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## BOOK REVIEWS

### RETHINKING THE "SCIENTIFIC REVOLUTION": A CRITIQUE OF TEN WORLD HISTORY TEXTS

In the first part of this paper, we focus on the underlying assumptions, conceptual underpinnings and general explanations related to Europe's Scientific Revolution. We base our observations and critique on the discussions and analyses reflected in several existing texts on *World Civilisation*<sup>1</sup>, one of the courses which has conventionally dealt with this issue. In the course of discussion we identify the deficiencies and strengths of the various interpretive schemes offered and suggest alternative explanations.

We propose that future texts should reflect greater awareness and sensitivity to the global, multiregional and evolutionary dimensions of the scientific revolution in question so as to de-emphasize parochialism and eurocentrism.

We conclude the paper with some personal ratings of each of the texts discussed in the context of criteria such as logical consistency, identification and discussion of conceptual issues, the degree of eurocentric parochialism, and overall format.

Contrary to the views of Esler, Upshur and others, the European Scientific Revolution of the 16th and 17th centuries was not a sudden breakthrough "clearing way the mists of legends superstition and ignorance," but rather was the culmination of "a rich and varied intellectual tradition" derived from a wide range of cultures and civilizations since antiquity.<sup>2</sup> The ancient and medieval worlds were indeed neither obstacles to scientific progress nor bereft of rational approaches to truth, but rather contained within them the seeds of intellectual and scientific discourse in the context of a wide range of personalities, volumes of specialized propositions about the natural world and the universe, and a gradually expanding range of technical instruments.<sup>3</sup>

Far from being "unique," the process of expansion of rational thought and the dethronement of cosmology and religious bigotry were all continuations

1. L. Stavrianos, *The World Since 1500: A Global History*, Prentice-Hall, 1991.

A. M. Craig, Graham, Kagan, Ozment, Turner, *The Heritage of World Civilization*. Vol. B, Macmillan, 1990.

W. McNeill, *A History of the Human Community*, Vol. 2, Prentice-Hall, 1993.

J. H. Upshur, Terry, Holoka, Goff, Lowr, *World History*, Vol. 2 West, 1991.

McKay, Hill, Buckler, *A History of World Societies*, Houghton Mifflin, 1992.

R. L. Greaves, Zaller, Canistraro, Murphy, *World Civilizations*, Harper Collins, 1993.

P. N. Stearns, Adas and Schwartz, *World Civilizations, The Global Experience*, Harper Collins, 1992.

A. Esler, *The Human Venture, A World History from prehistory to the present*, Prentice-Hall, 1992.

F. R. Willis, *World Civilizations*, Vol. II, Heath, 1986.

T. W. Wallbank, Taylor, Bailkey, Jewsbury, Lewis, Hackett, *Civilization Past and Present*, Harper Collins, 1992.

2. Quoted from Greaves et alia p. 634. The view differs from Esler p. 460; Upshur p. 479 and most others.

3. This is contrary to Upshur's view as explicitly stated.

of earlier processes of intellectual development, some of which dated back to the emergence of Egyptian, Mesopotamian, Chinese and Indian science in antiquity.<sup>4</sup> Others dated to the Abbasid era and the revolutionary transformations associated with the rise of intellectuals such as ibn Tufayl, al-Khwarizmi and ibn Sina, predecessors of Copernicus, Galileo and Paracelsus in the spheres of astronomy, mathematics and medical thought.<sup>5</sup>

It is seldom acknowledged that the heliocentric theory about the earth and the universe has its intellectual precedent in Greek and Egyptian thought in the context of the views of Aristarchus and later Egyptian Hermeticism. Far from being the sole pioneer of the heliocentric view and the dethronement of an earth-centered view of the world, Copernicus simply helped to entrench the perspective, and by so doing challenge the prevailing orthodoxy of the Church and the establishment. For this he must be rewarded in the pages of World Civilization textbooks, but his accomplishment and role in the scientific revolution must not be exaggerated. Nor must we distort the historical reality in our appraisal of Descartes or Paracelsus, scholars whose contributions pale into insignificance before the intellectual accomplishments of their predecessors in the field such as al-Khwarizmi and ibn Sina.<sup>6</sup> Indeed the former, building on Egyptian, Chinese, Indian and Greek science, in the 9th century, provided some of the earliest scientific treatises on analytic geometry, spherical trigonometry and algebra, the latter of which gained its name from one of his texts, namely, *Kitab al-Jabr wa al-Muqabalah*. The significance of Cartesian deductivism must be evaluated in the context of Athenian pioneering activity in this field. What of Ibn Sina - the Iranian scholar whose Canon of Medicine in the 11th century prevailed as the leading medical text of Europe for 500 years, significant for its scientific observations on nervous disorders, skin diseases and ophthalmology: before him, Paracelsus is of little significance, even granted his useful challenge to the views of Galen and the European medical establishment of the 15th century.

Contrary to some of the assumptions reflected in various world history texts, some of which are cited here, the ancient and medieval world in various parts of the world were in fact harbingers of scientific change in various ways. New approaches to truth, new modes of scientific expression and the emergence of a scientific jargon were as central to their development as were the emergence of new observatories<sup>7</sup>, scientific institutes, manuals and communities of practitioners, some of the basic features associated with the European scientific revolution of the 16th and 17th centuries, if we conflate the views of Wallbank, Esler and Stearns et alia on this matter.<sup>8</sup> The observatories, translation centers, academies of sci-

4. See J. Needham, *Science in Traditional China*, Cambridge, Mass Harvard University Press, 1981. C. F. Gloria Thomas-Emeagwali, *The Historical Development of Science and Technology in Nigeria*, Edwin Mellen, 1992; G. Thomas-Emeagwali, *Science and Technology in African History*, Edwin Mellen, 1992.

5. For reference to Paracelsus see Greaves et alia p. 639.

6. See also G. Thomas-Emeagwali, "Technology transfer: Early Modern Europe and the Third World", *Journal of the International Science Policy Foundation*, London, Vol. 16, June 1989.

7. See also Ahmad Al Hassan & Donald Hill, *Islamic Technology Unesco*, 1987.

8. See Wallbank et alia. p. 528; Esler p. 460; Stearns et alia p. 509.

ence and libraries of Baghdad and Jundishapur serve no less a function of in the development of scientific activity than do the museums and new institutes of learning in the context of the European scientific revolution, in that they too aided in the expansion of new modes of thought and new approaches to truth. The starting point of scientific activity and thought lay less in Northern European cities than in Southern Europe; more in the lands of the Nile, Euphrates and Indus than the Thames and the Loire. The significance of the 16th and 17th Scientific Revolution must be seen in the context of the universal search to explain the world rather than in the unique accomplishment of the European mind, as touted in the textbooks.

The transmission of scientific theories about the world from other parts of the globe to 15th century Europe must no longer be excluded by textbook writers, shrouded in secrecy and confined to specialist works on the subject, no more than we can deny Europe the center stage in the industrial revolution of the late 18th and 19th centuries. In the case of the former, transmission took place in a wide variety of ways aided by pioneering translators such as Constantine the African of Carthage (1020-1087), Jewish scholars such as ibn Gabirol (Ben Joel), and Robert of Chester, whose translation of Al-Khwarizmi's work proved to be of tremendous significance in the development of European mathematical thought. Contrary to Stavrianos' assertion, however, the fusion of scientific thought and production would be confined to the 19th century and would be less a product of a European genius than of an emerging industrial capitalism; less a reflection of "the mysteries of the West's great and unique contribution to humanity" than its relentless capture of world markets and the triumph of imperialism.<sup>9</sup> The union of philosopher-scientist and artisan can be made retroactive to the 16th and 17th centuries as Stavrianos attempts to do, only by editorial fiat, should we use his criteria and modes of assessment.

A review of the various texts suggests that hyperbolic phrases and what amounts to "feel-good" history have replaced sober scholarly analysis. The selective omission of historic precedents to the scientific processes discussed is often coupled with double standards of assessment.<sup>10</sup> Newton is applauded for entrenching religious orthodoxy whilst Copernicus, before him is applauded for challenging this. The dethronement of Newtonian science by Einsteinian relativity theory is not even mentioned in a footnote. Chinese scientists explored the relationship between sound and vibration; experimented with mirrors and light; explored the phenomenon of musical intervals mathematically; and observed sunspots about 1600 years before Galileo—but are given no credit for such scientific accomplishments. Neither are they given credit for their pioneering work with scientific instruments.<sup>11</sup>

The scientific revolution is largely confined to biographical excerpts and name-dropping as a substitute for informed analysis of the complexity of the phenomenon and its significance in the light of earlier achievements. Dead white

9. See Stavrianos. p. 471.

10. *ibid*

11. For a comprehensive analysis of these accomplishments see Needham. *op cit.*; See also Nathan Sivin, *Science and Technology in East Asia*, 1977; Schirokauer, *A Brief History of Chinese Civ.*, Harcourt Brace Jovanovich, 1991.

males parade the textbooks despite the fact that women like Emile du Chatelet served as translators, engaged in astronomical observation or were often partners in the scientific discoveries of their husbands. Maria Merian of Germany, Anna Manzolini of the Russian Royal Scientific Society and Genevieve D'Arionville of France contributed to the field of biology, medicine and chemistry in the 17th and 18th centuries and, like many of their female counterparts, contributed to the evolutionary development of the scientific enterprise. Only one of the textbooks cited freed itself from male chauvinistic accounts.<sup>12</sup>

*Conclusion.* Which then is the definitive text for understanding the Scientific Revolution in its full dimension, devoid of eurocentric prejudice and male exclusivism, logically argued and useful for students?<sup>13</sup> We venture to suggest that the gender sensitivity of Wallbank, married with the relative openness of Greaves, the few conceptual insights of McNeill and the empirical detail of Esler, could perhaps open the way for more detailed scholarly interpretations of the complex and evolutionary phenomena associated with Europe's Scientific Revolution of the 17th and 18th centuries. In the chart which follows we venture to give some personal scores of the individual textbooks examined, bearing in mind the reality of subjectivity in such schemes of assessment—and the need for a touch of humor!

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12. See Wallbank et alia. op. cit.

13. See Wolf's book review of Robin Winks et alia, *A History of Civilization: Prehistory to the present*, Prentice-Hall 1988, Paper presented at the Annual Meeting of the ISCSC, Scranton University, June 3-7 1993.

The treatment of Africa by Stearns et alia is generally impressive and superior to most other texts.

Laurence G. Wolf has a high regard for Stearns et alia. I concur with Wolf that on the whole the text is of a high quality in terms of reginal distribution, and of format when compared to so many others. However, the treatment of the Scientific Revolution is in my view largely deficient.

AUTHORS	TITLE OF TEXT	PUBLISHER	TITLE OF CHAPTER	RATING	REASONS FOR SCORE
Stavrianos	The World since 1500	Prentice-Hall	Europe's scientific and ind. rev: ch. 28	D	*logically inconsistent "Feel-good" history crude eurocentrism
Craig et alia	The Heritage of World Civilization	Macmillan	The Age of European Enlightenment ch. 23	B-	*mainstream, conventional interpretation; coherent-mild eurocentrism
McNeill	A History of the Human Community	Prentice-Hall	Europe's Self-Transformation ch. 16	B+	*Contradictory forces within the revolution clearly discussed. Mild eurocentrism
Upshur et alia	World History	West	Intellectual and Scientific devel. ch. 11	D	*Crude and mindless eurocentrism. Routine use of stereotypes
McKay et alia	A History of World Societies	Houghton Mifflin	Towards a new world view...ch. 20	B-	*Mild eurocentrism but logically consistent
Greaves et alia	World Civilizations	Harper Collins	Europe's century of genius ch. 24	A-	*Less gender sensitively than Wallbank but minimal eurocentrism. Refreshing. New insights. Good format.
Stearns et alia	World Civilizations The Global Experience	Harper Collins	The transformation of the West ch. 22	C	*"Feelgood" history; rather brief. No new insights
Esler	The Human Venture	Prentice-Hall	Europe-Absolutism and Enlightenment ch. 29	B-	*Only mildly eurocentric-routine conventional format and explanation
Willis	World Civilizations	Heath	No discussion		