Book Review

Minute genius: A tribute to the role of Italy in the development of science

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Ingegni Minuti, by Lucio Russo and Emanuela Santoni
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In a recent book, 'Ingegni minuti', Lucio Russo and Emanuela Santoni describe the development of science in Italy and the global contribution of Italian scientists in plain, non-academic language. The authors, a university professor of Probability Theory and a high school teacher, start by trying to give a definition of science to distinguish it from other fields of human knowledge. They define science as 'an ensemble of knowledge formed during several centuries that, though variable in content and methods, yet shares some fundamental features that allow it to be distinguished from other cultural issues. Moreover science implies theories which have an internal logic and an explicit, testable relationship with the real world'. Further, they acknowledge the ever-present risk in writing a history of science, which is to be caught in the so-called 'foundation myth', which assigns epochal discoveries to a single 'great genius' coming out of nowhere. Instead, they demonstrate that a discovery commonly attributed to a single scientist is due to a chain of partial observations and ideas from a number of sources. The achievement of the individual is to absorb these apparently disparate concepts by osmosis and to synthesise them into a unique theory or product.

In the Italian context, the book emphasises two particular features. First, after the Dark Ages and during the Renaissance, there was intense interaction between artists and scientists, and, indeed, the two activities were often manifested in the same person. Many examples are reported in the book, such as Piero della Francesca and his fellow Luca Pacioli, or Leon Battista Alberti, Giovanni Dondi (Figure 1) together with the less known Agostino Scilla, not to speak, of course, of Leonardo da Vinci.

Another historical feature of Italian science has been the influence of the Catholic Church. Indeed, and contrary to other European countries, the Italian universities were forbidden from hosting Theological Faculties, a rule that still applies today. Therefore, in Italy, the 'basic' sciences, like mathematics, physics and even astronomy, were cultivated mainly inside the Faculties of Medicine. In many other countries, these fell within the Faculty of Arts which, because of their association with the Theological Faculty, brought the obvious outcomes in terms of bias and restrictions on free enquiry. Thus, the Italian physicians were acquainted with the liberal arts of Trivium (grammar, dialectics and rhetoric) and of Quadrivium (arithmetic, geometry, astronomy and music). In particular, Italy already had a long-standing tradition in this field with the famous Medical School of Salerno (Scuola Medica Salernitana).

Ingegni Minuti is full of similar interesting observations, which may help explain many aspects of the status of science today in Italy and also emphasise the role of scientists in the unification of the country. A major point is the historic separation between research and industry. Until now the contribution of industry in supporting science both politically and economically falls well below that of other developed countries. The book also reveals that an 'Italian' scientific community was present and operating well before political unification (1860). Scientists from different parts of the country

Figure 1 Astrario of Dondi (1330–1389), Padua, reproducing the star movement, and hence 'avoiding' experimental observation.

were in continuous contact and, very early (from the 16th century), already communicated with each other in Italian or rather in Tuscan, which was then the most widespread 'vulgar' language. Finally, and peculiar to today's Italian academy, the authors report that the interuniversity mobility in the 16th and 17th century was proportionally much higher than nowadays.

Two more aspects of this book deserve mention. When speaking of the Italian contribution to scientific development, Russo and Santoni by no means restrict their history to Italian-born scientists. Instead they emphasise the contribution of foreigners to the Italian scientific milieu in the past. Just to mention a few, the famous anatomist Andrea Vesalio was born in Flanders and, after studying in Louvain and Paris, became professor of Medicine at the University of Padua. Another example is that of the Danish scientist and priest Niels Stensen better known as Niccolò Stenone, whose studies on fossils in Tuscany opened the new fields of geology and palaeontology.

In contrast, the work of Italians outside the borders of the country is not considered here; for example, the accomplishments of the mathematician Giuseppe Ludovico Lagrangia, born and educated in Turin and universally known as Joseph-Louis Lagrange, and those of the physicist Enrico Fermi, after his enforced emigration from Italy.

A thorough bibliography is given at the end of the book, together with an analytical index of names. However, the lack

of a general and of a subject index makes it sometimes difficult to navigate and find the information needed.

In conclusion, *Ingegni Minuti* is a highly recommended reference work for anyone interested in the development of science, in which Italy has historically made such a major contribution. This outstanding contribution is partly because of particular geographic location of the country and to its ability to take advantage of the scientific contents of ancient Greek manuscripts, first collected and translated in Italy by Greek refugees mainly after the fall of Byzantium. Thus, the flow of scientific achievements was brought to the modern era through a further channel besides the well-known role of Arab scholars, as already discussed by Lucio Russo in a previous book 'The forgotten revolution', which in 2004 deserved a comment in the *Nature*.

Conflict of Interest

The author declares no conflict of interest.

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