Survey of the Quantity and Distribution of Biochemical Literature

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During the recent past, several surveys have been conducted to determine which scientific periodicals contain the greatest number of articles of interest to chemists in special fields of endeavor, and to determine the country of origin of the publications as well as the language in which the article was written, F.S. Boig, with the collaboration of P. W. Howerton, has surveyed the literature of organic chemistry[1,2] and analytical chemistry[3,4] from this point of view. Boig, *et. al.*, have similarly surveyed the literature of pharmaceutical, cosmetic, and perfume chemistry,[5] dye and textile chemistry,[6] rubber chemistry,[7] petroleum chemistry,[8] and the industries of paint, varnish, and lacquers.[9] M. Fleischer has recently reviewed the field of mineralogical and geological chemistry.[10]

D. B. Baker, Director of Chemical Abstracts Service, has pointed out that the volume of reported fundamental and applied research in chemistry and chemical engineering has increased eightfold in 50 years. *Chemical Abstracts* systematically abstracted articles from 475 journals in its first year of operation (1907) and from about 9800 journals in 1960, originating from 97 countries and appearing in about 52 languages.[11] During 1961 there appeared in *Chemical Abstracts* 118,337 abstracts of papers and 26,249 abstracts of patents. During the same year there were published in the section on "Biological Chemistry" 35,046 abstracts of papers. This represents 2.75 times the number of abstracts of papers (12,663) appearing in its nearest competitor, the section on "Organic Chemistry."[12] These data indicate well the present-day importance of biochemistry as a field of chemical research. Our present survey was conducted to determine which journals published the greatest number of articles on biochemistry topics, and to determine the countries of publication as well as the languages in which the papers were written.

COLLECTION OF DATA

The abstracts of biochemical articles, as published in the "Biological Chemistry" section of *Chemical Abstracts*, were counted for every tenth year during the period 1910–60. Likewise the abstracts, as published in the "Physiologische Chemie" section of *Chem. Zentr.*, were tallied for the period 1880–1910. Polemic discussions and obituaries were eliminated from the study. The journal in which each paper was published was recorded. Whenever possible, the language of the article also was recorded. When not specified in the abstract the language was assumed to be the same as that of the country in which the journal was published. In the case of journals from multilingual countries, such as Switzerland, the language of the title of the journal was assumed to be the same as that of the article. Where it was impossible to determine the language of the original article in the above manner, a notation of "undetermined" was recorded. Most multilingual journals publish articles in English, French, or German; and citing articles therein as "undetermined" would cause little change in the relative position of the major languages as reported in this paper. The country in which each journal was published was determined from the "List of Periodicals Abstracted by Chemical Abstracts Service"[13] or from the "World List of Scientific Periodicals."[14] The year in which the journal started publication was obtained from the latter source.

DISCUSSION

In Table I the major journals are listed with the number of abstracts (*A*) found in *Chemical Abstracts* or in *Chem. Zentr.* at ten-year intervals from 1880 to 1960. A rank (*R*) is assigned to the journal to indicate its relative position of importance from the standpoint of the number of articles published in it during a particular year. The top twenty-five journals for the year 1960 are listed. Twelve other periodicals found in our survey in *Chemical Abstracts* to be importance for the years 1910–50 and eleven important journals found in our survey in *Chem. Zentr.* for the years 1880–1910 are included. Where no number is found under "*A*," no abstracts were found in that periodical for that particular year, either because the journal had not yet begun publication, or for some undetermined reason no abstract had been taken from it during the year.

Research scientists rely heavily on the most recent publications in their field. The majority of literature citations in the *J. Am. Chem. Soc.* and other leading chemical journals are to articles which have been published within the previous ten years.[16-20] Much less use is made of the older literature. Thus, when libraries have limited funds for the purchase of biochemical journals, priority should be given to the journals near the top of Table I in the most recent years. The necessity of completing back files of the older journals has been questioned, especially if there is a choice between purchasing a journal of former importance or a newer journal of present day importance.[16]

A simple count of abstracts does not distinguish between a short note found in *Nature* and a lengthy research report in the *J. Biol. Chem.* While the number of pages of an article is recorded in the abstract, no account is taken here of the length of the article. Emphasis is on the quantity of biochemical articles as determined by the number of abstracts, not the length of the article nor the quality of the research reported. There is also a chance that the literature has not been completely abstracted. Formerly Soviet literature was difficult to obtain,[21] but since the advent of *Referativnyi Zhurnal. Khimiya* in 1953, coverage of the Soviet literature in *Chemical Abstracts* has been as complete as Soviet coverage.[11] It can be assumed that an article not abstracted in *Chemical Abstracts* is not readily available, and is, therefore, of limited use to chemists in general.

Chemische Zentralblatt did not attempt to give a complete coverage of the literature until 1919, so that information recorded here before 1919 is somewhat distorted with greater emphasis on German articles in pure chemistry.[22] The relative position of a journal in 1910 from *Chemical Abstracts* data is not the same as from *Chem. Zentr.* data for the same year. For example, from *Chemical Abstracts* data the first four journals are *Compt. rend. soc. biol., Biochem. Z., Z. physiol. Chem.*, and *Compt. rend.*, whereas from *Chem. Zentr.* data the order is *Biochem. Z.*,

Table I

Important Biochemical Journals

From *Chemical Abstracts* (R = rank, A = number of abstracts)

Journal	Date	Country	1960 R	1960 A	1950 R	1950 A	1940 R	1940 A	1930 R	1930 A	1920 R	1920 A	1910 R	1910 A
Nature	1868	Engl	1	936	4	277	13	112		18		4		
J. Biol. Chem.	1905	USA	2	661	2	524	2	401	2	266	2	202	16	18
Biochim. et. Biophys. Acta	1947	Neth	3	635	22	96								
Proc. Soc. Exptl. Biol. Med.	1903	USA	4	607	1	598	1	587	23	55			13	20
Am. J. Physiol.	1898	USA	5	385	7	235	6	187	3	218	3	110	7	39
Compt. rend. soc. biol.	1849	Fr	6	365	3	391	3	326	12	104	13	43	1	284
Dissertation Abstr.	1938	USA	7	361		6								
Biochem. J.	1906	Engl	8	342	8	228	5	193	8	140	16	39	16	18
Arch. Biochem. Biophys.	1942	USA	9	312	6	243								
Compt. rend.	1835	Fr	10	274	9	192		58	11	129	5	77	4	84
Endocrinology	1917	USA	11	252	18	128	4	258		34		10		
Arch. intern. pharmacodynamie	1894	Belg	12	220	16	138		61		26		1		7
Klin. Wochschr.	1922	Germ	13	212	19	106	24	80	5	162				
Doklady Akad. Nauk S.S.S.R.	1828	USSR	14	187	11	183		65[a]		1[a]				
Naturwissenschaften	1913	Germ	15	186		55		45		43		2		
Arzneimittel.-Forsch.	1951	Germ	16	185										
J. Pharmacol. Exptl. Therap.	1909	USA	17	184	10	187	13	112	10	138	6	65	10	23
J. Biochem. (Tokyo)	1922	Jap	18	177		13		69		43				
Ann. N. Y. Acad. Sci.	1823	USA	19	176	21	101								
J. Bacteriol.	1916	USA	20	175	17	133	12	118		35		14		
Z. ges. exptl. Med.	1913	Germ	21	172	23	94		48	13	97		22		
J. physiol. (Paris)	1899	Fr	22	167		11		13		19		13		2
Can. J. Biochem. and Physiol.	1929	Can	23	166										
Arch. intern. physiol. et biochem.	1904	Belg	24	164		14		17		23		8		
Experientia	1945	Swit	25	162		17								
Arch exptl. Pathol. Pharmakol., Naunyn-Schmiedeberg's	1873	Germ	26	146		42	8	157	6	160		13	6	44
J. Lab. Clin. Med.	1915	USA	30	138	25	91	10	125	14	91	7	54		
Lancet	1823	Engl	50	95		44		72		32	10	46		5
Z. physiol. Chem., Hoppe-Seyler's	1877	Germ		90		43	22	87	9	138	20	34	3	184
Boll. soc. ital. biol. sper.	1927	Ital		88	5	254	9	144	4	202				
J. Physiol. (London)	1878	Engl		67		8		75	20	60	9	49	10	23
Deut. med. Wochschr.	1875	Germ		48		27		35		26	11	45	8	28
Byull. Eksptl. Biol. Med.	1936	USSR		48			7	177						
Arch. ges. Physiol., Pflüger's	1868	Germ		43		12		1	17	85		13	9	26
Munch. med. Wochschr.	1886	Germ		11				16		9	7	54	5	51
Z. Immunitätsforsch.	1908	Germ		10		12		22	6	160	4	90		5
Biochem. Z.	1906	Germ		1[b]		60	20	97	1	474	1	205	2	201
Total number of journals				29,224[a] 2,365		12,855 1,054		11,064 1,081		7,139 655		3,101 484		1,873 258

From *Chemisches Zentralblatt*

Journal	Date	Country	1910 R	1910 A	1900 R	1900 A	1890 R	1890 A	1880 R	1880 A
Biochem. Z.	1906–	Germ	1	172						
Z. physiol. Chem., Hoppe-Seyler's	1877–	Germ	2	147	1	63	1	19	3	24
Compt. rend.	1835–	Fr	3	83	2	59	2	17	1	26
Z. Immunitatsforsch.	1908–	Germ	4	70						
Arch. exptl. Pathol. Pharmakol., Naunyn-Schmiedeberg's	1873–	Germ	5	43	4	16		6		7
Arch. ges. Physiol., Pflüger's	1868–	Germ	7	29	3	28	5	11	5	15
Z. Biol.	1865–	Germ		22	5	14	6	10		3
Zentr. Physiol.	1887–1921[f]	Germ		19		8	3	13		
Ber. deut. chem. Ges.	1868–1945[f]	Germ		6		4		1	1	26
Landwirtsch. Vers.-Sta.	1859–1938	Germ		3		5		9	3	24
Arch. pathol. Anat. u. Physiol., Virchow's	1847–	Germ				1	4	12		2
Total number of abstracts			1,129		361		254		270[e]	
Total number of journals			109		67		63		61	

[a] Articles were in the foreign language edition, *Compt. rend acad. sci. U.R.S.S.* [b] D. B. Baker, Chemical Abstracts Service, explains that *Biochem. Z.* was skipped by their abstractor for several years and not discovered until late 1961. The journal is much more important than this table indicates. [c] The number of abstracts appearing in the top 25 journals for 1960 is 7663 or about 26% of the total. [d] This value does not agree exactly with the count (29,299) published in reference (15). [e] Merged in *Arch. ges. Physiol., Pflüeger's.* [f] Continued as *Chem. Ber.* [g] Contains biochemical, medicinal, and pharmaceutical articles.

Z. physiol. Chem., *Compt. rend.*, and *Z. Immunitätsforsch.*

No direct comparison can be made between 1880 and the later years because in 1880 biochemistry, medicinal chemistry, and pharmacy were combined in one section, while in later years there were separate sections for biochemistry, medicine, and pharmacy. The year 1880 is included in Table I only to give an indication of the major journals shortly after *Z. physiol. Chem.* began publication.

Distortion may occur if a journal has been unavailable for several years, such as during a war, then at a later date *Chemical Abstracts* obtains issues and abstracts several years of the journal at one time. For example, the November 20, 1930, issue of *Chemical Abstracts* records 97 abstracts from *Z. Immunitätsforsch.* covering a period of two years. Such examples are rare, however.

From the 1960 issue of *Chemical Abstracts* the editors eliminated abstracts of material recorded in more than one place, translations, unpublished papers given at society meetings, titles of standards such as ASTM, and cross references of certain patents.[11] This reduced the volume of *Chemical Abstracts* by around 3%. In 1910 *Chemical Abstracts* carried an "Immunochemistry" section in addition to the "Biological Chemistry" section. Our count for that year involved only those biochemical articles abstracted in the "Biological Chemistry" section. Later the editors of *Chemical Abstracts* incorporated into the "Biological Chemistry" section all of the abstracts formerly separately printed in the "Immunochemistry" section. Over the period of years included in this study, such editorial changes affect the absolute count of abstracts classed as biochemical.

The most noticeable feature derived from the data of Table I, as plotted in Fig. 1, is the rapid increase in biochemistry literature. It can be seen that from 1930 to 1960 the volume of abstracts doubled about every fourteen years. If only 1950 to 1960 is considered, the number of abstracts doubled within a period of eight years. When yearly counts of the abstracts are taken, great decreases in the number of abstracts are found at the close of a war period.[11] This is observed in our data as plotted in Fig. 1 for 1920 and 1950. The points representing the number of abstracts for these years are below the curve connecting the points for the peacetime years.

The *J. Biol. Chem.* has been the major biochemical journal for the greatest length of time in the recent past. It has been in second position since 1920. *Nature* at present has more articles abstracted from it than the *J. Biol. Chem.*, but many of these are very short. The *Proc. Soc. Exptl. Biol. Med.* was at the top of the list in 1940 and 1950, but dropped in rank in 1960, even though the number of abstracts increased. The French journals

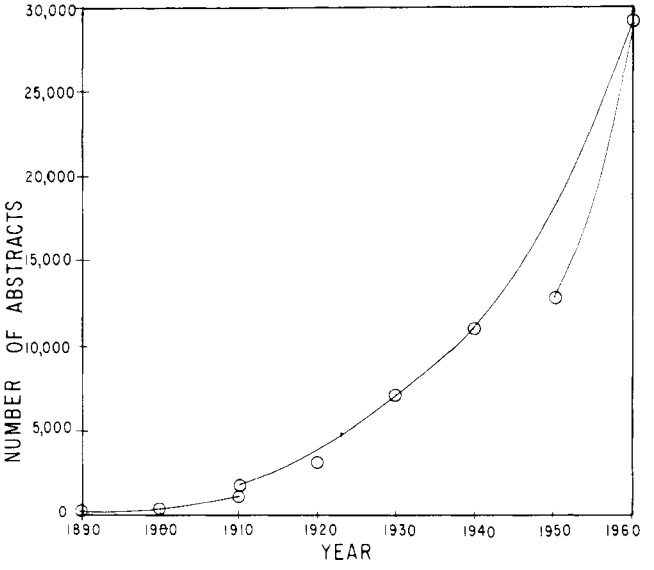

Fig. 1.—Increase in the number of abstracts of biochemical articles: on the abscissa, data for 1890–1910 are taken from *Chemisches Zentralblatt*; Data for 1910–60 are taken from *Chemical Abstracts*

Compt. rend. and *Compt. rend. soc. biol.* have been consistently among the major journals. *Compt. rend.* is especially noteworthy since it has also been a leader among organic chemistry journals throughout its long history.[1] The German journals *Z. physiol. Chem.* and *Biochem. Z.*, have shown a tremendous drop in importance since the First World War. *Biochem. Z.* was the major biochemical journal in 1920 and 1930, and *Z. physiol. Chem.* was at the top of the list in 1890 and 1900. Figure 2 shows graphically the rise and fall of four of the important journals.

The USSR, Japan, and Italy have few journals among the major twenty-five, but each of them has very many scientific and medical journals which have an occasional article of biochemical interest. There is nothing to indicate that Soviet journals are tending to displace American journals from the top of the list in biochemistry as they are tending to do in analytical and organic chemistry.[1,3]

The international journals, such as *Biochim. et Biophys. Acta*, *Arch. intern. pharmacodynamie*, and *Arch. intern. physiol. et. biochem.*, have shown a great increase in importance in 1960 over previous years. The importance of journals which print many brief reports is also increasing noticeably. *Nature*, *Naturwissenschaften*, and *Experientia* are prime examples. *Science* is not found in Table I, but it does have many articles of biochemical interest each year.

Dissertation Abstracts is a monthly compilation of abstracts of doctoral dissertations submitted to the journal. Many biochemical dissertations that are not printed elsewhere are found here. This journal has made an amazing climb into the classification of a major source of biochemical information in abstract form.

The 1911 volume of *Chemical Abstracts* was studied in comparison with 1910 to determine the validity of assigning a rank to the journals in any given year. It was found that the order of the top three journals was exactly reversed in 1911 over what it was in 1910. *Z. physiol. Chem.*, having 211 abstracts, was first in 1911, but third in 1910 with 184; *Biochem. Z.* was second in 1911 with 192 abstracts, and also second in 1910 with 201; *Compt. rend. soc. biol.* was third in 1911 with 135 abstracts, but first in 1910 with 284. The only other important change was a rise in the rank of the *J. Biol. Chem.* with 18 abstracts in 1910, but 82 abstracts in 1911. Thus, where few abstracts are recorded in a given year, a slight variation in the number of articles abstracted or a fluctuation in the number of articles published may cause some change in the relative position of any particular journal, but there

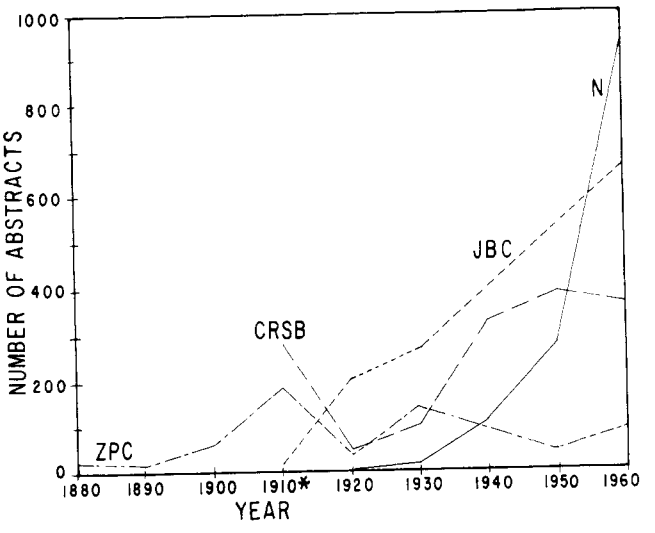

Fig. 2.—Increase in the number of abstracts of biochemical articles from four of the major journals: ZPC for *Zeitschrift für physiologische Chemie, Hoppe-Seylers*, CRSB for *Comptes rendus des séances de la société de biologie et de ses filiales*, JBS for *Journal of Biological Chemistry*, N for *Nature*. The data for the year 1910 are taken from *Chemical Abstracts*.

Table II

Number of Articles in the Major Languages

From *Chemical Abstracts* (R = rank, A= number of abstracts, % = percentage of total)

	1960			1950			1940			1930			1920			1910		
Language	R	A	%	R	A	%	R	A	%	R	A	%	R	A	%	R	A	%
English	1	15,350	52.5	1	7308	56.9	1	6138	55.4	1	2892	40.5	1	1492	48.1	3	263	14.0
German	2	3,125	10.7	3	1331	10.4	2	1457	13.2	2	2234	31.3	2	895	29.8	1	920	49.1
French	3	2,610	8.9	2	1435	11.2	3	932	8.4	3	639	8.9	3	355	11.4	2	467	24.9
Japanese	4	2,168	7.4	7	334	2.6	6	439	4.0	5	283	4.0	6	47	1.5			
Italian	5	1,645	5.6	4	837	6.5	5	557	5.0	4	475	6.7	4	122	3.9	4	166	3.4
Russian	6	1,522	5.2	5	512	4.0	4	639	5.8	7	144	2.0						
Undetermined	7	499	1.5	8	323	2.5	7	292	2.5	6	189	2.6						
Spanish	8	429	1.5	6	435	3.4				8	110	1.5						
Polish	9	299	1.0															
Dutch													5	60	1.9			
Total number of languages		46			21			27			22			17			17	

From *Chemisches Zentralblatt*

	1910			1900			1890	
Language	R	A	%	R	A	%	R	A	%
German	1	731	64.8	1	221	61.3	1	161	63.4
English	2	154	13.6	3	20	5.5	3	25	9.8
French	3	151	13.4	2	94	26.0	2	34	13.4
Italian	4	38	3.4	4	11	3.1	4	19	7.4
Swedish	5	20	1.8						
Dutch	6	13	1.2	5	5	1.4	6	3	1.2
Russian				6	4	1.1			
Estonian							5	6	2.4
Total number of languages		11			9			9	

should be little significant overall change. In the earlier years there is greater possibility of error, but the error should decrease as the number of abstracts increases.

Table II records the number of articles written in each language by rank, *R*, number of abstracts, *A*, and percentage of the total, %. English is, by far, the language of the literature of biochemistry, and has been ever since World War I. Over 50% of all biochemical articles are written in English at the present time. Before World War I, German was the language of biochemical literature. For the year 1910, 49% of the abstracts in the biochemical section of *Chemical Abstracts* were from articles written in German, while for the same year about 65% of the abstracts in the biochemical section of *Chem. Zentr.* were from articles written in German. This reflects the emphasis placed by the editors of *Chem. Zentr.* upon the German literature. French and Italian have remained high on the list as major languages over the years, whereas Russian and especially Japanese have shown tremendous growth in the more recent years.

Table III shows the number of articles published in each country, the rank, and the percentage contribution of each country to the total. In the case of international journals, it must be noted that the country in which the article was published is not necessarily the same as the country in which the research was done. The United States produces by far the most biochemical literature. Five of the top ten journals and about 30% of the total number of biochemical articles are published in the United States. Japan, perhaps surprisingly, is in second place. About 10% of the current biochemical literature is found in Japanese journals. Many articles in Japanese journals are written in English, so that the position of the Japanese language on our lists is lower than that of the country. England and Germany are at about the same level (9%) in 1960, followed by France (6.6%), Italy (5.7%), and the Russian Soviet Federated Socialists Republic (4.9%). Poland, Czechoslovakia, and the Ukrainian S.S.S.R. make their first appearance in 1960 among the nations producing at least one per cent. of the biochemical literature. This is indicative of a general trend toward greater biochemical research in communistic countries. Canada and India also show a gradual increase, as do other nations of the British Commonwealth that are not listed.

Table III
Number of Articles From the Major Countries

From *Chemical Abstracts* (R = rank, A = number of abstracts, % = percentage of the total)

	1960			1950			1940			1930			1920			1910		
Country	R	A	%	R	A	%	R	A	%	R	A	%	R	A	%	R	A	%
United States	1	8676	29.6	1	5286	41.1	1	4447	40.2	2	1951	27.3	1	1124	36.2	4	161	8.6
Japan	2	2916	10.0	7	441	3.4	6	659	6.0	6	465	6.5	7	57	1.8			
England	3	2721	9.3	2	1211	9.4	3	950	8.6	4	565	7.9	4	284	9.2	5	82	4.4
Germany	4	2680	9.2	4	1048	8.1	2	1177	10.6	1	2090	29.3	2	821	26.4	1	880	47.0
France	5	1933	6.6	3	1154	9.0	5	745	6.7	3	574	8.0	3	298	9.6	2	443	23.7
Italy	6	1657	5.7	5	821	6.4	7	543	4.9	5	475	6.7	5	122	3.9	3	166	8.9
Soviet Russian[1]	7	1437	4.9	6	512	4.0	4	850	7.7	7	144	2.0						
Netherlands	8	968	3.3	9	217	1.7	9	175	1.6				6	65	2.1			
Switzerland	9	704	2.4	11	207	1.6	10	125	1.1				9	43	1.4			
Belgium	10	673	2.3	13	182	1.3							8	52	1.7	6	21	1.1
Poland	11	481	1.5															
Canada	12	411	1.4	16	129	1.0												
India	13	408	1.4	14	146	1.1	11	113	1.0	10	88	1.2	11	31	1.0			
Denmark	14	368	1.2	10	216	1.7												
Czechoslovakia	15	348	1.2															
Ukrainian S.S.R.[1]	16	323	1.1															
Sweden				8	329	2.6	8	193	1.7				10	37	1.2			
Spain				12	195	1.5												
Argentina				15	137	1.1				9	93	1.3						
Austria										8	101	1.4				7	20	1.1
Total number of countries		86			51			59			45			38			26	

From *Chemisches-Zentralblatt*

	1910			1900			1890		
Country	R	A	%	R	A	%	R	A	%
Germany	1	738	63.6	1	218	60.4	1	154	60.6
France	2	143	12.7	2	92	25.2	2	30	11.8
United States	3	81	7.2	6	4	1.1	5	7	2.7
England	4	72	6.4	3	16	4.4	4	16	6.3
Italy	5	38	3.4	4	11	3.0	3	19	7.5
Sweden	6	20	1.8						
Netherlands	7	13	1.2	5	5	1.4	8	4	1.6
Russia				6	4	1.1			
Austria							5	7	2.7
Estonia							7	6	2.4
Switzerland							9	3	1.2
Total number of countries		18			11			12	

[1] Countries of the Soviet Union are tabulated individually. When the U.S.S.R. is considered as one unit, the totals are: 1960: R 5, A 2003, % 6.8; 1950: no significant change; 1940: R 3, A 959, % 8.7; 1910 to 1930: no significant change.

SUMMARY

There were 29,299 abstracts of biochemical papers plus 47 abstracts of patents for a toal of 29,346 abstracts published in *Chem. Abstr.* in 1960. This represents 22% of the total number of abstracts (132,159) for that year.[11, 15] This is 60% greater than the number of abstracts of papers and patents (18,233) appearing in the "Organic Chemistry" section. Listed in order of the number of abstracts of articles appearing in them, the ten major journals in 1960 were: *Nature, J. Biol. Chem., Biochim. et. Biophys. Acta., Proc. Soc. Exptl. Biol. Med., Am. J. Physiol., Compt. rend. soc. biol., Dissertation Abstr., Biochem. J., Arch. Biochem. Biophys., Compt. rend.*

Compt. rend. was the only one of these which was important in 1880. In 1960 the major languages in which biochemical articles were written were (in order): English, German, French, Japanese, Italian, and Russian. These six languages represented over 90% of all biochemical articles. In 1890 the order was German, French, English, and Italian, representing 94% of all biochemical articles. In 1960 the major countries from which biochemical articles came were (in order): United States, Japan, England, Germany, France, Italy, and Soviet Russia. These countries represented 76% of the abstracts. In 1890 the important countries were Germany, France, Italy, and England, representing 86% of the total.

REFERENCES

(1) F. S. Boig and P. W. Howerton, "History and Development of Chemical Periodicals in the Field of Organic Chemistry: 1877–1949," *Science*, **115**, 25 (1952).

(2) F. S. Boig, "Domestic and Foreign Periodicals in the Field of Organic Chemistry. A Statistical Analysis," *Science*, **110**, 107 (1949).

(3) F. S. Boig and P. W. Howerton, "History and Development of Chemical Periodicals in the Field of Analytical Chemistry; 1877–1950," *Science*, **115**, 555 (1952).

(4) F. S. Boig, "Domestic and Foreign Publications in the Field of Analytical Chemistry. A Statistical Analysis," *Chemist-Analyst*, **38**, 3 (1949).

(5) F. S. Boig and E. Brown, "Chemical Periodicals in the Fields of Pharmaceutical, Cosmetic, and Perfume Chemistry," *Merck Rept.*, **59**, 25 (July, 1950).

(6) F. S. Boig and W. J. Fitzpatrick, Jr., "Chemical Periodicals in the Dye and Textile Industries. A Statistical Analysis," *Textile Research J.*, **19**, 325 (1949).

(7) F. S. Boig, "American and Other Periodicals in the Field of Rubber Chemistry. A Statistical Analysis," *J. Rubber Research*, **18**, 112 (1949).

(8) F. S. Boig and K. A. Loftman, "Domestic and Foreign Periodicals in the Field of Petroleum Chemistry—A Statistical Analysis," *Oil Gas J.*, **47**, No. 51, 199 (April 21, 1949).

(9) F. S. Boig, "Chemical Literature in the Paint, Varnish, and Lacquer Industry," *Official Digest Federation Paint and Varnish Production Clubs*, **280**, 412 (1948).

(10) M. Fleischer, "Speed of Abstracting and Country of Origin of Abstracts Published in Section 8 (Mineralogical and Geological Chemistry) of 'Chemical Abstracts,'" *J. Chem. Document.*, **1**, No. 2, 36 (1961).

(11) D. B. Baker, "Growth of Chemical Literature Past, Present, and Future," *Chem. Eng. News*, **39**, 78 (July 17, 1961).

(12) *Chem. Eng. News*, **40**, 85 (March 5, 1962).

(13) American Chemical Society, "List of Periodicals Abstracted by Chemical Abstracts Service," American Chemical Society, Washington, D. C., 1956, Supplements 1957 to 1960.

(14) "World List of Scientific Periodicals," Third Edition, Butterworth Scientific Publications, London, 1952.

(15) *Chem. Eng. News*, **39**, 79 (March 6, 1961).

(16) R. L. Barrett and M. A. Barrett, "Journals Most Cited by Chemists and Chemical Engineers," *J. Chem. Educ.*, **34**, 35 (1957).

(17) H. H. Fussler, "Characteristics of the Research Literature Used by Chemists and Physicists in the United States. Part II," *Library Quart.*, **19**, No. 19, 119 (1949).

(18) A. M. Patterson, "Literature References in *Industrial and Engineering Chemistry* for 1939," *J. Chem. Educ.*, **22**, 514 (1945).

(19) A. M. Patterson, "Journal Citations in the 'Recueil,' 1937–1939," *Rec. trav. chim.*, **59**, 538 (1940).

(20) P. L. K. Cross, and E. M. Cross, "College Libraries and Chemical Education," *Science*, **66**, 385 (1927).

(21) P. W. Howerton, "Russian Literature in Organic Chemistry," *J. Chem. Educ.*, **26**, 205 (1949).

(22) E. J. Crane, A. M. Patterson, and E. B. Marr, "A Guide to the Literature of Chemistry," Second Edition, John Wiley & Sons, Inc., New York, N. Y., 1957, p. 133.

Concordance between Divisions and Journals of the American Chemical Society

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Scientific journals are generally recognized as a powerful factor in the conduct and advancement of scientific disciplines. The existence of suitable journals can catalyze the extension and application of new fields, and the absence of favorable publication media can deter research in even broad fields of science. Naturally, the births and deaths of journals, the definitions of scope and content of the papers they accept, and the policies and practises that guide the decisions of editors and reviewers with respect to individual papers, are all matters of frequent discussion and debate among scientists.

During the past few years, the American Chemical Society has doubled the number of journals that it sponsors. Much of the impetus to expansion was the result of requests from Divisions of the Society concerned with branches of chemistry not specifically served by existing journals. Divisions themselves publish two of the older journals, and several Divisions issue to their