Secondary Journals in Chemical and Biological Fields*

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The problems of the working scientists in keeping track of the literature in his field are multiplied by the rapid growth of the literature, and even more by the interdisciplinary nature of much of research going on today. These developments have led to an increasing backlog of journals on the desk of each scientist that remain, unhappily, unread.

In an effort to help in this documentation problem, many secondary journals have risen to abstract and index the primary literature output. This effort has now reached the point where, if one were to buy all of these secondary journals and services, he would find that the pile of abstract journals on his desk each month would probably exceed in size the stack of primary journals he normally tries vainly to work his way through. The cost of the secondary journals would probably far exceed the annual cost of the primary journals in which he has an interest.

One reason for the relatively unchecked proliferation of secondary journals is the failure of the publishers to take note of the concept that secondary journals should largely replace existing primary journals on the scientist's reading list, rather than add to his existing journal load. If every new or proposed secondary journal were examined from this point of view, rather than as to whether or not it is of intrinsic interest, we would tend to slow down the proliferation of secondary journals.

For example, the proposed *Chemical Biological Activities* of the Chemical Abstracts Service has many good features. However, nowhere in the published deliberations on this journal have we seen the concept discussed, "What is this journal expected to replace?" It is our own personal opinion that if *Chemical Abstracts* itself were published in a more graphic form, this might well make *Chemical Biological Activities* unnecessary and redundant. The same sort of thinking, applied to many of the other secondary journals, would show that they are, in fact, unnecessary and redundant. However, in keeping with our pluralistic society, it is reasonable that many approaches be tried and that the laws of economics determine which journals survive. Unfortunately, government subsidies for some of these efforts do not let the laws of supply and demand operate, or they delay their application.

In this paper we will discuss objectively some 50 abstract journals, including certain proposed services. Table I summarizes the salient features of these secondary services.

As an indication of the literature volume problem inherent in interdisciplinary research, the average pharmaceutical research organization must subscribe to 500 to 1,000 journals in order to keep up with developments in organic chemistry, pharmacology, microbiology, clinical science, etc. Many interdisciplinary academic or government research organizations require equal or greater coverage.

As to the growth of the literature, some generalizations are in order:

1. The chemical literature is judged to be doubling in volume every 8 years.
2. The bio-medical literature is estimated to be doubling every 10 to 12 years.
3. Of all the scientists in the history of the world who have ever done bio-medical research, an estimated 90% are still active in their professions.
4. There are about 20,000 bio-medical journals in the world, publishing more than 2,000,000 articles per year, and these figures will be obsolete before this paper is published.
5. There are about 50,000 technical books published each year.
6. The total number of technical journals is about 50,000, and these contain 4 to 5 million articles per year.

Since the volume of the chemical-biological literature is far beyond the reading capacity of any individual, many groups have addressed themselves to the literature problem. Indeed, because of the proliferation of primary journals, many companies have started abstract bulletins for their own staffs; these are of great help, if well done. In view of the foregoing, it is no surprise that secondary journals have appeared in such great numbers. However, since even the long list in Table I is incomplete, one can judge the somewhat self-defeating nature of these efforts when viewed from the reader's point of view.

Two of the largest secondary journals, *Biological Abstracts* and *Chemical Abstracts*, published about 100,000 and 165,000 abstracts, respectively, in 1962. Thus it would seem imperative that these abstracts be easy to scan, yet this is not always the case [*cf.* B. Loev, *J. Chem. Doc.*, **2**, 27 (1961)].

Chemical Abstracts covers about 8,000 journals, which certainly include the cream of the 20,000 chemical and biological journals extant. Incidentally the *Chemical Abstracts* "List of Periodicals" gives the names of about 14,000 journals, of which about 4,000 are chemical in nature, mostly applied. The important basic journals in chemistry probably number less than 100, so there is a great dilution of research information because of the proliferation of primary (and secondary) journals. Even the Russian monolith *Referativnyi Zhurnal* "only" manages to publish about 600,000 abstracts per year, which covers about 15% of the published technical literature.

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Table I
Summary of Secondary Journals

Journal	Material abstracted	Periodicals covered	Publication frequency	Frequency of indexes: Author	Frequency of indexes: Subject	Cost per year
Analytical Abstracts	Literature	200	Monthly	Annually	Annually	$14
Applied Sciences and Technology Index	Title and reference only	220	Monthly		Cumulated quarterly	$24
Bibliography of Agriculture	Title and reference only		Monthly	Monthly	Annually	$10
Biochemical Title Index	Key words from title	500	Monthly			$50
Biological Abstracts	Literature	100,000 articles	Biweekly	Biweekly	Biweekly	$225
BASIC	Key words from title	*Biological Abstracts*	Semimonthly			$10
Canadian Patent Office Record	Canadian patents		Weekly	Annually	Annually	$40
Cancer Chemotherapy Abstracts	Literature	4700	Monthly	Monthly	Monthly	Gratis
Chemotherapy Research Bulletin	Literature	500	Monthly			$45
Chemical Abstracts[a]	Literature and patents	8000	Biweekly	Semiannually	Semiannually	$1000 industrial; $500 academic
Chemical Titles	Key words from title	600	Biweekly	Biweekly		$65
Current Chemical Papers	Title and reference only	300–400	Monthly			$14
Current Contents	Title and reference only	600	Weekly			$100 $50 educational
Current Medical Digest	Literature		Monthly			$5
de Haen—New Product Surveys	New drugs					$125
Derwent FARMDOC	Patents	15 Countries	Weekly	Card indexes		$4250
Dissertation Abstracts	Doctoral dissertations	140 Institutions		Monthly	Monthly	$50
Documentation Ring	Literature and patents	150	Biweekly	Card indexes		Not available
Excerpta Medica	Literature	2000	Monthly	Monthly	Annually	$400
Hiroshi Kataoka[b] *Digest Service*	Patents		Biweekly			$300
Hospital Literature Index	Title and reference only	280	Quarterly			$10
Index Chemicus	Literature		Semimonthly	Semimonthly	Semimonthly Cumulated quarterly	$700 industrial; $350 educational
Index Medicus	Title and reference only	2000	Monthly			$26
Index Veterinarius	Title and reference only		Quarterly			$30
Industrial Statistics Abstracts	Literature		Triannually	Annually	Annually	$6
Japanese Periodicals Index	Title and reference only	800	Monthly		NSF (gratis)	
Leukemia Abstracts	Literature		Monthly	Annually	Annually	Gratis
Library Literature	Title and reference only	165	Quarterly			$34
Nutritional Abstracts	Literature	800	Bimonthly	Annually	Annually	$19
Official Gazette	Patents	U. S. patents	Weekly	Annually	Annually	$35
Psychological Abstracts	Literature	10,000 articles/yr.	Bimonthly	Bimonthly	Bimonthly	$20
Psychopharmacology Abstracts	Literature		Monthly	Monthly Cumulated annually	Monthly	Gratis

Table I
Summary of Secondary Journals (*Continued*)

Journal	Material abstracted	Periodicals covered	Publication frequency	Frequency of indexes: Author	Frequency of indexes: Subject	Cost per year
Readers Guide to Periodical Literature	Title and reference only		22 per year			$20
Uniterm Index	Chemical patents	*Official Gazette*	Bimonthly			$800
Unlisted Drugs	Literature		Monthly			$10
U. S. Patent Office Steroid Punch Cards	Steroid patents	U. S. patents	Irregular			$10
Vitamin Abstracts	Literature	100	Quarterly			$6
World Wide Abstracts of General Practice	Literature		Monthly			Gratis

[a]Individual sections are available to members at $25 per section (total of five sections). [b]May have recently terminated.

DISCUSSION OF INDIVIDUAL SERVICES

Analytical Abstracts.—The abstracts are classified into five major groups (General Analytical, Inorganic Analysis, Organic Analysis, Biochemistry, and General Technique and Apparatus). The format is very similar to that of *Chemical Abstracts;* the publication is issued by the Society for Analytical Chemistry (London).

Applied Science and Technology Index.—This is an index derived from periodicals in the fields of aeronautics, automation, chemistry, electricity, electronics, engineering, geology, metallurgy, physics, and related subjects. The articles are listed under main subject headings which are subdivided into more specific categories. Indexes are cumulated quarterly.

Bibliography of Agriculture.—This periodical is an index to the literature of agriculture and allied sciences. It is issued monthly by the National Agricultural Library of the U. S. Department of Agriculture and covers any journal that is written in one of the languages of western Europe or in Russian or has summaries or abstracts in one of these languages.

The titles and reference to the articles are arranged under ten main classes, then subdivided under each class.

Biochemical Title Index.—Titles of articles to be indexed are rotated by a computer to bring every significant word to the center of a line. Titles are then ordered alphabetically on each significant word. Nonsignificant words are omitted from the ordering but not from their appearance in the title.

This journal suffers from the two deficiencies that are common to all machine-produced permuted title indexes (*cf. Chemical Titles*). First, and most important, indexing is from the title, not the text, of an article. Therefore, important concepts in the text might not be indexed. Second, permuted-title indexes generally carry too many useless index entries, even when prepositions, conjunctions, etc., are suppressed. This shortcoming is even more glaring when the indexes are cumulated.

We strongly believe that keyword indexes provide a powerful tool for the rapid retrieval of information, but that in order to be maximally useful they should be prepared by scientists who will employ all of the concepts within an article.

Biological Abstracts.—This is an abstract periodical which covers journals from the world's biological research. Similar to *Chemical Abstracts,* but in the life sciences field, this journal published over 100,000 abstracts in 1962. The abstract appears about 5 months after receipt of a particular journal. Each issue (semimonthly) contains an author and a computer-produced, permuted title subject index (BASIC); these indexes are cumulated quarterly for each volume. Each issue also contains a "Systematic Index" which lists taxonomic categories and the respective abstract numbers that contain information pertaining to an organism belonging to that category. This systematic index is a laudable effort to collect related information, which should be one of the prime functions of indexes.

BASIC (Biological Abstracts Subject in Context).—This index was one of the first of its kind to attempt some form of easy access to an abstract journal. Similar to *Chemical Titles,* it is a computer-prepared, title-permuted subject index to *Biological Abstracts* that specializes in the life sciences. It uses the same format as *Biochemical Title Index,* but covers a broader area of interest. This journal is called the key to the world's biological research and is published semimonthly.

Canadian Patent Office Record.—This is similar to the U. S. Patent Office's *Official Gazette* in format. Two claims are given, and the total number of claims is stated. The subject index should be improved in its depth of indexing.

Cancer Chemotherapy Abstracts.—This abstract journal is issued monthly and provides international coverage of current papers from almost every medical source published (about 4,700 periodicals are scanned in the original language). Each issue contains an author and a subject index and is free to interested investigators from the Cancer Chemotherapy National Service Center, Bethesda, Md.

This is an example of the type of journal which, since it is given away, does not permit the laws of economics to operate rapidly in determining its value to the investigator. It does have the noble purpose of collecting and abstracting all journals in the cancer chemotherapy field.

But its large size, organization, and uncritical format may well lead to its remaining unread.

Chemotherapy Research Bulletin.—These abstracts are are provided in card form (4 × 6 in.) suitable for filing. Each issue describes 25–35 new drugs. Abstracts list chemical name, structure, authors, company or institution, reference, and any activity or pharmacology reported.

This is a useful file if one wants to keep compounds illustrative of various structural types and various activities, but it is not comprehensive, and the cards lack a molecular formula.

Chemical Abstracts.—This is the major chemical-abstract journal in the world. Detailed abstracts of all scientific and technical papers containing new information of a chemical interest and new information revealed in the patent literature are grouped into 73 classifications.

In 1962, *CA* abstracted 166,749 articles, of which 140,277 were scientific papers and the remainder were patents. There were 26 issues containing 16,725 pages of abstracts and 999 pages of author and patent indexes. The increase in abstracts was 15.3% over the preceding year, but this was partly due to a decrease in the time interval between *CA*'s receipt of reports and their subsequent publication.

Chemical Titles.—This is a computer-produced, "Key Word in Context Index" publication consisting of three parts. Key words from titles are arranged alphabetically down the center of the column. Next, there is a bibliographic listing of titles for each journal, arranged as a table of contents, and finally there is an author index with the reference code for the particular paper. The publication appears semimonthly.

Titles are permuted as in "BASIC." They are selected from about 600 journals of pure and applied chemistry and chemical engineering. About 75,000 titles per year are now indexed, with over 450,000 index entries.

Current Chemical Papers.—This monthly periodical lists new papers in pure chemistry by title and reference. They are divided into 13 general classes, *e.g.*, organic, inorganic, etc., and are further subdivided, *e.g.*, heterocyclics, aliphatics, etc. Three to four hundred chemical journals are scanned, but only articles containing new material are chosen. This publication is intended to inform chemists of new work more quickly than an abstract journal can, but no indexes are published.

Current Contents.—This journal reproduces the table of contents of every issue of more than 600 primary scientific journals in the chemical, pharmaco-medical, and life sciences. It is issued weekly by the Institute for Scientific Information and averages about 2,000 articles per week. It is strictly an alerting service to advise readers of the latest developments in these fields.

Current Medical Digest.—This is collection of short, concise, original articles in medicine, plus abstracts and condensations of articles from other medical journals. It is intended to keep the physician informed and up-to-date. It is published monthly by the Williams and Wilkins Company.

Paul de Haen–New Product Surveys.—These surveys constitute a private alerting service to the pharmaceutical industry. The service consists of a single typewritten sheet for each new single chemical entity which is marketed. It gives the name of the manufacturer, chemistry of the compound (including the structure), chemical name and molecular formula or a description of the drug, nonproprietary name, package information, patient indication, recommended dosage, precautions, date it was marketed, and the price to the retailer.

Derwent FARMDOC.—The Derwent Information Services (London) is offering a comprehensive coverage of the pharmaceutical patents from 15 countries. They term a first issuing patent a "basic" patent, later issuing patents on the same material are "equivalents" to the "basic" patent.

This service is described in some detail because of its novel elements. It is comprised of the following items:

1. Basic Abstract File (BAF).
   The abstracts of "basic" patents only are typed on regular IBM card stock. Then three of these cards are photographed onto 8½ × 11 in. paper sheets. These sheets make up the "BAF." Each abstract has an accession number in the upper left hand corner in addition to the pertinent patent data, including any specific claims.
2. Individual Country File (ICF).
   All patent claims are listed and filed by patent number under their respective countries. Patents are marked "basic" or "equivalent" and the proper data given; *e.g.*, an accession number is given to "basics," and for the "equivalents," the equivalent basic patent number and its accession number are given.
3. Patent Book.
   Copies of each patent abstracted are bound into 6 × 8 in. books. The patents are arranged chronologically by acession number.
4. File Cards.
   These are sets of printed IBM punched cards that are duplicates of the abstract cards but have code classification numbers at the top.
   a. One set of cards is filed by the assignee. The name of the person or the company is abbreviated and typed in the upper right hand corner. "Derwent Company Code Book" lists about 900 company abbreviations.
   b. A second set of cards can be filed as a key-word index according to the code numbers listed at the top. The "Pharmaceutical Manual Code Book" classifies the chemical contents of patents into 11 basic groups, *e.g.*, Steroids (I), Heterocyclics Fused Ring (VI), Aromatics and Alicyclics (X), etc. These groups are divided into subgroupings; *e.g.*, under Steroids (I) we can have estrones (A1), cortisones (C1), or androstenes (C9), etc. Therapeutics and physical properties are classified under Group XII which is subdivided into over 400 subjects, *e.g.*, antibacterial (XII A1), antiviral (XII A6), analgesics (XII D1), etc. It is from these 12 major groups and their subgroups that we obtain our key words for this useful file. This code is a simplification of the "Punch Card Code" mentioned next.
   c. A third set of IBM cards has been punched according to the instructions of the "Derwent Patents Punch Card Code." This code is similar to the manual code mentioned above but only in greater detail. The steroids are coded by the rules of the U. S. Patent Office steroid code, and the other chemical compounds are coded in both a generic way and very specifically by functional groups and their relationship to each other. This deck of cards is machine searchable and the coded information can be easily retrieved using a mechanical card sorter.

5. Equivalents to "Basic" File.
   A periodic list of patents by accession number indicates patents "equivalent" to the "basic" patent. The list appears weekly and is cumulated quarterly and yearly. It is an example of a service designed to provide both alerting to new developments and machine retrieval of information based on a detailed code.

Dissertation Abstracts.—This is a monthly compilation of abstracts of doctoral dissertations submitted to University Microfilms Inc., Ann Arbor, Michigan, by more than 140 cooperating institutions. Copies of the complete text can be purchased either on 35-mm. microfilm or as enlarged prints. Each issue consists of an abstract section, cross-indexed subject index, and an author index. There are also an annual cumulated subject and an author index. Since many doctoral dissertations are not published for some time, this journal is an excellent alerting tool.

Excerpta Medica.—This is a tremendous effort by the Excerpta Medica Foundation of Amsterdam to abstract the world's medical literature. Articles are classified into 20 separate sections according to medical specialties such as surgery, pediatrics, cancer, etc. The section on "Physiology, Biochemistry and Pharmacology" is the main research section, and all the other sections are mainly medical.

The sections are issued monthly with author indexes and with annual subject and author indexes.

Hiroshi Kataoka (Patent Digest Service).—This is a biweekly service covering all current Japanese chemical patents as soon as they are released. It gives brief but pertinent patent information, including the structure, the method of preparation, and uses.

Hosptial Literature Index.—This is an author-subject index of literature written in the English language, about hospital administration, planning and financing, and administrative aspects of the medical, paramedical, and prepayment fields. The index appears quarterly, and is cumulated annually; it covers about 280 periodicals and books.

Index Chemicus.—This is an attempt to list all of the 60,000 newly synthesized chemical compounds which are reported in scientific journals each year. The abstracts contain the name, structure, and molecular formula of each new compound, and depict a structural diagram of the chemical reactions whenever possible. It is issued semimonthly by the Institute for Scientific Information as a series of abstracts, with computer-produced author and molecular formula indexes which are cumulated three times a year.

It is an approach to the ideal format in abstracting articles in organic chemistry.

Index Medicus (Formerly *Current List of Medical Literature*).—This journal is published monthly by the National Library of Medicine. Author and subject indexes are cumulated annually. Title and reference are given for each entry.

This index listed 146,000 articles in 1962 from about 2,000 medical journals which were selected from over 5,000 received by the Library, and gives a broad cross section of the medical and paramedical periodical literature.

Index Veterinarius.—This journal is similar to *Index Medicus* but deals only with the veterinary field. It has a combined author and subject index of articles compiled from the world's literature and classified under arbitrary subject headings. It is issued quarterly by the Commonwealth Bureau of Animal Health, England. The title and journal reference only are given for each article.

Industrial Statistics Abstracts (short name); *International Journal of Abstracts—Statistical Methods in Industry* (formal name).—This is an abstract journal of articles which report applications of statistical methods to industrial situations. There are classification numbers at the upper right hand side of each abstract. The first number denotes the main industry covered, *e.g.*, chemicals, communications, electronics, etc.; and the second number gives the principal statistical method involved, *e.g.*, probability, sample design, etc. There are also a topical number and an accession number which appear at the lower left hand side of the page. The topicals include such subjects as computers, reliability, and market research. The abstracts are printed three to a page on thin card stock and can be cut out and used as a card index.

This journal is issued three times a year, and a companion journal, *Statistical Theory and Methods Abstracts*, is issued quarterly. These two journals complement each other and are published by the International Statistical Institute, The Hague. Indexes appear yearly by author and topic.

Japanese Periodicals Index.—This index is a list of titles and their references (in English) of articles taken from Japanese scientific periodicals, arranged by subject.

The index is issued monthly in two parts: Science and Technology, and Medical Sciences. The titles are taken from about 800 periodicals that were received the previous month.

This index is compiled by the National Diet Library, Tokyo.

Leukemia Abstracts.—This journal contains short abstracts of articles pertaining to leukemia. It is sponsored by the Lenore Schwartz Leukemia Research Foundation, prepared by Research Information Service and Medical Department of John Crerar Library, Chicago, and can be obtained gratis by medical libraries and hospitals, physicians treating leukemia patients, and any individual engaged in research in leukemia or allied interests.

Library Literature.—This is a quarterly index to materials on library science and librarianship covering 165 periodicals and all books and pamphlets dealing with library science. Each issue has a combined subject-author index.

Nutritional Abstracts and Reviews.—Selective coverage of over 800 journals about nutrition and related fields is provided by this journal. Abstracts are arranged by subjects by the Commonwealth Agricultural Bureau. Published bimonthly by Aberdeen University Press Ltd., Scotland, this service has an annual author and subject index.

Official Gazette of the U. S. Patent Office.—This publication covers U. S. patents and trademarks. It contains a claim or claims and a copy of the drawing of the patent, where applicable, as well as decisions in trademark and patent cases, indexes of patents and patentees, lists of patents for sale or license, and other general information.

The illustrations and claims are arranged by the Patent Office classification of subject matter.

There is an annual patentee index and a list by class and subclass of patents that were issued during the preceding year.

The *Official Gazette* is issued weekly, and can be obtained from the Superintendent of Documents, Washington, D.C.

Psychological Abstracts.—This publication provides brief abstracts of journal articles indexed according to broad subject headings and further subdivided into narrower categories. Published bimonthly with a subject and author index, it covers over 10,000 abstracts per year in the behavioral psychology field.

Psychopharmacology Abstracts.—This service gives rapid and comprehensive information about new developments and research results in the field of psychopharmacology. Each issue contains a subject and author index; these indexes are cumulated annually. The service is published monthly and distributed gratis by the Psychopharmacology Service Center of the National Institute of Mental Health to investigators doing research in this field.

Readers' Guide to Periodical Literature.—This is an index to U. S. periodicals (120) of broad general and popular character. It contains a selection of non-technical magazines representing all the important scientific, technical, and subject fields. Periodicals such as *Time, Today's Health, Science News Letter, Science Digest,* and *Scientific American* are indexed. It is issued 22 times a year as a combined author and subject index, with quarterly and annual cumulated indexes.

Uniterm Index to Chemical Patents.—This service is based on a collection of abstracts (consisting of principal claims) of all U. S. chemical and related patents, reprinted from the U. S. Official Gazette and issued every two months by Information for Industry, Inc., Washington, D. C. Most importantly, a coordinate index accompanies the abstracts. This consists of two identical subject indexes in parallel. Each index lists the abstract numbers under major and minor terms (subject headings). The abstracts are cross-referenced so that a search can be made as specific or as general as needed. Assignee, patent number, and patentee indexes are also issued with the abstracts.

Unlisted Drugs.—This is a cooperative effort of about two dozen pharmaceutical companies located mainly in the U. S., a college of pharmacy, and a chemical manufacturer to exchange information on unlisted drugs. Some companies are assigned journals to scan; they pick out any unlisted drug and give the name and code number, the manfacturer, equivalents, composition, action, dosage, and the reference. This journal is compiled and published by the Pharmaceutical Section of the Special Libraries Association and is issued monthly. Name and code-number indexes appear semiannually and are cumulated every 2 years.

Vitamin Abstracts.—This is a collection of very short abstracts of articles selected from about 100 journals in nutrition and related fields.

World Wide Abstracts of General Practice.—This is a collection of selected abstracts of papers of greatest value in general medicine, and in addition contains an original feature article on some aspect of medicine written by an outstanding authority in the field. The articles are abstracted by the Excerpta Medica Foundation, and the journal is published monthly by the Warner-Chilcott Laboratories and distributed gratis to the medical profession.

A number of other secondary services have recently been proposed or have become available. Many of these have in common the use of punched card or magnetic tape data processing equipment. The use of electromechanical or electronic machines is invaluable in searching large numbers of organic structures.

Chemical Biological Activities (CBA).—This computer-produced alerting and retrieval journal, proposed by Chemical Abstracts Service, has been discussed earlier. There is a real question as to what journals this service would replace for the average medicinal chemist. Finally, the impact of the journal from an alerting point of view is diluted by the presence of ciphers in the text. It has not convincingly been demonstrated that the ciphers make any unique contribution from either the alerting or the retrieval point of view.

Tape Indexes to Patents.—Such indexes have been prepared by both Information for Industry, Inc., and Documentation, Inc. It is not clear what advantages these tape indexes offer over the Uniterm Index mentioned earlier, or whether the added cost and the investment in equipment are justifiable.

Drugs in Prospect.—This is a card file on new drugs offered by Paul de Haen for $800. It lacks retrieval features.

Trivial Name Card Index.—This index of drugs and other compounds by trivial name has been announced by Verlag Chemie. It is potentially very useful, but no publication date had been announced as of this writing.

Index to Chemical Reactions (Theilheimer).—The Theilheimer volumes on chemical reactions are well known. What is not so well known is the fact that sets of chemical reactions from the current literature are distributed every 2 weeks. The cost is $160 per year for the first set, with additional sets being available at about $50 each to the same address. About 40 reactions are distributed in each issue. Thus, about 1,000 reactions each year are made available in advance of their incorporation into new volumes of the Theilheimer treatise.

Although we do not find the indexing system supplied with the reactions to be very useful, we have found that adding key-word headings to the 5 × 8 in. sheets (like acetylation, chlorosulfonation, hydrogenation, etc.), then trimming and pasting them on 4 × 6 in. cards, forms a very useful reaction file.

Documentation Ring.—This is a cooperative effort of eight pharmaceutical companies to attempt to keep abreast of the world's current medical literature. Present members are Bayer (Leverkusen), Ciba (Basel), Geigy (Basel), Knoll, Merck (Darmstadt), N. V. Organon, Smith Kline and French, and Karl Thomae. Each of the member companies is responsible for the coding and abstracting of about 30 journals, for a total of 40,000 articles every year. Chemical compounds with their biological activities are coded, and the information is put on IBM punched cards that can later be searched and easily retrieved. Abstracts and punched cards are exchanged among the members periodically, so that each one receives the benefit of the work of all of the others. This system has also been converted to magnetic tape operation by one of the members.

U. S. Patent Office Steroid Punched Cards.—The Patent Office periodically issues coded IBM punched

cards on steroids disclosed in patent classification # 260. Only steroids which fall into certain subclasses are coded. Excluded are all homo- and seco-type steroids. During 1958–1960, a part of the steroid literature was coded for the Patent Office on an experimental basis.

The Patent Office classifies patents on claimed subject matter rather than on subject matter disclosed, but once the patent fits one of the specific classes the information disclosed in the title, text, claims or configurations of possible substituents is extracted and coded. The patent number is also coded and punched. One of the disadvantages of this system is that the steroids are overcoded; *i.e*, many steroids listed in the patent are coded on the same card. This results in many false drops during a retrieval search.

SUMMARY

Many of the existing secondary literature sources in the chemical and biological fields are described. The plea is made that new journals and services be made available only if they can replace existing ones. To add to the working scientists's present reading burden is intolerable.

Information-Gathering and Use Habits of Chemists*

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Information-gathering and use-habits studies, abbreviated throughout this paper as "IGS," are aimed at determining why, how, how much, and with what effect information and information services are used. The information specialist—and this includes the information scientist, the documentalist, librarian, literature chemist, and information researcher—knows why information services should be used. He can, and does, point out that information services are useful as a source of ideas, for translating ideas into research projects (or abandoning the idea if someone else has preempted the field), for providing background information on research projects, and for determining specific facts. However, information services are intended for the final user of information, not for the information specialist. Differences therefore exist between how information services should be used and how they are used in fact. Mooers has pointed this out in some generalizations on why some information retrieval systems are not used:

> "An information retrieval system will tend *not* to be used whenever it is more painful and troublesome for a customer to have information than for him not to have it... Having information *is* painful and troublesome. We all have experienced this. If you have information, you must first read it, which is not always easy. You must try to understand it. To do this, you may have to think about it. The information may require that you make decisions about it or other information. The decisions may require action in the way of a troublesome program of work, or trips, or painful interviews. Understanding the information may show that your work was wrong, or that your boss was wrong, or may show that your work was needless. Having information, you must be careful not to lose it. If nothing else, information piles up on your desk unread. It is a nuisance to have it come to you. It is uncomfortable to have to do anything about it. Finally, if you do try to use the information properly, you may be accused of puttering instead of working. Then in the end, the incorporation of the information into the work you do often may not be noticed or appreciated. Work saved is seldom recognized. Work done—even in duplication—is well paid and rewarded."[1]

IGS are potentially useful in bridging the gap between the kind of information services needed and the kind in existence, and between how information services should be used and are used. Studies reported in the literature deal with different phases of the subject and different types of user populations and make use of different study techniques. The aim of this paper is to present a brief review of the literature of and about IGS, and to determine whether and how IGS can assist in improving information systems in general and/or, more specifically, in planning and evaluating information services for a particular research organization.

For a fuller survey of IGS, the reader is referred to reports by Tornudd[2] and Columbia University's Bureau of Applied Social Research.[3] Both of these reports attempt to compare results of IGS. Tornudd has also prepared a summary of 72 studies arranged by subject field of users. IGS in progress are reported in Section 1, "Information Needs and Uses," of the National Science Foundation's semi-annual publication, "Current Research and Development in Scientific Documentation."[4]

IGS are concerned with the interaction between information and the user and producer of information. IGS attempt to determine how ideas and facts are generated, recorded, disseminated, and obtained from the recorded and remembered body of knowledge. Such studies are thus concerned with the entire spectrum of communication of technical and related information, of which information services are a part.

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