

Significant journals of science

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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 references¹, appeared in 1972². This year the JCR became a regular section and volume of the SCI³. 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 hypothesize 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 field⁴. 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 indiscriminating. 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 JCR⁵.

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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. G: 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. 1a. See the legend of Fig. 1a 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	B	C	D	E	F	
1	1	98995	J Am chem Soc	4.585	17088	5
2	2	91645	*Physical Rev (5)	2.670	19174	1
3	3	81553	J Biol Chem	5.845	15685	6
4	5	75206	*Nature (3)	4.006	18924	2
5	4	68272	*J chem Soc (9)	1.870	18515	7
6	6	62041	J chem Physics	2.918	10462	9
7	8	51491	Biochim biophys Acta	5.120	14129	5
8	7	47505	Science	5.412	11781	8
9	9	46917	Proc natn Acad Sci USA	8.989	15517	4
10	11	37047	Lancet	6.677	10583	10
11	10	31563	Biochem J	5.627	4085	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	8.564	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	5.744	8110	12
18	19	22520	J Physiol Lond	4.495	5160	46
19	33	22460	*Nuclear Physics (3)	2.514	7356	16
20	21	22245	*J Cell Biol (2)	6.770	5683	38
21	29	22201	Aerophys 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	5526	40
26	16	19277	J appl Physics	1.558	3275	42
27	31	18375	J Bacteriology	2.727	3809	37
28	30	18190	Analytical Chem	5.291	4140	32
29	17	18171	Proc Soc expl Biol Med	1.471	2454	58
30	25	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	155
33	13	16782	*C r Acad Sci (5)	0.529	4247	29
34	35	16509	Tetrahedron Letters	1.727	5004	22
35	38	15970	*Archa Biochem Biophys (2)	2.952	3050	48
36	53	15948	Endocrinology	4.537	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	2.556	5854	36
40	24	14706	*Chem Ber (2)	1.506	1353	104
41	37	14666	Ann N Y Acad Sci	1.181	1291	113
42	52	14461	Circulation	6.854	4025	34
43	50	14310	Inorg Chem	4.433	3588	39
44	45	13911	*Acta crystallographica (3)	1.361	2394	60
45	82	13847	*Eur J Biochem (2)	5.857	4595	27
46	47	13753	J Pharmacol expl Ther	5.576	2026	65
47	42	13072	Fedn Proc	0.489	4212	30
48	58	12544	Cancer Res	5.391	5164	45
49	69	11645	*J clin Endocr Metab (2)	5.170	3443	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	5.014	2788	53
55	48	10756	*Angew Chem (2)	4.140	2656	56
56	67	10231	Ann internal Med	4.828	2187	63
57	35	10227	Brain Res	3.104	4522	28
58	87	10206	Analytical Biochem	2.379	2184	64
59	46	9824	*Dokl Akad Nauk SSSR (7)	0.359	1681	81
60	62	9779	Am J Med	4.411	1535	90
61	76	9678	J natn Cancer Inst	3.389	2858	52
62	95	9497	Cancer	2.561	2056	66
63	59	9142	Can J Chem	1.596	1793	73
64	707	9094	FEBS Letters	5.049	4815	25
65	74	9082	Circulation Res	4.922	1698	79
66	108	9026	*Physica Status Soli (5)	1.476	3201	44
67	64	8903	Tetrahedron	1.576	1913	69
68	77	8350	Am J Obstet Gynec	2.100	2236	62
69	78	8335	Plant Physiol	2.580	1935	68
70	54	8205	*Acta chem scand (5)	1.042	1192	124
71	63	8798	J Lab clin Med	2.802	1132	151
72	115	8595	Gastroenterology	5.594	2260	61
73	107	8625	Appl Physics Letters	3.220	3246	43
74	70	8619	J appl Physics	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	8185	Bull Soc chim France	1.001	1492	96
78	81	7941	Bull chem Soc Japan	0.932	1859	72
79	132	7928	J Chromatography	2.175	2886	51
80	71	7922	Acta physiol scand	2.804	919	170
81	72	7914	J phys Soc Japan	1.132	1500	95
82	61	7860	*Z Naturforsch (3)	1.070	1503	94
83	192	7794	J Neurochem	3.555	2464	57
84	106	7656	*Br J Pharmacol	3.516	1751	77
85	80	7559	Ann Surgery	2.129	1060	140
86	113	7335	*Cell Tissue Res (2)	1.961	1761	75
87	122	7183	J Pediatrics	2.600	890	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	2.023	1689	80
92	100	6951	Pediatrics	2.502	1546	105
93	120	6811	Am J Cardiol	3.704	1089	71
94	276	6788	J Virology	4.864	3142	47
95	149	6770	*J Bone Jt Surg (5)	1.358	719	234
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	6365	*Fizika (verd Tela (2)	0.762	1588	102
100	189	6307	Radiology	1.198	1320	107
101	66	6177	Annin Chemie (J Liebig)	1.024	452	239
102	89	6066	*Archa internal Med (2)	2.302	946	163
103	90	5994	Am Heart J	1.791	840	188
104	86	5885	J opt Soc Am	2.016	905	173
105	94	5849	*J Physics Chem Solids (2)	1.594	715	239
106	99	5761	J inorg nucl Chem	0.962	1149	128
107	156	5745	J Endocrinology	2.919	1757	76
108	117	5685	*J Pharmacol Sci (5)	1.622	1549	92
109	92	5679	J gen Microbiol	2.160	1136	129
110	115	5675	Surgery	1.559	842	187
111	378	5575	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	156	5491	Archa 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	5363	*Spectrochim Acta (5)	1.487	840	187
123	85	5326	Genetics	2.835	995	157
124	158	5197	J Ultrastruct Res	2.709	857	190
125	103	5186	Rev mod Phys	21.500	731	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	5.525	719	238
133	154	5031	J Urology	0.721	776	216
134	194	5000	Life Sciences	2.062	1200	121
135	177	4909	Acta endocrinologica	2.461	1585	105
136	267	4861	J infect Dis	5.040	1669	82
137	75	4847	Phytopathology	1.155	789	210
138	111	4822	Physics Fluids	1.188	972	159
139	116	4801	Rev scien Instrum	1.018	1001	153

140	160	4767	J. Biochem. Japan	1.715	1079	138	282	589	2831	Solar Physics 1967	1.929	1059	141
141	184	4707	Nucl. Instrum. Meth.	1.050	1420	100	291	191	2725	NS Archs. Pharmacol. 1972	2.798	1033	145
142	127	4704	Z. anorg. allg. Chem.	1.019	595	286	230	319	3405	Annu. Rev. Biochem. 1952	19.358	1055	147
143	159	4697	J. comp. Neurol.	3.725	771	219	287	190	2946	Archs gen. Psychiatry 1960	2.475	1032	150
144	105	4656	Can. J. Physics	1.058	774	218	237	500	3279	Psychopharmacologia 1959	2.347	1002	152
145	168	4655	Lab. Investigation	2.940	932	166	332	776	2526	*Zh. analyt. Khim. 1946 (2)	1.060	896	156
146	153	4604	Hoppe-Seyler's Z. physiol. Chem.	2.291	1051	146	370	416	2171	IEEE J. Quantum Electronics 1965	3.367	263	158
147	211	4603	Applied Optics	1.832	1559	89	232	327	3375	Biopolymers 1963	2.492	972	159
148	370	4600	Surface Science	3.340	1787	74	459	-	1592	Transplantation Rev 1969	25.579	972	159
149	224	4511	*Comp. Biochem. Physiol. (3)	1.014	1250	116	236	326	3074	Chromosoma 1959	3.873	861	162
150	247	4480	Applied Microbiology	1.292	1196	122	356	-	2585	Metallurg. Trans. AIME 1970	1.054	939	164
151	155	4479	Am. J. clin. Pathol.	1.348	663	255	434	-	1707	*Lettere Nuovo Cimento 1969 (2)	0.755	329	167
152	182	4462	Am. J. Surg.	1.185	731	231	337	627	2258	J. gen. Virology 1967	2.361	923	168
153	220	4453	Molecular Physics	2.354	1258	115	466	-	1555	Optical Communications 1969	1.351	502	169
154	442	4451	*J. comp. Physiol. (2)	2.782	893	175	511	545	2551	*Chem 1970 (2)	1.255	914	172
155	137	4416	Am. J. Dis. Child.	1.495	809	202	523	506	2422	Mutation Res. 1964	2.365	894	174
156	162	4393	*Archa Dermatologica (3)	1.794	823	192	289	533	2738	Acta chem. Res 1968	7.405	861	177
157	852	4369	Phytochemistry	1.105	1058	87	500	394	2630	*Agric. biol. Chem. Tokyo 1961 (2)	0.982	867	179
158	110	4356	Acta Metallurgica	1.705	583	291	505	470	2559	Carbohydrate Res. 1965	1.312	867	179
159	93	4353	*J. comp. physiol. Psychol. (2)	1.230	663	256	420	NA	1771	J. Vacuum Sci. Technol. 1964	1.472	867	179
160	140	4348	Cold Spring Harb. Symp.	2.443	623	278	371	539	2159	*J. chromatogr. Sci. 1969 (2)	3.196	847	186
161	139	4347	Ann. Physics	2.128	598	284	358	512	2387	Earth planetary Sci. Letters 1966	1.808	827	186
162	214	4308	Planta	2.589	1261	114	227	268	2423	Br. J. Haematol. 1955	2.711	824	187
163	135	4303	Archa Pathology	1.521	508	332	321	530	2449	Clin. Pharmacol. Therap. 1970	3.425	818	199
164	85	4277	*Proc. IEEE (2)	2.013	781	215	253	277	5114	Obstet. Gynecol. 1955	1.367	816	200
165	147	4253	Pflugers Arch./Eur. J. Physiol.	1.810	856	184	506	317	2557	Steroids 1965	3.189	810	201
166	238	4208	*J. Pharmacy Pharmacol. (2)	3.140	1118	132	548	-	1281	J. magn. Resonance 1969	2.082	808	203
167	443	4180	*Zh. neorg. Khim. (2)	0.525	823	198	274	248	2893	Med. J. Australia 1914	0.725	805	204
168	199	4116	J. Anim. Sci.	1.311	1000	154	504	589	2600	Isr. Akad. Nauk SSSR Khim 1956	5.540	802	205
169	153	4104	Chem. Revs	1.480	856	191	220	561	3530	Expl Neurology 1959	1.827	793	207
170	161	4093	J. thorac. cardiovasc. Surg.	11.154	580	293	427	552	1740	J. Crystal Growth 1967	3.503	791	209
171	180	4072	J. cell. Physiol. (2)	3.757	710	240	286	381	2767	*J. Obst. Gyn. Br. Comm. 1961 (2)	1.922	786	211
172	286	4068	J. Reprod. Fert.	2.357	1414	101	494	627	1453	Icarus 1962	3.489	785	212
173	274	4054	*Transplantation (2)	2.250	1134	130	277	343	2825	J. Catalysis 1962	1.605	784	213
174	558	4049	Clin. expl Immunol.	4.423	1601	85	428	608	1728	*Pediatr. Res. 1967 (2)	4.399	783	214
175	176	4040	Coll. Caech. chem. Comm.	0.791	831	194	384	941	2055	Macromolecules 1968	2.276	776	216
176	169	4031	*Am. Rev. resp. Dis. (3)	1.630	937	165	246	207	3155	Anesthesiology 1940	2.024	771	219
177	189	4023	Geochim. cosmochim. Acta	4.056	1160	127	241	293	3186	J. agric. Food Chem. 1953	1.196	771	219
178	271	4005	Analytica chim. acta	2.093	1312	110	257	311	3069	*J. Atmosph. Sci. 1962 (2)	2.051	769	222
179	157	4003	*Deur. med. Wschr. (2)	1.022	1025	149	390	374	1990	*Fiz. Tekh. Poluprovodn. 1967 (2)	0.680	762	223
180	148	3996	Physiol. Revs	13.961	499	334	357	736	2261	*Zh. org. Khim. 1965 (2)	0.643	757	224
181	158	3993	Acta med. scand.	1.124	509	331	361	399	2222	Talanta 1958	1.787	751	231
182	195	3938	Diabetes	3.941	863	183	267	277	2949	*Can. J. Botany 1951 (2)	1.069	729	234
183	97	3932	*Zh. fiz. Khim. (2)	0.531	646	266	251	255	3130	Archa Dis. Childhood 1926	1.901	728	236
184	194	3906	Geol. Soc. Am. Bull.	1.674	1026	147	311	320	2547	Br. J. Cancer 1947	3.332	724	237
185	564	3899	Astronomy Astrophys.	2.267	2018	67	233	164	3535	Makromolekul. Chemie 1945	1.088	704	241
186	172	3897	J. Dairy Sci.	0.273	569	300	425	-	1755	Org. Mass Spectrometry 1968	1.088	704	241
187	218	3892	Neurology	2.181	796	206	259	235	3038	Br. Heart J. 1959	1.631	690	243
188	503	3874	*Int. J. Cancer (2)	4.928	1508	93	270	266	2927	*Nouv. Presse Med. 1972 (2)	0.612	696	244
189	367	3869	Clinical Chem.	3.195	1450	97	387	576	2004	Toxicol. appl. Pharmacol. 1959	1.672	659	245
190	171	3864	Am. J. Ophthalmol.	1.389	792	208	349	334	2332	*Archa Microbiologia 1974 (2)	1.468	684	246
191	178	3864	Progr. theor. Physics	1.421	1003	151	281	282	2845	Metabolism 1952	2.387	678	247
192	178	3858	Mon. Not. R. astr. Soc.	2.467	1056	143	326	639	2435	Expl Brain Res. 1965	3.596	676	249
193	165	3857	Archa Ophthalmology	1.293	561	302	328	259	3414	J. mol. Spectroscopy 1957	1.744	675	251
194	154	3852	J. Fluid Mech.	1.254	617	280	371	587	2147	Vision Research 1961	1.800	675	251
195	146	3822	*Ber. Bunsenges.	1.582	532	319	353	297	2321	Planetary Space Sci. 1959	1.645	671	253
196	160	3820	J. math. Physics	1.046	632	274	293	183	2696	Can. J. Biochem. 1964	1.671	670	254
197	339	3777	*J. mednl Chem. (2)	1.444	1196	123	502	472	2621	Molec. Pharmacol. 1965	3.785	670	254
198	369	3726	Gut	5.336	1081	137	238	228	3259	J. clin. Pathol. 1947	1.550	642	258
199	130	3710	Am. J. Botany	1.578	357	441	269	308	2931	J. Insect Physiol. 1957	1.505	642	258
200	232	3701	J. Neurosurgery	1.252	856	271	263	308	2987	Am. J. clin. Nutrition 1954	1.714	658	260
201	204	3699	Scand. J. clin. Lab. invest.	1.917	644	268	226	185	3453	Austral. J. Chem. 1953	1.006	658	260
202	249	3673	*Archa Neurol. (2)	2.217	745	228	234	281	3321	*J. Cell Sci. 1966 (2)	2.973	657	263
203	599	3647	*Eur. J. Pharmacol. (2)	2.537	1205	120	317	NA	2505	J. Fish. Res. Board Can. 1938	1.053	656	263
204	339	3633	Developmental Biol	5.584	1242	117	294	230	2669	Bacteriol. Revs 1937	16.795	655	264
205	196	3561	Arzneimittel-Forschung	0.876	833	193							
206	202	3538	*Clin. Sci. med. (2)	2.474	762	223							

b

284	-	2809	Cellular Immunol. 1970	4.848	1721	78
244	174	3164	Bull. Am. phys. Soc. 1925	0.347	1459	98
376	-	2094	Eur. J. Immunol. 1971	4.852	1441	99
448	-	2337	Infect. Immunity 1970	2.032	1335	106
272	295	2919	*Clin. Res. 1958 (2)	0.198	1316	108
507	-	2356	Transplantation Proc 1969	2.709	1314	109
427	-	1470	Prostaglandins 1972	5.247	1296	111
281	448	2850	*Molecular gen. Genetics 1967 (2)	2.699	1293	112
242	370	3182	*J. electroanal. Chem. 1967 (2)	1.367	1222	118
239	744	3238	Physiol. Behavior 1966	1.678	1171	126
355	-	2406	Antimicrob. Ag. Chemother. 1972	2.564	1118	132
323	507	2447	J. nucl. Med. 1960	3.040	1061	139

Perhaps the point to be stressed in presenting these data is the bibliographic law of concentration'. When the *SCI* was first reviewed in *Nature* more than a decade ago', 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*.

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	8.307	J. exp. Med.	5557 468
2	8.989	6.566	Proc. natn. Acad. Sci. USA	15317 1704
3	8.564	6.359	New Engl. J. Med.	7385 883
4	7.502	8.811	J. molec. Biol.	6129 817
5	6.992	5.562	J. clin. Invest.	5577 769
6	6.854	1.214	Circulation	4025 589
7	6.770	3.386	J. Cell Biol.	3683 544
8	6.677	1.485	Lancet	10383 1555
9	5.845	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	2.553	Int. J. Cancer	1508 506
18	4.922	1.750	Circulation Res	1698 345
19	4.864	5.269	J. Virology	5142 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	7325 1555
24	4.537	4.433	J. Neurophysiology	676 149
25	4.495	2.432	J. Physiol. Lond.	5166 705
26	4.423	3.563	Clin. exp. Immunology	1601 362
27	4.411	4.516	Am. J. Med.	1555 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	Astrophys. J.	7451 1834
36	4.060	0.672	Arthritis Rheumatism	618 151
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	2948 786
47	3.744	4.292	Biochem. biophys. Res. Comm.	8110 8166
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	3.060	Biochem. J.	4885 1347
54	3.596	4.783	Expl. Brain Res	676 188
55	3.576	5.568	J. Pharmacol. exp. 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	Gai	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	3.213	NA	J. Allergy clin. Immunol.	463 144

74	3.205		Clin. Endocrinology	350 78
75	3.196	1.312	J. Chromatogr. Sci.	847 265
76	3.195	0.683	Clin. Chemistry	1460 457
77	3.189	2.454	Steroids	810 254
78	3.175		J. Neurobiology	300 63
79	3.144	1.739	Ann. human Genetics	285 90
80	3.140	1.254	J. Pharmacy Pharmacol.	1118 356
81	3.137	2.333	Am. J. human Genetics	456 139
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.	4322 1457
85	3.068	1.050	J. Am. med. Assoc.	2382 972
86	3.049	NA	FEBS Letters	4815 1579
87	3.048		Differentiation	64 31
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	932 317
95	2.920		Bioinorganic Chem.	75 25
96	2.919	0.021	J. Endocrinology	1737 602
97	2.918	3.128	J. chem. Phys.	10462 5585
98	2.916		Biol. Reproduction	592 205
99	2.884	0.409	Anal. Rec.	549 225
100	2.864	1.537	J. Neuropathol. exp. 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	3.859	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	1.638	J. comp. Physiol.	893 321
109	2.727	3.541	J. Bacteriology	3809 1397
110	2.711	2.658	Br. J. Hematol.	824 504
111	2.709	3.012	J. Ultrastruct. Res.	837 309
111	2.709		Transplantation Proc.	1514 144
113	2.704	3.596	Physical Rev.	19174 7092
114	2.699	2.860	Molecular gen. Genetics	1293 479
115	2.600		Invertivology	91 35
115	2.600	1.574	J. Pediatrics	1890 727
117	2.589	2.944	Planta	1261 487
118	2.580	1.573	Plant Physiol.	1935 750
119	2.564		Antimicrob. Agents Chemother.	1118 456
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	3.583	J. geophys. Res.	3854 1520
125	2.528		Radiation Effects	493 195
125	2.528	2.836	Nuclear Physics	7356 2910
126	2.513		Thrombosis Res.	392 156
127	2.512	4.965	J. Petrology	105 41
128	2.512	2.277	J. Cryst. Growth	791 316
129	2.503	2.277	Pediatrics	1546 538
130	2.502	1.495	J. gen. Virology	928 371
131	2.501	2.894	Biopolymers	972 390
132	2.492	2.791	Immunochimistry	611 246
133	2.484	3.232	In Vitro	258 104
134	2.481	NA	Arch. gen. Psychiatry	1022 413
135	2.475	1.409	Clin. Sci. mol. Med.	762 223
136	2.474	2.732	Mon. Not. R. astr. Soc.	1036 420
137	2.467	4.307	Expl. Hematology	69 28
138	2.464		Acta endocrinologica	1385 562
139	2.461	1.316	Inorg. Chemistry	3589 1461
140	2.457	3.188	Neuroendocrinology	438 179
141	2.447	2.873	Cold Spring Harbor Symp.	623 255
142	2.445	5.463	Neuropharmacology	554 227
143	2.441	1.685	Am. J. Physiology	2122 999
144	2.414	3.115	Hormones Behavior	193 80
145	2.413		Chem. Physics Letters	4205 1750
146	2.403	2.477	J. organomet. Chem.	3891 1627
147	2.392	3.497	Metabolism	678 284
148	2.387	2.088	Analyt. Biochem.	2184 918
149	2.379	5.350	Am. Zoologist	342 144
150	2.375	0.326	Mutation Res.	894 378
151	2.365	2.497	Cancer	2056 871
152	2.361	2.064	J. Reprod. Fert.	1414 600
153	2.357	2.014	J. psychiat. Res.	75 31
154	2.355	NA	Proc. R. Soc. Lond.	1114 474
155	2.350	3.083		

156	2.349	3.662	Psychol. Bull.	444	189	27	6.453	9.600	Adv. Enzymology	193	30
157	2.347	3.580	Psychopharmacologia	1002	427	28	6.357	3.384	Erg. physiol. biol. Chem. exp. Pharm.	89	14
158	2.357	—	Drug Metab. Disposition	236	101	29	6.133	NA	Adv. organomet. Chem.	92	15
159	2.354	2.173	Molecular Physics	1258	539	30	6.085	18.000	Prog. phys. org. Chem.	73	12
160	2.311	2.561	Faraday Disc. chem. Soc.	208	90	31	6.000	NA	Topics Stereochem.	24	4
161	2.297	1.374	J. Verbal Learning Verbal Behav.	595	172	32	5.735	—	Annu. Rev. Biophys. Bioenerg.	172	50
162	2.291	1.636	Hoppe-Seyler's Z. physiol. Chem.	1031	450	33	5.689	—	Chem. Soc. Revs	256	45
163	2.286	—	Organic Mass Spectrometry	704	308	34	5.500	NA	Int. Rev. Cytology	209	38
164	2.279	—	J. Neurocytology	159	61	35	5.444	—	Adv. cell. molec. Biol.	49	9
165	2.276	2.529	Macromolecules	776	341	36	5.214	—	Q. Rev. Biophysics	73	14
166	2.268	2.061	Photochem. Photobiol.	542	239	37	5.045	NA	Adv. Quantum Chem.	111	22
167	2.267	0.987	Astronomy Astrophysics	2018	890	38	5.000	NA	Adv. Colloid Interface Sci.	25	5
167	2.267	—	J. Steroid Biochem.	590	172	38	5.000	NA	Electroanal. Chem.	15	3
169	2.262	0.842	Invest. Ophthalmology	579	256	38	5.000	3.647	Vitamins Hormones	55	11
170	2.250	3.164	Transplantation	1154	504	41	4.923	—	Adv. cyclic Nucleotide Res.	256	52
171	2.237	0.869	Gen. comp. Endocrinol.	633	283	42	4.775	6.545	Annu. Rev. Microbiol.	191	40
172	2.234	—	Cell Tissue Kinetics	239	107	43	4.690	5.176	Biol. Revs Cambridge Phil. Soc.	136	29
173	2.217	1.449	Archs Neurology	745	356	44	4.500	16.285	Solid St. Physics	45	10
174	2.205	1.514	Brain	391	132	45	4.375	NA	Int. Rev. Neurobiol.	35	8
175	2.204	2.479	Acta physiol. scand.	919	417	46	4.359	4.685	Rev. Geophys. Space Physics	269	62
176	2.200	1.769	Archs internal Med.	946	430	47	4.300	—	Adv. Human Genetics	43	10
177	2.199	NA	Analytical Letters	497	226	48	4.188	5.000	Medicine	268	64
178	2.193	NA	Physics Today	182	83	49	4.176	NA	Adv. microb. Physiol.	71	17
179	2.181	0.868	Neurology	796	365	50	4.156	4.435	Psychol. Rev.	320	77
180	2.175	1.271	J. Chromatography	2886	1328	51	4.000	NA	Adv. Lipid Res.	52	13
181	2.160	2.127	J. gen. Microbiology	1136	526	52	3.783	5.629	Annu. Rev. nucl. Sci.	87	23
182	2.151	—	J. non-crystalline Solids	628	292	53	3.750	4.695	Coordination Chem. Revs	255	68
183	2.147	2.376	Diabetologia	507	145	53	3.750	NA	Prog. med. Virol.	60	16
184	2.134	2.359	Physics Letters	7672	3595	55	3.500	3.555	Annu. Rev. phys. Chem.	133	38
185	2.129	1.613	Ann. Surgery	1060	496	55	3.500	NA	Prog. med. Genetics	49	14
186	2.128	3.089	Ann. Physics	598	281	57	3.462	NA	Prog. Surf. Membrane Sci.	45	13
187	2.100	1.207	Am. J. Obstet. Gynecol.	2236	1065	58	3.412	7.533	Adv. Virus Res.	58	17
188	2.096	NA	Eur. J. clin. Pharmacol.	262	125	59	3.000	NA	Adv. metab. Disorders	21	7
189	2.093	0.965	Analytica chim. Acta	1312	627	59	3.000	NA	Botanical Rev.	66	21
190	2.090	2.027	Eur. J. Cancer	466	223	59	3.000	NA	Drug Metab. Revs	42	14
191	2.083	1.787	Acta mathematica	75	36	59	3.000	NA	Essays Biochem.	27	9
192	2.082	—	J. magnetic Resonance	808	388	59	3.000	NA	Prog. Materials Sci.	15	5
193	2.073	2.252	Exp. Eye Res.	537	259	64	2.923	NA	Catalysis Revs	76	26
194	2.071	—	Cell Differentiation	145	70	65	2.909	4.500	Prog. cardiovasc. Dis.	160	35
195	2.067	1.839	Life Sciences	1200	582	66	2.900	NA	Int. Rev. expl. Pathol.	29	10
196	2.056	—	Contraception	368	179	67	2.844	8.386	Rep. Prog. Physics	128	45
197	2.054	1.645	Int. J. Radiation Biol.	456	222	68	2.746	4.255	Annu. Rev. Medicine	173	63
198	2.051	2.016	J. Atmospheric Sci.	769	375	69	2.456	4.000	Adv. Enzyme Regulation	106	43
199	2.041	1.195	J. Antibiotics Tokyo	445	218	70	2.462	0.176	Q. Rev. Biology	64	26
200	2.032	—	Infection Immunology	1535	637	71	2.273	5.600	Adv. Carbohydr. Chem. Biochem.	25	11
201	2.031	2.329	J. phys. Chem.	2768	1363	72	2.250	2.888	Harvey Lectures	36	16
202	2.024	2.040	Aesthetics	771	381	73	2.200	NA	Adv. clin. Chem.	22	10
203	2.023	1.888	Biochem. Pharmacol.	1689	835	74	2.188	NA	Adv. Pharmacol.	35	16
204	2.022	1.855	Theor. chim. Acta	645	319	75	2.086	NA	Annu. Rev. Psychol.	73	35
205	2.016	0.904	J. opt. Soc. Am.	905	449	76	2.079	5.485	Annu. Rev. Entomology	79	38
206	2.013	1.372	Proc. Instn elect. electr. Engrs	781	386	77	2.071	NA	Applied Spectrosc. Rev.	29	14
						78	2.047	4.914	Annu. Rev. Phytopathol.	88	43

b

1	25.579	—	Transplantation Revs	972	58
2	22.645	9.600	Adv. Immunology	317	14
3	21.500	4.317	Revs mod. Physics	318	34
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	13.861	17.333	Physiol. Revs	499	36
8	12.545	15.428	Progr. Allergy	138	11
9	11.613	8.592	Rec. Progr. Hormone Res.	360	31
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	7.833	—	Curr. Topics cell. Regulation	94	12
17	7.765	20.200	Prog. nucleic Acid Res.	132	17
18	7.403	17.083	Acta chem. Res.	881	119
19	7.373	3.688	Adv. Physics	177	24
20	7.316	7.047	Annu. Rev. Plant Physiol	278	38
21	7.145	NA	Curr. Topics dev. Biol.	50	7
22	7.090	NA	Annu. Rev. Pharmacol.	529	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.	75	11
26	6.581	4.216	Annu. Rev. Physiol.	204	31

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*.

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	5710	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	345
J expl Botany	1762	1.506	369	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	43
Phytochemistry	4569	1.105	1568	624
Phytopathology	4842	1.155	789	372
Plant Cell Physiol	1223	1.164	327	115
Plant Dis Reporter	1489	0.415	307	379
Plant Physiology	8835	2.580	1935	573
Planta	4508	2.589	1261	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	0.579	243	17
Astron Zh	738	0.435	171	194
Astronomical J	2385	1.955	545	182
Astronomy Astrophysics	3899	2.267	2018	497
Astrophys J	22201	4.065	7453	1040
Astrophys Letters	879	1.209	347	127
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	5.489	785	150
J atmospher Sci	2630	2.051	769	211
J atmospher terrest Physics	1886	1.522	509	210
J geophys Res	15281	2.536	3854	791
J Spacecraft Rockets	421	0.334	139	199
Mon Not R astron Soc	3858	2.467	1036	249
Planetary Space Sci	2321	1.645	671	155
Publ astron Soc Japan	360	0.874	83	44
Publ astron Soc Pacific	1191	1.081	508	161
Publ Dominion astrophys Observatory	136	1.250	10	2
QJR astron Soc	128	0.923	48	20
Solar Physics	2851	1.929	1059	282
Rev Geophys Space Physics	872	4.339	269	40
Sov Astronomy AJ	456	0.295	116	194
Space Sci Revs	637	1.718	177	34
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	103	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	0.391	70	86
Indiana Univ math J	207	0.590	111	94
Inventiones math	383	0.808	105	67
J Algebra	834	0.775	248	213
J differential Equations	375	0.610	111	60
J math Anal Appl	871	0.393	190	235
J Math pure appl	201	0.879	29	27
Math Annln	1190	0.381	123	145

Math Computation	602	0.557	107	109
Math Z	1150	0.471	164	152
Michigan math J	275	0.482	40	38
Pacific J Math	1133	0.279	180	239
Phil Trans R Soc A	1765	1.016	188	43
Proc Am math Soc	1725	0.504	433	516
Proc Cambridge phil Soc	1348	0.397	91	103
Proc London math Soc	834	0.535	81	78
Q appl Math	558	0.505	49	43
SIAMJ math Analysis	107	0.467	36	93
SIAMJ num Analysis	333	0.662	100	89
Studia math	506	0.491	106	59
Studies appl Math	99	0.615	32	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 *Teplotnergenika* (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*, 170, 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 1973 Annual*, 9 (Institute for Scientific Information, Philadelphia, 1974).
- ⁴ Garfield, E., *Current Contents*, 5, 7 (1974).
- ⁵ Garfield, E., *Journal Citation Reports*, Section 2, 2-4 (1974).
- ⁶ Garfield, E., *Current Contents*, 5, 5-6 (1974).
- ⁷ Cleverden, C. W., *Nature*, 203, 446 (1964).
- ⁸ Line, M. B. and Wood, D. N., *J. Documentation*, 31, 234-243 (1975).
- ⁹ *Index to Scientific Reviews (ISR) 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, 1973).
- ¹⁰ Cole, J. R., and Cole, S., *Science*, 170, 360-374 (1972).