Intellectual Curiosity and the Scientific Revolution

A Global Perspective

Seventeenth-century Europe witnessed an extraordinary flowering of discoveries and innovations. This study, beginning with the Dutch-invented telescope of 1608, casts Galileo's discoveries into a global framework. Although the telescope was soon transmitted to China, Mughal India, and the Ottoman Empire, those civilizations did not respond as Europeans did to the new instrument. In Europe, there was an extraordinary burst of innovation in microscopy, human anatomy, optics, pneumatics, electrical studies, and the science of mechanics. Nearly all of those aided the emergence of Newton's revolutionary grand synthesis, which unified terrestrial and celestial physics under the law of universal gravitation. That achievement had immense implications for all aspects of modern science, technology, and economic development. The economic implications are discussed in the concluding epilogue. All these unique developments suggest why, for at least four centuries, the West experienced a singular scientific and economic ascendancy.

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Those who think about the long cycles of science and civilizations and the question of why the Western world succeeded as it did may need to anchor their speculations in several mundane facts. When the scientific revolution occurred in the seventeenth century, the United States of America did not yet exist. In 1609, when Galileo made his revolutionary telescopic discoveries, a hardy band of English settlers attempted to establish the Popham Colony on the forbidding coast of Maine. Owing to the harsh winters of New England, the ill-fated colony was gone a year later.

In 1776, when the thirteen colonies banded together to form the United States, the inhabitants of those often wilderness regions numbered perhaps six million. China and India at the time counted more than 100 million subjects each, dwarfing the population of the struggling American colonies. No one would have predicted that the educational, political, and economic institutions being fashioned in those embryonic United States would propel it to become the dominant power in the twentieth century.

Similarly, a population comparison of Western Europe with China and India in the seventeenth century would find a huge excess of nearly 50 percent more people in the Asian regions. Some would say that India and China were then richer in material goods than Europe.

Third, as the present narrative will show, whatever glories ancient China, India, or the Islamic Middle East may have enjoyed in the past, their contributions to the making of modern science were minor. This conclusion will seem shocking to many readers, largely because of the romantic views of China that can be found in histories of it. Likewise, as I suggest in Chapter 10, the Arab-Islamic achievements in mathematics

and astronomy have often been discussed, but their direct influence on Copernicus, Tycho Brahe, Galileo, Kepler, and Newton, among others, has yet to be shown.

Nevertheless, there is little doubt but that the seventeenth-century scientific revolution of Europe gave that part of the world a huge bundle of intellectual capital that was not to be found outside the West for more than 350 years. All the great revolutionary advances in science that occurred from that time to the present were largely, if not wholly, fashioned in the ambience of the West. Given the resistance to the efforts to disseminate the telescope and other scientific advances to other parts of the world in the seventeenth century, described in this study, more searching reviews of the cultural heritages of China, India, and the Islamic Middle East may be needed. At the same time, those who think that we have entered a "Pacific century," with Asian powers greatly outstripping the Western world, will want to ask themselves just how this might be accomplished. The question is how those Asian societies and civilizations can so rapidly remake themselves as leaders in science, education, and political development against a background of stagnation for centuries between the sixteenth and the present centuries.

Can a resurgent Confucianism now emerging in China give it the necessary twenty-first-century grounding essential for a modern, democratic, borderless economy? Can the growing Hindu nationalism and ultranationalism (Hindutva) of India give it the foundation for the same modern postindustrial, global economy now emerging? And can the new Islamist orientation that has swept the Muslim world in the twentieth century provide the transformative intellectual foundations required for full participation in the increasingly secular, high-tech, knowledge-based economy?

Anyone who ponders the existence of the World Wide Web and its origins in the United States and Europe will doubtless come to the conclusion that many aspects of the extraordinary economic and technological growth of the early twenty-first century were made possible by scientific and technological advances designed in the West. Their globalization has brought seemingly infinite possibilities to all parts of the world. Great economic powers have come and gone, which makes one think that there may be far more gold in properly designed educational institutions and deep commitments to scientific inquiry than there appears to be in the ubiquitous marketplace.

On the roads to modernity, we are accustomed to identifying the Industrial Revolution of the eighteenth century as a great landmark. The

present inquiry will lead us to consider whether that great transformation could have taken place without the scientific revolution and, above all, Newton's *Principia Mathematica* and the related developments in astronomy and the science of mechanics that occurred uniquely in Western Europe. It may be more than coincidence that the absence of those developments in other regions of the world had something to do with the economic and political stagnation that persisted outside Europe (and Europe overseas) all the way to the mid-twentieth century. Such are some of the questions that need to be examined in an age of apparent instant thought and communication that has everyone wired.

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