sequence of the quickening doctrine," writes Mohr, "the vast majority of American women during the middle decades of the nineteenth century . . . never had to face seriously the moral agonies so characteristic of the twentieth century's attitude toward the subject of abortion" (p. 74). Abortion may have been an unpleasant method of contraception, but it was not murder.

Surprisingly, the attack on this amoral view of abortion came from physicians rather than ministers, a fact that leads Mohr to treat the antiabortion crusade as a chapter in medical rather than religious history. While America's clergy stood quietly in their pulpits, physicians launched a campaign that proved "in the long run to be the single most important factor in altering the legal policies toward abortion in this country" (p. 157). According to Mohr, "regular" physicians attacked abortion for a variety of ethical, scientific, economic, and nativist reasons. Abortion violated the Hippocratic oath and rested on the scientifically untenable doctrine of quickening; but if "regular" physicians refused to perform abortions, they would lose patients to "irregular" practitioners with less science and fewer scruples. And if native-born WASP women continued to abort, the children of Catholic immigrants would soon flood the country.

Mohr's analysis of the physicians' role contains several flaws that mar an otherwise excellent work. First, although he correctly identifies regular physicians as leaders in the fight against abortion, he errs, I think, in overestimating their influence. During the middle decades of the 19th century the reputation and legal clout of the regular physicians reached their nadir. Patients turned in droves to other—irregular—practitioners, and state legislatures systematically stripped the orthodox doctors of their privileged position by repealing licensing laws. Given this climate, it seems unlikely that the opinions of regular physicians swayed legislators to the extent Mohr suggests. Besides, we know from Mohr himself that legislatures controlled by the enemies of regular medicine sometimes passed antiabortion laws.

Second, in stressing the allegiance of regular physicians to the Hippocratic oath, which did indeed forbid abortion, Mohr neglects to mention that the ancient oath also prohibited surgery, imposed secrecy upon those who took it, and obligated them to such quaint customs as teaching their instructors' children free. Obviously American physicians paid no attention to the oath, and probably not one in a thousand even knew what it said.

Third, Mohr's tendency to split the medical profession into antiabortion regulars and proabortion irregulars confuses and misleads. The confusion begins with his vague descriptions of regulars as having "had formal medical training either in the United States or in Great Britain or been apprenticed under a regular doctor" (p. 14), as being "committed to the forward-looking tenets of what would become scientific medicine" (p. 147), and as constituting a "medical sect" (p. 76). All these definitions, slightly modified, apply equally well to many irregulars, especially homeopaths and eclectics. Furthermore, Mohr is not always able to distinguish between regulars and irregulars (for example, he quotes James C. Jackson, a highly irregular hydropath, on the side of orthodoxy), and he erroneously speaks of the "elimination of most irregulars" (p. 239) at a time—the late 19th century—when sectarian practice reached its peak numerically.

In assessing motivation, Mohr accurately sees the antiabortion activities of regular physicians as stemming more from a desire to regulate the practice of medicine than from a commitment to the sanctity of human life. But he overlooks the similar aspirations of many irregulars. And his entire argument that there was a significant regular-irregular dichotomy over abortion collapses when we discover that the largest and most influential medical sect, the homeopaths, *opposed* abortion, as did many eclectics, representing the second largest medical sect in America.

On the basis of circumstantial (but convincing) evidence, Mohr concludes that the antiabortion campaign succeeded not only in outlawing abortion but in actually reducing its incidence. By the late 19th century observers were once again associating the practice "with the poor, the socially desperate, and the unwed—usually seduced or misled—girl" (p. 240). The expected increase in the national birth rate failed to occur, Mohr argues, partially because American couples turned to other methods of contraception.

In a brief but informative afterword Mohr skips three-quarters of a century to discuss the 1973 *Roe* decision, in which the Supreme Court effectively legalized abortions during the first two trimesters of pregnancy. Ironically, he notes, American physicians now joined the movement to liberalize the very policies their predecessors had promoted. The fascinating story of this 20th-century shift in attitudes toward abortion remains to be told, and we can only hope that the acclaim that has greeted Mohr's first book on abortion will inspire him to write a sequel.

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Cosmological Theories

Planets and Planetarians. A History of Theories of the Origin of Planetary Systems. STANLEY L. JAKI. Halsted (Wiley), New York, 1978. vi, 266 pp. + plates. $16.95.

Whether or not one is convinced by the author's portrayal of scientists as conspiring to overlook unfavorable evidence while defending theories based on a priori assumptions, this review of theories about the origin of our planetary system succeeds in laying bare assumptions and in devastatingly criticizing scientists' errors, intentional or not.

He may have wished to find a conspiracy of silence among the Greeks, but Jaki realizes that not every interesting question is formulated at the outset. Greek astronomy generally did not extend beyond descriptions of the motions of planets, and as late as Kepler the only explanation sought for the arrangement of the planets was a geometrical harmony. Physics dealt solely with terrestrial matters, and the Aristotelian heaven was unchanging. Not until after the Copernican revolution, with the breakdown of the Aristotelian distinction between terrestrial and celestial regions and the union of astronomy and physics, did the development of the planetary systems become a question for science.

After devoting a chapter to these developments Jaki goes on to the more modern attempts to deal with the question.

Descartes's theory of vortices, with purely mechanical interactions, satisfied some adherents of the new mechanical philosophy. But it contained no role for God. Nor could it be connected with quantitative astronomical observations such as the elliptical orbits of planets, a phenomenon Descartes usually avoided mentioning. Physics had yet to find in quantitative exactness "a powerful antidote to mixing arbitrarily the interplay of various physical factors." E. J. Aiton's account of this theory and its fate, *The Vortex Theory of Planetary Motions*, is

more extensive than Jaki's, if less entertainingly or irritatingly iconoclastic.

Newton's law of gravity explained elliptical orbits, preserved a role for God as builder of the heavenly clockwork, and contradicted Descartes's theory of evolution of the planetary system from matter evenly distributed. Collision between a comet and the sun was a possible mechanism for planetary formation. Alternatively, gravity could act upon particles of different density.

Laplace's nebular hypothesis, combining gravitational contraction and the angular momentum of a large, rotating, gaseous nebula around the sun, was proposed in 1796 and held the field for a century. Jaki traces both the development of the theory through the five editions of Laplace's book and the facile overlooking of difficulties in the theory by several generations of scientists in France, Germany, England, and the United States. On the American reception of Laplace's theory in a more general intellectual context, especially the interfusing of scientific and religious thought, see Ronald Numbers's *Creation by Natural Law: Laplace's Nebular Hypothesis in American Thought*.

Most of the angular momentum of the solar system is in the planets, but most of the mass is in the sun. Thomas Chamberlin, a geologist, and Forest Moulton, an astronomer, at the University of Chicago showed that the division of angular momentum and mass poses an unsurmountable difficulty for the nebular hypothesis. They thought that the close approach of another star might have transferred angular momentum from the sun to the planets. Photographs of spiral nebulae encouraged belief in such a process. Jaki's account, here as elsewhere, is restricted to published sources. In a recent article in the *Journal for the History of Astronomy* (1978) Stephen Brush draws upon manuscript materials and presents a broader historical and philosophical discussion of the Chamberlin-Moulton hypothesis.

The Chamberlin-Moulton theory faltered because in satellite systems, in contrast to the planetary system, virtually all the angular momentum is in the central body. Nor were critics comfortable with a collisional theory in which planetary systems were a rare occurrence rather than a normal phenomenon. More recent theories, involving rotational fission, magnetohydrodynamical waves, turbulent motions, condensations, and the like have also met with what S. Chandrasekhar called "the usual fate of cosmogonical theories not to survive." Scientists have yet to explain satisfactorily the origin of the planetary system.

Jaki convincingly demonstrates that planetary theories often have initially been judged more on their potential frequency of action than on their fit with observation. One might then ask, granted that philosophical values are immensely important in science, whether observational considerations eventually doom an otherwise esthetic theory and whether a theory that satisfied observational criteria but was in conflict with fundamental human values could ever win general acceptance. And is the preference for a frequently employed planet-creating mechanism a manifestation of a more general philosophical insistence upon the uniformity of nature that appears also in geological uniformitarianism? Jaki also might have discussed more thoroughly the apparently continuing importance of the principle of plenitude; belief in planetarians (inhabitants of other planets) is mentioned but infrequently.

Jaki's critique is important, and should be extended. The book deserves a subject index and better integration of illustrations and text.

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A History of Scripps

Scripps Institution of Oceanography. Probing the Oceans 1936 to 1976. ELIZABETH NOBLE SHOR. Tofua Press, San Diego, Calif., 1978. x, 502 pp., illus. Cloth, $17.95; paper, $8.95.

Of all the oceanographic laboratories in the United States only the Scripps Institution of Oceanography sees to it that its history is kept up to date. In 1967 *Scripps Institution of Oceanography: First Fifty Years* by Raitt and Moulton was published describing the Institution's growth from 1892 to 1942. Now Elizabeth Noble Shor has brought the account up to date with *Scripps Institution of Oceanography: Probing the Oceans 1936 to 1976*.

After a brief recapitulation of the Institution's beginnings as a peripatetic shore station and a biological association without special emphasis on "marine," Shor focuses on the years immediately prior to World War II when the famous Norwegian oceanographer Harald Sverdrup became the Institution's third director. By this time the Institution was a part of the University of California and had approximately 12 senior staff members, a half-dozen visiting scientists, and five graduate students. Within two months of Sverdrup's arrival, the fishing boat used as a research vessel burned and the Scripps oceanographers were shorebound —but not for long. Between Sverdrup with his admirable stubbornness and World War II with its sudden and imperative demand for oceanographic information, the Institution was soon in possession of four research vessels, a staff of 111, and a budget that had quintupled in a decade. At this point, 1946, Shor abandons a straight chronological presentation and divides the book into chapters on the Institution's major research units. Each of these accounts covers approximately the same years, 1946 to 1976.

As a commissioned history the book has a characteristic suite of advantages and disadvantages. On the positive side is the completeness of the account. With the cooperation of the Institution's administration the author has had access to the records of every research unit, institute, department, and subgroup. And there is an impressive number of these at Scripps—the Marine Life Research Program, the Marine Physical Laboratory, the Visibility Laboratory, and the Institute of Marine Resources, to mention only a third of the divisions covered. For each, information is included on its founding, evolution, objectives, and major successes. The book has many illustrations and is thoroughly documented.

On the negative side is the absence of any attempt to stand back from the Institution and study its growth in relation to the politics, economics, or scientific thinking going on in the rest of the country. Why did Scripps develop so slowly in the early years of this century? Why did its leaders assume that Naval support would be withdrawn after World War II? Why is it the largest oceanographic institution in the country today? Such questions aren't even raised, nor are questions concerning the internal dynamics of the Institution itself. Rather than write a historical account of how the Institution has evolved within a context at least as broad as the country itself, Shor has chosen to present an insider's affectionate view.

From this choice stems a second disadvantage. Because of the author's loyalty to the extended Scripps "family," each one of the score of scientists, students, and technicians whom we meet come across as honest, intelligent, energetic, and enthusiastic. No one fails. No one steps on anyone else's toes. We are given biographical vignettes of dozens of