

## Book Reviews

*Chemical Sciences in the Twentieth Century*, ed. by CARSTEN REINHARDT, Wiley-VCH, Weinheim, 2001, xviii + 281 pp., EUR 80.78 [ISBN 3-527-30271-9].

Writing about recent science is very difficult. On the one hand, there are popularizers and journalists whose job it is to get it across to those who are not expert: and they will have an agenda. Professors of chemistry would like them to emphasize what interests researchers in the mainstream, and see them as underlaborers more-or-less accurately getting across material that cannot be strictly conveyed to those without mathematics and experience in handling apparatus and performing experiments. In this view, their job is evangelism and apologetics – and though the belief has often been falsified, most scientists dream that if people understand science better, they will love it more (and happily pay for it). This might apply to its history as well: and indeed a hope that the image of chemistry would be brightened lay behind the European Science Foundation's support of a splendid (but austere academic) project on the development of the science between 1789 and 1939 – dates significant in both political and chemical history, with books by Lavoisier and Pauling. Popularizers like history to be full of heroes struggling against the odds and against sceptics, and crying 'eureka'. We know that history is not always edifying – but popularizers too may refuse to be advocates for the powers-that-be, seeing eminent scientists as a bunch of Frankensteins and seeking to debunk their pretensions and refocus their energies, while taking great interest in the 'alternative' science

and medicine which most in the field would consider beneath notice.

Either way, this popularization is not serious history: anybody familiar with an event or a place will know how wide of the mark journalistic accounts always seem to be (a sober thought when we take them on trust for stories more remote). And on the other hand in studies of recent science, there are the review articles written by distinguished scientists surveying important work in their field. These are essential to practitioners, but almost unreadable by those outside: and it is important that they should be 'whig' history (written from a present-day perspective) rather than critical and contextual history. Just as lawyers look to the past for useful precedents rather than for understanding other societies, so chemists want something useful in their present predicaments. Their roll-call of the eminent will change with the decades, and this kind of history must be in part a rational reconstruction rather than a careful attempt to get inside the skin of participants. Review articles (we might note) also save much time in libraries, and give useful references to be cited unread – a bad habit one tries to stamp out among students, reminding us to be suspicious of citation figures. Beside these, we have obituaries (again written by eminent contemporary scientists) which can be very illuminating but are subject to the conventions of the genre and will tend to be whiggish; and interviews with the elderly and distinguished, which may be capricious (nobody is on oath in memoirs or interviews) and must be partial, though often illuminating. There is no time to stand back, or for the test of time.

For the historian, therefore, there is not very much room to manoeuvre, to

bring in the longer perspective, the fuller view, the considered judgement. Fifty years ago, historians of science concentrated mostly upon the 'Scientific Revolution' of the seventeenth century, leaving later periods to the industry of scientists, active or retired: and chemistry did well over the years out of such careful and scholarly researchers as Berthelot, Ostwald, and Partington. But professional historians then moved into the nineteenth and early twentieth centuries, as the success of the ESF program indicated. They asked different questions, and hoped for a rather different audience: not just of scientists interested in the past of their discipline, but also of others wanting to fill out a view of the past dominated by politics or by social history – placing chemistry for example in its context, and asking why people wanted to do it (or anyway hear about it) and what it was for. This was not too difficult because men of science like Davy, Liebig, Faraday, Hofmann, or Wurtz were accustomed to getting their work across to inexpert audiences. They were not yet writing the compressed and symbol-loaded prose, in the passive voice and full of abstract nouns, that we associate with twentieth-century science: and they hoped to excite their hearers or readers into taking up chemistry, rather than simply get them through a syllabus. John Herschel could say of astronomy by 1830 that without a sound and sufficient knowledge of mathematics nobody was qualified to form an independent opinion on any part of the science: but that was not yet true of chemistry until the twentieth century. We can guess who will want to read reviews or obituaries: but who is the audience for history of twentieth-century science which is not popularization? Equations, algebraic or chemical, are a great turn-off: the coming of teams of experts working with modern instruments presents less human interest than Berzelius or other heroes working in the kitchen with blowpipes and test-tubes, or struggling to get a laboratory built. Without a degree in chemistry, or

involving a good deal of it, it would be difficult to find much sense or interest in Carsten Reinhardt's volume – and that is a problem in our world of two (or more plausibly, many) cultures.

The book comes with an attractive cover showing chemists with the glassware of 1900 and the complex instrumentation of 2000: the days of 'stinks' are long past. Inside, ROALD HOFFMANN kicks off with thoughts on why chemists need history: because it is interesting, human and personal, and reveals process – giving it real spiritual value. CHRISTOPH MEINEL in his preface provides background, and then CARSTEN REINHARDT sets out the general themes that will run through the book: disciplines, fields, and boundaries. Reduction, unification, incursions from mathematics and physics, and work in teams have changed the way that sciences have looked since the major boundaries were drawn in the research universities of the nineteenth century: making 'subdisciplinary' and 'interdisciplinary' into potentially useful categories within sciences. Borderlines do indeed feature throughout the book, between academe and industry as well as between disciplines: and indeed industry, materials science, instrumentation, health and safety, and the growth of research schools are prominent in these stories, along with accounts of the coming of quantum chemistry and various specialisms.

Exponential growth has meant that a history of twentieth-century chemistry involves a cast of thousands: we do occasionally get overwhelmed by numbers, but the authors have often focussed upon individuals and their situations. Thus we find a good deal about Coulson, Bonino, Barriol, the Noddacks, and Polanyi for example, and this can help concentrate discussions which might otherwise be very abstract and general. They can also be full of human interest which might not be expected in theoretical chemistry: of political involvement (with Mussolini's fascists), and of winners and losers. The study of losers, of

mistakes and unrealized possibilities, is always worthwhile in history; and here it pays off too, and allows authors to raise the question whether (as biographers of Lavoisier have wondered) the honor and glory goes to the ambitious bastards. We also meet conservatism about innovations, theoretical or instrumental, which historians have learned to expect at all times and places. One unsurprising feature is that whereas (as Wurtz in fact ruefully realized) nineteenth-century chemistry was a German science, the twentieth was the American century – important things happened elsewhere, but it was the research schools in the American universities and their links with industry, brought out particularly by Nicolas Rasmussen, that were dominant.

We look at the rise of cosmochemistry, at radiochemistry, polymer science, and biotechnology, with authors who are good guides into these territories – though some of the papers would have benefited from a read-through by a native speaker of English. And we end with BERNADETTE BENSUADE-VINCENT looking at materials science and raising the question whether chemists have a future in this new world. Chemistry has such a long past that it would be surprising if like some dinosaur it were to become extinct; but while sciences are not social constructions, the boundaries between them clearly are – and ‘chemistry’ might cease to be a useful label. But we can infer from these studies that chemists are likely to continue to be crucial figures in the research teams which, to the continuing bafflement of lay people, will carry science forward as an intellectual, a practical, and a social activity.

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ALLEN G. DEBUS: *Chemistry and Medical Debate. Van Helmont to Boerhaave*, Science History Publications, Canton MA, 2001, xvii + 277 pp. [ISBN 0-88135-285-3].

In the field of the history of science Allen G. Debus deserves to be ranked among the innovators. In his pioneering studies, he has presented such figures as Paracelsus and Robert Fludd as subjects worthy of study. Within a domain that was dominated by physics and astronomy, he saw a space for chemistry. He has placed the history of medicine within a wider scientific, religious, and philosophical context and has characterized the ‘chemical philosophy’ as a third force between the declining Aristotelianism and the rising mechanical philosophy. He has always highlighted the close relationship between the spread of humanistic ideals, the increase in philological skill, and scientific progress in the early-modern period (from this point of view, his *Man and Nature in the Renaissance* is exemplary). He has never missed the opportunity to emphasize the connections among such cultural factors as religious humanism, biblical studies, and textual authority in the making of the scientific enterprise, most of all the cross-referencing of the great book of nature and the Scriptures. Last but not least, he has never undermined the role of the educational establishment and the pedagogical implications of the new science.

In this volume, Debus retraces the principal results of his studies, specifically focusing on the debate between chemistry and medicine, a debate that was triggered in the 16<sup>th</sup> century by the appearance of the Paracelsian oeuvre and that was far from concluded at the end of the eighteenth century. One of the great merits of Debus’ book is its far-ranging scope and the attention to long-term developments in the history of science. It is indeed the case that teleology has become anathema in the field of historical studies of late. One ought to ask