

a new food-standards agency, independent of government and industry, to act in the interests of consumers. Many scientists were not enthusiastic about this change. But those who have worked in the system realize that good regulation and transparency are not enemies of progress.

The banking industry is waking up to

the fact that advanced knowledge helped to create profits beyond imagination, but that greed and secrecy played a part in its near-downfall. *Animal Spirits* gives hope that such knowledge can be a force for good. *Fool's Gold*, meanwhile, reminds us that this must go hand-in-hand with transparency and keeping the public interest uppermost. ■

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**Ehsan Masood will chair a Nature debate on science and the financial crisis in London on 21 September — details at <http://tinyurl.com/nc9pvn>. For more on the economy, see <http://tinyurl.com/nlb76n>.**

# How Spain redrew the world

## Secret Science: Spanish Cosmography and the New World

by María M. Portuondo

University of Chicago Press: 2009.

360 pp. \$45

In the autumn of 1571, Juan López de Velasco, an ambitious legal scholar with one eye on the heavens, accepted the coveted position of chief cosmographer and chronicler to Philip II, the King of Spain. Velasco received a salary hike and a trunk filled with invaluable documents collected by his predecessor. In the years that followed, the maps, treatises and narrative accounts found inside the trunk revealed the geography of a new world to this enthusiastic map-maker, whose job included updating the empire's navigational charts and keeping ships' pilots and government bureaucrats informed of any new geographical data retrieved from overseas. Velasco sat at the centre of one of the most successful information-gathering operations the world had ever known. But his work remained secret for centuries.

Thanks to several recent studies, the private knowledge held by generations of servants to the Iberian Crown — and hidden for centuries in dusty archives — has now been thrust into the public eye. One such study is María Portuondo's impeccably researched book on Spanish cosmographical practice. Cosmography was a discipline that involved creating textual descriptions of the known world using charts and images similar to those bequeathed to Velasco. The early modern equivalent of satellite-enhanced telemetry, these colourful cartographic images served sixteenth-century monarchs and their ministers in pragmatic ways. They were used for plotting trade routes, tracing the design of new cities, conceiving military campaigns and imagining the world's emerging political boundaries.

At stake in these materials was the very nature of scientific practice itself. Long before Galileo Galilei cast doubt on the existence of an Earth-centred Universe, Spanish navigators and royal cosmographers were already working to overturn centuries of received wisdom about the layout of the cosmos and Earth's place within it. Science, and the direction of the modern world, would never be the same.

Cosmography was Renaissance shorthand for several modern disciplines: astronomy, history, geography, anthropology, navigation and the study of nature. Practitioners brought together these techniques with the classical

New World and a crescendo of reports from Spanish pilots heralding islands and continents that were previously unknown, cosmographers had to quickly adjust the master chart of the world, held at the House of Trade in Seville, Spain's central clearing house for geographical information. Eyewitness observations from the Americas would trump ancient theories as the world map was redrawn.

In the past two decades or so, some Spanish historians of science have adopted a defensive tone when discussing the supposed lack of Iberian prowess during the scientific revolution — as compared with the better-known discoveries made by northern Europeans such as Francis Bacon, Johannes Kepler or Isaac Newton. They argue that Spanish and sometimes Portuguese navigators were precursors to those 'revolutionary' scientific activities. Spanish pursuits in astronomy, navigation and other empirical disciplines, they assert, have historically been neglected or ignored owing to long-standing prejudice and misinformation.

Particularly refreshing in Portuondo's tale is the absence of such an attitude. Rather, she shows how a cast of eclectic men of letters in service to the Spanish crown set out to change the image of the world. They developed elaborate geographical questionnaires to learn from local populations, and sponsored programmes of celestial observations — during lunar eclipses, for instance — to make a global network of field laboratories out of their monarch's territorial possessions, even though the results were never publicized beyond a privileged few.

Similarly to Velasco's chest of cartographic treasures, Portuondo's study reveals valuable evidence with which scholars can refashion their images of the Renaissance world and the achievements of Spanish science at the dawn of modernity. ■

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Discovery of the New World stretched geographical boundaries and Spanish cosmographers' skills, exemplified in this 1580 map of Oaxtepec, Mexico.

and biblical narratives describing the shape of the known world, which, at the time, stretched barely beyond the African coast and Asia minor — as described by influential geographers such as the Greek Strabo and the Roman Pomponius Mela.

But in 1492 everything changed. Once Spanish galleons had crossed the Atlantic under the command of the Genoese navigator Christopher Columbus, Spanish cosmographers were forced to reconcile increasingly contradictory ways of thinking. With the discovery of the

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