recognition has difficulties with this problem as many methods rely on separable categories. When some of the categories being studied are subsets of others, this assumption breaks down. The more strongly a method depends on independence of categories, the more spectacularly it fails, which explains much of Figure 2's trends.

ACKNOWLEDGMENT

We thank Dr. J. W. Frazer of Lawrence Livermore Laboratory for his aid in initiating this study, A. Harper for helping with ARTHUR, and M. daKoven for criticism.

REFERENCES AND NOTES

(1) P. C. Jurs, B. R. Kowalski, and T. L. Isenhour, *Anal. Chem.*, **41**, 21 (1969).
(2) P. C. Jurs, B. R. Kowalski, T. L. Isenhour, and C. N. Reilley, *Anal. Chem.*, **41**, 690 (1969).
(3) B. R. Kowalski, P. C. Jurs, T. L. Isenhour, and C. N. Reilley, *Anal. Chem.*, **41**, 695 (1969).
(4) P. C. Jurs, B. R. Kowalski, T. L. Isenhour, and C. N. Reilley, *Anal. Chem.*, **42**, 1387 (1970).
(5) P. C. Jurs, *Anal. Chem.*, **42**, 1633 (1970).
(6) N. M. Frew, L. E. Wangen, and T. L. Isenhour, *Pattern Recognition*, **3**, 281 (1971).
(7) P. C. Jurs, *Anal. Chem.*, **43**, 20 (1971).
(8) P. C. Jurs, *Appl. Spectrosc.*, **25**, 483 (1971).
(9) L. E. Wangen, N. M. Frew, and T. L. Isenhour, *Anal. Chem.*, **43**, 845 (1971).
(10) J. B. Justice, D. N. Anderson, T. L. Isenhour, and J. C. Marshal, *Anal. Chem.*, **44**, 194 (1972).
(11) F. E. Lytle, *Anal. Chem.*, **44**, 1867 (1972).
(12) W. L. Felty and P. C. Jurs, *Anal. Chem.*, **45**, 885 (1973).
(13) T. J. Stonham and M. A. Shaw, *Pattern Recognition*, **7**, 235 (1975).
(14) G. S. Zander, A. J. Stuper, and P. C. Jurs, *Anal. Chem.*, **47**, 1085 (1975).
(15) T. J. Stonham et al., *Anal. Chem.*, **47**, 1817 (1975).
(16) G. L. Ritter, S. R. Lowry, C. L. Wilkins, and T. L. Isenhour, *Anal. Chem.*, **47**, 1951 (1975).
(17) L. J. Soltzberg et al., *J. Am. Chem. Soc.*, **98**, 7144 (1976).
(18) L. Pietrantonio and P. C. Jurs, *Pattern Recognition*, **4**, 391 (1972).
(19) J. B. Justice and T. L. Isenhour, *Anal. Chem.*, **47**, 2286 (1975).
(20) G. L. Ritter, S. R. Lowry, T. L. Isenhour, and C. L. Wilkins, *Anal. Chem.*, **48**, 591 (1976).
(21) P. C. Jurs, *Anal. Chem.*, **43**, 1812 (1971).
(22) L. E. Wangen, F. M. Frew, T. L. Isenhour, and P. C. Jurs, *Appl. Spectrosc.*, **25**, 203 (1971).
(23) B. R. Kowalski and C. F. Bender, *Anal. Chem.*, **45**, 2334 (1973).
(24) C. F. Bender, H. D. Shepherd, and B. R. Kowalski, *Anal. Chem.*, **45**, 617 (1973).
(25) J. B. Justice and T. L. Isenhour, *Anal. Chem.*, **46**, 223 (1974).
(26) B. R. Kowalski, "Pattern Recognition in Chemical Research", *Comput. Chem. Biochem. Res.*, **2**, 1–76 (1974).
(27) L. J. Soltzberg et al., *J. Am. Chem. Soc.*, **98**, 7139 (1976).
(28) N. A. B. Gray, *Anal. Chem.*, **48**, 2265 (1976).
(29) B. R. Kowalski and C. F. Bender, *Anal. Chem.*, **44**, 1405 (1972).
(30) J. Schechter and P. C. Jurs, *Appl. Spectrosc.*, **27**, 225 (1973).
(31) C. F. Bender and B. R. Kowalski, *Anal. Chem.*, **46**, 294 (1974).
(32) S. Wold, *Pattern Recognition*, **8**, 127 (1976).
(33) T. W. Anderson, "An Introduction to Multivariate Statistical Analysis", Wiley, New York, N.Y., 1958.
(34) Mass Spectroscopy Data Centre, Building A8.1A, AWRE, Aldermaston, Reading RG74PR, England.
(35) D. L. Duewer, B. R. Kowalski, and J. Fasching, *Anal. Chem.*, **48**, 2002 (1976).
(36) ARTHUR: available from Dr. B. R. Kowalski, Laboratory for Chemometrics, Chemistry Department, University of Washington, Seattle, Wash. 98195.
(37) Dr. A. L. Crittenden, private communication.

LETTERS TO THE EDITOR

Patent Symposium Papers

Dear Sir:

The August 1977 issue, to me, is one of the most valuable you have ever issued, in terms of interest and relevance to my work. The relevance is of the order of 70–80%. That is, there is useful material for me in nearly every article. Further, each article is well written and sheds light on some rather obscure points of the chemical patent situation. I felt at home with the authors of those articles; they are the sort of people whom I would like to cultivate.

Altogether, my heartiest congratulations for an excellent issue.

(Mrs.) **Elizabeth H. Groot**, Librarian
Schenectady Chemicals, Inc.,
Schenectady, New York 12301

Received September 16, 1977

Bibliometric Problems Associated With The Patent Literature

Dear Sir:

The patent symposium published in the August 1977 issue of the Journal was indeed an informative treat. It was especially important in that it focuses attention on some difficult, but inescapable, bibliographic and bibliometric problems.

Bibliometrics, the statistical study of the literature,[1] has been particularly useful for quantitatively characterizing the flow of information involved in the development of pharmaceuticals.[2-4] In fact, it appears to be useful for making predictions about the ultimate clinical success of a drug long before it becomes a marketed commodity.[5]

On the whole, patents form only a small portion of the developing drug literature, less than 10% of the total publications,[4] with some notable exceptions, as might be expected. Nevertheless, patents are important bibliometrically in that their positions in time relative to other publications often reveal clues to the future of their subject drug. Drugs which have a high probability of clinical success usually have clinical papers published before their patents.[2] That is, a drug which has a patent published before a paper reporting its administration to a human has a low probability of clinical success. This is not a hard and fast rule, but a heuristic probability statement—one that, while maybe not refined enough yet for huge financial ventures, does have a practical use as a routine working hypothesis for predicting, and coping with, future information demands.

Nevertheless, in spite of all their bibliometric value, patents are still an irritating nuisance to contend with. Maynard[6] reassures us that although patents are different from journal articles in format, nature, and purpose, they are still important integral components of the chemical literature. Such a position certainly cannot be rejected.

However, dealing with patents bibliographically is often an exercise in frustration. The only readily available printed source for bibliographic data is *Chemical Abstracts* (CA), and, as Maynard stresses, CA is very selective (i.e., biased) in its inclusion. Furthermore, CA only gives bibliographic data for the basic patent; the concordance only gives patent numbers, not even dates. Perhaps the most stinging blow is that the *Official Gazette of the United States Patent and Trademark Office* does not even give the pages!

Since bibliographic data are required before any bi-

bliometrics can be performed, the great problem with patents (from this admittedly esoteric point of view) is that bibliographic data (specifically: author(s), exact title, inclusive pagination, data of publication) are often not readily available.

One obvious way to compensate for the bibliographic omissions in CA and other sources would be for the publication of complete patent bibliographies for important drugs, or, at least, a more thorough citation of patents in comprehensive review papers.

If patents are part of the literature, they deserve to be treated as such. Patents are entitled to the same bibliographic elegance that enshrines other publications.

(1) A. Pritchard, "Statistical Bibliography or Bibliometrics?", *J. Doc.*, **25**, 348–9 (1969).
(2) D. A. Windsor, "Publications on a Drug before the First Report of Its Administration to Man", *Bull. Med. Libr. Assoc.*, **59**, 433–7 (1971).
(3) D. A. Windsor, "Levodopa: Bibliometric Differences before and after NDA Approval", *Curr. Ther. Res.*, **18**, 521–4 (1975).
(4) D. A. Windsor, "Developing Drug Literatures. 1. Bibliometrics of Baclofen and Dantrolene Sodium", *J. Chem. Inf. Comput. Sci.*, **15**, 237–41 (1976).
(5) D. A. Windsor, "Could Bibliometric Data Be Used to Predict the Clinical Success of Drugs?", *J. Doc.*, **32**, 174–81 (1976).
(6) J. T. Maynard, "*Chemical Abstracts* as a Patent Reference Tool", *J. Chem. Inf. Comput. Sci.*, **17**, 136–9 (1977).

Donald A. Windsor
Library, Norwich Pharmacal Company
Norwich, New York 13815
and School of Advanced Technology
State University of New York
Binghamton, New York 13901

Received October 14, 1977

Meeting the Challenges of the Changing Patent Literature

Dear Sir:

May I comment on three of the papers which appeared under this heading in your August 1977 issue?

Firstly, Skolnik[1] repeats the common notion that the British Statute of Monopolies was passed in 1623. I'm not clear when this popular mistake first appeared in the literature, but it is a fine example of the sort of repeated misquotation discussed in a recent paper by Holmes.[2] To set the record straight, the Statute of Monopolies did not, in fact, become law until 1624.[3]

Secondly, Duffey[4] remarked that the British Parliament is considering a new bill which would change British law to a "deferred examination" system, as employed by West Germany, France, and Japan. In fact, this bill has now become law, though its provisions will not come into effect until summer 1978.

Thirdly, Maynard[5] in his paper stated that the findings of Ziegler and Natta appeared in the patent literature almost ten years before journal publication, and he used this as evidence that important developments are published in patents long before they appear in journals. This point is indeed valid, but unfortunately the example Maynard quotes is not a very good one! Studies in this department[6] have shown that the first Ziegler and Natta patents appeared in 1954, but that journal articles on the topic already started appearing in 1955. A far better example of patents predating journal articles can be seen in the case of GALVALUME, the hot-dip coating of an aluminum–zinc alloy for application to steel. Other studies in this department[7] have shown that the first patents for this process appeared in 1966, but the first journal article on the topic did not appear until 1972, and in any case was written by a general science reporter. To this date no detailed technical description of this process has been published in a journal article.

(1) H. Skolnik, "Historical Aspects of Patent Systems", *J. Chem. Inf. Comput. Sci.*, **17**, 119–121 (1977).
(2) J. D. Holmes, "Misquotation in Science: The Case of Quinine Sulphate Fluorescence", Proceedings of the 4th Canadian Conference on Information Science, 1976.
(3) K. Boehm, "The British Patent System", Cambridge University Press, 1967.
(4) M. M. Duffey, "Searching Foreigh Patents", *J. Chem. Inf. Comput. Sci.*, **17**, 126–130 (1977).
(5) J. T. Maynard, "*Chemical Abstracts* as a Patent Reference Tool", *J. Chem. Inf. Comput. Sci.*, **17**, 136–9, (1977).
(6) R. T. Bottle and J. M. Sweeney, unpublished results.
(7) C. Oppenheim and E. A. Sutherland, unpublished results.

Charles Oppenheim
Centre for Information Science
The City University, London, E.C.1, England

Received October 17, 1977

Keywords vs. Index Terms (Reply to Dr. Russell J. Rowlett, Jr.[1])

Dear Sir:

1. If a Keyword is good enough to gain quick access to terms in the weekly index, it should be in current use by AUTHORS. If it is good enough for authors, why is it not good enough for the Cumulative Index?

2. Since the headings in the Cumulative Index are controlled, how were they chosen, how often do they change? Is there anywhere an analog to the *Index Medicus* tree structure to assist a user in finding related terms, analogous terms, or forbidden (obsolete) terms?

3. The writer states that he cannot judge how papers were deemed significant. If the Cumulative (controlled) Index terms were present in the abstracts of papers examined, they were significant. Of these, 39% remained untouched by the Cumulative Index.

4. If an author uses terminology that is not in *his immediate* area of expertise, he may manipulate it differently from one whose area of expertise it is. It should be the province of an index to lead the experts in the field to this tangential work.

5. Dr. Rowlett avows main thrust indexing as the only one for conceptual material. If this is to be effective, who should then designate the main thrust. Is this author input; should it be?

6. Chemical Abstracts Service admits that searching for conceptual material is more difficult than searching for particular substances; need it be?

Concepts of necessity cross many lines and invade several fields at once. What is tangential to one area might be vital to another. This is particularly true where ingenuity and sensitivity in indexing is crucial. With a main-thrust-is-enough approach, a titles-only index (provided journal editors are strict about descriptive titles) would be sufficient. We could then dispense with the Cumulative Index Subject Index altogether. Any area which is important enough to the author to be included in *his* abstract should be indexed. Chemical Abstracts Service is not serving its users if it does not allow them access to material already present in the abstract.

Polling users for Index terms would be one solution; multiple access terms would be another.

(1) See B. Charton, "Searching the Literature for Concepts", *J. Chem. Inf. Comput. Sci.*, **17**, 45–6 (1977); and R. J. Rowlett, Jr., "Keywords vs. Index Terms", *ibid.*, **17**, 192–193 (1977).

Barbara Charton
Pratt Institute School of Science
Brooklyn, New York 11205

Received November 17, 1977