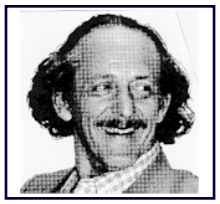

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Significant journals of science

Eugene Garfield*

In 1974 the Science Citation Index (SCI) *covered about 401,000 articles and communications in 2,443 scientific and technical journals. They cited about 3.2 million different publications an average of 1.8 times each. In this article some results of an analysis of more than 5 million citations in the references of journal articles indexed for the* SCI *in 1974 are presented and an attempt is made to interpret those results in the light of an earlier study of 1969 citations.*

THE basic information recorded in the *SCI* for citing and cited papers is a "condensed citation." It gives first author, year, journal, volume, and page. The citing–cited pairs can be sorted and subsorted in various ways, as one's interests dictate. Sorting by cited author produces the *Citation Index* section of the *SCI*. Sorting by citing and cited journals produces the two major sections of the *Journal Citation Reports* (*JCR*).

ISI's *Journal Citation Reports* is an index of journal–journal links based on a grouping and summation of condensed citations using journal rather than author as the primary sorting key. A preliminary *JCR*, based on an analysis of 1969 references[1], appeared in 1972[2]. This year the *JCR* became a regular section and volume of the *SCI*[3]. It is the source of the 1974 citation data discussed here.

In this report I have used two indicators of journal significance: total citations and impact. The first is simply the number of times a journal was cited in 1974. Impact, on the other hand, is a measure of the relationship between citations and articles published. For this report, impact was calculated by dividing the number of 1974 citations of 1972 and 1973 articles by the number of articles published in 1972 and 1973. For example, the 817 articles published in 1972 and 1973 in the *Journal of Molecular Biology* were cited 6,129 times in 1974. The impact of the journal is therefore 7.502.

Fig. 1(*a*) lists the 206 journals most cited in 1974. Fig. 1(*b*) lists an additional 78 journals whose 1972 and 1973 articles only—rather than articles of any and all years, as in Fig. 1(*a*)—were highly cited in 1974. (The total of 284 journals in Fig. 1(*a*) and (*b*) corresponds to the number of journals listed in Fig. 2(*a*) and (*b*), which have impacts greater than 2.) In most cases (63%) these journals began publication in the 1960s and 70s. Older journals like the *Comptes Rendus* rank well in Fig. 1(*a*), mainly because there is so much that can be cited. Fig. 1(*b*) is a needed supplement to the list in Fig. 1(*a*), since the journals have high current citation but lack historical mass to push them up into the top of a list ranked by total citations.

Figures 2(*a*) and (*b*) show the 284 journals with impacts greater than 2. Fig. 2(*a*) lists 206 primary journals. Fig. 2(*b*) lists 78 review journals; the impact of review journals is generally higher than that of primary journals.

Figure 3 lists journals that rank highest in citation and impact for three specialities: mathematics, botany, and astronomy/astrophysics. The differences in average impact and citation between the three illustrative categories indicate why comparisons between journals in different specialities may be invidious. For example, it would be foolish to conclude merely on the basis of citation counts that *Astrophysical Journal* is a "better" journal than *Annals of Mathematics*, or to hypothesise without a great deal of study which serves its own field "better."

Variation from field to field is determined by the interplay of several factors. Perhaps the most important is the average number of references per paper in the field[4]. In general, mathematicians cite less than half as many papers as do biochemists. Engineers on the other hand cite books as heavily as journals, as do social scientists. Furthermore, calculation of impact based on 1972 and 1973 publications is bound to affect the impact of journals in a field like mathematics, where citation of older literature is far more common than in others. Thus, the impact of mathematics journals would be higher if calculated on the basis of 1970 and 1971 publications.

It seems necessary to point out the obvious, as I have done in preparing Fig. 3, because one short-sighted criticism of the *JCR* has been that its listings and rankings are undiscriminating. One can get from the *JCR* information on journals within disciplines for intradisciplinary comparison. None of the mathematics journals listed in Fig. 3 was cited enough to appear in Fig. 1(*a*), but the citation counts and impact factors show plainly that the two leading mathematics journals are *Transactions of the American Mathematical Society* (on the basis of total citations) and *Acta Mathematica* (on the basis of impact). In both citation and impact the average mathematics journal ranks lower than the average astronomy or botany journal.

If one wishes to add to a general-science collection the two or three leading journals of mathematics, botany, or astronomy/astrophysics, one must examine longer lists and select from them the top journals in each speciality, as I have done in preparing Fig. 3.

The remarkable stability of the significant journals of science is attested by their continued high citation and impact. Of the 206 journals most cited in 1969, 169 remain among the top 206 in 1974. One may regard the changes as the result of healthy competition. The 37 journals that dropped from the 206 most cited between 1969 and 1974 rank between 224 and 426 in the complete listing that appears in the *JCR*[5].

*Institute for Scientific Information, Philadelphia, Pennsylvania 19106.

Fig. 1a. Journals most highly cited in 1974. Journals are listed in descending numerical order of total citations in the references of 1974 issues of journals processed for the *Science Citation Index*. A: rank in terms of total 1974 citations. B: rank in terms of total 1969 citations. C: total 1974 citations. D: 1974 impact. E: total 1974 citations of 1972 and 1973 articles. F: rank in terms of 1974 citations of 1972 and 1973 articles. An asterisk before a journal title indicates that counts for sections, retitled continuations, translated versions, and so on, have been combined with those for the original; the number in parentheses after the journal title indicates the number of such sections, and so on, that went into the combination, including the original. *b*. Journals whose 1972 and 1973 articles were highly cited in 1974. Journals are listed in descending numerical order of total 1974 citations of their 1972 and 1973 articles. Journals ranking higher in this respect will be found among the journals listed in Fig. 1*a*. See the legend of Fig. 1*a* for significance of the column markers. An asterisk before a journal title indicates that counts for sections, retitled continuations, translated versions, etc., have been combined with those for the original; the number in parentheses after the journal title indicates the number of such sections, etc., that went into the combination, including the original. The date of a journal's inauguration follows its title.

a

A	B	C		D	E	F
1	1	98995	J. Am. chem. Soc.	4.385	17088	3
2	2	91645	*Physical Rev. (5)	2.670	19174	1
3	3	81353	J. biol. Chem.	5.845	15685	6
4	5	75206	*Nature (3)	4.006	18924	2
5	4	66272	*J. chem. Soc. (9)	1.870	12513	7
6	6	62041	J. chem. Physics	2.918	10462	9
7	8	51491	Biochim. biophys. Acta	3.120	14129	5
8	7	47505	Science	5.412	11781	8
9	9	46917	Proc. natn. Acad. Sci. USA	8.989	15317	4
10	11	37047	Lancet	6.677	10383	10
11	10	31563	Biochem. J.	3.627	4885	23
12	12	29275	Physical Rev. Letters	5.059	10108	11
13	32	27080	Biochemistry	4.711	7325	17
14	25	26726	New Engl. J. Med.	8.364	7385	15
15	22	24768	J. clin. Invest.	6.992	5377	21
16	18	24209	J. molec. Biol.	7.502	6129	18
17	41	23220	Biochem. biophys. Res. Comm.	3.744	8110	12
18	19	22520	J. Physiol. Lond.	4.495	3160	46
19	33	22460	*Nuclear Physics (3)	2.514	7356	16
20	21	22245	*J. Cell Biol. (2)	6.770	5685	38
21	29	22201	Astrophys. J.	4.063	7451	14
22	14	21519	Am. J. Physiol.	2.414	2412	59
23	27	20748	Brit. med. J.	3.556	4829	24
24	36	20699	J. expl Med.	11.874	5557	19
25	15	20539	J. org. Chem.	1.495	3526	40
26	16	19277	J. appl. Physics	1.558	5275	42
27	31	18375	J. Bacteriology	2.727	3809	57
28	30	18190	Analytical Chem.	5.291	4140	32
29	17	18171	Proc. Soc. expl Biol. Med.	1.471	2454	58
30	23	18086	J. phys. Chem.	2.031	2768	54
31	26	17211	J. Am. med. Ass.	5.068	2982	49
32	20	17201	*Proc. R. Soc. (5)	2.350	1114	135
33	13	16782	*C.r. Acad. Sci. (5)	0.529	4247	29
34	35	16509	Tetrahedron Letters	1.777	5004	22
35	38	15970	*Archs Biochem. Biophys. (2)	2.952	3050	48
36	53	15948	Endocrinology	4.337	4098	33
37	49	15826	J. Immunology	5.112	4703	26
38	34	15666	*Physics Letters (2)	2.133	7672	13
39	39	15281	J. geophys. Res.	2.536	3854	36
40	24	14706	*Chem. Ber. (2)	1.506	1353	104
41	37	14668	Ann. N. Y. Acad. Sci.	1.181	1291	113
42	52	14461	Circulation	6.854	4025	34
43	50	14310	Inorg. Chem.	2.457	3589	39
44	45	13911	*Acta crystallographica (5)	1.361	2394	60
45	82	13847	*Eur. J. Biochem. (2)	5.857	4595	27
46	47	13755	J. Pharmacol. expl. Ther.	3.576	2026	65
47	42	13072	Fedn Proc.	0.489	4212	30
48	58	12544	Cancer Res.	3.391	3164	45
49	69	11645	*J. clin. Endocr. Metab. (2)	5.170	3445	41
50	43	11459	*J. Physics (7)	1.689	5450	20
51	28	11421	*Zh. eksp. teor. Fiz. (2)	1.565	1607	84
52	57	11371	Virology	3.752	2949	50
53	40	11294	*J. Polym. Sci. (6)	0.964	1565	88
54	65	11127	Exp. Cell Res.	3.014	2788	53
55	48	10756	*Angew. Chem. (2)	4.140	2666	56
56	67	10231	Ann. internal Med.	4.828	2187	63
57	355	10227	Brain Res.	3.104	4522	28
58	87	10206	Analytical Biochem.	2.579	2184	64
59	46	9824	*Dokl. Akad. Nauk SSSR (7)	0.559	1681	81
60	62	9779	Am. J. Med.	4.411	1535	90
61	76	9678	J. natn. Cancer Inst.	3.289	2858	52
62	93	9497	Cancer	2.561	2036	66
63	59	9142	Can. J. Chem.	1.396	1793	73
64	707	9094	FEBS Letters	3.049	4815	25
65	74	9082	Circulation Res.	4.922	1698	79
66	108	9026	*Physica Status Sol. (3)	1.476	3201	44
67	64	8903	Tetrahedron	1.576	1913	69
68	77	8890	Am. J. Obstet. Gynec.	2.100	2236	62
69	78	8835	Plant Physiol.	2.580	1955	68
70	54	8805	*Acta chem. scand. (3)	1.042	1192	124
71	63	8798	J. Lab. clin. Med.	2.802	1132	151
72	115	8693	Gastroenterology	5.594	2260	61
73	107	8625	Appl. Physics Letters	3.220	3246	43
74	70	8619	J. appl. Physiol.	1.780	1184	125
75	481	8478	Applied Physics Letters	2.403	4205	31
76	141	8241	J. organomet. Chem.	2.592	3891	35
77	56	8183	Bull. Soc. chim. France	1.001	1492	96
78	81	7941	Bull. chem. Soc. Japan	0.932	1859	72
79	152	7928	J. Chromatography	2.175	2886	51
80	71	7922	Acta physiol. scand.	2.204	919	170
81	72	7914	J. phys. Soc. Japan	1.132	1500	95
82	61	7860	*Z. Naturforschung (5)	1.070	1503	94
83	192	7794	J. Neurochem.	3.535	2464	57
84	106	7656	*Br. J. Pharmacol.	3.516	1751	77
85	80	7459	Ann. Surgery	2.129	1060	140
86	113	7355	*Cell Tissue Res. (2)	1.961	1761	75
87	122	7185	J. Pediatrics	2.600	1890	70
88	84	7120	Blood	4.519	1529	91
89	60	7117	Helv. chim. Acta	1.649	1054	144
90	68	7063	Philosophical Mag.	1.856	876	178
91	147	7007	Biochem. Pharmacol.	2.025	1689	80
92	100	6951	Pediatrics	2.502	1546	105
93	120	6811	Am. J. Cardiol.	3.704	1889	71
94	276	6788	J. Virology	4.864	3142	47
95	149	6770	*J. Bone Jt Surg. (3)	1.558	729	254
96	73	6662	Z. Physik	1.540	864	182
97	112	6600	Experientia	0.885	1647	83
98	88	6539	J. gen. Physiol.	4.508	741	229
99	51	6562	*Fizika tverd. Tela (2)	0.762	1588	102
100	129	6507	Radiology	1.198	1320	107
101	66	6177	Annln Chemie (J. Liebig)	1.024	432	379
102	89	6066	*Archs internal Med. (2)	2.202	946	163
103	90	5994	Am. Heart J.	1.791	840	188
104	86	5885	J. opt. Soc. Am.	2.016	905	175
105	94	5849	*J. Physics Chem. Solids (2)	1.394	715	239
106	99	5761	J. inorg. nucl. Chem.	0.962	1149	128
107	156	5745	J. Endocrinology	2.919	1757	76
108	217	5685	*J. Pharmaceut. Sci. (3)	1.622	1549	92
109	92	5679	J. gen. Microbiol.	2.160	1136	129
110	115	5675	Surgery	1.559	842	187
111	378	5573	Solid St. Comm.	1.945	2768	55
112	170	5557	Clin. chim. Acta	1.669	1587	86
113	150	5556	J. Neurophysiology	4.537	676	249
114	98	5501	Methods Enzymology	1.765	547	311
115	136	5491	Archs Surgery	1.462	915	171
116	101	5486	Surgery Gynec. Obstet.	1.532	750	226
117	109	5478	J. Electrochem. Soc.	1.053	1098	136
118	55	5474	*Nuovo Cimento (3)	0.994	999	155
119	123	5428	J. acoust. Soc. Am.	1.142	830	195
120	96	5388	Am. J. Pathol.	2.807	856	184
121	91	5388	J. expl Psychol.	1.027	750	226
122	126	5365	*Spectrochim. Acta (3)	1.487	840	188
123	83	5326	Genetics	2.855	995	157
124	158	5197	J. Ultrastruct. Res.	2.709	857	190
125	105	5186	Revs mod. Physics	21.500	751	251
126	121	5167	J. Histochem. Cytochem.	4.005	757	224
127	102	5138	Anat. Rec.	2.884	649	265
128	235	5092	*Zh. obshch. Khim. (2)	0.808	1050	142
129	192	5063	Immunology	2.816	1118	132
130	125	5053	J. Nutrition	1.845	740	230
131	117	5038	Am. J. Roentg. Rad. Ther.	1.008	634	272
132	166	5033	J. Lipid Res.	3.525	719	238
133	134	5031	J. Urology	0.721	776	216
134	194	5000	Life Sciences	2.062	1200	121
135	177	4909	Acta endocrinologica	2.461	1385	103
136	267	4863	J. infect. Dis.	3.040	1669	82
137	75	4847	Phytopathology	1.155	789	210
138	111	4822	Physics Fluids	1.188	972	159
139	116	4801	Rev. scient. Instrum.	1.018	1001	155

140	160	4767	J. Biochem. Japan	1.715	1079	138
141	184	4707	Nucl. Instrum. Meth.	1.050	1420	100
142	187	4704	Z. anorg. allg. Chem.	1.019	595	286
143	159	4697	J. comp. Neurol.	3.725	771	219
144	105	4656	Can. J. Physics	1.038	774	218
145	168	4655	Lab. Investigation	2.940	952	166
146	153	4604	Hoppe-Seylers Z. physiol.Chem.	2.291	1051	146
147	211	4603	Applied Optics	1.852	1539	89
148	370	4600	Surface Science	3.340	1787	74
149	224	4511	*Comp. Biochem. Physiol. (3)	1.014	1250	116
150	247	4480	Applied Microbiology	1.292	1196	122
151	155	4479	Am. J. clin. Pathol.	1.548	663	255
152	182	4462	Am. J. Surg.	1.185	731	231
153	220	4455	Molecular Physics	2.354	1258	115
154	442	4451	*J. comp. Physiol. (2)	2.782	895	175
155	137	4416	Am. J. Dis. Child.	1.495	809	202
156	162	4395	*Archs Dermatology (3)	1.784	835	192
157	262	4369	Phytochemistry	1.105	1568	87
158	110	4356	Acta Metallurgica	1.705	583	291
159	95	4353	*J. comp. physiol. Psychol. (2)	1.230	665	256
160	140	4348	Cold Spring Harb. Symp.	2.445	623	278
161	139	4347	Ann. Physics	2.128	598	284
162	214	4308	Planta	2.589	1261	114
163	135	4303	Archs Pathology	1.521	508	532
164	85	4277	*Proc. IEEE (2)	2.013	781	215
165	147	4253	Pflugers Arch./Eur. J. Physiol.	1.810	656	184
166	238	4208	*J. Pharmacy Pharmacol. (2)	3.140	1118	132
167	443	4180	*Zh. neorg. Khim (2)	0.525	825	198
168	199	4116	J. Anim. Sci.	1.311	1000	154
169	153	4104	Chem. Revs	11.154	580	295
170	161	4095	J. thorac. cardiovasc. Surg.	1.480	856	191
171	180	4072	*J. cell. Physiol. (2)	3.757	710	240
172	286	4068	J. Reprod. Fert.	2.357	1414	101
173	274	4054	*Transplantation (2)	2.250	1154	130
174	558	4049	Clin. expl Immunol.	4.425	1601	85
175	176	4040	Coll. Czech. chem. Comm.	0.791	851	194
176	169	4031	*Am. Rev. resp. Dis. (3)	1.630	957	165
177	189	4023	Geochim. cosmochim. Acta	4.056	1160	127
178	271	4005	Analytica chim. acta	2.093	1312	110
179	157	4003	*Deut. med. Wschr. (2)	1.022	1025	149
180	148	3996	Physiol. Revs	15.861	499	334
181	138	3995	Acta med. scand.	1.124	508	331
182	195	3952	Diabetes	3.941	863	183
183	97	3932	*Zh. fiz. Khim (2)	0.331	646	266
184	194	3906	Geol. Soc. Am. Bull.	1.674	1026	147
185	364	3899	Astronomy Astrophys.	2.267	2018	67
186	172	3897	J. Dairy Sci.	0.275	569	300
187	218	3892	Neurology	2.181	796	206
188	503	3874	*Int. J. Cancer (2)	4.928	1508	93
189	367	3869	Clinical Chem.	3.195	1460	97
190	171	3864	Am. J. Ophthalmol.	1.389	792	208
190	178	3864	Progr. theor. Physics	1.421	1003	151
192	178	3858	Mon. Not. R. astr. Soc.	2.467	1036	145
193	165	3857	Archs Ophthalmology	1.295	561	302
194	154	3852	J. Fluid Mech.	1.254	617	280
195	146	3827	*Ber. Bunsenges.	1.382	532	319
196	160	3820	J. math. Physics	1.046	632	274
197	339	3777	*J. medni Chem. (2)	1.444	1196	125
198	369	3726	Gut	3.356	1081	137
199	130	3710	Am. J. Botany	1.378	557	441
200	252	3701	J. Neurosurgery	1.252	636	271
201	204	3699	Scand. J. clin. Lab. Invest.	1.917	644	268
202	249	3675	*Archs Neurol. (2)	2.217	745	228
203	599	3647	*Eur. J. Pharmacol. (2)	2.557	1205	120
204	339	3633	Developmental Biol.	3.384	1242	117
205	196	3561	Arzneimittel-Forschung	0.876	853	193
206	202	3598	*Clin. Sci. mol. Med. (2)	2.474	762	225

b

284	–	2809	Cellular Immunol. 1970	4.848	1721	78
344	174	3164	Bull. Am. phys. Soc. 1985	0.347	1459	98
376	–	2094	Eur. J. Immunol. 1971	4.852	1441	99
348	–	2357	Infect. Immunity 1970	2.032	1355	106
272	295	2919	*Clin. Res. 1958 (2)	0.198	1316	108
307	–	2556	Transplantation Proc. 1969	2.709	1314	109
487	–	1470	Prostaglandins 1972	5.247	1296	111
281	448	2850	*Molecular gen. Genetics 1967 (2)	2.699	1293	112
242	370	5182	*J. electroanalyt. Chem. 1967 (2)	1.567	1222	118
239	744	5238	Physiol. Behavior 1966	1.678	1171	126
355	–	2406	Antimicr. Ag. Chemother. 1972	2.564	1118	132
323	507	2447	J. nucl. Med. 1960	3.040	1061	139
282	589	2831	Solar Physics 1967	1.929	1059	141
291	191	2725	NS Archs. Pharmacol. 1972	2.798	1033	145
230	319	3405	Annu. Rev. Biochem. 1932	19.358	1026	147
267	190	2946	Archs gen. Psychiatry 1960	2.475	1022	150
237	500	3279	Psychopharmacologia 1959	2.547	1002	152
352	776	2526	*Zh. analyt. Khim. 1946 (2)	1.060	996	156
370	416	2171	IEEE J. Quantum Electronics 1965	3.567	988	158
232	327	3575	Biopolymers 1963	2.492	972	159
459	–	1592	Transplantation Revs 1969	25.579	972	159
256	326	3074	Chromosoma 1959	3.875	961	162
356	–	2265	Metallurg. Trans. AIME 1970	1.054	939	164
434	–	1707	*Lettere Nuovo Cimento 1969 (2)	0.795	929	167
357	627	2258	J. gen. Virology 1967	2.501	928	168
468	–	1553	Optics Communications 1969	1.551	920	169
311	545	2551	*Chem. 1970 (2)	1.255	916	172
323	506	2422	Mutation Res. 1964	2.365	894	174
289	535	2758	Acta chem. Res 1968	7.405	881	177
300	384	2630	*Agric. biol. Chem. Tokyo 1961 (2)	0.982	867	179
305	470	2559	Carbohydrate Res. 1965	1.312	867	179
420	NA	1771	J. Vacuum Sci. Technol. 1964	1.472	867	179
571	559	2159	*J. chromatogr. Sci. 1969 (2)	3.196	847	186
538	512	2587	Earth planetary Sci. Letters 1966	1.802	827	196
227	268	3423	Br. J. Haematol. 1955	2.711	824	197
321	550	2449	Clin. Pharmacol. Therap. 1970	3.423	818	199
253	277	3114	Obstet. Gynecol. 1953	1.367	816	200
306	317	2557	Steroids 1965	3.189	810	201
548	–	1281	J. magn. Resonance 1969	2.082	808	203
274	248	2893	Med. J. Australia 1914	0.725	805	204
304	589	2600	Izv. Akad. Nauk SSSR Khim 1936	0.540	802	205
220	561	3550	Expl Neurology 1959	1.827	795	207
427	552	1740	J. Crystal Growth 1967	2.505	791	209
286	581	2767	*J. Obst. Gyn. Br. Comm. 1961 (2)	1.922	786	211
494	627	1455	Icarus 1962	3.489	785	212
277	543	2885	J. Catalysis 1962	1.605	784	213
428	608	1728	*Pediatric Res. 1967 (2)	4.399	783	214
384	941	2035	Macromolecules 1968	2.276	776	216
246	207	3155	Anesthesiology 1940	2.024	771	219
241	295	3186	J. agric. Food Chem. 1953	1.196	771	219
257	311	3069	*J. Atmosph. Sci. 1962 (2)	2.051	769	222
390	374	1990	*Fiz. Tekh. Poluprovodn. 1967 (2)	0.680	762	223
357	756	2261	*Zh. org. Khim. 1965 (2)	0.643	757	224
361	399	2222	Talanta 1958	1.787	731	231
267	277	2949	*Can. J. Botany 1951 (2)	1.069	729	234
251	255	3130	Archs Dis. Childhood 1926	1.901	728	236
311	520	2547	Br. J. Cancer 1947	5.232	724	237
233	164	3535	Makromolek. Chemie 1945	1.088	704	241
425	–	1755	Org. Mass Spectrometry 1968	1.088	704	241
259	255	3058	Br. Heart J. 1939	1.631	698	243
270	266	2927	*Nouv. Presse Med. 1972 (2)	0.612	696	244
387	576	2004	Toxicol. appl. Pharmacol. 1959	1.672	689	245
349	354	2332	*Archs Microbiology 1974 (2)	1.468	684	246
281	282	2845	Metabolism 1952	2.387	678	247
828	–	717	Kidney International 1972	3.740	677	248
326	639	2435	Expl Brain Res. 1965	3.596	676	249
228	259	3414	J. mol. Spectroscopy 1957	1.744	675	251
371	587	2147	Vision Research 1961	1.800	675	251
353	297	2321	Planetary Space Sci. 1959	1.645	671	253
293	185	2696	Can. J. Biochem. 1964	1.671	670	254
302	472	2621	Molec. Pharmacol. 1965	3.785	670	254
258	228	3259	J. clin. Pathol. 1947	1.550	662	258
269	308	2951	J. Insect Physiol. 1957	1.505	662	258
263	308	2987	Am. J. clin. Nutrition 1954	1.714	658	260
226	185	3455	Austral. J. Chem. 1953	1.006	658	260
254	281	3321	*J. Cell Sci. 1966 (2)	2.973	657	262
317	NA	2505	J. Fish. Res. Board Can. 1958	1.053	656	263
294	250	2669	Bacteriol. Revs 1937	16.795	655	264

Perhaps the point to be stressed in presenting these data is the bibliographic law of concentration[6]. When the *SCI* was first reviewed in *Nature* more than a decade ago[7], the scope of its journal coverage was called into question. I believe time has shown beyond doubt that the important literature of science is encompassed by fewer than 1,000 journals. And even fewer account for the truly significant. Of some 45,000 serials of all kinds received by the British Lending Library, two-thirds are rarely, if ever, subject of request. A small core of about 5,000 accounts for almost 80% of all requests[8].

Fig. 2 *a*, High-impact journals in 1974 (excluding review journals). Journals are listed in descending numerical order of 1974 impact factor. *b*, High-impact review journals. A: rank in terms of 1974 impact; B: 1974 impact; C: 1969 impact; D: total 1974 citations of 1972 and 1973 articles; E: total number of 1972 and 1973 articles.'

A	B	C		D	E
1	11.874	8.507	J. expl Med.	5557	468
2	8.989	8.566	Proc. natn. Acad. Sci. USA	15517	1704
3	8.364	2.359	New Engl. J. Med.	7585	885
4	7.502	8.811	J. molec. Biol.	6129	817
5	6.992	5.562	J. clin. Invest.	5377	769
6	6.854	1.214	Circulation	4025	589
7	6.770	3.586	J. Cell Biol.	3683	544
8	6.677	1.485	Lancet	10383	1555
9	5.843	6.059	J. biol. Chem.	15685	2342
10	5.412	2.993	Science	11781	2177
11	5.394	1.147	Gastroenterology	2260	419
12	5.247	–	Prostaglandins	1296	247
13	5.170	3.868	J. clin. Endocr. Metab.	5443	666
14	5.112	4.121	J. Immunology	4703	920
15	5.059	4.911	Physical Rev. Letters	10108	1998
16	4.957	–	Scand. J. Immunology	570	115
17	4.928	2.555	Int. J. Cancer	1508	306
18	4.922	1.750	Circulation Res.	1698	345
19	4.864	5.269	J. Virology	3142	646
20	4.852	–	Eur. J. Immunology	1441	297
21	4.848	–	Cell. Immunology	1721	355
22	4.828	1.679	Ann. internal Med.	2187	453
23	4.711	5.694	Biochemistry	7525	1555
24	4.537	4.435	J. Neurophysiology	676	149
25	4.495	2.432	J. Physiol. Lond.	3166	703
26	4.423	3.563	Clin. expl Immunology	1601	362
27	4.411	4.516	Am. J. Med.	1535	348
28	4.399	0.680	Pediatric Res.	783	178
29	4.383	5.164	J. Am. chem. Soc.	17088	3899
30	4.340	NA	Seminars Hematology	204	47
31	4.337	2.906	Endocrinology	4098	945
32	4.319	2.219	Blood	1529	354
33	4.380	2.968	J. gen. Physiol.	741	172
34	4.140	2.925	Angew. Chemie	2666	644
35	4.065	4.661	Amrophys. J.	7451	1834
36	4.060	0.672	Arthritis Rheumatism	613	151
37	4.056	2.725	Geochim. cosmochim. Acta	1160	286
38	4.006	2.342	Nature	18924	4724
39	4.005	2.287	J. Histochem. Cytochem.	757	189
40	3.967	2.090	Cytogenet. Cell Genetics	357	90
41	3.941	2.039	Diabetes	863	219
42	3.875	2.767	Chromosoma	961	248
43	3.875	3.976	Eur. J. Biochem.	4595	1186
44	3.796	–	Tissue Antigens	429	113
45	3.785	3.916	Molecular Pharmacol.	670	177
46	3.752	4.486	Virology	2949	786
47	3.744	4.292	Biochem. biophys. Res. Comm.	8110	2166
48	3.740	–	Kidney International	677	181
49	3.737	3.488	J. cell. Physiol.	710	190
50	3.726	–	Clin. Immunol. Immunopathol.	231	62
51	3.725	2.335	J. comp. Neurology	771	207
52	3.704	2.170	Am. J. Cardiology	1889	510
53	3.627	5.060	Biochem. J.	4885	1347
54	3.596	4.783	Expl Brain Res.	676	188
55	3.576	5.568	J. Pharmacol. expl Ther.	2060	576
56	3.567	1.307	IEEE J. Quantum Electronics	988	277
57	3.556	0.677	Br. med. J.	4829	1358
58	3.535	2.884	J. Neurochemistry	2464	697
59	3.525	3.876	J. Lipid Res.	719	204
60	3.516	2.658	Br. J. Pharmacol.	1751	498
61	3.489	1.697	Icarus	785	225
62	3.441	3.401	Br. med. Bull.	320	93
63	3.423	1.657	Clin. Pharmacol. Ther.	818	239
64	3.391	2.879	Cancer Res.	3164	933
65	3.384	3.729	Developmental Biol.	1242	367
66	3.340	2.629	Surface Science	1787	535
67	3.336	1.174	Gut	1081	324
68	3.291	1.605	Analyt. Chem.	4140	1258
69	3.289	4.009	J. natn. Cancer Inst.	2858	869
70	3.266	–	J. Membrane Biol.	578	177
71	3.232	1.670	Br. J. Cancer	724	224
72	3.220	3.545	Applied Physics Letters	3246	1008
73	3.215	NA	J. Allergy clin. Immunol.	463	144
74	3.205	–	Clin. Endocrinology	250	78
75	3.196	1.312	J. Chromatogr. Sci.	847	265
76	3.195	0.685	Clin. Chemistry	1460	457
77	3.189	2.454	Steroids	810	254
78	3.175	–	J. Neurobiology	200	63
79	3.144	1.739	Ann. human Genetics	285	90
80	3.140	1.256	J. Pharmacy Pharmacol.	1118	356
81	3.137	2.595	Am. J. human Genetics	436	139
82	3.135	1.981	Am. Naturalist	326	104
83	3.120	3.102	Biochim. biophys. Acta	14129	4529
84	3.104	3.486	Brain Res.	4522	1457
85	3.068	1.050	J. Am. med. Assoc.	2982	972
86	3.049	NA	FEBS Letters	4815	1579
87	3.048	–	Differentiation	64	21
88	3.040	1.000	J. infect. Dis.	1669	549
88	3.040	0.505	J. nuclear Med.	1061	349
90	3.016	–	Cognitive Psychology	190	63
91	3.014	2.241	Expl Cell Res.	2788	925
92	2.973	4.918	J. Cell Science	657	221
93	2.967	3.250	Arch. Biochem. Biophys.	5050	1028
94	2.940	2.008	Lab. Investigation	952	317
95	2.920	–	Bioinorganic Chem.	73	25
96	2.919	2.021	J. Endocrinology	1757	602
97	2.918	3.128	J. chem. Physics	10462	3585
98	2.916	–	Biol. Reproduction	592	203
99	2.884	0.409	Anat. Rec.	649	225
100	2.864	1.557	J. Neuropathol. expl Neurol.	232	81
101	2.846	4.057	Q. J. Med.	222	78
102	2.835	1.815	Genetics	995	351
103	2.823	–	J. immunol. Meth.	223	79
104	2.816	5.859	Immunology	1118	397
105	2.807	1.814	Am. J. Pathol.	856	305
106	2.802	1.702	J. Lab. clin. Med.	1132	404
107	2.792	1.266	NS Arch. Pharmacol.	1033	370
108	2.782	1.658	J. comp. Physiol.	893	321
109	2.727	3.541	J. Bacteriology	3809	1397
110	2.711	2.658	Br. J. Hematol.	824	304
111	2.709	3.012	J. Ultrastruct. Res.	857	309
111	2.709	–	Transplantation Proc.	1514	144
113	2.704	3.596	Physical Rev.	19174	7092
114	2.699	2.880	Molecular gen. Genetics	1293	479
115	2.600	–	Intervirology	91	35
115	2.600	1.574	J. Pediatrics	1890	727
117	2.589	2.944	Planta	1261	487
118	2.580	1.575	Plant Physiol.	1955	750
119	2.564	–	Antimicrob. Agents Chemother.	1118	436
120	2.545	0.916	Biophysical J.	514	202
120	2.545	–	Eur. J. clin. Invest.	280	110
120	2.545	–	J. molecular Evolution	112	44
123	2.537	3.661	Eur. J. Pharmacol.	1205	475
124	2.536	3.585	J. geophys. Res.	3854	1520
125	2.528	–	Radiation Effects	493	195
125	2.528	2.836	Nuclear Physics	7356	2910
127	2.513	–	Thrombosis Res.	392	156
128	2.512	4.965	J. Petrology	103	41
129	2.503	2.277	J. Crystal Growth	791	316
130	2.502	1.495	Pediatrics	1346	538
131	2.501	2.894	J. gen. Virology	928	371
132	2.492	2.791	Biopolymers	972	390
133	2.484	3.232	Immunochemistry	611	246
134	2.481	NA	In Vitro	258	104
135	2.475	1.409	Archs gen. Psychiatry	1022	413
136	2.474	2.752	Clin. Sci. mol. Med.	762	225
137	2.467	4.307	Mon. Not. R. astr. Soc.	1036	420
138	2.464	–	Expl. Hematology	69	28
139	2.461	1.316	Acta endocrinologica	1383	562
140	2.457	3.188	Inorg. Chemistry	3589	1461
141	2.447	2.873	Neuroendocrinology	438	179
142	2.445	5.463	Cold Spring Harbor Symp.	625	255
143	2.441	1.685	Neuropharmacology	554	227
144	2.414	3.115	Am. J. Physiology	2412	999
145	2.413	–	Hormones Behavior	193	80
146	2.403	2.477	Chem. Physics Letters	4205	1750
147	2.392	3.497	J. organomet. Chem.	3891	1627
148	2.387	2.088	Metabolism	678	284
149	2.379	3.350	Analyt. Biochem.	2184	918
150	2.375	0.326	Am. Zoologist	342	144
151	2.365	2.497	Mutation Res.	894	378
152	2.361	2.064	Cancer	2056	871
153	2.357	2.014	J. Reprod. Fert.	1414	600
154	2.355	NA	J. psychiat. Res.	73	31
155	2.350	3.085	Proc. R. Soc. Lond.	1114	474

156	2.349	5.662	Psychol. Bull.	444	189
157	2.347	2.580	Psychopharmacologia	1002	427
158	2.337	–	Drug Metab. Disposition	256	101
159	2.334	2.175	Molecular Physics	1258	539
160	2.311	2.561	Faraday Disc. chem. Soc.	208	90
161	2.297	1.374	J. Verbal Learning Verbal Behav.	395	172
162	2.291	1.636	Hoppe-Seylers Z. physiol. Chem.	1051	450
163	2.286	–	Organic Mass Spectrometry	704	308
164	2.279	–	J. Neurocytology	159	61
165	2.276	2.529	Macromolecules	776	341
166	2.268	2.061	Photochem. Photobiol.	542	239
167	2.267	0.987	Astronomy Astrophysics	2018	890
167	2.267	–	J. Steroid Biochem.	390	172
169	2.262	0.842	Invest. Ophthalmology	579	256
170	2.250	5.164	Transplantation	1154	504
171	2.237	0.869	Gen. comp. Endocrinol.	653	283
172	2.234	–	Cell Tissue Kinetics	239	107
173	2.217	1.449	Archs Neurology	745	336
174	2.205	1.514	Brain	291	132
175	2.204	2.479	Acta physiol. scand.	919	417
176	2.200	1.769	Archs internal Med.	946	430
177	2.199	NA	Analytical Letters	497	226
178	2.195	NA	Physics Today	182	83
179	2.181	0.868	Neurology	796	365
180	2.173	1.271	J. Chromatography	2886	1328
181	2.160	2.127	J. gen. Microbiology	1136	526
182	2.151	–	J. non-crystalline Solids	628	292
183	2.147	2.876	Diabetologia	307	143
184	2.134	2.359	Physics Letters	7672	3595
185	2.129	1.613	Ann. Surgery	1060	496
186	2.128	3.089	Ann. Physics	598	281
187	2.100	1.207	Am. J. Obstet. Gynecol.	2256	1065
188	2.096	NA	Eur. J. clin. Pharmacol.	262	125
189	2.093	0.965	Analytica chim. Acta	1312	627
190	2.090	2.027	Eur. J. Cancer	466	223
191	2.083	1.787	Acta mathematica	75	36
192	2.082	–	J. magnetic Resonance	808	388
193	2.075	2.252	Expl Eye Res.	537	259
194	2.071	–	Cell Differentiation	145	70
195	2.062	1.859	Life Sciences	1200	582
196	2.056		Contraception	368	179
197	2.054	1.645	Int. J. Radiation Biol.	456	222
198	2.051	2.016	J. Atmospheric Sci.	769	375
199	2.041	1.195	J. Antibiotics Tokyo	445	218
200	2.032	–	Infection Immunity	1335	657
201	2.031	2.329	J. phys. Chem.	2768	1363
202	2.024	2.040	Aesthesiology	771	381
203	2.023	1.888	Biochem. Pharmacol.	1689	835
204	2.022	1.855	Theor. chim. Acta	645	319
205	2.016	0.904	J. opt. Soc. Am.	905	449
206	2.013	1.372	Proc. Instn electl electr. Engrs	781	388

b

1	25.579	–	Transplantation Revs.	972	58
2	22.645	9.600	Adv. Immunology	317	14
3	21.500	4.517	Revs mod. Physics	318	54
4	19.358	17.584	Annu. Rev. Biochem.	1026	55
5	16.795	20.615	Bacteriol. Revs	655	39
6	15.778	NA	Curr. Topics Microbiol.	142	9
7	15.861	17.333	Physiol. Revs	499	56
8	12.545	15.428	Progr. Allergy	138	11
9	11.613	8.592	Rec. Progr. Hormone Res.	360	51
10	11.154	8.160	Chem. Revs	580	52
11	9.700	8.888	Adv. inorganic Chem. Radiochem.	97	10
12	9.577	22.400	Pharmacol. Revs	498	52
13	9.200	3.259	Adv. chem. Physics	92	10
14	8.379	7.743	Annu. Rev. Astr. Astrophys.	243	29
15	7.875	9.176	Prog. Biophys. molec. Biol.	189	24
16	7.853	–	Curr. Topics cell. Regulation	94	12
17	7.765	20.200	Prog. nucleic Acid Res.	132	17
18	7.403	17.083	Accts chem. Res.	881	119
19	7.375	3.688	Adv. Physics	177	24
20	7.316	7.047	Annu. Rev. Plant Physiol.	278	38
21	7.143	NA	Curr. Topics dev. Biol.	50	7
22	7.000	NA	Annu. Rev. Pharmacol.	329	47
23	6.963	NA	Adv. Cancer Res.	188	27
24	6.679	NA	Annu. Rev. Genetics	187	28
25	6.636	23.000	Adv. Protein Chem.	73	11
26	6.581	4.216	Annu. Rev. Physiol.	204	31
27	6.455	9.600	Adv. Enzymology	193	30
28	6.357	3.384	Erg physiol. biol. Chem. exp. Pharm.	89	14
29	6.133	NA	Adv. organomet. Chem.	92	15
30	6.085	18.000	Prog. phys. org. Chem.	73	12
31	6.000	NA	Topics Stereochem.	24	4
32	5.733	–	Annu. Rev. Biophys. Bioenegng	172	30
33	5.689	–	Chem. Soc. Revs	256	45
34	5.500	NA	Int. Rev. Cytology	209	38
35	5.444	–	Adv. cell. molec. Biol.	49	9
36	5.214	–	Q. Rev. Biophysics	73	14
37	5.045	NA	Adv. Quantum Chem.	111	22
38	5.000	NA	Adv. Colloid Interface Sci.	25	5
38	5.000	NA	Electroanalyt. Chem.	15	3
38	5.000	3.647	Vitamins Hormones	55	11
41	4.923	–	Adv. cyclic Nucleotide Res.	256	52
42	4.775	6.545	Annu. Rev. Microbiol.	191	40
43	4.690	5.176	Biol. Revs Cambridge Phil. Soc.	136	29
44	4.500	16.285	Solid St. Physics	45	10
45	4.375	NA	Int. Rev. Neurobiol.	35	8
46	4.359	4.685	Rev. Geophys. Space Physics	269	62
47	4.300	–	Adv. Human Genetics	43	10
48	4.188	5.000	Medicine	268	64
49	4.176	NA	Adv. microb. Physiol.	71	17
50	4.156	4.433	Psychol. Rev.	320	77
51	4.000	NA	Adv. Lipid Res.	52	13
52	3.783	5.629	Annu. Rev. nucl. Sci.	87	23
53	3.750	4.695	Coordination Chem. Revs	255	68
53	3.750	NA	Prog. med. Virol.	60	16
55	3.500	3.555	Annu. Rev. phys. Chem.	133	38
55	3.500	NA	Prog. med. Genetics	49	14
57	3.462	NA	Prog. Surf. Membrane Sci.	45	13
58	3.412	7.333	Adv. Virus Res.	58	17
59	3.000	NA	Adv. metab. Disorders	21	7
59	3.000	3.818	Botanical Rev.	66	21
59	3.000	–	Drug Metab. Revs	42	14
59	3.000	NA	Essays Biochem.	27	9
59	3.000	NA	Prog. Materials Sci.	15	5
64	2.923	NA	Catalysis Revs	76	26
65	2.909	4.500	Prog. cardiovasc. Dis.	160	55
66	2.900	NA	Int. Rev expl Pathol.	29	10
67	2.844	8.296	Rep. Prog. Physics	128	45
68	2.746	4.255	Annu. Rev. Medicine	173	63
69	2.456	4.000	Adv. Enzyme Regulation	106	43
70	2.462	0.176	Q. Rev. Biology	64	26
71	2.273	5.600	Adv. Carbohydr. Chem. Biochem.	25	11
72	2.250	2.888	Harvey Lectures	36	16
73	2.200	NA	Adv. clin. Chem.	22	10
74	2.188	NA	Adv. Pharmacol.	35	16
75	2.086	NA	Annu. Rev. Psychol.	73	35
76	2.079	5.485	Annu. Rev. Entomology	79	38
77	2.071	NA	Applied Spectrosc. Rev.	29	14
78	2.047	4.914	Annu. Rev. Phytopathol.	88	43

In using the data presented here, one should be aware that we revised our definition of "source items" used to calculate impacts. In 1969 we included as source items much material (editorials, non-scientific and non-technical correspondence, news notes, and so on) that does not by its very nature invite citation in scientific and technical reports. This policy worked to the disadvantage of some major journals. Our redefinition accounts in part for the changed impact in 1974 of journals like *Nature*, *Science*, *Lancet*, *Journal of the American Medical Association*, and *British Medical Journal*.

What is the significance of journal impact? By demonstrating that only 150 journals have impacts greater than 3, I believe we have established the futility of discussions based on the assumption that the average library must acquire and store thousands of journals. Since the average impact in 1974 was 1.015, any of the journals listed in the figures is likely to be a good candidate for selection.

Fig. 2(*b*) shows clearly the importance of review journals, confirming our earlier studies. Their extraordinary impact, along with a surge in the number of review-type articles and publications, led to ISI's decision to publish *Index to Scientific Reviews*[9].

Clearly, a large part of the scientific record is of low impact. Only careful study can show whether this fact

Fig. 3 Significant journals in three scientific specialities. Each list gives journal, (A) total 1974 citations, (B) impact factor, (C) total 1974 citations of 1972 and 1973 articles, (D) number of 1974 articles. Journals are listed in alphabetical order. The botany journals include all with more than 600 citations or an impact greater than 1. The astronomy/astrophysics journals include all with more than 400 citations or an impact greater than 0.8. The mathematics journals include all with more than 500 citations or an impact greater than 0.5.

BOTANY

Journal	A	B	C	D
Am J Botany	3710	1 378	557	127
Ann Botany	1674	1 069	232	130
Annu Rev Phytopathol	566	2 047	88	21
Annu Rev Plant Physiol	1760	7 316	278	19
Bot Review	585	3 000	66	5
Can J Botany	2897	1 069	729	343
J expl Botany	1762	1 506	569	120
J Phycology	653	1 409	193	74
Mycologia	1143	0 607	176	128
New Phytologist	1405	1 158	500	115
Physiol Plant Pathol	206	1 152	114	49
Physiol Plantarum	2617	1 555	479	196
Physiol Veget	322	1 172	116	45
Phytochemistry	4369	1 103	1568	624
Phytopathology	4842	1 155	789	572
Plant Cell Physiol	1225	1 164	327	115
Plant Dis Reporter	1489	0 413	307	379
Plant Physiology	8835	2 580	1935	373
Planta	4308	2 589	1761	219
Trans Br Mycol Soc	947	0 610	186	171
Z Pflanzenphysiol	1008	1 340	351	180

ASTRONOMY/ASTROPHYSICS

Journal	A	B	C	D
Ann Geophysique Paris	588	0 786	110	28
Annu Rev Astron Astrophys	955	8 379	245	17
Astron Zh	738	0 435	171	194
Astronomical J	2383	1 953	545	182
Astronomy Astrophysics	3899	2 267	2018	497
Astrophys J	22201	4 065	7451	1040
Astrophys Letters	879	1 209	347	
Astrophysics Space Sci	963	1 048	395	194
Earth planetary Sci Letters	2587	1 802	827	189
EOS Trans Am geophys Union	625	12 967	589	28
Geochim cosmochim Acta	4023	4 056	1160	134
Icarus	1453	3 489	785	150
J atmosph Sci	2630	2 051	769	211
J atmosph terrest Physics	1886	1 322	509	210
J geophys Res	15281	2 556	3854	791
J Spacecraft Rockets	421	0 354	139	199
Mon Not R astron Soc	3858	2 467	1056	249
Planetary Space Sci	2321	1 645	671	155
Publ astron Soc Japan	360	0 874	85	44
Publ astron Soc Pacific	1191	1 081	308	161
Publ Dominion astrophys Observatory	136	1 250	10	2
Q J R astron Soc	128	0 923	48	20
Solar Physics	2831	1 929	1059	282
Revs Geophys Space Physics	872	4 339	269	40
Sov Astronomy AJ	456	0 295	116	194
Space Sci Revs	637	1 718	177	54
Z Astrophysik	597			

MATHEMATICS

Journal	A	B	C	D
Acta Math	675	2 083	75	18
Adv Math	137	0 647	44	50
Am J Math	1064	0 474	54	58
Ann Mathematics	1921	1 226	105	35
Bull Am math Soc	1281	0 516	221	241
Comm pure appl Math	750	0 598	49	25
C r Acad Sci A	845	0 210	360	688
Duke math J	711	0 591	70	86
Indiana Univ math J	207	0 590	111	94
Inventiones math	585	0 808	105	67
J Algebra	854	0 775	248	213
J differential Equations	575	0 610	111	60
J math Anal Appl	871	0 595	190	235
J Math pures appl	201	0 879	29	27
Math Annln	1190	0 581	125	145
Math Computation	602	0 557	107	109
Math Z	1150	0 471	164	152
Michigan math J	275	0 482	40	58
Pacific J Math	1133	0 279	180	259
Phil Trans R Soc A	1765	1 016	188	43
Proc Am math Soc	1725	0 504	455	516
Proc Cambridge phil Soc	1548	0 597	91	103
Proc London math Soc	854	0 535	81	78
Q appl Math	558	0 505	49	45
SIAM J math Analysis	107	0 467	56	93
SIAM J num Analysis	533	0 662	100	89
Studia math	506	0 491	106	59
Studies appl Math	99	0 615	52	20
Trans Am math Soc	2622	0 488	371	340

supports or contradicts the idea that science is built on the accumulated results of average effort that prepare the way for breakthroughs". In any event, the data seem to me to warrant an examination of the cost-effectiveness of the present publishing system. Journals devote to the mass of rarely cited papers the same resources as to the small part that citation analysis shows to be important. Less than 1% of all papers cited will be cited ten or more times in any annual *SCI*. Although more than 40 million references have been processed for the *SCI* during the past fifteen years, only 116,400 papers have been cited ten times or more in any one year.

One would hope that the availability of *Journal Citation Reports* will have a salutary effect on editorial complacency. A change in a journal's citation rate or impact rate is proper reason for editorial concern, admitting that factors beyond editorial control may be responsible. Thus, a drop in the impact of the leading Soviet journal of physics, *Zhurnal Eksperimentalnoi i Teoreticheskoi Fiziki*, or a rise in the impact of *Teploenergetika* (translated as *Thermal Engineering*) may reflect a shift in interest or emphasis of research worldwide. But a change in citation rate or impact rate may just as likely reflect a change in quality of output.

Journal citation analysis can be quite complex in some cases. The problem of Soviet publications is one such case. Apart from the usual bibliographic problems encountered, one must deal with the fact that most leading Soviet journals appear in two versions, Russian and English. *Fizika i Tekhnika Poluprovodnikov* appears in English as *Soviet Physics Semiconductors*. Clearly that is not a close translation of the title, much less a transliteration. Such bibliographic casualness about titles is bad enough, but there is worse. Most of the retitled translations appear about a year after the originals. This means, if one assumes that the translation is the major stimulant of subsequent citation in Western journals, that the citable life of the Soviet literature is unfairly shortened at the outset by an overlong gestation period. And the outset is important, for if an article is going to be cited, it is most likely to be cited during the first or second year after publication. In the case of Russian journals, citations contributed by translated versions are usually out of phase with those of the rest of the literature. To assure confusion worse confounded, some of the translated versions have volume and page numbers different from the Russian originals. In our tabulations for the *JCR*, we have as far as possible compensated for these annoying vagaries.

As the data show, new journals can achieve high impact quickly. Good examples are *Cellular Immunology* (first published 1970) and *Prostaglandins* (1972). Their total 1974 citation counts were 2,809 and 1,470 respectively; their impacts, 4.848 and 5.247. Among the newer journals the 'European' journals are especially notable in this respect. *FEBS Letters* (began 1968, impact 3.049); *European Journal of Biochemistry* (began 1967, impact 3.874); *European Journal of Immunology* (began 1971, impact 4.852). We must hope that internationalisation of journals will continue. I believe that Latin-American, Asian, and African

journals would do well to consolidate in like manner to produce fewer but larger journals. It is clear that a large journal, even if less than first class, is more difficult to ignore than a smaller journal with equal and perhaps greater impact.

In some cases, however, consolidation is inappropriate and may be detrimental. Take, for example, *Journal of the American Chemical Society* (*JACS*) and *Journal of the Chemical Society*. The *Journal of the Chemical Society* encompasses nine different subtitled journals. If one were to consolidate comparable journals of the American Chemical Society, their total citation count would be about 183,000, almost double the 98,995 of the *JACS*. The impact of this conglomerate would, however, be only 3.381 (respectable enough) rather than 4.383. Insistence by the Chemical Society upon corporate identity for its journals by means of an identical "main title" with repeatedly retitled sections is the source of bibliographic confusion, as well as of much tedious work in sorting out citation data. It seems to me that most commercial publishers would have refused to scrap a title as well-known as *Transactions of the Faraday Society*. In my opinion, the umbrella of a corporate main title for all a society's journals does little for their individual identities.

I have avoided commentary on the performance of specific journals, preferring to use the space granted me here for data rather than comment and speculation. And I have published many such analyses, usually on a categorical basis in *Current Contents*. All of them have had the same purpose, and lead to the same general conclusion. Science needs objective criteria for measuring the performance of journals. Citation analysis seems to offer a sound beginning. Considering the paucity of management tools available to the average science librarian—general or specialist—and considering as well the often prejudicial role of individual scientists in journal selection (we all have our favourite journals), I feel that the *JCR* data can provide a more reliable basis for journal selection than any we have had until now.

1 Garfield, E., *Science*, **178**, 471–479 (1972).
2 *Journal Citation Reports (JCR)* 1. *Journal Ranking Package* 2. *Source Data Package* 3. *Reference Data Package* (Institute for Scientific Information, Philadelphia, 1973).
3 Garfield, E., *Journal Citation Reports: a Bibliometric Analysis of References Processed for the 1974 Science Citation Index*. Science Citation Index 1975 Annual, 9 (Institute for Scientific Information, Philadelphia, 1976).
4 Garfield, E., *Current Contents*®, 5–7 (1976).
5 Garfield, E., *Journal Citation Reports*, Section 2, 2–4 (1976).
6 Garfield, E., *Current Contents*®, 31, 5–6 (1971).
7 Cleverdon, C. W., *Nature*, **203**, 446 (1964).
8 Line, M. B., and Wood, D. N., *J. Documentation*, **31**, 238–243 (1975).
9 *Index to Scientific Reviews 1974 Annual, an International Interdisciplinary Index to the Review Literature of Science, Medicine, Agriculture, Technology, and the Behavioral Sciences*, 2 vols (Institute for Scientific Information, Philadelphia, 1975).
10 Cole, J. R., and Cole, S., *Science*, **178**, 368–374 (1972).