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The discovery of radioactivity, its physical properties, and its biological effects, transformed scientific and popular worldviews over the course of the twentieth century, upending existing understandings of everything from basic physics to the dynamics of international political power. But although this shift had global implications, its origins were chronologically and geographically bounded. Historiography on nuclear research and technology tends to focus on the post World War II era and on Cold War atomic powers, especially the Soviet Union and the United States. And historians of nuclear technology in Europe have highlighted German atomic research in the Nazi era, with the implied question of what might have happened had Nazi Germany succeeded in building a bomb before 1945, or countries such as France that made atomic energy a cornerstone of their postwar identities.

In this context, Austrian atomic research may not at first appear to be an obvious book topic. Austria did not promote nuclear research that directly threatened international security, it never sought to develop atomic weapons, and it was one of the few European countries to reject atomic energy during the Cold War. Nevertheless, as this volume shows, radioactivity research and atomic technology played an important role in twentieth-century Austrian science and politics. Further, in the first half of the twentieth century, Austrian radioactivity research was not a provincial effort that paralleled similar and more influential developments in countries such as France, Britain, Germany, the United States, and after 1945, the Soviet Union. Rather, Austrian scientists played a crucial role in shaping international understandings of radioactivity through their research findings, as active participants in international scientific networks, and as suppliers

of radioactive materials.

Before World War I, the Habsburg Empire controlled the only known European source of radium in Joachimsthal (Bohemia), providing Marie and Pierre Curie, Ernest Rutherford and other scientists with radioactive research materials. This domestic monopoly helped Austrian researchers take an early lead in radioactivity research. As Deborah Coen and Michael Stölzner show, researchers in Vienna's Exner circle emerged as key participants in international debates about radioactive fluctuation, radioactive decay, and Brownian motion within the first decade of the twentieth century. In 1910, the Austrian government moved to institutionalize and promote domestic research efforts, founding the Institute for Radium Research in Vienna – the first scientific institute in the world to focus specifically on the study of radioactivity. As essays by Beate Ceranski and Silke Fengler demonstrate, the Institute influenced international research networks until World War II both as a source of radioactive materials and as the locus of pathbreaking research. Further, Wolfgang Knierzinger and Christian Forstner show that the institute's researchers continued to play a critical role in biological and medical research in the 1930s, in the Nazi nuclear program during World War II, and in Austrian atomic energy research after the war. Similarly, Rainer Karlsch's essay on Soviet interest in Austrian nuclear scientists, radioactive materials, and equipment illustrates the country's standing as a research center, even though Karlsch argues that the Soviets were ultimately able to exploit more expertise and raw materials in post-war Germany than in Austria. Finally, although the loss of international research funding in the late 1930s, Nazi domination after 1938, and financial difficulties after 1945 eroded Austrian researchers' international position, the country still plays an important role in European debates about nuclear energy. A national referendum in 1978 banned nuclear energy from the country, providing a model for anti-nuclear movements elsewhere in Europe.

This collected volume edited by Silke Fengler and Carola Sachse is a product of the research project „Österreichische Kernforschung im Spannungsfeld von interna-

tionaler Kooperation und Konkurrenz," at the University of Vienna. In her introduction, Sachse argues convincingly that the history of nuclear research in Austria remains underexplored. Existing scholarship has focused on the period before 1938, the biographies of individual scientists, the Institute for Radium Research, or on the active participation of female and Jewish scientists in an era when they were still excluded from more established scientific disciplines. Sachse suggests that a broader framework is needed to understand the significance of Austrian nuclear science at home and abroad. She suggests that this volume paves the way for such an understanding by expanding the chronological frame beyond 1938 and into the 1950s and 1960s, as well as by emphasizing the importance of international scientific networks and of national and international politics on scientific research.

The volume's organization reflects the historiographical themes that Sachse describes as characteristic of existing scholarship on Austrian nuclear science. The first block of essays focuses on the period before the founding of the Austrian Second Republic in 1955, and particularly on the years between 1900 and 1938. The second explores the biographies of the scientists Carl Freiherr Auer von Welsbach, Marietta Blau, and Erich Schmid, highlighting the ways in which each researcher's life and scientific impact was shaped by changing economic, institutional, and political circumstances in the first half of the twentieth century. Finally, the last section focuses directly on scientific research and international scientific debates. As such, the volume does not turn the historiographical field on its ear. However, the essays do point in some new directions. In particular, they suggest continuity into the postwar period, showing that despite the decline of the Institute for Radium Research, the emigration of many scientists in 1938, and funding problems after 1945, Austrian researchers' pioneering work and international presence in the first decades of the century continued to shape nuclear science long after their early material and institutional advantages over their European and American colleagues had vanished. Further, many of the authors draw comparisons between Austria and other countries, especially

Germany, giving a clearer sense of how Austrian researchers and institutions compared to their contemporaries elsewhere. Finally, the volume hints at further questions to be explored. For example, Carola Sachse's introduction and Wolfgang Knierzinger's essay on the Research Institute in Gastein make clear that before World War II, Austrian radioactivity researchers and their Central European counterparts were deeply engaged in research about the biological effects and medical uses of radiation exposure, especially in spa settings such as Gastein. Since most lay people were more familiar with claims of radioactivity's health benefits than of its physical properties before World War II, further exploration of this research and its public reception would not only be interesting, but would provide additional political and cultural context of the kind that Sachse advocates.

Carola Sachse introduces this volume with an ambitious call for scholars to rethink the history of nuclear science as a global story shaped by national decisions. Although the essays that follow do not reflect a complete theoretical reframing of the historiography of Austrian nuclear science along those lines, they form a useful collection that highlights a diverse group of scholars' explorations of the dynamics and significance of Austrian nuclear science. These essays will attract most attention from historians of science, but their examination of how scientific developments and debates evolved in the turbulent political context of the twentieth century should make them of interest to historians of Central European intellectual and political history as well.

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