

# Current Comments®

EUGENE GARFIELD

INSTITUTE FOR SCIENTIFIC INFORMATION®  
3501 MARKET ST., PHILADELPHIA, PA 19104

The New *Biomedical Engineering Citation Index Database on CD-ROM*, Containing Searchable Abstracts, *Related Records*, and *KeyWords Plus*

Number 29

July 20, 1992

## ABSTRACT

The Institute for Scientific Information® has launched two new specialty citation indexes on CD-ROM—the *Biomedical Engineering Citation Index*™, and the *Materials Science Citation Index*™. These indexes contain searchable author abstracts, *KeyWords Plus*™, author keywords, and *Related Records*™. The *Biomedical Engineering Citation Index* is discussed below. The new indexes join the Biotechnology, Neuroscience, and Chemistry specialty indexes launched last year. The *Materials Science Citation Index* will be discussed in a future issue.

The increased cost of modern medicine is often attributed to the use of high technology in diagnosis and treatment. Much of this technology forms the core of biomedical engineering research. This rapidly expanding, multidisciplinary field is concerned with the application of physical and engineering science to medical problems. While X-ray machines would be a classical example of biomedical engineering, more modern techniques would include magnetic resonance imaging, computerized tomography, ultrasound, and so on. I've reviewed these advances in earlier essays.<sup>1-4</sup>

This growth in biomedical engineering has resulted in the creation of a new database on CD-ROM—the *Biomedical Engineering Citation Index*™ (*BECI*™). Launched early in June by the Institute for Scientific Information® (ISI®), this service covers the literature of many subspecialties, including artificial organs and implants, limbs, prostheses, biomaterials, surgical tools, rehabilitation equipment, sensors, computer applications in medicine, medical devices, etc. It also covers medical informatics.<sup>5</sup>

The *BECI* is the fifth in the series of new specialty indexes introduced by ISI within the last year. It joins the Biotechnology, Neuroscience, and Chemistry citation indexes on CD-ROM, which I described in January.<sup>6,7</sup> Another new CD-ROM database, the *Materials Science Citation Index*™, was launched in June as well. I will discuss it in the near future.

As indicated above, the *BECI* covers all the areas of engineering applied to medicine and health care. The first disk covers January through April of this year and will be updated bimonthly, building to an annual, end-of-the-year cumulation. A separate cumulative disk covering 1991 is also available.

This new service provides coverage of more than 100 core journals and also draws heavily, but selectively, on hundreds of other relevant periodicals in ISI's master database of more than 7,000 journals. Some 20,000 to 30,000 source articles will be included each year. Each source record includes bibliographic data, cited references, and abstracts. Also included is a variety of subject indexing, not the least of which is *KeyWords Plus*™, which provides signifi-

```

U3.04 — Biomedical Engineering Citation Index (Jan 92 - Apr 92) — D3.5
F1-Help      F2-Database      F3-Search      F4-Results      F5-Quit

Set 6: Basic Index
DENTAL AMALGAM ALLOYS — Records: 1 of 1

Psarras-U Wennberg-A Derand-T
Cytotoxicity of Corroded Gallium and Dental Amalgam Alloy - An Invitro
Study (English) => Article

ACTA ODONTOLOGICA SCANDINAVICA
Vol 50 Iss 1 pp 31-36 1992 (HH725)

Related Records: 4      Cited References: 28

RelatedRecords      citedReFs      aBstract/Keywords      Addresses
View                Collect        Print                Save

```

Figure 1A. Display for record containing title words "dental amalgam alloys." When B key is pressed, the following abstract appears.

```

U3.04 — Biomedical Engineering Citation Index (Jan 92 - Apr 92) — D3.5
F1-Help      F2-Database      F3-Search      F4-Results      F5-Quit

S
D Abstract/Keywords      Press ESC to leave abstract/keyword display.

Author keywords: Cell Culture; Corrosion; Dental Restoration
KeyWords Plus: MERCURY LEVELS; CYTO-TOXICITY; CORROSION; COPPER; ZINC; AIR

Abstract:
The cytotoxicity of one gallium and three different dental amalgam
alloys was assessed in a cell culture system. Two evaluation methods were
used, the filter method and an extraction method. Before being tested,
set specimens of the alloys were stored in 0.9% NaCl solution for 1 and
10 weeks, to corrode. The alloys showed various degrees of cytotoxicity,
ranging from mild to marked. Differences were found between the two
testing methods, but in most cases no major differences in cytotoxicity
were found between the Ga alloy and the amalgams. The results encourage
further study and development of the Ga alloy, which is mercury-free.

```

Figure 1B. Abstract of article by V. Psarras et al. containing author keyword "dental amalgam alloys."

cant power beyond author keywords. User experience with *KeyWords Plus* is now extensive and justifies the claims made in earlier descriptions.<sup>8</sup>

#### Searchable Author Abstracts and Related Records™

The *BECI* is searchable in a number of different ways, some unique to ISI. For

example, it contains searchable author abstracts (Figure 1). Figure 1A shows the first screen in a search on dental amalgam alloys. Figure 1B shows the abstract. Note that this also would be retrieved in searching for "mercury-free." Displaying an abstract involves pressing one key. This paper would also be retrieved in a keyword search of "cell culture."

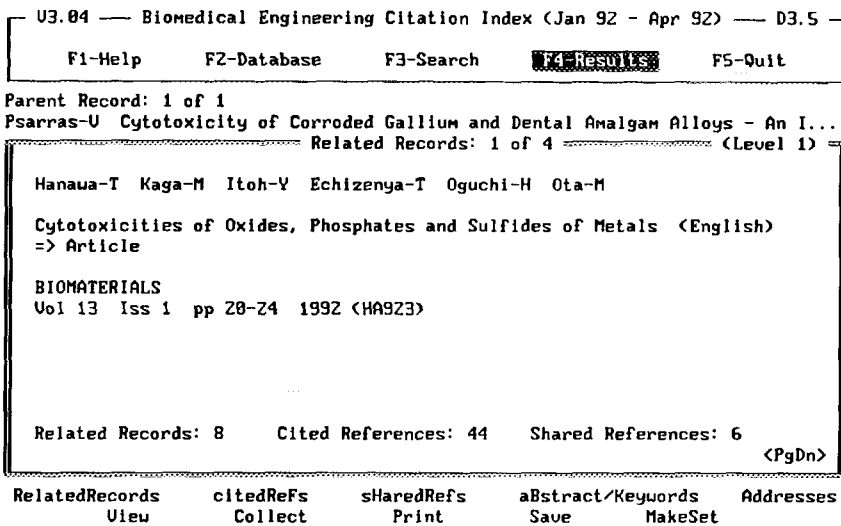


Figure 2A. First of four records related to Psarras paper identified in Figure 1. Just press R key.

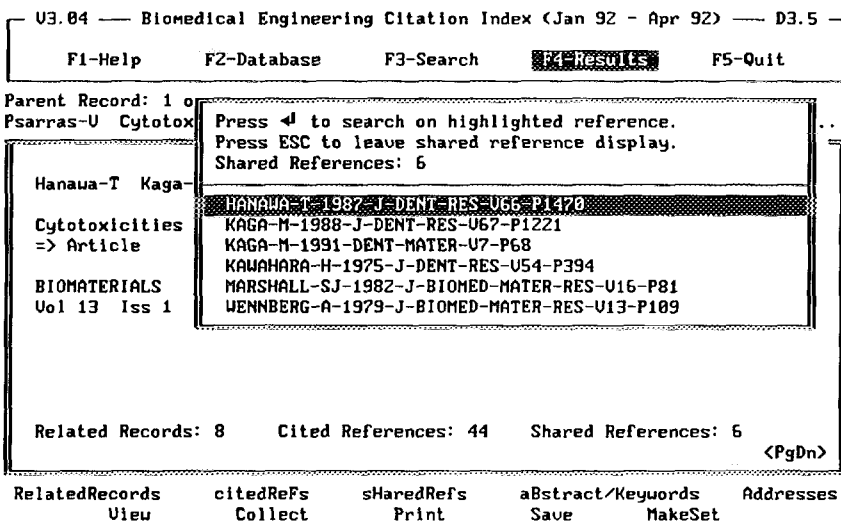


Figure 2B. Display of six Shared References. Simply press H key.

Figure 2 shows the result of navigating by *Related Records*<sup>™</sup>. The paper by Hanawa et al. contains six references in common with the paper by Psarras. These are shown in Figure 2B. This feature displays, in ranked order, articles that have one or more bibliographic references in common with a given parent record. Through these linkages, subject relationships are revealed that

would not always be obvious through keyword or title searches. This hypersearch of cited references extends the scope of cited reference searching—now an important part of most literature search strategies.<sup>9</sup>

#### Citation Index Search

Suppose you are familiar with a paper on the use of ceramics for prosthetics pub-

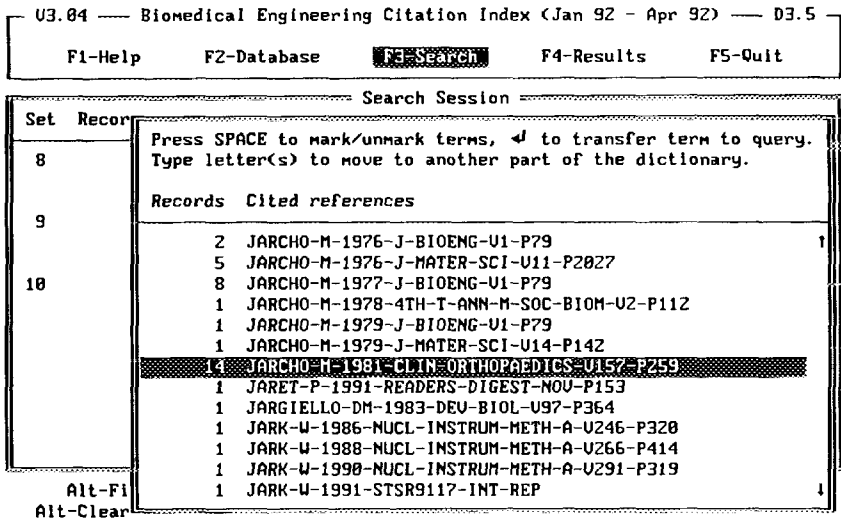


Figure 3A. Citation Index Dictionary listing for JARCHO-M.

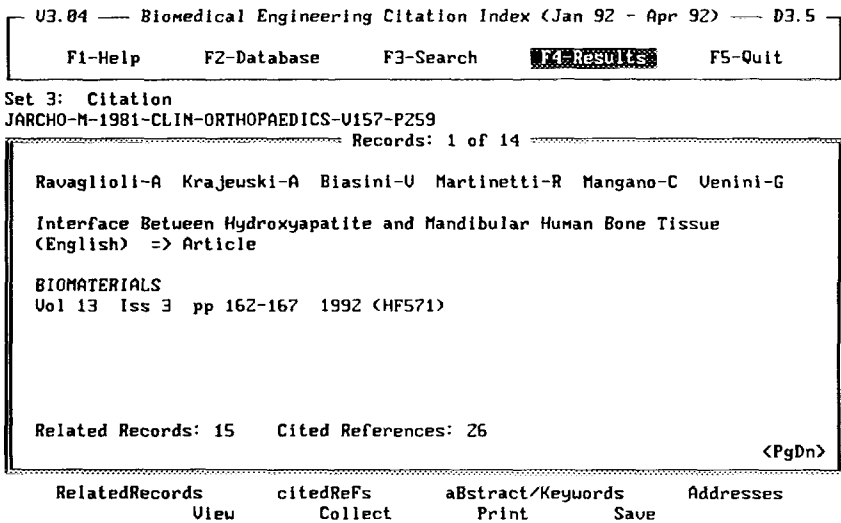


Figure 3B. Display of 1 of 14 papers turned up in cited reference search of 1981 paper by M. Jarcho on use of ceramics for prosthetics.

lished in 1981 by M. Jarcho in *Clinical Orthopaedics and Related Research*.<sup>10</sup> Figure 3A shows the dictionary listing for the cited reference search. Figure 3B shows the record for a 1992 paper on the interface between bone formation and hydroxyapatite ceramics—1 of 14 that cited Jarcho's 1981 article between January and April this

year. Space does not permit listing the 13 other papers, which discuss the use of calcium phosphate materials as bone substitutes, development of new bioactive bone cements, and much more. From each of these papers you can navigate to other related papers.

Citation indexing, of course, has been the mainstay of the *Science Citation In-*

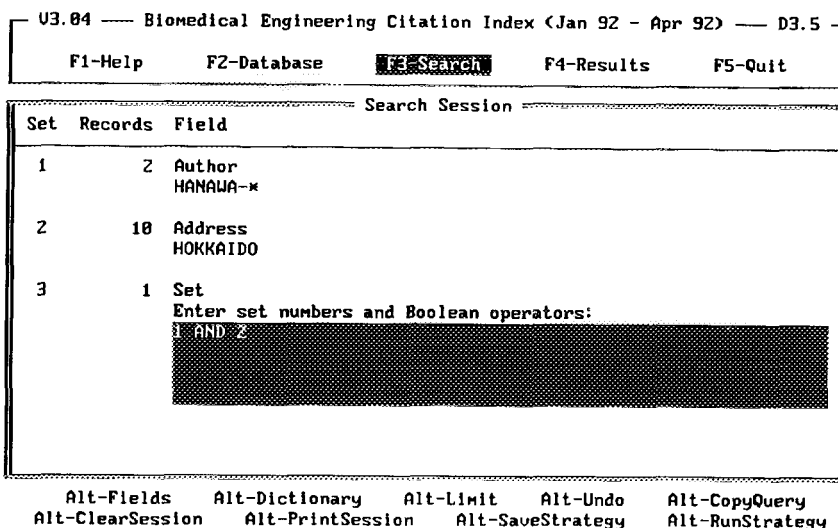


Figure 4A. Example of search for a name in combination with a university.

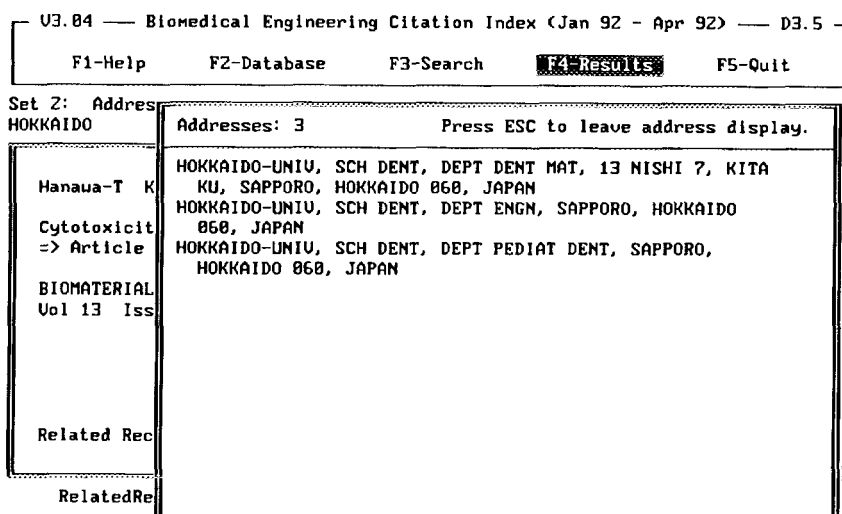


Figure 4B. Address display for T. Hanawa in Figure 2A.

*dex*® (*SCI*®) system for three decades. This search dimension, combined with CD-ROM technology, gives you quicker and more in-depth access to the literature. The result is a search that winds up being both highly focused and comprehensive. Of course, the *BECI* also can be searched for author and/or addresses. Figure 4 shows a

search for papers by Hanawa at Hokkaido University. This search method is very handy when you can't recall a complete name or reference.

For those not familiar with searching on CD-ROM, there are five option keys at the top of the display screen that allow you to select different functions within

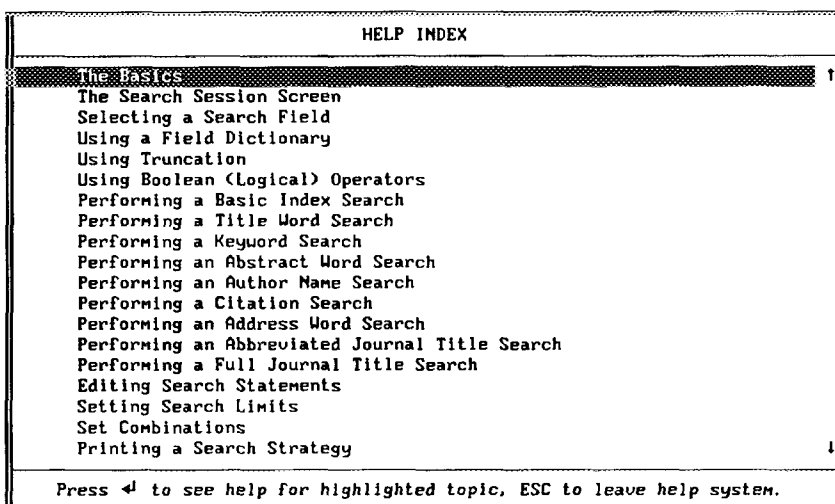
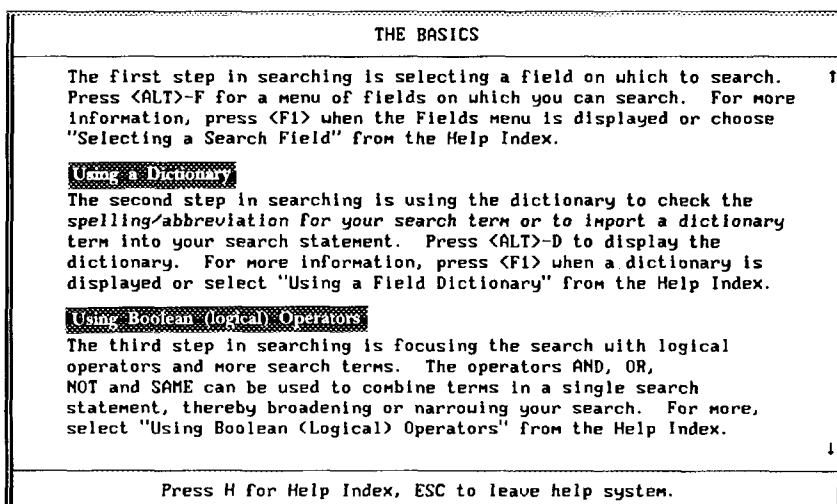


Figure 5. Display of portion of Help Index which appears when F1 option key is pressed. The Basics topic is highlighted. When the ↓ function key is pressed, text (below) appears that explains the various options available to the researcher. The text continues when you scroll down using the arrow key.



the database. The first of these keys (F1), when pressed, provides a Help Index from which you can select topics that give detailed explanations and definitions of the various search options. Figure 5 shows a portion of the Help Index from which you can select a topic of interest.

#### Historical Origins of the Field

*Current Contents*® (CC®) has been following the rapid development of biomedical engineering for some time. My 1985 Alza Lecture (named for the corporation founded in 1968 by Alejandro Zaffaroni)

to the Biomedical Engineering Society was published the following year in the *Annals of Biomedical Engineering*.<sup>11</sup> In 1987, we updated this material with an essay in *CC*<sup>3</sup> that included background notes on the development of biomedical engineering. That essay outlined the historical origins of the field, which date back to 3000 BC when heat was used to treat cancer.<sup>12</sup>

The first effort to formally organize biomedical engineering into a specialized discipline came just after World War II. In 1947, the Institute for Radio Engineers and the American Institute for Electrical Engineers established committees to study biological and medical areas related to engineering. These two organizations merged in 1963 to form the Institute of Electrical and Electronics Engineers (IEEE). Today this organization publishes many journals related to biomedical engineering, but especially the authoritative *IEEE Transactions on Biomedical Engineering*.

The Biomedical Engineering Society, established in 1968, became the first professional society devoted solely to biomedical engineering.<sup>13</sup> In 1972, it began publishing the *Annals of Biomedical Engineering*, another of the core journals in the field.

Another recent indicator of the impact of this field is the election of a bioengineer as the president of Sigma Xi. George Bugliarello is also the president of Polytechnic University in Brooklyn, New York.<sup>14</sup>

#### **How the Product Was Developed**

I'm often asked how we determine the need for a new CD-ROM specialty index. In the case of *BECI*, informal discussions with scientists confirmed there was indeed interest in such a service. We identified 25 core journals in the field, using the *SCI* and the *Journal Citation Reports*®. Then, we surveyed more than 1,200 ran-

domly selected authors of papers in these journals. They were asked to rate 75 journals we had selected as being relevant and add any others they considered to be important sources in the field. Authors around the world were contacted, but especially in those countries where there are a large number of researchers in biomedical engineering—the UK, Japan, Canada, France, Italy, The Netherlands, and Germany. From this audience, 19 journals emerged as author favorites, 15 of which also were in the core used to create the mailing list. These, of course, were also part of the larger list of 75 journals.

An important part of defining the coverage of a specialty index is the field's vocabulary. The search profile used to draw in as many articles as possible includes a comprehensive listing of keywords. We are also able to use our powerful journal citation "scanning" technique. Thus, all current articles that cite one or more works published in any of the field's core journals are identified as potentially relevant and are scanned by editors who make the final selection decisions.

In prior essays, I have described how we use our research front classification system to monitor the growth of specialty fields.<sup>15,16</sup> This cocitation-based technique is crucial to our ability to make certain that our specialty databases provide the optimum mix of relevance and precision. Since the overall *SCI* database encompasses 600,000 articles a year, we believe that any subset of this file, augmented by any additional relevant journals, will more than adequately cover even broad disciplines like biotechnology, neuroscience, chemistry, and now biomedical engineering and materials science. The scope of any such product can be quickly fine-tuned as we receive user feedback.

Operating system requirements for the *BECI* include an IBM MS-DOS microcomputer, or compatibles, or an NEC PC 9800 Series microcomputer. An Apple

Macintosh version will be available in the fall, as will networking software for the IBM and Macintosh.

The introductory subscription rate to the *Biomedical Engineering Citation Index* on CD-ROM is \$1,950. A multiple copy rate is also available. For a free trial subscription, write: Institute for Scientific Information, 3501 Market Street, Philadelphia, PA 19104; or, in the US or Canada, call

1-800-336-4474. Elsewhere, call (215) 386-0100, ext. 1483. Fax: (215) 386-2911.

\*\*\*\*\*

*My thanks to Paul R. Ryan and Eric Thurschwell for their help in the preparation of this essay.*

© 1992 ISI

## REFERENCES

1. **Garfield E.** Medical genetics: the new preventive medicine. *Current Contents* (36):5-20, 7 September 1981. (Reprinted in: *Essays of an information scientist*. Philadelphia: ISI Press, 1983. Vol. 5. p. 222-37.)
2. -----, Journal citation studies. 45. Surgery journals: another operation in citation analysis. *Current Contents* (21):3-18, 27 May 1985. (Reprinted in: *Ibid.*, 1986. Vol. 8. p. 197-212.)
3. -----, Exploring the frontiers of biomedical engineering: an overview of historical and current considerations. *Current Contents* (10):3-11, 9 March 1987. (Reprinted in: *Ibid.*, 1989. Vol. 10. p. 63-71.)
4. -----, Noninvasive medicine. Parts 1-3. *Current Contents* (41):3-12, 10 October 1988; (42):3-11, 17 October 1988; (43):3-12, 24 October 1988. (Reprinted in: *Ibid.*, 1990. Vol. 11. p. 325-53.)
5. -----, Informatics and the future of biomedical education curricula. *Current Contents* (4):3-8, 27 January 1986. (Reprinted in: *Ibid.*, 1988. Vol. 9. p. 27-32.)
6. -----, The new Biotechnology and Neuroscience Citation Indexes on CD-ROM include abstracts and increased coverage. *Current Contents* (1):3-8, 6 January 1992.
7. -----, New *Chemistry Citation Index* on CD-ROM comes with abstracts, *Related Records*, and *KeyWords Plus*. *Current Contents* (3):5-9, 20 January 1992.
8. -----, *KeyWords Plus*: ISI's breakthrough retrieval method. Parts 1 & 2. *Current Contents* (32):5-9, 6 August 1990; (33):5-9, 13 August 1990. (Reprinted in: *Essays of an information scientist: journalology, KeyWords Plus, and other essays*. Philadelphia: ISI Press, 1991. Vol. 13. p. 295-304.)
9. **Charton B.** Chemists' use of libraries. *J. Chem. Inform. Comput. Sci.* 32(3):199-203, 1992.
10. **Jarcho M.** Calcium phosphate ceramics as hard tissue prosthetics. *Clin. Orthop. Related Res.* 157:259-78, 1981.
11. **Garfield E.** Mapping the world of biomedical engineering: Alza Lecture (1985). *Ann. Biomed. Eng.* 14:97-108, 1986.
12. **Strobehn J W & Double E B.** Hyperthermia and cancer therapy: a review of biomedical engineering contributions and challenges. *IEEE Trans. Biomed. Eng.* 31:779-87, 1984.
13. **Schwan H P.** The development of biomedical engineering: historical comments and personal observations. *IEEE Trans. Biomed. Eng.* 31:730-6, 1984.
14. **Twombly R.** Honor society Sigma Xi strives to bolster image and membership. *The Scientist* 6(14):1; 8-9; 18, 6 July 1992.
15. **Garfield E.** ABCs of cluster mapping. Parts 1 & 2. *Current Contents* (40):5-12, 6 October 1980; (41):5-12, 13 October 1980. (Reprinted in: *Op. cit.*, 1981. Vol. 4. p. 634-49.)
16. -----, Contract research services at ISI—citation analysis for governmental, industrial, and academic clients. *Current Contents* (23):5-13, 8 June 1992.