Book Reviews

New Ideas in America

Creation by Natural Law. Laplace's Nebular Hypothesis in American Thought. RONALD L. NUMBERS. University of Washington Press, Seattle, 1977. xii, 184 pp. $15.

Opposition to Darwin's theory of the evolution of man has raised sufficient popular controversy over the past century to create a general impression that the United States has a religious culture against which scientists must struggle to establish their secular truths. Historians have long recognized that that impression is inaccurate. In many respects—political, social, intellectual—America can be seen as the first modern nation. Recently, historians of science have shown also that antebellum culture accorded the highest value to science. Leading American colleges required science at the core of their curricula, scientists were the center of the nascent intelligentsia, and faith in applied science was a primary value in the democratic ideology. In *Creation by Natural Law*, Ronald Numbers demonstrates that the scientific and religious establishments had accepted a naturalistic theory of the origin of the solar system decades before the *Origin of Species*.

Within the general framework of Newtonian gravitational theory, Laplace hypothesized in the 1790's that the solar system had evolved by condensation of a gaseous nebula. Planets condensed out of the sun's rotating atmosphere. Laplace's theory undermined one of Newton's own proofs of the existence of a deity, which was that the design of the planetary orbits (which lie in a plane) could have been accomplished only by supernatural purpose. Despite the atheistic purpose of Laplace, in the 1830's and 1840's this nebular hypothesis won wide acceptance in the United States. The latent atheism was subverted by the authors of the Bridgewater Treatises, who showed how the hypothesis fitted into an argument by design, with the deity working out his plan by secondary causes. With the orthodoxy of the nebular hypothesis protected, American scientists went ahead to accept the theory on its scientific merits, paramount among which was Daniel Kirkwood's "analogy," a mathematical ratio between the diurnal rotation of the planets and their gravitational "spheres of attraction."

A debate between James Dwight Dana, an editor of the *American Journal of Science*, and a biblical literalist, Tayler Lewis, seemingly settled the question whether a nebular hypothesis could square with the Mosaic account of creation. Drawing on the work of Arnold Guyot, an immigrant scientist, Dana argued in *Bibliotheca Sacra*, a New England Congregational journal, that the Mosaic chronology of creation could be interpreted naturalistically. The Bible's "formless waters" of the first day corresponded to a gaseous nebula, with "light" generated by chemical action following the gravitational condensation of the gas. Similar interpretations were brought forth for the other biblical epochs.

Acceptance of the nebular hypothesis had become sufficiently entrenched that Asa Gray, appealing for Darwinian evolution in the 1860's, pointed to the hypothesis as an analogy in inorganic development for the organic development of species. Furthermore, just as the nebular hypothesis had been teleologically interpreted, so also organic evolution could be seen as the fulfillment through secondary natural laws of God's plan for man. Gray's deism was less popular among fellow scientists in the post–Civil-War era than before, but nonetheless, Numbers maintains, his appeal to the nebular hypothesis indicated the manner in which American intellectual culture had been prepared for evolutionary theory.

Numbers's account of the reception of the nebular hypothesis is based on extraordinary reading of the literature and an exhaustive search of manuscript collections. As a basic narrative, it is unlikely to be significantly changed by later scholars. Unfortunately, his plausible thesis has only indirect evidence at its most interesting point: the connection between the pre-Darwinian popular acceptance of the nebular hypothesis and the rapid assimilation of Darwinian evolution. He asserts that "the nation's intellectual communities suffered surprisingly little trauma as they successfully and rapidly assimilated the new scientific doctrine [evolution]. Much of the credit for making this possible should go, we think, to the nebular hypothesis" (p. 105). His evidence is that advocates of evolution frequently had previously accepted the nebular hypothesis, and that leading Darwinian spokesmen appealed to the nebular hypothesis in support of evolution. Yet Numbers is unable to establish the direct link between a scientist's espousal of the nebular hypothesis at one time and Darwinism at another. It is more probable, as Numbers hints, that the nebular hypothesis was one element in a growing scientific culture in which secular naturalism broadly prepared the way for Darwinism. Also, Numbers is unable to establish a direct connection between denominational acceptance of the nebular hypothesis and Darwinism, admitting in an appendix that acceptance of the one did "not necessarily" lead to the other (p. 123). Despite these difficulties, which stem from restricted focus, Numbers's work, one of the very few histories of the reception of a scientific idea and its development in the United States, gives glimpses of the relationship between science and secular culture and should be of wide interest to scientists as well as historians.

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Media Figures

The Visible Scientists. RAE GOODELL. Little, Brown, Boston, 1977. x, 242 pp. $9.95.

American science, which went public in a big way only after World War II, was slow to produce the kind of code of conduct for communication and popularization it had formulated for other facets of the scientific career. Therefore, there was a tendency to be conservative. Praise was bestowed upon journalists who gave science a good press in books and articles about the wonders of basic research, and upon distinguished scientists who published their scattered general writings and speeches in an effort to educate the citizenry of the modern age.

Two forces acted to alter this situation. The first was the emergence of a se-