

The Division of Chemical Literature: A Historical Survey—1943 to the Present†

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Since the first ACS national meeting in 1890, papers on some aspect of the chemical literature have been on ACS programs. With the formation of the Chemical Literature Group within the Division of Chemical Education in 1943, these papers for the first time could be presented together within one or several sessions. The Group evolved into a Division in 1949, and since then the Division has been the cohesive force within the ACS for the community of chemists with shared interests and objectives in the art and science of chemical documentation. The critical and significant events in the history are explored.

When the American Chemical Society was formed in 1876, chemists tended to be involved in all of chemistry. Chemistry had not yet entered the age of fragmentation and specialization. The literature of chemistry was slowly evolving from a long period of infancy. There were only a handful of journals, and the more important ones were published in Germany, France, and England. American chemists read these journals, and a few contributed to them, as well as to the few American chemical journals, namely, Chandler's *American Chemist*, Druggists' *Circular and Chemical Gazette*, *American Gas Light Journal and Chemical Repertory*, Silliman's *Journal of Science*, and the *Journal of the Franklin Institute*. A five-foot shelf was more than sufficient to hold the essential books of a chemist in 1876. Practically every chemist at that time accepted his obligation to know the literature as a part of being a chemist.

Membership in the American Chemical Society, starting with 133 at the time of its organization, barely rose to 200 at the time of its first national meeting in 1890 in Newport, Rhode Island. Forty chemists attended this first ACS meeting. In 1893, the American Chemical Society collaborated with the World's Congress of Chemists in holding the first international chemistry meeting in the United States. The Congress, which met in Chicago, was attended by 182 chemists, 83 of whom were ACS members, to hear a total of 76 papers. The significance of this meeting, beyond being international, is that the 76 papers were grouped under nine divisions, such as analytical, inorganic, organic, physical, and others. One of the nine groups was bibliography.

Even though the 1893 international meeting presaged the segmentation of chemistry, it was not until June 30, 1908, that the first division was formed—the Division of Industrial Chemists and Chemical Engineers, now known as the Division of Industrial and Engineering Chemistry. By January 1, 1909, four other divisions were formed: Agricultural and Food Chemistry, Fertilizer Chemistry, Organic Chemistry, and Physical and Inorganic Chemistry. By this time, ACS membership was about 5000 and was publishing three journals: *Journal of the American Chemical Society* (begun in 1879), *Chemical Abstracts* (begun in 1907), and *Journal of Industrial and Engineering Chemistry* (begun in 1909). Each ACS member received these three journals as part of his \$10.00 membership dues.

Almost from the very beginning of ACS national meetings, papers were presented on various aspects of the chemical literature. Indeed, being aware of and knowing the

chemical literature was considered so important by the founding fathers of the ACS that three features in addition to original articles were considered essential for the *Journal of the American Chemical Society* starting in the first issue in 1879: (1) "Abstracts of American and Foreign Journals," (2) a library accessions list, and (3) book reviews. The abstracts section continued until *Chemical Abstracts* was established in 1907. The first symposium in some aspect of chemical literature presented at an ACS national meeting was one on "Chemical Libraries and Their Problems" in April, 1919, Buffalo, N.Y.

Many factors contributed to the growth of the professions in chemistry. The most important was the evolving and growing chemical industry and the concomitant expansion of the American educational system that was responsible for the education and training of the scientists and engineers. ACS membership grew from 7,170 in 1914 to 12,203 in 1919. Impetus for this growth came from the industrial needs of World War I. A similar impetus from World War II advanced ACS membership from 23,519 in 1939 to 43,000 by the end of 1945.

The period between 1900 and 1940 was one of exceptional growth of the chemical industry, the number of professional chemists and engineers, and the chemical literature throughout the world, but most notably in the United States. The number of papers abstracted in *Chemical Abstracts* more than quadrupled from 1907 to 1940. At the beginning of the 20th century, there were less than 400 journals published in the world that contained articles of chemical interest. These journals for the most part were relatively small. For example, JACS contained 743 pages of original contributions in all of the issues produced in 1900, but these 743 pages were equivalent to less than 450 pages of the present format. By 1920, *Chemical Abstracts* covered about 1000 journals, and by 1940, it was covering over 3500 journals (today it covers over 12,000 journals). In 1940, the number of pages published in JACS was about 3500. Also by 1940, the ACS had expanded its number of journals from three to five, the newer ones being *Analytical Chemistry* and *Chemical & Engineering News*, which were introduced in 1929 and 1932, respectively.

Orientation of chemists toward disciplines actually began in the 19th century. As the literature of chemistry expanded and the number of chemists increased at a rapid rate, the educational process and the conduct of research in the industrial environment accelerated the segmentation of chemistry into a variety of disciplines. Put another way, what chemists did began to define the disciplines of chemistry. Thus, by 1940, there were 18 divisions in the American Chemical Society where members could present papers at each of the two national annual meetings and be in asso-

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ciation with others having the same interests and objectives in chemistry and chemical technology.

Between the two World Wars, chemists with unique skills and talents found many employment opportunities. Thus emerged the technical editor; technical translator; technical writer; indexer and abstractor; chemical librarian; bibliographer, reviewer, and historian; and others which became subsumed under the concept of literature chemist. From the time chemistry became a science, chemists spent much of their time as literature chemists. Every chemist who relates his experimental data and conclusions with those in the literature is working as a literature chemist. When a chemist satisfies his needs for new knowledge and for continuing his professional development through the literature, he is a literature chemist. When a chemist writes a scientific paper for presentation or publication, or a review paper, or a technical book, he is a literature chemist.

It is therefore not surprising that numerous papers were presented before each of the 18 ACS divisions that would have been suitable for the Division of Chemical Literature, had it been in existence. For example, the following papers, among others in the literature area, were presented at ACS national meetings:

"Acquainting the Undergraduate with the Chemical Literature"—J. R. Sampey in Division of Chemical Education, 1937, Spring

"Lantern-Slide Techniques"—H. N. Alyea in Division of Chemical Education, 1937, Spring

"Collateral Readings in Inorganic Chemistry"—L. A. Goldblatt in Division of Chemical Education, 1937, Spring

"Classification of Chelate Rings"—H. Diehl in Division of Physical and Inorganic Chemistry, 1937, Spring

"Esterification: A Review of the Recent Past and a Look to the Future"—E. E. Reid, Division of Industrial and Engineering Chemistry, 1937, Fall

"Are Patents on Medicinal Discoveries and Food in the Public Interest"—a panel discussion, Division of Medicinal Chemistry, 1937, Fall

"Plea for Courses in Scientific Journalism"—E. Z. Friedenberg, Division of Chemical Education, 1938, Spring

"What Constitutes a Chemical Discovery"—C. A. Browne, Division of History of Chemistry, 1938, Spring

"American Patent Practice and Procedure"—Symposium, Division of Medicinal Chemistry, 1938, Fall

"Nomenclature of the Sugars and Their Derivatives"—Symposium, Division of Sugar Chemistry, 1938, Fall

"Nomenclature of Synthetic Rubbers"—H. L. Fisher, Division of Rubber Chemistry, 1939, Fall

"The Vocabulary of Chemistry"—G. W. Muhlman, Division of Chemical Education, 1939, Fall

"Nomenclature of the Carbohydrates"—E. F. Degering and E. M. Burdick, Division of Sugar Chemistry, 1940, Spring

"Inorganic Chemical Nomenclature"—Symposium, Division of Physical and Inorganic Chemistry, 1941, Spring (among the speakers were E. J. Crane, J. D. Scott, and B. A. Soule)

"Nomenclature of Cyclic Hydrocarbons"—P. M. Van Arsdell and G. Egloff, Division of Organic Chemistry, 1941, Fall

"30 Years of Petroleum Research"—B. T. Brooks, Division of Petroleum Chemistry, 1942, Spring

"Pectin Nomenclature"—Z. I. Kertesz, Division of Agriculture and Food Chemistry, 1942, Fall

"Frozen Assets. The Problem of Putting Chemical Knowledge to Work"—B. A. Soule, Division of Chemical Education, 1942, Fall

"Problems of the Scientific Literature Survey"—G. Egloff, M. Alexander, and P. M. Van Arsdell, Division of Chemical Education, 1943, Spring

Most of these papers, and especially the last one by Egloff, *et al.*, enjoyed a high attendance. It was quite apparent that there was a relatively large number of ACS members who had interests in and were oriented to the chemical literature. At the 1943 Spring ACS national meeting in Detroit, a group of these people got together to plan a symposium on "Technical Library Techniques" under the leadership of N. C. Hill and the blessings of the executive committee of the Division of Chemical Education for the Fall ACS national meeting. This symposium was well attended, but, most importantly, it generated an enthusiasm that resulted in the formation of the Chemical Literature Group of the Division of Chemical Education. A total of 17 papers comprised the Fall, 1943, symposium on "Technical Library Techniques." Some of the speakers were F. E. Wall, M. G. Mellon, E. J. Crane, G. Egloff, and J. F. Smith. It is of interest to note that at this same ACS national meeting B. H. Weil presented a paper on "Information Service and War Effort" before the Division of Industrial and Engineering Chemistry.

The symposium on "Technical Library Techniques" was continued to the Spring 1944 and 1946, and Fall 1946 meetings with N. C. Hill chairing three and J. W. Perry chairing one. Papers in these four symposia, however, covered many areas, such as information sources, technical editing, abstracting, learning Russian, punched cards, patents, etc. Other symposia also were presented, such as those on chemical patents (Fall 1946 and Spring 1947), petroleum information services (Spring 1947), laboratory notebook systems (Fall 1947), punched cards (Fall 1947), nomenclature (Fall 1947), and indexing and classifying chemical information (Spring 1948). During this period in the 1940's, papers in areas of interest to literature chemists were also presented in other divisions. An outstanding example of conflicting interests was the symposium on technical journalism presented before the Division of Industrial and Engineering Chemistry at the Spring 1948 meeting.

That the Chemical Literature Group of the Division of Chemical Education was able to engineer programs at ACS national meetings with a high degree of success was rewarded by the ACS Council granting divisional status to the Chemical Literature Group at St. Louis in 1948. Thus was born the Division of Chemical Literature with Norman C. Hill as chairman for 1949. Hill, we should remember, was one of the people who formed the Chemical Literature Group of the Division of Chemical Education, who was chairman of the Group during its interim period, and who participated actively in arranging for and chairing the programs. Another significant event occurred in 1949—Volume 1, Number 1, of *Chemical Literature* was introduced as the divisional newsletter with B. H. Weil as editor.

The important thing that happened in the 1940's, with the advent of the Division of Chemical Literature, was the establishment of a community of chemists with shared interests and objectives. For want of a better name, we called ourselves literature chemists, but we continue to seek a suitable name for the art and science of our discipline of chemistry. Again for the want of a better name, I have been using chemical documentation since the 1950's.

With the formation of the Division of Chemical Literature, literature chemists had a forum for the presentation of papers that advanced the art and science of their discipline of chemistry and which described the spectrum of activities and interests of literature chemists. These papers constituted an important and growing body of literature. They were, however, without a completely suitable medium for publication.

From 1943 to the end of 1948, the six-year period during which the Chemical Literature Group operated under the umbrella of the Division of Chemical Education, a total of 149 papers was presented. Of these, 62 were published in the *Journal of Chemical Education*; 14 in *Chemical & En-*

Table I. Division of Chemical Literature Officers, 1949–1974

Year	Chairman	Chairman-elect	Secretary	Asst secretary	Treasurer
1949 ^a	N. C. Hill	G. J. Cox	R. S. Casey		B. A. Soule
1950	E. J. Crane	J. W. Perry	R. S. Casey		B. A. Soule
1951	J. W. Perry	J. F. Smith	R. S. Casey		B. A. Soule
1952	J. F. Smith	R. S. Casey	Charlotte M. Schaler		T. E. R. Singer
1953	R. S. Casey	B. A. Soule	Lorna F. Lederman		Madeline M. Berry
1954	B. A. Soule	M. P. Doss	Hanna Friedenstein	Alice G. Anderson	Madeline M. Berry
1955	M. P. Doss	M. G. Mellon	Hanna Friedenstein	Alice G. Anderson	Madeline M. Berry
1956	M. G. Mellon	J. H. Fletcher	Lucille Jackson	Harriet A. Geer	Madeline M. Berry
1957	J. H. Fletcher	B. H. Weil	Lucille J. Strauss	Harriet A. Geer	Virginia R. Valeri
1958	B. H. Weil	Hanna Friedenstein	Harriet A. Geer	D. F. Gamble	Virginia R. Valeri
1959	Hanna Friedenstein	K. F. Heumann	Harriet A. Geer	D. F. Gamble	F. J. Bassett
1960	K. F. Heumann	H. Skolnik	D. F. Gamble	Barbara M. Davis	F. J. Bassett
1961	H. Skolnik	F. R. Whaley	D. F. Gamble	Barbara M. Davis	Helen F. Ginsberg
1962	F. R. Whaley	D. F. Gamble	Barbara M. Davis	L. N. Starker	Helen F. Ginsberg
1963	D. F. Gamble	C. C. Conrad	Barbara M. Davis	L. N. Starker	E. Garfield
1964	C. C. Conrad	Harriet A. Geer	Barbara M. Davis	Nellie M. Payne	E. Garfield
1965	Harriet A. Geer	H. T. Bonnett	Barbara M. Davis	Nellie M. Payne	Barbara A. Montague
1966	H. T. Bonnett	Helen F. Ginsberg	L. N. Starker	Keatha K. Krueger	Barbara A. Montague
1967	Helen F. Ginsberg	J. H. Clark	L. N. Starker	Keatha K. Krueger	Barbara A. Montague
1968	J. H. Clark	C. M. Bowman	Margaret S. Hicks	Keatha K. Krueger	Barbara A. Montague
1969	C. M. Bowman	F. K. Broome	Margaret S. Hicks	Keatha K. Krueger	Patricia M. McDonnell
1970	F. K. Broome	R. E. Maizell	Margaret S. Hicks	S. M. Kaback	Patricia M. McDonnell
1971	R. E. Maizell	S. J. Tauber	Margaret S. Hicks	S. M. Kaback	S. M. Kaback ^b
1972	S. J. Tauber	J. E. Rush	C. E. Granito	Margaret K. Park	S. M. Kaback
1973	J. E. Rush	C. E. Granito	R. E. Maizell ^c	Margaret K. Park	Judy E. Davis
1974	C. E. Granito	Barbara A. Montague	Mary Reslock	Emma-June Tillmanns	Judy E. Davis

^a Officers for 1949 appointed by Chairman of ACS. ^b Acting Treasurer for Miss McDonnell (on leave). ^c Acting Secretary for C. E. Granito.

gineering News; eight in the *Advances in Chemistry* series; four in the first edition of "Punched Cards"; and three in two other journals for a total of 94 publications or 63% of those presented.

From 1949 to the end of 1960, a 12-year period, a total of 1013 papers was presented before the Division of Chemical Literature. Of these, 24 were published in the *Journal of Chemical Education*; 178 in the *Advances in Chemistry* series; 41 in other books ("Punched Cards," "Information Processing Equipment," "Technical Editing," and others); and 64 in other journals, for a total of 307 publications or 30% of those presented.

That the majority of the papers presented before the Division of Chemical Literature could find no medium for publication, and that the ones which were published generally appeared many months or years after the presentation, became a major issue among the members. The division appointed a Journal Study Committee late in 1957 to seek a solution to the problem. This the committee did with considerable help from ACS staff and officers by the introduction of the *Journal of Chemical Documentation* by ACS in 1961 (see *Chem. Lit.*, Winter issue, 1959). Initially, the plan was to have two issues per year, but the flow of papers was such as to justify expansion to three issues in the first year, 1961, and to four issues per year thereafter. By the introduction of the *Journal* and its steady growth over the years, we now have a body of literature that represents the best in the evolving art and science of chemical documentation.

Through J. W. Perry's efforts in the mid-1940's, the ACS Board of Directors became interested in the potential of punched cards and established a Board Committee on Punched Cards in 1946, with Perry as chairman. This committee continued to be supported by the Board into the 1950's. Shortly after the publication of the book, "Punched Cards," by Perry and Casey in 1951, the committee was renamed the ACS Committee on Scientific Aids to Literature Searching. In 1952, the ACS Board felt that this committee had fulfilled its objectives and recommended its continuation as a committee of the Division of Chemical Literature. Thus, the Committee on Mechanical Aids for Chemical

Documentation became a special committee of the Division of Chemical Literature in 1955 with Allen Kent as chairman; the name was changed to Committee on Aids to Chemical Documentation in 1956 (see *Chem. Lit.*, Winter issue, 1957). The name was changed to Committee on Chemical Documentation in 1959, and the objective changed from project undertakings to that of being a sounding board for members to discuss new concepts and to explore solutions to problems. The committee held open meetings at every meeting since 1958 (see *Chem. Lit.*, Fall issue, 1959) until relatively recently.

During the early 1950's, the Division of Chemical Literature was involved in the National Research Council's program on the evaluation of four notation systems: Dyson, Wiswesser, Gruber, and Silk. Many members of the division participated in this nationwide study, which stimulated considerable interest in the use of notation systems and prompted the presentation of many papers before the Division of Chemical Literature [see *Chem. Eng. News*, 30, 407–10 (1952)].

A new dimension was added to the Division of Chemical Literature in 1961, when members of the Delaware ACS Section were instrumental in the formation of the Delaware Valley ACS Chemical Literature Group (see *Chem. Lit.*, Fall issue, 1961). As most attendees were from the Delaware Section, the Group evolved into a Topical Group of the Delaware Section with an average of four meetings per year. Another important consequence of the initial organization has been the participation of regional members of the Division of Chemical Literature in programs of the ACS Middle Atlantic Region. In each of the nine Middle Atlantic Regional Meetings, there has been a full program of papers in Chemical Documentation. These programs have been highly successful, enjoying high attendance, generally the highest of all groups.

In 1965, the division's executive committee decided to eliminate the Annotated Bibliography section of *Chemical Literature* and assigned to the Publications Committee the task of finding a suitable medium for its members to be aware of the evolving literature. The chairman (H. Skolnik) of the Publications Committee met with A. Elias, American

Documentation Institute, and B. M. Woods, Special Libraries Association, to establish a cooperative venture for producing a serial publication for abstracts of papers of interest to members of each of the three organizations (see *Chem. Lit.*, Spring issue, 1966). This cooperative venture successfully resulted in the launching of *Documentation Abstracts* in 1966 under the equal initial sponsorship and financial support of the three organizations for Volume 1. Beginning with Volume 2, the new journal became self-supporting. The name was changed to *Information Science Abstracts* in 1969.

Chemical Literature has been the division's major communications with the membership. The first and longest serving editor was B. H. Weil, who launched the publication and made it into an important publication. Succeeding editors have been: Ethaline Cortelyou, 1958 and 1965-8; Iver Igelsrud, 1959-61; Virginia Valeri, 1962-4; Lorraine du

Puis, 1969; J. E. Rush, 1970-2; and Gabriel Revesz, 1973-present.

Of historical importance were the two meetings the division held on its own: January 19-21, 1958, in Pittsburgh, Pa., at which attendance was 157; and March 14-17, 1973, in Columbus, Ohio, at which attendance was 147.

Within the first year of its formation, there were about 700 members in the division. Membership slowly increased to about 1100 in the late 1950's and early 1960's, and since then has been fairly stable at about 900-1000.

Officers of the division from its founding to the present are listed in Table I. These people and the chairmen of the various committees, especially the program chairmen, have contributed materially to the successful evolution and growth of the Division of Chemical Literature and to the increasing importance of the division to its members and to chemistry and chemical technology.

Changing Patterns in the Doctoral Research of Chemistry Majors

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The changing patterns in the dissertation research of Ph.D. candidates in chemistry were analyzed via *Dissertation Abstracts* for 1969-1970 vs. 1972-1973.

Many changes have occurred in the doctoral research programs of universities as a result of the changing patterns in the supply and demand for individuals with the Ph.D. in chemistry. In the mid 60's there was an apparent shortage of individuals with a terminal degree in chemistry; however, this shortage turned to an apparent oversupply of individuals by the early 70's. As a result, the number of students entering terminal degree programs has decreased and the major areas of study and research have shifted.

The purpose of this study was to analyze some of the changing patterns in the dissertation research of Ph.D. candidates in chemistry. More particularly, the purposes were to analyze the number of dissertations published in *Dissertation Abstracts* (DA) over a four-year period and the changing patterns of the dissertation topics based on the frequency of appearance of certain selected key words.

A frequency count was made of the number of doctoral dissertations abstracted in the Biochemistry and Chemistry sections (including subheadings) of DA during 1969-1970 (Volume 30)¹ and 1972-1973 (Volume 33).² A 4% sample of key words was selected from the 1,825 terms contained in the index of a general college chemistry textbook.³ The resulting 4% sample yielded 73 words. In turn, these 73 words were matched with the key word index of Volumes 30 and 33 of DA. The results were 45 words that appeared both in the textbook and in DA. In turn, the key word index for the two volumes of DA were checked to locate the number of dissertations that contained each of the key words.

Table I shows the number and percentage of dissertations by major area and volume of publication in DA. A total of 2,503 abstracts of dissertations were published in Volume 30 of DA and 2,494 in Volume 33 representing a

net decrease of 0.4%. It should be noted that over the four-year period the number of institutions contributing abstracts to DA increased from 249 to 259. Therefore, there was a net reduction in the number of abstracts published. In turn, this would lead one to conclude that, overall, there was a decrease in the amount of doctoral research in chemistry being conducted at institutions contributing to DA.

There was an apparent increase in the amount of research in biochemistry. The number of dissertations increased from 488 in Volume 30 to 617 in Volume 33. Decreases in the number of dissertations abstracted were noted in the fields of organic chemistry (753 vs. 654) and biological chemistry (181 vs. 108). However, it should be pointed out that the number of dissertations in the areas of

Table I. Number and Per Cent of Dissertations by Major Field and by Volume of Publication in *Dissertation Abstracts*

Field	Volume 30 (1969-70)		Volume 33 (1972-73)	
	No.	%	No.	%
Biochemistry	488	19.5	617	24.7
Chemistry	—			
General	57	2.3	83	3.3
Agricultural	0	0.0	1	0.1
Analytical	129	5.2	133	5.3
Biological	181	7.2	108	4.3
Inorganic	273	10.9	265	10.6
Nuclear	34	1.4	20	0.8
Organic	753	30.1	654	26.4
Pharmaceutical	52	2.1	54	2.2
Physical	477	19.1	469	18.8
Polymer	50	2.0	77	3.1
Radiation	9	0.4	13	0.5
Totals	2503		2494	