field and marine stations and new sites. A second workshop this fall will prepare recommendations for NSF, says Siegel-Causey.

Meanwhile, a smaller NSF initiative is nearing the starting gate. That's a plan to spend $2.5 million in 1999 to set up microbial observatories at half a dozen existing field stations, with the intention to double or triple that number in 2000. The money would fund research that extends existing studies ranging from identifying new species and sequencing DNA to measuring nitrogen fixation and other biogeochemical processes. "For far too long, microorganisms have been a black box," says Colwell. "But it turns out that they play a fundamental role in everything."

The two initiatives would dovetail nicely, says Siegel-Causey: "I could imagine one station having adjacent plots of land labeled microbial and biodiversity observatories." But he says the biodiversity observatories initiative, once unveiled, could well be a far more ambitious project than the microbial stations: "We're thinking an order of magnitude larger." Not quite astronomical proportions, maybe, but a big step for environmental researchers and taxonomists.

–JEFFREY MERVIS

CITATION ANALYSIS

Harvard Tops in Scientific Impact

Harvard University wins bragging rights in the latest ranking of U.S. research universities, according to the September/October *ScienceWatch*. It not only churned out more papers than any other university between 1993 and 1997, but the work was rated as having higher scientific impact across the board.

The Philadelphia-based Institute for Scientific Information, which publishes *ScienceWatch*, tracks citations from hundreds of scientific journals. To rank the top 100 federally funded universities in 21 separate fields, *ScienceWatch* worked out the average number of times that papers from researchers at each institution were cited in another paper. These scores were then calculated as a percentage above or below the world average for papers in the same field, to yield an estimate of their "relative impact." In clinical medicine, for example, papers from Johns Hopkins University were cited, on average, 9.19 times—129% above the world average for the field. Chris King, who edits *ScienceWatch*, says the calculation "represents what scientists think is important in their field when they write papers."

Harvard placed in the top 10 in 17 of the 21 categories, *ScienceWatch* reports. It was followed by Stanford University (13 top-10 placings), California Institute of Technology (Caltech) with 11, Yale University (9), the University of Michigan (9), Massachusetts Institute of Technology (MIT) with 8, University of California (UC) Berkeley (7), University of Washington (6), UC Santa Barbara (6), Cornell University (6), and UC San Diego (6).

Although the overall rankings were based on performance in all fields of science, *ScienceWatch* published rankings in only nine biological science fields in the current issue; it plans to publish the rankings in the physical sciences and some social science fields in its next issue. The biology rankings indicate that quality does not always go hand in hand with quantity. In neuroscience, for example, Caltech came out on top for relative impact, publishing 395 papers compared to Harvard's 2419. Washington University in St. Louis ranked first in immunology with only a third as many papers as number two Harvard, and MIT had the highest relative impact in molecular biology and genetics with a fraction of Harvard's publication rate. The same held true for the rankings of biology and biochemistry, which Duke University topped.

–AMY ADAMS

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TOP UNIVERSITIES IN BIOLOGICAL SCIENCES

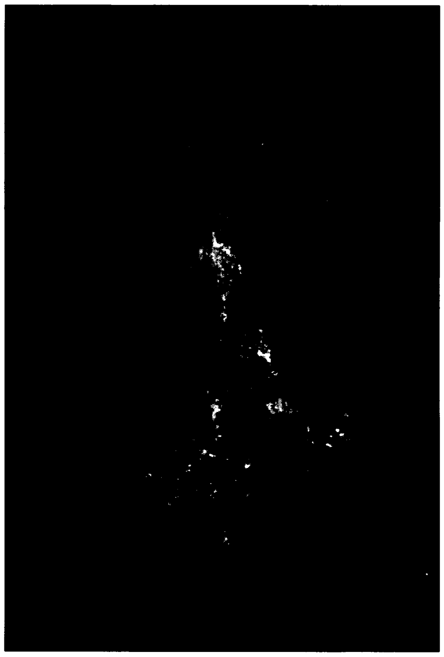
Institution	# of papers	Relative impact*
Neuroscience		
Caltech	395	135
Stanford University	911	106
Johns Hopkins University	1558	105
Immunology		
Washington University	551	140
Harvard University	1668	107
Stanford University	631	87
Molecular Biology and Genetics		
MIT	823	239
Rockefeller University	547	213
Harvard University	3064	149
Biology and Biochemistry		
Duke University	1446	130
Univ. of Texas Southwestern Medical Center, Dallas	1377	124
Harvard University	4525	123

* Citations per paper as percent above world average for that field.

ORIGIN OF LIFE

A Biomolecule Building Block From Vents

In 1952, University of Chicago chemists Stanley Miller and Harold Urey staged a simple demonstration that transfixed other scientists pondering the origin of life. They showed that a mixture of ammonia, methane, hydrogen, and water yielded amino acids—the building blocks of proteins—when zapped with the lab equivalent of a lightning bolt. The demonstration was hailed as a re-creation of a likely first step toward life. But critics later dubbed the experiment a creation rather than a re-creation, pointing out that whereas inert nitrogen gas (N_2) would have been abundant on the early Earth, the reactive forms needed to make amino acids, such as ammonia (NH_3), would have been scarce. "The formation of ammonia has always been a big problem for origin-of-life scenarios," says Jim Ferris, a chemist at Rensselaer Polytechnic Institute in Troy, New York.



J. EDMOND/WHOI/VISUALS UNLIMITED

Pressure cooker. Minerals formed at deep-sea vents like this one could have catalyzed the formation of ammonia.

Now, a team of researchers at the Carnegie Institution of Washington, D.C., report in this week's issue of *Nature* that they may have found a major source of early ammonia: the hot springs on the deep sea floor. In a series of laboratory tests, the researchers found that minerals deposited there make efficient catalysts for converting nitrogen into ammonia at the high temperatures and pressures of the vents. And because the vents continuously heat up and spew out huge vol-