

*Up from Generality: How Inorganic Chemistry Finally Became a Respectable Field*, Jay A. Labinger, Springer, Heidelberg and New York, 2013, ix + 77 pp, ISBN 978-3-642-40119-0, \$54.99, softcover (ISBN 978-3-642-40120-6, \$39.99, eBook).

Science wars constitute an everyday occupation of scientists. Indeed, science is carried out by heterogeneous communities of research and education in competition for limited quantities of economic, political and symbolic capital. Each scientific community tries to rake in as much funding, power, and recognition as its members think they deserve according to their advancement of knowledge and their development of applications. A structural feature of science and an inner factor of dynamism, science wars drive the history of science and technology. This is the underlying idea used by Jay A. Labinger in his latest book about the history of inorganic chemistry in the United States from the nineteenth century onwards. The main thesis of *Up from Generality: How Inorganic Chemistry Finally Became a Respectable Field* is that the development of inorganic chemistry in US Academia can be read as a gradual process that turned a fuzzy, backward sub-field of chemistry in the late nineteenth century into “an independent, intellectually viable discipline” (p ix) during the second part of the twentieth century, at equality with “the other main branches of chemistry,” organic and physical chemistry.

The explicit goal of this short historical monograph of seventy pages or so is to demonstrate how and why inorganic chemistry passed from minor to major status among chemical sub-fields during the twentieth century. In spite of a broad title, the scope of the book focuses on American Academia during the twentieth century. The demonstration consists of an introduction, four chapters, and a conclusion. For each chapter, the current review describes the historical content and analyzes the argumentation and methods. The introduction is a seven-page chapter that mixes personal reminiscences, other testimonies, and selected citations from historical textbooks. It stresses the discrepancy from which the book originated: an increasing prestige of inorganic chemistry experienced by the author himself when he was a young inorganic chemist in the 1960s in US Academia; a weak status and a negative definition—what is not organic—in the nineteenth century and still in the late 1960s at Harvard, the field being “more or less conflated with general chemistry” (p 2). The entire demonstration thus relies on a regressive logic from the present to the past. The major risk of such a perspective is to replace a complex historical process made of contradictions,

incoherencies, and alternatives, by an over-simplified one-way road to the present.

The core of the book consists of four well-balanced chapters of a dozen pages each with several archival pictures of scholars and a bibliography at the end of each chapter. Chapter 2 gives a short historical account of inorganic chemistry in the nineteenth century thanks to several top-rank textbooks on the history of chemistry. The synthesis is interesting even though it magnifies the heroes of chemistry like Dmitri Mendeleev for the periodic table of elements and Alfred Werner for his theoretical contribution to coordination chemistry. One can regret that the selected quotations of the two first chapters are systematically used to stress one single idea—the sociological weakness of inorganic chemistry in the science wars against organic and physical chemistry—whereas neither explicit definition nor list of sub-fields is given to explain what was the inorganic chemistry of the time. The author usually takes for granted the (implicit) features of the inorganic chemistry he has known during his career. Instead, a temporal analysis in the changing definitions, sub-fields, practices, institutions, identities, etc., would have been much more convincing to explicate the *historicity* of inorganic chemistry from the nineteenth century onwards. Thus, the discipline is *naturalized* through expressions such as “birth,” “renaissance,” and “premature,” as if there was an essence of inorganic chemistry.

Chapter 3 describes the building of inorganic chemistry in US Academia during the twentieth century and stresses “a major transition in [its] status” in the 1950s and 1960s (p 17). It convincingly crosses a set of anecdotes told by some American and British inorganic chemists and a thorough quantitative study. This study, whose method is detailed in an appendix (pp 73-75), relies on statistical correlations to demonstrate that the institutional representation of inorganic chemists (for example, the number of rewards) reveals the symbolic status of inorganic chemistry (for example, respectability). It focuses on two central institutions in US Academia: for science in general, the National Academy of Sciences; for chemistry in particular, the American Chemical Society, including the *Journal of the American Chemical Society*. A good quantitative analysis would have required a qualitative discussion about the choice of variables and the meaning of results. Why, for example, does the method favor published articles and institutional rewards rather than university chairs? Why is there no mention of industrial applications, patents, or companies?

From the national level of chapter 3, chapter 4 dives into the local dimension of one laboratory of Caltech. The

goal is to stress the importance of personal factors—the rivalry between Donald Yost and Linus Pauling—to explain scientific dynamics and inertia. This detour allows the first exhibition in the book of archival documents (apart from pictures): a list of faculty chemists drawn by Pauling in 1944 in which Yost did not appear (p 37). A first definition of inorganic chemistry extracted from a 1930 Caltech curriculum is also given here, which is very late. This chapter could have given the opportunity to discuss the different available sources and to organize them into hierarchy since a 1930 curriculum of Caltech, a 1944 memo by Pauling, a 1956 conference from Ronald Nyholm, and a 2002 testimony of Fred Basolo do not have the same status as sources of information.

Chapter 5 shifts from description to explanation. It tries to justify why inorganic chemistry gained social “respectability” from the 1950s onwards. This is the most questionable chapter of the book because historical clues are replaced by inner conviction. The author mentions “external” factors (quantum theory and experimentation) that may have played a role but he prefers to pray for his own chapel: “I find it hard to accept that the major impetus came from outside the field [...]: inorganic chemists themselves were the movers and shakers” (p 51). The main “agents [...that] made inorganic chemistry truly respectable” were the domains of “asymmetric catalysis” and “organometallic chemistry” through the comprehension of reaction mechanisms. This is a strong claim but there is no historical evidence to support this: four reaction mechanisms are given with current notations and without publication reference (pp 53-55). There is a confusion between history and memory here. Indeed, the *curriculum vitae* of the author reads: the “chemistry research [of the author] has been focused in the areas of organotransition metal chemistry and energy-related catalysis. Many of his contributions have taken the form of mechanistic explanation” from the late 1960s onwards (p 77). The author is so linked to the milieu from which he seeks to write the history that he deeply relies on personal feelings and memories. To this respect, the academic lineages (p 60) are interesting to question since they are both historical tools to understand intellectual and institutional genealogies and family trees to identify the self and the others (the author belonging to the lineage of John Osborn).

The conclusion (chapter 6) shifts from history/memory to the sociology of scientific disciplines. It aims to account for the formation of inorganic chemistry through the four-item model of S. Frickel and N. Gross to define “scientific/intellectual movements:” avail-

ability of resources, dissatisfaction, mobilization, and identification of people. At the end of the conclusion, the different sub-fields of inorganic chemistry are eventually listed. Besides the already mentioned coordination and organometallic chemistry, the author adds bioinorganic and solid state chemistry (linked to materials science), which developed from the 1960s onwards (p 66). So why ignore them in chapter 5 (and more generally all over the book) to account for the rise of inorganic chemistry? It is also a pity that the identification of inner factors prevents the consideration of broader evolutions of the twentieth century, including instrumental revolutions, cold war, industrial developments, and the policy-making of technoscience.

To conclude this review, how can *Up from Generality: How Inorganic Chemistry Finally Became a Respectable Field* be read and understood? Certainly, the book is good reading, contains plenty of original anecdotes, citations, and memories from English-speaking inorganic chemists, and introduces a heuristic quantitative approach. Its scope is certainly narrower than expected: the book is a contribution to the history of coordination chemistry, a sub-field to which the author belongs. To write a history of inorganic chemistry would have required taking into account several other sub-fields such as high temperature materials, solid state chemistry, gas chemistry, etc. It is interesting and valuable that scientists contribute to the history of their own science since they know the culture from inside. This may, however, lead to a discourse of legitimation of the self (with regards to others) and of the present (with regards to the density of the past). In another context, the historian of mathematics Ivor Grattan-Guinness called this attitude the “royal road to me.” Labinger’s book presents the *royal road* to (current) inorganic chemistry as a gain of “respectability” by the “generalization” of theoretical frameworks. The narrative is a systematic trial to show that all the elements of the science wars converge towards the restoration of the injustice (from backward to forward status) and the advancement of the rationality (from singularity to generality). In the meantime, it lacks the complex interactions between human beings and natural things that drive the history of science and technology. When epistemic, technical, economical, political, social, and cultural factors are in interaction, justice and rationality become nothing but two small pieces of the historical puzzle.

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