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Current Comments®

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Announcing *Science Watch*: A Unique Newsletter Tracking Trends and Performance in Scientific Research

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As we head into the new decade and, beyond it, the twenty-first century, the pace of scientific discovery will only continue to increase. Already most of us find it difficult to keep up with research developments in our own field and virtually impossible to keep abreast of what's new in vast and varied areas such as chemistry or medicine. Gone are the days of the generalist; today, most scientists are specialists, and there's probably no changing that.

But those who manage scientific research or who allocate scientific resources cannot afford to be too narrow. I predict that the successful science administrators and science policymakers of the future will be those who can maintain a broad perspective on the science scene. That broad vision will foster foresight of a special and valuable type—one that enables them to allocate funds more effectively now and to plan more wisely for the future.

To provide that broad perspective of the scientific landscape, ISI® has created *Science Watch*™, a new monthly newsletter of science indicators.

Science Watch gives its readers a "bird's-eye view" of current trends across the whole range of scientific inquiry. What's more, using productivity and impact indicators, *Science Watch* reports on the research performance of nations, states, universities, private and government labs, and industrial firms.

The approach of *Science Watch* is essentially quantitative. By tapping into ISI's *Science Citation Index*® database and a variety of specially built files derived from it, *Science Watch* can systematically analyze the journal literature to tell readers *what the scientific community itself* is signaling as important, as revealed by the patterns of citations that scientists record in their articles. Thus, *Science Watch* is an objective, analytical condensation of the scientific community's collective judgment on what are today's "hot" and emerging areas, as well as on which institutions and which researchers are leading the way in those areas.

To some degree, this type of analysis has been available to readers of *Current Contents*® (*CC*®) for a number of years. The citation analyses that have appeared in these pages have utilized ISI's database extensively and often in great depth. More recently, the "Research" section of the biweekly newspaper *THE SCIENTIST*® has offered selected quantitative analyses of trends. These brief, journalistic reports have proven extremely popular.

Science Watch is the systematic extension of these editorial activities, tailored for an audience that includes R&D managers in the public and private sectors; university presidents, provosts, and deans; science policymakers, in federal and state government agencies; science attachés; financial analysts and venture capitalists; planners and strategists of science-based industrial firms, both large and small; market-research analysts; science and business journalists; science-policy analysts; and many others including some bench scientists. In other words *Science Watch* is for all who need to keep abreast of significant trends across the entire spectrum of science. Of course, many

Figure 1: Front page of sample issue of *Science Watch*.

What's Inside...

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Superconductivity Studies Continue At Record Rate, While New DNA Technique Speeds Discoveries In Biomedicine And Forensics

SCIENCE'S HOTTEST FIELDS: THE TOP 20

Rank	Field	No. Specialties	% Immediacy
1	High-Tc superconductors	11	90.7
2	PCR DNA amplification	1	83.3
3	Comet Halley's composition	1	80.0
4	Fibroblast growth factors	1	78.6
5	B-cell stimulatory factors	1	74.5
6	Glucocorticoid receptor	1	65.0
7	G proteins	2	63.3
8	Fos oncogene	1	62.5
9	Ballistic transport in GaAs	1	60.9
10	Resonant tunneling diodes	1	60.0
11	T-cell activation	1	59.5
12	AIDS virus and treatments	4	58.1
13	Scanning tunneling microscopy	1	57.1
14	Campylobacter pylori and ulcers	1	56.5
15	String theory	2	54.9
16	Hypercholesterolemia treatment	1	53.6
17	Tumor necrosis factor/Cachectin	1	52.8
18	Colony stimulating factors	1	52.6
19	Neurokinins and tachykinins	1	52.4
20	Optical FDM transmission	2	51.7

SOURCE: 1988 Research Front Database. Institute for Scientific Information, Philadelphia

Superconductivity research continues to sizzle. Studies of growth factors are rapidly proliferating. And a new technique for amplifying DNA is fueling an explosion of work on genetic abnormalities and infectious diseases. These are [illegible] highlights [illegible] most [illegible] fied as topics of intensive investigation in this year's survey, but AIDS and string theory fell in the rankings while superconductivity remained on top.

Emerging growth fields—those that appear for the first time on this year's [illegible] fields [illegible]

research libraries will want to subscribe to *Science Watch* for their users.

As you will see, *Science Watch* publishes crisp analyses with clear graphical display of quantitative information (see Figure 1). It provides trend analyses, rankings of research performance, and, last but not least, lists of hot papers. In one month *Science Watch* will identify and rank the papers that have been the most cited in biology and physics during a recent two-month period. The next month *Science Watch* will do the same for clinical medicine and chemistry.

Science Watch does not merely identify "hot" fields, key papers, and leaders and laggards in performance. It also supplements these data with the insight of experts in the area under review. The publication and citation data are the basis of the analyses, but they do not themselves tell the whole story. As I've said so often, these data require interpretation.

To give you a taste of what you will find in *Science Watch*, we are reprinting here a brief article from the sample issue, published last October. It is an analysis of the citation

impact of physics papers from five top-rated US universities.

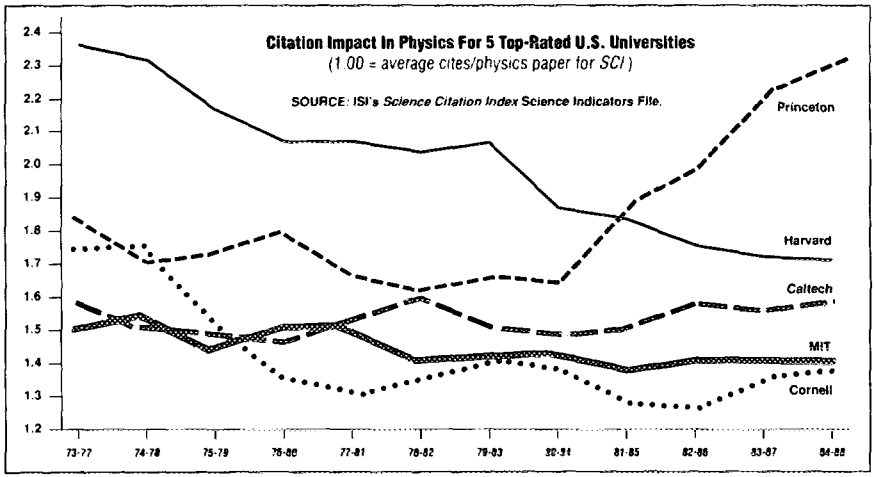
The sample issue also surveys the 20 hottest specialty areas in science. In another feature, the field of organic (not ceramic) superconductors is highlighted; our data show that this emerging area is dominated by Japan. Also in the sample issue, Hans Peter Hertig, science and technology counselor of the Swiss Embassies in Washington, DC, and Ottawa, Ontario, Canada, comments on the spectacular past performance of Swiss science and the challenges facing policymakers in light of the changes that are coming in 1992.

In the January issue, the lead story looks at the research performance of individual National Institutes of Health institutes from 1973 to 1988. There's also a report about a material, until now a laboratory oddity, that is now on the verge of commercialization. In addition, a Nobel laureate describes his newest discovery, one that holds the promise of applications in medicine and communication. The January issue also features the hottest papers in biology and physics.

Science Watch is published monthly, except in August. The December issue will review the year's most significant research happenings and look ahead to where tomorrow's discoveries are anticipated. The regular subscription price is $295.00, but *CC* readers may subscribe for $245.00.

If you have not received a sample of *Science Watch*, please write to the editor, David A. Pendlebury, Research Department, ISI, 3501 Market Street, Philadelphia, Pennsylvania 19104, or call him at 1-800-523-1850, ext. 1411.

String Theorists Boost Physics Performance At Princeton



A survey of the citation impact of physics papers, published between 1973 and 1988, from five top-rated U.S. universities has revealed a dramatic improvement since the early 1980s at Princeton. During this period, the citation impact of Harvard and Cornell declined, while that of MIT and that of Caltech remained relatively unchanged.

In this analysis, ISI's Research Department tracked citations to all papers published in a select set of 142 high-impact physics journals (representing the entire range of physics specialties) from each of the five universities. For a series of overlapping five-year periods, total ci-

tations to a university's physics papers were divided by total number of physics papers from that institution. For example, during 1973-1977 Caltech scientists published 1,362 papers in this set of 142 journals, and these papers were cited a total of 13,962 times during this same five-year period, giving physics papers from Caltech an average citation impact of 10.25. By comparing that figure to 6.43, which is the average citation impact for all physics papers over this period, a relative citation rate of 1.59 was obtained for physics at Caltech (see chart). This procedure was repeated for each university for each five-year period.

As noted, Princeton has shown the most improved performance in terms of citation impact among these five institutions. Its physics articles were cited some 84% more frequently than the average physics paper in 1973-1977; in 1984-1988, they were cited 131% more than the average. Most of the credit for this increase goes to Edward Witten and the group known as the "Princeton String Quartet" (J.A. Harvey, D.J. Gross, E. Martinec, and R. Rohm). By substituting one-dimensional strings for elementary "point" particles, they are aiming to achieve a unified field theory. These mathematically inclined physicists have been at the forefront of the "Superstring Revolution," which began in earnest in 1984 (see also page 3).

This upturn at Princeton coincides with the arrival in 1981 of Edward Witten, who before that was at Harvard (in 1987 he joined the Institute for Advanced Study in Princeton, N.J.). Of the 100 most-cited physics papers from Princeton during 1973-1988, Witten's name appears on 19—all published in the 1980s. Gross is listed on 11, 5 of which are the joint work of the String Quartet. Overall, papers on string theory and the mathematics that support it account for 25 of Princeton's Top 100.

Harvard's story is not so happy. In the period 1973-1977, Harvard's physics was way ahead in citation impact among this group. Its papers were cited 136% more than the average during this period. Since then, there has been a fairly steady decline in citation impact, although it still ranks second in the group of five.

As with Princeton, people seem to have made a difference at Harvard. The loss of Steven Weinberg to the University of Texas at Austin in 1982 undoubtedly eroded Harvard's citation pull in the mid to late 1980s, since particle physics represents such a large part of Harvard's physics program: 51 of its 100 most-cited physics papers, 1973-1988, dealt with classical particle physics. While he was still in Cambridge, Mass., Weinberg produced 12 of those papers. He surely helped Harvard's citation impact in the 1970s. So did Witten, who wrote four papers in Harvard's top 100 before he went to Princeton in 1981. On the other hand, Harvard still has particle physicists Howard Georgi and Sheldon Glashow, who together and separately are listed on about a half dozen papers among Harvard's 100 most cited.

Cornell, too, has slipped in citation impact since 1973. Papers in condensed matter physics and material sciences account for 44 of its 100 most-cited physics papers for 1973-1988, while particle physics papers number 25. Cornell physicists seem, from ISI's data, to have been more active in particle physics in the 1970s than in the 1980s. Owing to a slightly higher average rate of citation in particle physics than in, say, condensed matter physics, the dip may represent an institutional shift to another area.

MIT and Caltech both remained, over this period, relatively steady in citation impact. Both conduct diversified research in physics. Caltech has a particular emphasis on astrophysics and geophysics among its 100 most-cited papers, while MIT's Top 100 covers a wide range of subjects from particle, to condensed matter, to chemical physics. ■