

Journal of Undergraduate Sciences

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The Progress of Science

A recently published book authored by John Horgan of *Scientific American*, entitled *The End of Science*, contends that “if one believes in science, one must accept the possibility—even the probability—that the great era of scientific discovery is over. Further research may yield no great revelations or revolutions, but only incremental, diminishing returns.” Simply put, Horgan suggests that science has reached its maturity. My intention is not to criticize Horgan’s thesis—this has already been amply done by a number of other writers in various forums—but to comment on the phenomenon that Horgan underscores, the rapid progress of science.

The ways in which science is performed today are eminently different, and far more sophisticated, than those of the science of a hundred years ago, fifty years ago, or even ten years ago. Determining the nucleotide sequence of a gene was once considered a remarkable feat; today, with the assistance of the polymerase chain reaction (PCR) technique, it is routine. Space-based observatories reveal to present-day astronomers vistas unimagined by the earthbound scientists of previous generations. The use of combinatorial chemistry techniques in screening for novel pharmaceuticals promises to reduce the need for human labor by orders of magnitude. No less remarkable is the sociological evolution in the practice of science. In the past, science was the province of wealthy individuals working in private laboratories, whereas today’s science is carried forward by teams and collaborations of investigators funded by nations and corporations.

The so-called “scientific method” has endured, but its implementations have changed. And there is no reason to believe they will not continue to evolve in the near future. Horgan may be correct in proclaiming that the human race is finished with elaborating the fundamental principles of pure science, but nobody denies that there is still much work to be done. Science will continue to be the focus of many people’s lives for a long time to come, and its methodologies will continue to find improvement or replacement in the hands of its practitioners.

Nowadays the predominant force driving the transformation of science (and indeed, many other aspects of our society) seems to be information technology. Although the Internet has come into common use only in the past few years, it is already an indispensable resource in the laboratory setting. Gene and protein sequence databases are easily accessed and searched from anywhere in the world via the Internet. Abstracts of journal articles in a number of disciplines are now cataloged and available on the World Wide Web, and an increasing number of journals are publishing their articles online. The technology will be extended to allow, for instance, observatories in distant locations to coordinate their monitoring of astronomical events, or instrumentation to be operated from remote sites. Most significantly, scientists are using electronic mail and Web pages to communicate to one another their research plans, preliminary findings, and other information. Communication will give way to collaboration as distances shrink into meaninglessness and individuals at different institutions are able to conduct day-to-day research in tandem.

As science increasingly incorporates cutting edge technologies such as the Internet and becomes an enterprise transcending national boundaries, the productivity and payoffs of a healthy research program should proportionately rise. In light of this, it is difficult to legitimate Horgan’s statement that future research will yield only diminishing returns; on the contrary, one would expect increasing returns on every dollar spent on basic and applied research. We should realize that far from coming to an end, the age of science is just beginning.

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As a student-run publication entering only its third year of existence, the *Journal* remains in a continual state of evolution, seeking out more effective ways by which to further its mission of informing students about science, medicine and public policy from a research-oriented point of view. In this issue we are pleased to premiere a *Science Briefs* section with short articles describing recent events and findings in the scientific sphere. We plan to include this section in each of our future quarterly issues, covering the news of the preceding few months. It is our hope that students will benefit from learning about the latest breaking developments in research science alongside learning about the research of their peers.

Kiran Musunuru

Editor Emeritus

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Cover illustration: The picture on the cover, taken by Jeff Hester and Paul Scowen of Arizona State University using the Hubble Space Telescope, shows the interior of the Crab Nebula, the subject of one of the articles in this issue. Clearly visible are the neutron star at the center of the nebula and the filamentary features arrayed around the star. This image was created with support to Space Telescope Science Institute, operated by the Association of Universities for Research in Astronomy, Inc., from NASA contract NAS5-26555, and is reproduced with permission from AURA/STScI.

