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Current Comments®

Journal Citation Studies. 41. Entomology Journals—What They Cite and What Cites Them

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In a recent essay on ISI Press®,[1] I gave a brief description of *Dear Lord Rothschild*,[2] a biographical memoir on Walter Rothschild by his niece, Miriam Rothschild. It is gratifying to report that the scientific and popular press agree that this is an exceptional book that bridges many cultures.[3-5]

In my review, I promised to tell you more about the extraordinary Miriam Rothschild. The book that tells the story of her scientist-conservationist uncle is just the tip of the iceberg. At age 74, Miriam Rothschild has demonstrated just one more facet of her polymathic talents.

We often speak about the two cultures of art and science. But within science there are many separate cultural groups. One group of biologists, for example, is represented by the Federation of American Societies for Experimental Biology (FASEB). Another kind of biology is that taught in high schools and colleges. This "traditional" biology is better exemplified by the American Institute of Biological Sciences (AIBS). FASEB and AIBS represent two cultures of biology. The full spectrum of biology, or life science as we call it in *Current Contents*® (*CC*®), runs the gamut from preclinical medicine to agriculture.

While the readership of *CC* includes many botanists, zoologists, and even an occasional paleontologist, fields such as entomology have only occasionally received attention here. We did touch on the firefly,[6] spiders,[7] and a few other diversions of biological interest, but the most definitive study involved a citation analysis of botany journals.[8]

When I met Miriam Rothschild, I became conscious of the fact that we had never specifically discussed the field of entomology. We have published several *Citation Classics*™ by entomologists,[9,10] including one in the current issue of *CC/Life Sciences*.[11] I decided to analyze the entomology journals indexed in *Science Citation Index*® (*SCI*®). The analysis follows the pattern in our studies of other fields, such as earth science[12] and biochemistry.[13] I believe the study will enable us to better appreciate the contributions of such entomologists as Miriam Rothschild. In the near future, we intend to discuss the research of this entomologist *extraordinaire* in an essay.

Entomology is the study of insects, the largest class of living things on Earth. In the fourth century BC, Aristotle used the word "entoma," or insect, to describe the animals he observed to have three basic body sections. Today, there are about 850,000 known species of insects, and entomologists continue to discover new species. In fact, it has been estimated that another 850,000 species of insects are still unknown to scientists.[14]

Table 1 lists 36 entomology journals indexed in *SCI* that are included in this study. The year each of these "core" journals began publication is also shown. Fifteen of the journals in Table 1 are published in the US. The UK accounts for six core entomology journals. Canada, France, and Japan each publish

two core journals. Australia, Czechoslovakia, the Federal Republic of Germany, India, the Netherlands, New Zealand, People's Republic of China, South Africa, and Switzerland each publish one of the journals listed in Table 1.

As in our previous journal citation studies, we will treat the 36 core journals as if they were a single "Macro Journal of Entomology." That is, we'll pool their references to see what journals they collectively cite. Conversely, we are interested in identifying what journals cite this macro journal. Data reported here are taken from the 1982 *Journal Citation Reports*® (*JCR*™), which is volume 14 of *SCI*.

Table 1: Core entomology journals indexed by *SCI*® and the year each began publication.

Acta Entomologica Bohemoslovaca—1965
Acta Entomologica Sinica—1950
Annales de la Societe Entomologique de France—1832
Annals of the Entomological Society of America—1908
Annual Review of Entomology—1956
Applied Entomology and Zoology—1966
Bulletin of Entomological Research—1910
Canadian Entomologist—1868
Ecological Entomology—1976
Entomologia Experimentales et Applicata—1958
Entomon—1976
Entomophaga—1956
Environmental Entomology—1972
Florida Entomologist—1917
Great Lakes Entomologist—1966
Insect Biochemistry—1971
Insectes Sociaux—1954
International Journal of Insect Morphology and Embryology—1971
Japanese Journal of Applied Entomology and Zoology—1957
Journal of Arachnology—1972
Journal of Economic Entomology—1908
Journal of Insect Physiology—1957
Journal of Medical Entomology—1964
Journal of the Australian Entomological Society—1967
Journal of the Entomological Society of Southern Africa—1939
Journal of the Georgia Entomological Society—1966
Journal of the New York Entomological Society—1893
Mosquito News—1941
New Zealand Entomologist—1951
Pacific Insects—1959
Physiological Entomology—1976
Proceedings of the Entomological Society of Ontario—1959
Proceedings of the Entomological Society of Washington—1884
Proceedings of the Hawaiian Entomological Society—1905
Systematic Entomology—1976
Zeitschrift fur Angewandte Entomologie—Journal of Applied Entomology—1914

The 36 core journals published 2,600 articles in 1982. This represents less than one percent of the 378,000 articles included in the 1982 *JCR*. Keep in mind that *JCR* excludes items such as editorials, news reports, and obituaries. The core journals cited 42,000 references in 1982, or about half of one percent of the eight million references processed in *JCR* that year. Thus, the average 1982 entomology article cited 16 references, lower than the 21 cited in the average *SCI* article.

The core entomology journals *received* 23,500 citations in 1982, less than half of one percent of all *JCR* citations that year. Just four journals account for 50 percent of these citations: *Annals of the Entomological Society of America* (2,150 citations), *Canadian Entomologist* (1,950), *Journal of Economic Entomology* (4,000), and *Journal of Insect Physiology* (3,700). Thus, citations to the entomology journals follow the "law of concentration," discussed previously.[15]

Table 2 lists the 50 journals that were most frequently cited *by* the core group in 1982. They are listed in descending order of number of citations from the core entomology journals (column A). Also shown are citations received from all *JCR*-covered journals (column B), self-citations (column C), impact factors (column G), immediacy indexes (column H), and the number of articles each journal published in 1982 (column I). Impact factors indicate how often a journal's articles were cited in the past few years. Immediacy indicates how frequently a journal's articles were cited in the same year that they were published. We'll say more about impact in this essay.

The 50 journals in Table 2 received 17,000 citations from the core group, or 41 percent of all references cited by the

Table 2: *The 50 journals most cited by core entomology journals in 1982. An asterisk indicates a core journal.* A = citations received from core journals. B = citations received from all journals. C = self-citations. D = percent of citations from all journals that are core journal citations (A/B). E = percent of citations from all journals that are self-citations (self-cited rate, C/B). F = percent of core citations that are self citations (C/A). G = impact factor. H = immediacy index. I = 1982 source items.

	A	B	C	D	E	F	G	H	I
*J. Econ. Entomol.	2332	4007	764	58.2	19.1	32.8	.73	.18	283
*J. Insect Physiol.	1410	3697	488	38.1	13.2	34.6	1.58	.41	143
*Ann. Entomol. Soc. Amer.	1172	2139	232	54.8	10.9	19.8	.53	.18	128
*Can. Entomol.	1089	1944	276	56.0	14.2	25.3	.54	.16	140
*Environ. Entomol.	1052	1683	398	62.5	23.7	37.8	.72	.17	270
Science	527	70,867	—	.7	—	—	6.81	1.73	988
*Bull. Entomol. Res.	521	941	177	55.4	18.8	34.0	.54	.28	69
Nature	511	110,923	—	.5	—	—	8.75	2.10	1362
*Mosq. News	503	804	234	62.6	29.1	46.5	.60	.07	94
*Entomol. Exp. Appl.	484	990	116	49.0	11.7	24.0	.67	.37	75
*Annu. Rev. Entomol.	467	1255	48	37.2	3.8	10.3	4.75	.89	18
*J. Med. Entomol.	378	759	191	49.8	25.2	50.5	.61	.31	109
J. Invertebr. Pathol.	334	1494	—	22.4	—	—	.89	.31	123
J. Exp. Biol.	324	4448	—	7.3	—	—	1.98	.76	154
*Z. Angew. Entomol.—J. Appl. Entom.	323	530	180	60.9	34.0	55.7	.45	.08	125
*Insect Biochem.	290	870	168	33.3	19.3	57.9	1.48	.32	88
J. Anim. Ecol.	274	2643	—	10.4	—	—	1.82	.59	64
Can. J. Zool.	272	3796	—	7.2	—	—	.88	.30	373
Ecology	264	8088	—	3.3	—	—	2.45	.62	205
J. Comp. Physiol.	263	5505	—	4.8	—	—	1.81	.51	245
J. Chem. Ecol.	262	1029	—	25.5	—	—	1.86	.54	129
*Appl. Entomol. Zool.	202	361	86	56.0	23.8	42.6	.37	.15	85
J. Biol. Chem.	193	131,922	—	.2	—	—	5.87	1.18	2380
Ann. Appl. Biol.	190	2173	—	8.7	—	—	.63	.29	138
Experientia	184	8652	—	2.1	—	—	.79	.15	679
*Fla. Entomol.	184	249	57	73.9	22.9	31.0	.45	.17	81
Oecologia	175	2888	—	6.1	—	—	1.38	.27	259
*J. Ga. Entomol. Soc.	162	204	54	79.4	26.5	33.3	.24	.17	98
Biol. Bull.	152	3103	—	4.9	—	—	2.01	.41	66
Proc. Nat. Acad. Sci. US	152	110,436	—	.1	—	—	9.28	1.65	1677
*Physiol. Entomol.	146	323	55	45.2	17.0	37.7	1.35	.11	53
J. Kans. Entomol. Soc.	145	295	—	49.2	—	—	—	—	—
*Insectes Soc.	144	434	84	33.2	19.4	58.3	.60	.14	42
Amer. Naturalist	143	5273	—	2.7	—	—	2.00	.55	137
*Entomophaga	141	301	0	46.8	0	0	.40	—	—
Develop. Biol.	124	9551	—	1.3	—	—	3.95	.99	321
Gen. Comp. Endocrinol.	121	3943	—	3.1	—	—	1.80	.48	193
J. Parasitol.	121	3909	—	3.1	—	—	.89	.16	220
Z. Vergl. Physiol.	118	1100	—	10.7	—	—	—	—	0
Evolution	116	3328	—	3.5	—	—	2.68	.59	121
Amer. J. Trop. Med. Hyg.	108	3471	—	3.1	—	—	1.55	.46	185
J. Agr. Food Chem.	107	5385	—	2.0	—	—	1.20	.34	320
*Ecol. Entomol.	106	308	35	34.4	11.4	33.0	1.25	.65	52
Biochem. J.	104	38,440	—	.3	—	—	3.38	.69	791
T. Roy. Entomol. Soc. London	104	260	—	40.0	—	—	—	—	—
Bull. Entomol. Soc. Amer.	103	177	—	58.2	—	—	—	—	—
Aust. J. Zool.	101	791	—	12.8	—	—	.74	.32	71
*Acta Entomol. Bohemoslov.	92	150	45	61.3	30.0	48.9	.26	.10	58
Biochim. Biophys. Acta	92	71,656	—	.1	—	—	2.65	.48	2213
Amer. Midland Naturalist	89	1487	—	6.0	—	—	.58	.12	98

core in 1982. Twenty are themselves members of the core. They are indicated by asterisks. These 20 journals received 22,000 citations in 1982, of which 51 percent were from core citing journals. The 30 *non*-core journals on the list received 617,000 citations, of which just one percent were from the core group.

Several entomologists who reviewed this study suggested that a journal's age affects the number of citations it receives. That is, the longer a journal has been in publication, the greater the number of its citable articles and, thus, the more citations it receives. Presumably, the same "advantage" is enjoyed by journals that publish a large number of articles each year. However, the advantage of a journal's age or size varies from field to field.

For example, consider the top two journals in Table 2. The *Journal of Eco-*

nomic Entomology received about 4,000 citations from all *JCR*-covered journals in 1982. The *Journal of Insect Physiology* received 3,700 citations. The first journal has been in publication since 1908 while the second started in 1957, a difference of 50 years. Also, in 1982 the first journal published twice as many articles as the second journal (column I). Despite the great differences in age *and* size, both journals received about the same number of citations.

But in general, any journal with a long history will accumulate a larger number of citations regardless of the average quality of its articles, now or in the past. However, impact is how we differentiate journals that are highly cited for *historical* reasons from those producing articles of great *current* relevance and quality. Historical or "cumulative" impact is yet another measure we can study by showing what particular years of a journal's publications are cited. *JCR* reports such data over a ten-year period for each journal it indexes. For example, the *Annual Review of Entomology* received 1,255 citations in 1982, of which 16 were to articles it published that year; 63 to its 1981 articles; 108 to 1980; 132 to 1979; 68 to 1978; 75 to 1977; 76 to 1976; 84 to 1975; 56 to 1974; 64 to 1973; and 513 to 1972 and earlier years.

The five core journals that ranked highest in impact appear in Table 2. *Annual Review of Entomology* had an impact of 4.75. Review journals generally have the highest impact. *Journal of Insect Physiology* follows with an impact of 1.58. *Insect Biochemistry* had an impact of 1.48; *Physiological Entomology*, 1.35; and *Ecological Entomology*, 1.25. When we consider all 36 core journals as a group, the Macro Journal of Entomology has an impact of .61. This compares to 1.06 in our study of botany journals[8] and 3.36 for biochemistry.[13]

In the 1982 *JCR*, impact is calculated by adding the number of articles a journal published in 1980 and 1981. The number of citations these articles received in 1982 is also tabulated. Dividing the latter by the former, we find how often the average article from the *previous two years* is cited in the current year.

Of course, the relevance of this two-year base depends on the lag time for each field's literature. That is, the core journals might have higher impacts if a two-year base *earlier* than 1980-1981 is used. Table 3 lists the top ten high-impact entomology journals, showing how their impacts vary when different two-year bases are used. For example, *Annual Review of Entomology* has an impact of 4.75 when 1982 citations to its 1980-1981 articles are considered. But its impact rises to 6.49 when we consider 1982 citations to its 1979-1980 articles. This pattern is generally followed by the other entomology journals. So this two-year base would perhaps be more relevant if we were comparing the impact of entomology journals to those in other fields. But the relative rankings of the journals in Table 3 does not change significantly, whichever two-year period is used.

The peak years for the entomology journals can be determined by examining their "half-lives," also shown in Table 3. Cit*ed* half-life indicates the median age of articles from each journal that were cited in 1982. For example, the core journal with the shortest half-life is *Ecological Entomology*. It has a cited half-life of 3.1 years. That is, half of the citations this journal *received* in 1982 were to articles it published from 1980 through 1982.

Cit*ing* half-life indicates the median age of the literature cited *by* each journal. *Mosquito News* has the shortest citing half-life of the core journals in this study at 6.6 years. Half of its 1982 references cited articles published from 1976 through 1982.

As you can see, a few of the core journals in Table 3 have citing and cited half-lives greater than ten years. The data indicate that the entomology literature remains useful and significant for a fairly long period of time. In the future, *JCR* will provide complete data on any half-

Table 3: 1982 impact factors of selected entomology journals across various two-year bases. Cited and citing half-lives for each journal appear at the far right.

Journal	1980-81	1979-80	1978-79	1977-78	1976-77	Cited Half-Life	Citing Half-Life
Annu. Rev. Entomol.	4.75	6.49	5.00	3.11	3.68	8.1	8.7
Ecol. Entomol.	1.25	1.30	1.30	1.15	.99	3.1	8.8
Entomol. Exp. Appl.	.67	.88	1.19	1.08	.58	7.4	7.6
Environ. Entomol.	.72	.95	.91	.86	.82	5.5	8.3
Insect Biochem.	1.48	1.68	1.35	1.18	.97	3.9	7.4
Int. J. Insect Morph.	.71	1.02	.87	.65	.79	5.2	>10.0
J. Econ. Entomol.	.72	.89	.90	.80	.75	>10.0	7.6
J. Insect Physiol.	1.58	2.19	2.12	1.47	1.25	8.5	8.0
J. Med. Entomol.	.61	.66	.50	.51	.63	6.6	>10.0
Physiol. Entomol.	1.35	1.46	1.54	1.26	.73	3.4	8.3

lives greater than ten years. However, we have determined that the average half-life for the core journals in this study, taken as a group, is between 11 and 12 years, whether cit*ing* or cit*ed*.

The *Annual Review of Entomology* ranks first in immediacy as well as impact—.89 (Table 2, column H). Immediacy is calculated by dividing the number of citations to a journal's 1982 articles by the total number of articles it published that year. *Ecological Entomology* has the second highest immediacy at .65. *Journal of Insect Physiology* is next at .41, followed by *Entomologia Experimentales et Applicata* at .37. *Insect Biochemistry* and *Journal of Medical Entomology* are virtually tied for fifth place with an immediacy of .32 and .31, respectively. The Macro Journal of Entomology has an immediacy of .18.

Table 4 lists 50 journals that most frequently cit*ed* the core entomology journals in 1982. Although these 50 journals represent seven percent of the 711 journals that cited the core group that year, they account for 68 percent of all citations received by the core in 1982.

Twenty-five journals in Table 4 are members of the core group. Again, they are indicated by asterisks. These 25 journals cited 39,000 references in 1982, of which 29 percent were to the core journals in this study. In contrast, the non-core journals in Table 4 cited 140,000 references, only three percent of which were to the core.

As is our custom, we also have looked at the specific content of these journals. Table 5 lists the 44 most-cited articles from the core entomology journals. They are arranged alphabetically by first author. The number of citations each article received from 1961 through 1982 in *SCI* is also shown. Only those papers which were cited more than 100 times are listed. When this study was begun, citation data from the 1955-1964 *SCI* cumulation were not available. However, we were later able to add citations, in parentheses, to those papers on the list published in 1960 and earlier.

Seven of the 36 core journals are represented in the table. *Annual Review of Entomology* accounts for 16 of the 44 papers listed. *Journal of Economic Entomology* and *Journal of Insect Physiology* each published ten of the most-cited entomology articles. *Annals of the Entomological Society of America* and *Canadian Entomologist* each account for three articles. *Bulletin of Entomological Research* and *Mosquito News* each account for one paper. Our search service can provide editors with complete lists of the most-cited articles published in any journals they desire.

The most-cited paper, by W.S. Abbott, US Department of Agriculture, Washington, DC, is also the oldest paper on the list. Published in 1925 in *Journal of Economic Entomology*, Abbott's paper discusses a method for calculating the effectiveness of insecticides. In par-

Table 4: The 50 journals which most frequently cited core entomology journals in 1982. An asterisk indicates a core journal. A = citations to core journals. B = citations to all journals. C = self-citations. D = percent of total citations that are core journal citations (A/B). E = percent of total citations that are self-citations (self-citing rate C/B). F = percent of citations to core journals that are self-citations (C/A). G = impact factor. H = immediacy index. I = 1982 source items.

	A	B	C	D	E	F	G	H	I
*Environ. Entomol.	1461	3559	398	41.1	11.2	27.2	.72	.17	270
*J. Econ. Entomol.	1233	2973	764	41.5	25.7	62.0	.73	.18	283
*J. Insect Physiol.	888	3393	488	26.2	14.4	55.0	1.58	.41	143
*Ann. Entomol. Soc. Amer.	770	2197	232	35.1	10.6	30.1	.53	.18	128
*Z. Angew. Entomol.—J. Appl. Entom.	678	2459	180	27.6	7.3	26.6	.45	.08	125
*Can. Entomol.	657	2003	276	32.8	13.8	42.0	.54	.16	140
*J. Med. Entomol.	653	2262	191	28.9	8.4	29.3	.61	.31	109
J. Chem. Ecol.	610	2727	—	22.4	—	—	1.86	.54	129
*Entomol. Exp. Appl.	601	1790	116	33.6	6.5	19.3	.67	.37	75
*Annu. Rev. Entomol.	565	3010	48	18.8	1.6	8.5	4.75	.89	18
*Insect Biochem.	466	2510	168	18.6	6.7	36.1	1.48	.32	88
*Mosq. News	445	985	234	45.2	23.8	52.6	.60	.07	94
*J. Ga. Entomol. Soc.	393	989	54	39.7	5.5	13.7	.24	.17	98
*Appl. Entomol. Zool.	359	1112	86	32.3	7.7	24.0	.37	.15	85
*Bull. Entomol. Res.	345	1105	177	31.2	16.0	51.3	.54	.28	69
*Fla. Entomol.	337	1133	57	29.7	5.0	16.9	.45	.17	81
*Physiol. Entomol.	336	1115	55	30.1	4.9	16.4	1.35	.11	53
Can. J. Zool.	325	9544	—	3.4	—	—	.88	.30	373
Comp. Biochem. Physiol. Pt. A	261	8742	—	3.0	—	—	.82	.17	334
Parasitology	247	3789	—	6.5	—	—	1.99	.54	113
Oecologia	236	7603	—	3.1	—	—	1.38	.27	259
Cryo-Lett.	197	1135	—	17.4	—	—	.95	.23	30
Comp. Biochem. Physiol. Pt. B	186	10,556	—	1.8	—	—	.90	.17	387
*Ecol. Entomol.	180	1070	35	16.8	3.3	19.4	1.25	.65	52
*Entomon	177	902	20	19.6	2.2	11.3	.11	.03	104
J. Comp. Physiol.	175	6831	—	2.6	—	—	1.81	.51	245
Experientia	174	10,697	—	1.6	—	—	.79	.15	679
*Insectes Soc.	165	828	84	19.9	10.1	50.9	.60	.14	42
Residue Reviews	163	1302	—	12.5	—	—	.83	.10	10
J. Invertebr. Pathol.	160	1765	—	9.1	—	—	.89	.31	123
*Acta Entomol. Bohemoslov.	159	743	45	21.4	6.1	28.3	.26	.10	58
Science	159	27,145	—	.6	—	—	6.81	1.73	988
*J. Aust. Entomol. Soc.	155	599	29	25.9	4.8	18.7	.21	.10	59
Res. Pop. Ecol.	155	667	—	23.2	—	—	.59	.29	28
Ecology	141	7552	—	1.9	—	—	2.45	.62	205
*J. N.Y. Entomol. Soc.	132	521	13	25.3	2.5	9.9	.25	.06	36
*Int. J. Insect Morphol. Embryol.	129	832	27	15.5	3.3	20.9	.71	.10	30
*Pac. Insects	125	544	53	23.0	9.7	42.4	.18	.15	41
J. Morphol.	123	3507	—	3.5	—	—	.91	.33	98
Gen. Comp. Endocrinol.	122	5582	—	2.2	—	—	1.80	.48	193
J. Exp. Zool.	121	6628	—	1.8	—	—	1.34	.31	275
Pestic. Biochem. Physiol.	113	1806	—	6.3	—	—	1.45	.32	79
Z. Pflanzenkr. Pflanzensch.	111	1511	—	7.4	—	—	.39	.11	82
Aust. J. Zool.	109	2069	—	5.3	—	—	.74	.32	71
Amer. J. Trop. Med. Hyg.	108	3652	—	3.0	—	—	1.55	.46	185
Advan. Nutr. Res.	104	1649	—	6.3	—	—	2.80	.50	10
Ann. Appl. Biol.	99	2334	—	4.2	—	—	.63	.29	138
Comp. Biochem. Physiol. Pt. C	99	4781	—	2.1	—	—	1.18	.30	182
*Great Lakes Entomol.	98	431	19	22.7	4.4	19.4	.13	.06	35
Amer. Naturalist	96	5248	—	1.8	—	—	2.00	.58	137

ticular, it describes how researchers can account for insects that died of "natural causes" when samples of insects treated and untreated with insecticides are compared. This paper was cited at least 650 times between 1955 and 1982. Despite its age, it continues to be highly cited. In 1982, it received 32 citations; in 1981, 38 citations; in 1980, 42; in 1979, 33; etc.

The second most-cited paper is by W.H. Telfer, University of Pennsylvania, Philadelphia, and was published in *Annual Review of Entomology* in 1965. This review describes the mechanism and control of yolk formation in insects. It was cited 262 times from 1965 to 1982. The author commented on this *Citation Classic* in 1979.[16] Eight other papers in Table 6 were designated *Citation Classics*.[9,10,17-22]

The third most-cited paper is by C.S. Holling, Forest Insect Laboratory, Sault

Table 5: The 44 most-cited articles from the core entomology journals cited 100 or more times, 1961-1982 *SCI*®, in alphabetical order by first author. At the time these data were collected, the 1955-1964 *SCI* was not yet available. We have added (in parentheses) the additional cites for the papers published in 1960 or earlier.

Citations 1961-1982		Bibliographic Data
604	(55)	**Abbott W S.** A method of computing the effectiveness of an insecticide. *J. Econ. Entomol.* 18:265-7, 1925.
119	(0)	**Adkisson P L, Vanderzant E S, Bull D L & Allison W E.** A wheat germ medium for rearing the pink bollworm. *J. Econ. Entomol.* 53:759-62, 1960.
120		**Auclair J L.** Aphid feeding and nutrition. *Annu. Rev. Entomol.* 8:439-90, 1963.
115	(20)	**Baumhover A H, Graham A J, Bitter B A, Hopkins D E, New W D, Dudley F H & Bushland R C.** Screw-worm control through release of sterilized flies. *J. Econ. Entomol.* 48:462-6, 1955.
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178	(9)	**Solomon M E.** Control of humidity with potassium hydroxide, sulphuric acid, or other solutions. *Bull. Entomol. Res.* 42:543-54, 1951.
101		**Staal G B.** Insect growth regulators with juvenile hormone activity. *Annu. Rev. Entomol.* 20:417-60, 1975.
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262		**Telfer W H.** The mechanism and control of yolk formation. *Annu. Rev. Entomol.* 10:161-84, 1965.
203	(0)	**Thorsteinson A J.** Host selection in phytophagous insects. *Annu. Rev. Entomol.* 5:193-218, 1960.
149		**Vanderzant E S, Richardson C D & Fort S W.** Rearing of the bollworm on artificial diet. *J. Econ. Entomol.* 55:140, 1962.

Citations 1961-1982	Bibliographic Data
111	**Waters T F.** The drift of stream insects. *Annu. Rev. Entomol.* 17:253-72, 1972.
105	**Wigglesworth V B.** Chemical structure and juvenile hormone activity: comparative tests on *Rhodnius prolixus*. *J. Insect Physiol.* 15:73-94, 1969.
194	**Wyatt G R.** The biochemistry of insect hemolymph. *Annu. Rev. Entomol.* 6:75-102, 1961.
118	**Yamamoto R T.** Mass rearing of the tobacco hornworm. II. Larval rearing and pupation. *J. Econ. Entomol.* 62:1427-31, 1969.
129 (4)	**Yamasaki T & Narahashi T.** The effects of potassium and sodium ions on the resting and action potentials of the cockroach giant axon. *J. Insect Physiol.* 3:146-58, 1959.

Table 6: Sample of highly cited entomology articles published in non-core journals, in alphabetical order by first author.

Total *SCI*® Citations 1955-1982	Bibliographic Data
136	**Bollenbacher W E, Vedeckis W V, Gilbert L I & O'Connor J D.** Ecdysone titers and prothoracic gland activity during the larval-pupal development of *Manduca sexta*. *Develop. Biol.* 44:46-53, 1975.
58	**Bowers W S & Martinez-Pardo R.** Antiallatotropins: inhibition of corpus allatum development. *Science* 197:1369-71, 1977.
168	**Bowers W S, Ohta T, Cleere J S & Marsella P A.** Discovery of insect antijuvenile hormones in plants. *Science* 193:542-7, 1976.
61	**de Barjac H.** Une nouvelle variete de Bacillus thuringiensis tres toxique pour les moustiques: B. thuringiensis var. israelensis serotype 14. (A new subspecies of Bacillus thuringiensis very toxic for mosquitoes: Bacillus thuringiensis var israelensis new variety serotype 14.) *C.R. Acad. Sci. Ser. D* 286:797-800, 1978.
251	**Feeny P.** Seasonal changes in oak leaf tannins and nutrients as a cause of spring feeding by winter moth caterpillars. *Ecology* 51:565-81, 1970.
174	**Hagedorn H H, O'Connor J D, Fuchs M S, Sage B, Schlaeger D A & Bohm M K.** The ovary as a source of γ-ecdysone in an adult mosquito. *Proc. Nat. Acad. Sci. US* 72:3255-9, 1975.
79	**Kennedy J S & Marsh D.** Pheromone-regulated anemotaxis in flying moths. *Science* 184:999-1001, 1974.
87	**Nijhout H F & Williams C M.** Control of moulting and metamorphosis in the tobacco hornworm, *Manduca sexta* (L.): growth of the last-instar larva and the decision to pupate. *J. Exp. Biol.* 61:481-91, 1974.
64	**Nijhout H F & Williams C M.** Control of moulting and metamorphosis in the tobacco hornworm, *Manduca sexta* (L.): cessation of juvenile hormone secretion as a trigger for pupation. *J. Exp. Biol.* 61:493-501, 1974.
74	**Reichstein T, von Euw J, Parsons J A & Rothschild M.** Heart poisons in the monarch butterfly. *Science* 161:861-6, 1968.
71	**Scriber J M.** Limiting effects of low leaf-water content on the nitrogen utilization, energy budget, and larval growth of *Hyalophora cecropia* (Lepidoptera: Saturniidae). *Oecologia* 28:269-87, 1977.
84	**Slansky F & Feeny P.** Stabilization of the rate of nitrogen accumulation by larvae of the cabbage butterfly on wild and cultivated food plants. *Ecol. Monogr.* 47:209-28, 1977.
116	**Truman J W.** Physiology of insect rhythms. I. Circadian organization of the endocrine events underlying the moulting cycle of larval tobacco hornworms. *J. Exp. Biol.* 57:805-20, 1972.
87	**Wyatt G R & Pan M L.** Insect plasma proteins. *Annu. Rev. Biochem.* 47:779-817, 1978.

Ste. Marie, Ontario. It discusses factors involved in the predation of sawfly cocoons by small mammals, such as the population density of the prey. Published in *Canadian Entomologist* in 1959, this paper received 246 citations from 1959 to 1982. Holling currently is the director of the Institute of Resource Ecology, Vancouver, British Columbia.

It is important to remember that Table 5 does *not* include entomology articles published in *non*-core journals, such as *Nature*, *Science*, *Journal of Experimental Biology*, *Ecology*, etc. We identified a sample of entomology articles published in these journals that were cited at least six times by the core group in 1982. We then tabulated their citations from 1955 through 1982 in *SCI*. Table 6 lists the 14 most-cited entomology articles from this sample. Incidentally, Miriam Rothschild is coauthor with T. Reichstein and colleagues on the paper published in *Science* in 1968. This fascinating paper discussed heart poisons in the monarch butterfly. It is important to stress that we attribute no specific *qualitative* differences between these papers—that's why they are arranged alphabetically rather than in

order of citations. We would have liked to create a map of entomology showing how these papers interact, but we are constrained by time.

Comparing Tables 2 and 4, we see that ten journals appear among the top 20 on both lists. They are: *Annals of the Entomological Society of America*, *Annual Review of Entomology*, *Bulletin of Entomological Research*, *Canadian Entomologist*, *Entomologia Experimentales et Applicata*, *Environmental Entomology*, *Insect Biochemistry*, *Journal of Economic Entomology*, *Journal of Insect Physiology*, and *Journal of Medical Entomology*. These journals rank highest in terms of their references *to* the core literature, and the number of citations received *from* the core. The same ten journals also ranked among the top 20 in terms of impact and immediacy.

This concludes our look at the core journals of entomology. In the weeks to come, the journal citation studies series will continue with an examination of the core journals of analytical chemistry.

* * * * *

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