



BOOK REVIEW

FROM PLATINUM RODS TO PLANCK'S CONSTANT

Terry Quinn, *From artefacts to atoms: the BIPM and the search for ultimate measurement standards*. Oxford University Press, 2011. Pp. xxviii + 432, £70.00 (hardback). ISBN 978-0-19-530786-3.

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This is an epic time for world measurement. Over centuries, human beings have depended on physical objects to provide unit standards—rods of metal for length, for instance, or lumps of stone for mass—that were subject to wear, decay, and even loss. Recently, however, the organization that supervises the world's measurement system, the International Bureau of Weights and Measures (BIPM), set itself on track to replace artefact standards with natural constants, in conjunction with a reorganization of unit definitions. It is, declares Terry Quinn, the 'greatest change in the conceptual basis of the world's system of weights and measures since the time of the French Revolution.'

Such a development makes this an opportune time for a history of the institution that brought it all about. However, histories of scientific institutions are difficult to write. They involve many intersecting stories that overlap, both thematically and chronologically. Writing the history of an institution is even trickier when the author was a player in the unfolding tale, skirting the danger of skewing the narrative from personal interest—and not only was Quinn BIPM's director (its first British head) from 1988 to 2003, but he also spearheaded the recent epic transformation.

Fortunately, Quinn turns out to be a superb historian. He provides a marvellous picture of science in action: of people, politics, institutions, technology, skills and science, and of how they all blend together. If the BIPM were a person who sat down to write a memoir of its life in a clear-headed, sober way, it would resemble something like *From artefacts to atoms*. It is unlikely that this subject will ever be covered more carefully, and with a better historical and scientific sense.

Quinn begins the story with the Great Exhibition of 1851 in London, which helped initiate events that would culminate, a quarter-century later, in the historic Metre Convention of 1875—one of the great landmarks in global cooperation. Quinn, who read the essential documents with care and in their original languages, combines the personalities, politics and science so well that at times one gets the uncanny sense that he was there listening in.

The story continues with the establishment of the BIPM, the creation of the first prototype standards, and the institution's early scientific work. Quinn provides a detailed description of such things as the problems of melting and casting the platinum–iridium metal used for the prototypes, evidently relying on first-hand knowledge of the difficulties of the process. The same is

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true of Quinn's description of processes such as the calibration of the prototypes—which involved considerable skill and was anything but routine—and he is able to add dimensions to the description that few others could provide.

Quinn also covers the General Conferences on Weights and Measures that followed the establishment of the BIPM, the creation of national metrological laboratories, technological innovations such as the invention of Invar, and the transformation of the metric system into the SI, the 'International System'. Other issues covered include traceability, legal metrology and mutual recognition. To illustrate Quinn's remarkable sense for the telling detail, let me cite his discussion of the creation of the journal *Metrologia* in 1965. The 'real reason' for the journal's creation, Quinn reports—which was left unsaid in all the reported discussions—was to circumvent Article 19 of the Regulations of the Convention requiring all reports and publications of the Bureau to be in French. This made sense at the time of the signing of the Convention, when French was the language of diplomacy; it had lost its rationale in 1965 but would have been onerous and time-consuming to change. The episode thus illustrates the often-creative challenge of managing an international institution amid changing conditions.

Quinn's scholarship is sound, conveyed with good judgement of what is important and what not. The danger of history written

by someone who has carefully read all the documents and minutes is to become lost in minutiae, and to lose sight of the big picture. That does not happen here. When we read about things such as failing banks, the price of oil, cracking foundations, poor climate control, construction permits, pension funds, national tensions, budget issues, interruptions due to war, and melodramatic personal stories, it is because each of these in some way is important to the unfolding history of the BIPM.

This book is an essential reference book for any historian of science. Many scientists will also be interested in it, given metrology's role in research. The book will also interest those occupied with globalization, international cooperation, the history of institutions and the history of specialized times such as the Cold War.

There is a passage at the end of G. H. Hardy's *Mathematician's apology* in which Hardy wonders whether it is better, when telling a story about scientists, to represent people high up on a pedestal, like Nelson's column, so that you get a grasp for their eminence but fail to see the human details—or up close, where you see the human details and flaws but lose sense of their achievements and greatness. A similar conundrum faces those who write about institutions—whether to stand back and look at their impact, or pull the focus in close on the operations. In this book Quinn has somehow managed to accomplish both.