—	4.383
23. NZ J. Sci.	731	90	60	12.3	8.2	66.7	0.197
24. Plant Physiology	7839	90	—	1.1	—	—	2.580
25. Astronomy Astrophysics	7919	88	—	1.1	—	—	2.267
26. J. Reprod. Fertil.	7623	87	—	1.1	—	—	2.357
27. Brit. Med. J.	12458	85	—	0.7	—	—	3.556
28. J. Dairy Sci.	3964	84	—	2.1	—	—	1.086
29. Prog. Med. Virology	2583	83	—	3.2	—	—	3.750
30. Nature	26016	81	—	0.3	—	—	3.636
31. J. Austral. Inst. Agr. Sci.	767	79	35	10.3	4.6	44.3	0.213
32. Analytical Chem.	27658	73	—	0.3	—	—	3.291
33. Amer. J. Vet. Res.	4507	72	—	1.6	—	—	0.833
34. Astronomical J.	2885	71	—	2.5	—	—	1.953
35. Austral. Paediatric J.	855	71	22	8.3	2.6	31.0	0.879
36. Crop Science	2938	71	—	2.4	—	—	0.529
37. J. Organic Chem.	21976	69	—	0.3	—	—	1.495
38. J. Inorg. Nucl. Chem.	9026	68	—	0.8	—	—	0.962
39. J. Chem. Soc. Dalton	10505	66	—	0.6	—	—	2.312
40. Austral. J. Mar. Freshw. Res.	496	65	63	13.1	12.7	96.9	0.606
41. Austral. J. Dairy Technol.	371	62	59	16.7	15.9	95.2	0.371
42. Canad. J. Botany	5699	62	—	1.1	—	—	1.069
43. Indian J. Chem.	5196	61	—	1.2	—	—	0.400
44. Coord. Chem. Reviews	4588	60	—	1.3	—	—	3.750
45. S. Afr. Med. J.	6180	60	—	1.0	—	—	0.440
46. Solar Physics	4026	60	—	1.5	—	—	1.929
47. Brit. J. Nutr.	2165	59	—	2.7	—	—	1.442
48. Vet. Record	2418	59	—	2.4	—	—	0.872
49. Res. Vet. Science	1890	58	—	3.1	—	—	0.658
50. Ann. Botany	2080	57	—	2.7	—	—	1.069

made up 1.5% of the 2443 journals covered by the *SCI* in 1974. They produced 2562 or 0.6% of the 400,971 items indexed, and 34,230 (0.7%) of the 5.232 million citations processed for the *SCI* in 1974. The average number of references per article was about 13, the international average.

Figure 2 shows the 50 journals that the Australian/New Zealand (A/NZ) group cited most frequently in 1974. Figure 3 shows the 50 journals that most frequently cited the A/NZ group in 1974. Each of the figures shows the total number of citations made or received by a journal, the number of citations made or received by the A/NZ group, the number of self-citations, and percentages (where appropriate) that relate these figures to each other. The last column in both Figures 2 and 3 shows impact factors. Impact is the average number of times articles published by a journal in 1972 and 1973 were cited in 1974.

In 1974 the A/NZ group cited 5198 different publications a total of 12,068 times. The 50 journals in Figure 2 account for 35% (12,068) of those citations. Figure 3 shows the journals that cited the A/NZ group most. The 36 journals in Figure 1 were cited by 1458 different publications a total of 17,355 times. The 50 journals in Figure 3 accounted for 38% of those citations.

Figure 2 (journals most cited by A/NZ journals) shows that 12 of the 50 are A/NZ journals, and that 9 of the 12 are among the first 25.

This concentration is about the same as for the French, Japanese and German literatures we've studied (11, 15, and 10 respectively). In our recent study of Latin-American journals the number was only 5.4

Figure 3 (journals that most often cite A/NZ journals) shows that 18 of the 50 are themselves A/NZ journals. Or, to put it the other way, 32 of the journals that cite A/NZ journals most frequently are published elsewhere. In this respect, the A/NZ journals do better than the French, Japanese, and German journals we've studied. In those cases, the counts were only 18, 22, and 22 respectively. I think these figures are a very rough indication of international use of these national literatures, though the Japanese in particular may reflect linguistic inaccessibility more than in other cases. The corresponding figure in the case of Latin-American journals was a deceptive 41. That number might be an artefact of the *SCI*'s coverage of Latin-American journals. Other factors must also play a role. Latin-American journals are, on the whole, as infrequently cited in Latin-American journals as elsewhere.

We know that Australian and New Zealand scientists publish their reports in other countries' journals as well as their own. The address listings published weekly in *Current Contents* and cumulated annually in ISI's *Who is Publishing in Science*<sup>®</sup> reveal that in 1974 there were 8168 papers by authors

with Australian and New Zealand addresses.<sup>5</sup> Although some of these were published in journals covered by *CC* but not *SCI*, the A/NZ journals listed in Figure 1 accounted for just about a third (2562/8168). Thus, more than 68% of the A/NZ output is published elsewhere. This contrasts sharply with comparable figures for France, Germany, and Japan. The French published 95% (15527/16349) in French journals. In Germany 67% (22061/32996) were published there, and in Japan it was 80% (10930/13606).

The make-up of the lists in Figures 2 and 3 is interesting. The dominant characteristic of the journals listed in Figure 2 is their biomedical orientation. Of the 50 journals most cited by A/NZ journals, 19 are biomedical (predominantly medical) and 11 are concerned with food production, veterinary medicine, and botany. The life sciences seem to dominate A/NZ research, and medicine takes the lead. True, the *Journal of the American Chemical Society* heads the list of journals most cited by A/NZ journals, as it usually heads every such list, but physics journals are conspicuously absent, except for

*Journal of Chemical Physics* (number 27) and *Physical Review* (number 39).

Of the 50 journals listed in Figure 3--those that cite A/NZ journals most often--biomedicine claims 10 journals, while food production, veterinary science, and botany claim another 21.

An interesting footnote to this study is the observation that with one exception no non-English language journal appears on the lists in Figures 2 and 3. The exception is *Chemische Berichte*, cited primarily for older work.

The most highly cited of the A/NZ journals on the list in Figure 1 is *Australian Journal of Chemistry* (cited 3453 times in 1974), closely followed by *Medical Journal of Australia* (cited 2893 times). The two journals with highest impact, however, were *Australian Journal of Experimental Biology and Medicine* (impact 1.346, cited 1451 times) and *Australian Journal of Biological Sciences* (impact 1.366, cited 1974 times). As will be seen shortly, when we publish a list of highly cited articles for this region, these journals will account for many of them.

1. Wably B J. Australian journals of scientific research. *Nature* 261:661-64, 1976.
2. Garfield E. Journal citation studies. 2. Highly Cited botany journals. *Current Contents (CC)* No. 2, 13 January 1975.
3. ————. Journal citation studies. 20. Agriculture journals and the agricultural literature. *CC* No. 20, 19 May 1975.
4. ————. Journal citation studies. 26. Latin-American journals. *CC* No. 37, 13 September 1976.
5. *ISI's Who is Publishing in Science, 1975 Annual, An International Directory of Scientists and Scholars in the Life, Physical, Social and Applied Sciences.* (Philadelphia: Institute for Scientific Information®, 1975), p. 8 ("Statistical summaries of author address frequency by geographical distribution.")