

Chapter 4

The Institute for Radium Research in Red Vienna

As this work has now been organized after several years of tentative efforts each collaborator has *his* or *her* [emphasis mine] particular share to take in making the practical preparations necessary for an experiment. Besides each has *his* or *her* particular theme for research which he pursues and where he can count on the help from one or more of his fellow workers. Such help is freely given certain workers having spent months preparing the means required for another workers theme.¹

When Hans Pettersson submitted this description of the work at the Radium Institute in a report to the International Education Board in April 1928, several women physicists were already part of his research team on artificial disintegration. A number of other women explored radiophysics and radiochemistry as collaborators of the institute, formed their own research groups, and worked alongside some of the best-known male physicists in the field. More specifically, between 1919 and 1934, more than one-third of the institute's personnel were women. They were not technicians or members of the laboratory support staff but experienced researchers or practicum students who published at the same rate as their male counterparts.

1

Marelene Rayner-Canham and Geoffrey Rayner-Canham have already drawn our attention to the fact that women clustered in radioactivity research in the early twentieth century. Identifying three different European research schools on radioactivity—the French, English, and Austro-German—the Rayner-Canhams argue that women "seemed to play a disproportionately large share in the research work in radioactivity compared to many other fields of physical science."² Through prosopographical studies of important women in these three locations, the authors address the puzzle of why so many women were attracted to this particular field. The explanations they propose focus mainly on the character of mentors, directors, and chief collaborators. The more supportive these figures were, the easier it was for women to be accepted into physics laboratories specializing in radioactivity. Once they gained professional access to the field, women developed strong networks and maintained close contacts with one another, thus fortifying and sustaining their positions.

2

A second set of explanations touch on research practices—the fact that radioactivity involved meticulous, routine, and repetitive work. The Rayner-Canhams, like many others, hold that women were more willing than men to

3

perform monotonous tasks and endure the hardships of dealing with radioactive materials.³ Finally, they point to the structure and the subject matter of the discipline as a reason for the unusually high concentration of women in it. In the early twentieth century, radioactivity was a comparatively new field that was thought to be on the edge of mainstream science.⁴ Because it lacked the strong male hierarchies of more established disciplines, it was easier for women to gain access; moreover, it had an aura of excitement for anyone seeking a meaningful career.⁵ In addition to such explanatory approaches, scholars have explored the role of women in early radioactivity research through a variety of biographical studies that aim to provide missing pieces of the history of the discipline, recover forgotten women scientists, or do justice to the role of Marie Curie as a pioneer in the field.⁶

While these approaches reveal the importance of women's scientific contributions, they also create a master narrative that presents radioactivity research in general terms, hiding differences among the various geographic localities and historical contexts. The lack of comparative analyses that take into account the particular institutional, cultural, and political circumstances of the different research schools strengthens the assumption that women clustered around radioactivity research in all European institutes. It also encourages a monolithic understanding of disciplinary practices and laboratory cultures by assuming that work in radioactivity involved tedious tasks that women performed more willingly than their male colleagues throughout the different institutional settings.

It is a fact that during the early twentieth century, women could be found in the most prestigious laboratories of the day, probing the chemical, physical, and biological phenomena of radioactive substances. Ellen Gleditsch in Oslo, Lise Meitner in Berlin, and Jarmilla Petrova in Prague are just a few of those who worked extensively in radioactivity.⁷ Nonetheless, studies indicate that the only institutes with a significant percentage of women researchers were the Radium Institute in Vienna and Marie Curie's laboratory in Paris. From 1919 to 1934 in the Vienna Institute, women accounted for 38 percent of the total number of researchers at the institute. At Curie's Institut du radium, women made up between 25 and 30 percent from 1906 to 1934.⁸ In contrast, although Ernest Rutherford welcomed and supported women's participation in science, there were no women among his students or collaborators in Cambridge during the 1920s.

Gleditsch seems to have had only a couple of female students in her laboratory, and it is still unclear whether there were any women experimenters in Meitner's group.⁹

Focusing on Vienna, I would like to complicate historians' general assumptions that there were a disproportionately large number of women engaged in radioactivity research in the early years. Largely unaddressed in earlier studies is the significance of the institutional context, particularly with regard to work culture and gender politics of collaboration in the major radioactivity research centers. I argue that a unique constellation of progressive politics and supportive, politically aware personalities created the local conditions that led women to play an extraordinarily significant role in the Radium Institute. 6

Universal suffrage in 1919 brought the Social Democratic Party (SDAP) to power in Vienna and gave them absolute control of the municipal government. In what has come to be called "Red Vienna," Social Democrats retained their power from 1919 to 1934 and carried out extensive social reforms. From the housing projects and educational reforms to the admission of women to those academic institutions that had tenaciously kept their doors closed to them even after the end of the First World War, the basic motive of the Social Democrats was to reconstruct the working and middle class according to socialist standards. Among the ongoing reconstructions was that of the meaning of sexual difference in Viennese society. The construction of gender was put forward through the party's discourse and its reformative social projects. 7

Having established their intellectual and political power through the control of the municipal government and some of the academic institutes, Social Democrats were able to provide a new conceptual framework for understanding the relationship between men and women. They challenged the traditional and dominant images that described social gender roles, reattributed meaning to sexual difference according to socialist ideology, and offered practical venues in which both men and women could personify these novel discursive constructions. It was within this framework that women conceived themselves and were able to become active participants in the new social and political status. 8

The impact of the First World War on the gendering of occupational positions played an additional role. As the Viennese mathematician Olga Tausky-Todd recalls: 9

Careers for women before World War I were, as far as I remember, primarily as teachers in girl's schools, secretaries, shop assistants, domestic service, nurses, dressmakers, and things of that sort. All this was changed greatly during the war and it never went back the way it had been, though some of the positions acquired during the war years went back to men afterwards. I remember very well in the buses and trams, the fares were collected by women and even the drivers were occasionally women. All secretaries were now women. Nurses had been given very intense training, including university courses, and their profession became highly respected. Women teachers had to have far greater training than was required before—even a Ph.D. in the better high schools.¹⁰

In that ongoing and busy construction of gender, the academic community occupied a central role. Although the socialist reforms were aimed mainly at the proletariat, the reformists, many of them members of the academic community, were nurtured in the Mediziner-Viertel. From the party leader, Otto Bauer, to the councilor for health and social welfare, Julius Tandler, to the key figure in the Vienna Circle, Otto Neurath, the socialists gathered in the Viertel, making politics through intellectual discussion. The Mediziner-Viertel was transformed into one of the main experimental laboratories where the Social Democrats instigated their social reforms. Benefiting from this ongoing political process, women entered several academic institutions. It is indicative that before the war, only one woman entered the university for every 12 men, but at the end of the Red Vienna era, the ratio had increased to 1:2.8.¹¹

The Institute for Radium Research and the field of radioactivity was just one example of areas where women were gaining entrance to a scientific field and succeeding with notable achievements. The political reforms merged well with the peculiarities of radioactivity research. As an interdisciplinary field, radioactivity offered scientists unique opportunities to cross disciplinary boundaries. This often proved a successful strategy for women in sustaining their role as active experimenters. However, only a few scientific institutes in Vienna were "Red." In general, well-established institutions such as the University of Vienna and the Austrian Academy of Sciences retained their conservative politics, proving the limitations of the socialist power.

Red Vienna: Politics and Gender

Peace treaties at the end of the First World War led to the establishment of the First Austrian Republic, with Vienna as its capital, in November 1918. In the elections of February 1919, the Social Democrats emerged as a strong political

power. Supported by the working class, especially in Vienna, the party was run by a group of progressive Viennese intellectuals, many of them Jewish, including Otto Bauer and Karl Renner. Realizing that they could not rule alone, they were forced to form a coalition government with the conservative Christian Social party.¹² A second coalition, formed at the end of 1919, with slight differences in parliamentary composition, gave the socialists the time to put forward reforms in education and the military and to secure the full legal equality of women under the constitution. However, the coalition was dissolved by June 1920, marking the end of the socialists' power at the national level.

Having achieved the two practical goals of the prewar feminist movement—the right to vote and admission to higher education—during these years, women seemed to have lost any specific motive for further political engagement.¹³ The lack of an independent feminist political forum, in combination with the support of women's rights by the Social Democrats, prompted many women to participate on the party's side. Apparently, feminists' support was decisive in the municipal elections of May 1919 when the Social Democrats won an absolute majority on the city council, holding 100 out of 165 seats. According to Anson Rabinbach, "The shift to Socialist hegemony" was in part "a result of the extension of the franchise to women and young adults."¹⁴ It is not a coincidence that by 1921, women accounted for 26 percent of Social Democrat party members in Vienna.¹⁵

13

While in power, the aim of the Social Democrats was to transform working-class culture and education, to alter the behavior of the workers, and to use the city as a laboratory for the party's social experiment. The architecture of Red Vienna is indicative of this transformation. The severe housing shortage forced the socialists to relieve the crisis by building new dwellings and improving the living conditions of the Viennese working class. The design and layout of the new buildings embodied communitarian values that the socialists wished to foster. Apartment buildings and complexes were located around a central courtyard. Their interior was characterized by small apartments with two rooms and minimal kitchen and bathroom facilities. Specific architectural structures imposed the party's culture and introduced unique gender relations and roles. The communal laundry and cooking facilities, a central housing office and meeting rooms for the tenants, and enforced building rules for access to space were intended to provide quasi-private environments. Playgrounds and kindergartens were designed to facilitate women's everyday lives between work and family. Although they were designed to reduce the burden on women, the new apartment buildings kept intact the underlying

14

assumption that children's care was a gendered task. The building planners and socialist designers sought to protect a few more traditional values despite their overall attempts to alter women's social position. For example, gender roles within the family became tangible in the managerial structure of communal facilities. In each building, there was a laundry supervisor who, besides scheduling the wash days for each family, "kept all but the women out of the washing facility (on the prudish grounds of protecting female modesty)."¹⁶ The gender division of labor within the household was apparent by the assignment of the traditional role of housekeepers to women.

Besides using architecture as a way to impose socialist ideology, the Social Democrats challenged the traditional gender roles and attempted to construct gender according to their views. The popular magazines of Red Vienna, the party's newspapers, the trade unions literature, and the mass media such as cinema and radio shaped the gender discourse of the 1920s, while further reforms made it possible for Viennese men and women to endorse the party's efforts. 15

As Helmut Gruber emphasizes, the "new woman" was presented as intelligent, educated, engaged in politics and social life, dressed in unrestrictive garments, and professionally successful. "The working class woman of yesterday—careworn in appearance, imprisoned by her clothes, unapproachable by those who needed her—was to be abolished by waving a magic wand."¹⁷ 16

The strategies for these transformations varied. By equalizing male and female wages, the socialists made it possible for women to gain status through their work. The city's social support services, such as nurseries and kindergartens, recognized women's double role as workers and mothers, while access to birth control and abortion became part of the socialists' program. New domestic technologies such as electric irons, sewing machines, and vacuum cleaners were supposed to reduce the burden of housework. Most important to women's emancipation were the educational reforms and the increasing role of public education in character formation (*Erziehung*) and intellectual training (*Bildung*).¹⁸ Especially for the Jewish women, as Edith Prost argues, "*Bildung* was a possibility for emancipation—emancipation as a Jew and as a woman."¹⁹ 17

The Social Democrats' tradition of supporting women's active social personae goes back even before the 1920s. The Verein Jugendlicher Arbeiter, the party's major youth organization, admitted women for the first time in 1914. In 1908, the party had established the Kinderfreunde, a parents association through which they 18

aimed to reduce the burdens of childcare that fell disproportionately on mothers.²⁰ Despite these efforts, some critics argue that the party's intended cultural, economic, and legal changes did not fundamentally alter women's subordinate social role. As Johanna Gehmacher claims, "The Social Democratic model of comradeship in gender relations merely covered the increase of women's reproductive tasks within the party's reform program."²¹

It is true that various municipal programs lacked sensitivity to gender issues in many ways. Nonetheless, it would be shortsighted not to acknowledge that, in fact, the Social Democrats provided the framework for a potentially unique political culture that would enable women to shape spaces for themselves in the factory, the laboratory, and the household. These advantages came at a high price, however. Women working in academia, especially, were often obliged to sacrifice motherhood, to accept an overly burdensome workload, and to settle for a diminished personal and intimate life. Yet the Social Democrats made it possible for them to enter the academic scene. Despite constant feminist petitions and political pressure before the First World War, women had been excluded from several academic institutions. The socialist political agenda in education forced these institutions to accept women as students.²²

In the academic year 1918–19, the Technische Hochschule, Vienna's Polytechnic, opened its doors to women. The next year, 20 women registered as matriculated (*ordentliche*) students and 17 as non-matriculated (*ausserordentliche*), most of whom chose the field of technical chemistry.²³ In 1919, the faculty of law did likewise, opening up the opportunity to women for the higher civil service, one of the higher status professions.²⁴ Additional reforms secured girls' entrance to boys' secondary schools and the state undertook girls' secondary education.²⁵ At the same time, the labor and feminist movements of Red Vienna gave a boost to the number of women enrolled at the city's university.²⁶ From 1919 to 1934, the number of women attending university studies was exceptionally high compared to the number of male students. (See Table 01/4.)²⁷

That means that immediately after the First World War, only 13 percent of students at the university were female; by the end of 1933–34, their numbers had reached 25 percent. (See Chart 01/4.)

As the next table indicates, the study of physics and chemistry was among the most favored fields at the University of Vienna. (See Table 02/4.)²⁸

The substantial increase in women's admission to university studies during the 1920s, as Edith Probst argues, came as a result of the reforms of the workers and feminist movements of Red Vienna.²⁹ What is also striking is the role of the academic community of the Mediziner-Viertel in that ongoing construction of gender. 22

Science in the "Red" City

Science in Red Vienna was interwoven into the social, political, and gendered fabric of the city, with the Mediziner-Viertel as its central cocoon. The urban space in and around the university functioned as a complex material and symbolic environment where the socialists implemented their educational reforms. Believing that real educational opportunities were vital to working-class progress, school reforms became the central piece of socialist politics. To transform secondary school education, however, required the establishment of a network of communal scientific institutions, which could support the socialist program. Otto Glöckel, president of the Vienna School Council in interwar years and undersecretary of education in the coalition government of 1919, was the leading figure of the educational reform movement. To realize his reform program, Glöckel first needed a new generation of teachers with academic training in recent child development and psychology methods. 23

In 1922, Glöckel offered the eminent German psychologist Karl Bühler one of the philosophy chairs at the University of Vienna. He was eager that the university appoint a philosophy professor with expertise in experimental psychology and Bühler fit his expectations. Bühler would be accompanied by his wife, Charlotte Bühler (née Malachowski), a Berliner Jew who was also a child psychologist. To the eyes of Glöckel, the two of them could turn Vienna into the center for psychology research. He was proved right. 24

The University of Vienna lacked a specialized department on psychology and thus negotiations with Bühler were threatened to fail. Negotiating for the city of Vienna, Glöckel guaranteed the establishment of a municipal institution that would be devoted to advancing teacher training and be used as a university institute on psychology. The agreement led to the establishment of the Institute of Psychology under the auspices of the city of Vienna in 1923.³⁰ Bühler was obliged to teach at the university while the city agreed to provide him the rooms and the funds for one assistant and one mechanic at the Vienna School Supervisory Council, located at 25

the Ring close to the university. In the following years, because of its prominence, the institute was the only European institution to receive funds from the Rockefeller Foundation to develop a biologically grounded theory of development.

The structure of the institute reflected the political tensions between the Social Democratic party and the Ministry of Education, controlled by the Christian Socialists. It was known both as the *Institute of Psychology of the City of Vienna* and the *Institute of Psychology of the University of Vienna*, revealing its double status. The one who most benefited from it was Charlotte Bühler, who was hired by the city as *Ordentlichen Assistentin* at the institute and de facto as a university assistant. It was not until 1929 that the university faculty accepted her as an associate professor. Charlotte also directed the Reception Center for Children (Kinderübernahmestelle), a modern observation center which decided the fate of abused or neglected children from problematic families. This was an initiative of the Public Welfare Office concerned with the lives of Viennese working-class families, a terrain where socialists tried to impose their norms of the orderly. The center provided for Charlotte the institutional space to advance her practical studies on children's psychology.³¹ 26

The socialists' attempts to document and resolve urban problems such as child abuse or disorderly behavior resulted in new ways of organizing scientific research—such as the around-the-clock observation of children's behavior at the Reception Center. The topography of the socialists' reforms pointed once again to the Viertel. The Reception Center for Children was intentionally located in the ninth district, close to the university and the Rathaus, the center of the social power. Karl Bühler held a Wednesday night psychology colloquium at the institute. Participants frequently moved the meeting at late evening for dinner to the Regina Hotel, across from the Chemistry Institute on Währingerstrasse.³² 27

As Sheldon Gardner and Gwendolyn Stevens argue, "Viennese psychology revolved around the university; even the private mental health practitioners sought the prestige that accompanied academic affiliation."³³ Thus, the city was shaping science in two ways: through the Social Democratic party—its political representative—and through its urban space which provided the subjects and the sources for psychological research as well as the cultural environment for social intermingling. 28

Besides sponsoring innovative projects, Charlotte Bühler was opening doors for women. Many young and committed educationalists entered the institute, among them prominent female psychologists such as Marie Jahoda, Edith Weisskopf, Else Frenkel-Brunswik, Else Köhler, and Editha Sterba.³⁴ Lote Danziger was Charlotte's assistant and Käthe Wolf offered courses in child psychology. The boldness of Jahoda's words is indicative of women's new self-conception during Red Vienna: "At the time, I was completely convinced that I would once become socialist minister of education in Austria. There was no question about it!"³⁵ 29

Psychoanalysis was another attractive scientific enterprise for women during Red Vienna. As Allan Janik and Hans Veigl remind us, "Freud's clientele consisted principally of the sons and, above all, the daughters of Ringstrasse participants."³⁶ The city, and especially the area around the Viertel, provided an essential cultural milieu to be used as a source for Freud's practice as well as ready access to the desired academic respectability that the title of a professor at the University of Vienna carried. From 1873 to 1885, Freud studied at the University of Vienna, lived his passion for physiology and neurology, and after graduation, took a lower post at the general hospital.³⁷ 30

In late summer of 1891, Freud chose to move into a spacious middle-class apartment at Berggasse 19, a street running parallel to Türkenstrasse in the Mediziner-Viertel.³⁸ His works on hysteria, the interpretation of dreams, and the psychopathology of everyday life found a wide audience among the upper-class, especially Viennese women. After he was appointed as an associate professor at the University of Vienna in 1902, his apartment on Berggasse became the meeting place for four physicians. Every Wednesday, the group, known as the Wednesday Psychological Society, discussed psychoanalytic issues. Including more than a dozen participants by 1908, the group adopted the designation of the Vienna Psychoanalytical Society and was registered under this name as a local group of the newly formed International Psychoanalytical Association in Vienna. Freud moved his office to Berggasse 35, an ideal location for his work. 31

During the First World War, practically all activities of the society ceased and only resumed operations after its end. A second-generation of analysts, most of whom had already undergone formalized training, such as Freud's daughter Anna, Helene and Felix Deutsch, Edward and Grete Bibring, Wilhelm Hoffer, Wilhelm Reich, Richard Sterba, Otto Fenichel, and Siegfried Bernfeld took over the society. Women played an unusually prominent role in the group. 32

In 1922, an "enthusiastic group of young rebels," as Dora Hartmann, the wife of the analyst Heinz Hartmann, characterized the psychoanalysts, founded a psychoanalytic outpatient clinic and three years later, the Psychoanalytic Training Institute, a center for training analysts.³⁹ Being instrumental in establishing it, Helene Deutsch became its director, a position which she maintained until 1933 when she immigrated to the United States.⁴⁰ The same year, Anna, Freud's daughter, became the second deputy of the Vienna Psychoanalytic Society and, since 1927, she had been general secretary of the International Psychoanalytical Association.⁴¹ By 1931, the membership of the society listed 39 men and 19 women, meaning one-third of the participants were women.⁴² 33

The socialists, however, never felt comfortable with the work of Freud. In 1927, in an effort to support the psychoanalytic society, the municipal principals offered Freud a plot of land at Berggasse to build an institute and house the society.⁴³ Despite the fact that the city was supportive, the offer was turned down due to the lack of additional financial sources. In 1936, the society finally acquired a place of its own at Berggasse 7, where the training institute, the outpatient clinic, and the publishing house of the society were also accommodated. By then, however, most of the society's members who were Jewish had fled Austria to avoid Nazi persecution.⁴⁴ 34

A research center for experimental biology, the Biologische Versuchsanstalt, known also as the Vivarium, is also worth noting for the number of women who worked there during Red Vienna. The institute was founded on the basis of a private initiative and not as a direct municipal plan. It was devoted exclusively to laboratory research in zoology, botany, biochemistry, and physiology. 35

In 1903, the zoologist Hans Przibram, in collaboration to the botanists Wilhelm Figdor and Leopold von Portheim, purchased a bankrupt show/aquarium in the Prater, Vienna's entertainment park close to the center, and they turned it into an institute for experimental biology.⁴⁵ In 1914, the institute was donated to the Imperial Academy of Sciences and its founders remained honorary directors whereas a board of curators appointed by the academy ensured its smooth function. 36

Przibram, the brother of Karl Przibram, belonged to the Jewish bourgeoisie and did not hide his progressive ideology. He was acquainted with the architect Adolf Loss and the Sezession, where he presented some of his graphics during the winter exhibits of 1899–1900 and 1900–1901.⁴⁶ The other two directors of the institute, 37

Leopold Portheim and Wilhelm Fidgor, also came from prominent Jewish families with close connections to the industrialists and culturally progressive circles of Vienna.⁴⁷

The picture of the Vivarium as one of the city's most liberal institutes remains incomplete without mentioning Paul Kammerer, who started his work at the institute as Przibram's assistant in the planning of the aquaria and terraria.⁴⁸ The talented Kammerer studied music at the University of Vienna and was acquainted with the artistic circles of the city, an interest he shared with Hans Przibram. In 1926, Kammerer took his own life, offering an odd resolution to an ongoing controversy with William Bateson from Cambridge.⁴⁹ Bringing the institute to the center of scientific attention, the Viennese and international presses covered the episode extensively. 38

Controversially or not, under the auspices of Przibram and Portheim, the work of a number of other prominent researchers such as Kammerer boosted the Vivarium to the forefront of research in experimental biology. Through its connections to the Social Democrats, the Vivarium also emerged as an important site of attempted social reforms. Supporting the municipal projects of educating the public (*Volksbildung*) during the Red Vienna era, Przibram played an instrumental role in reviving an exhibit in the old aquarium of the Vivarium.⁵⁰ Within the first half year, in 1932–33, the institute hosted around 6,500 visitors and the profits from the tickets reached 2,600 schillings.⁵¹ The exhibit was also open to the public schools of the city. 39

Przibram's role was decisive in also supporting women's participation at his institute. The zoologist Leonore Brecher, one of his students, completed her habilitation in 1923 and during the last two years of her study, she was appointed as Przibram's private *Assistentin*.⁵² In 1925, the opportunity arose to appoint an *Assistent* as a state employ at the institute, but Brecher had already received a fellowship from the *Deutsches Notgemeinschaft* to spend research time at the Rhoda Erdmann Institute in Berlin. Her colleague, Paul Weiss, was finally appointed instead.⁵³ Brecher's list of publications is notable during the five years she remained at the Biological Institute. Other women who did research at the Vivarium were the botanists Rosi Jahoda and Helene Jacobi, the zoologist Auguste Jellinek, and the botanist Irma Pisk-Felber.⁵⁴ From 1920 to 1934, there were 39 women out of the 109 scientists, or 36 percent, who listed either as research 40

students or personnel. This high percentage does not come as a surprise. "Many Jewish, liberal, and social scientists," as Ute Deichmann mentions, "worked at the Vivarium."⁵⁵ Only few of them had positions at the University of Vienna.

The intellectual circles that flourished on the margins of the academy and the traditional university were definitely more open to women. It is not by chance that in both of the scientific institutes created through the city's initiatives and in private endeavors that benefited from municipal support, women accounted for one-third of the research personnel and often held high positions in the organizations' hierarchies. Besides the personal ideology of those who founded or directed the institutions, the political agenda of the socialists seems to have also played a crucial role in accepting a large number of women in science. As a means to understand the status quo of postwar Vienna and a way to change it, socialists such as Otto Glöckel, the party leader Otto Bauer, and the philosopher Otto Neurath regarded science and education as a crucial component of their socialist cultural experiment. Thus, they provided the epistemic framework and the political power for social transformations, including the altering of traditional gender roles in society and academia.

41

Neurath emphasized the importance of economics and natural sciences to the socialist program through his involvement with the Vienna Circle, the philosophical group of logical positivists, the socialist housing project, and the creation of a museum of economics in Vienna.⁵⁶ His strong political activity in the circles of Social Democrats and his connections to the scientists and philosophers of the Vienna Circle shed light on the engagement of philosophical circles with the politics and culture of Red Vienna. With his fellow students Philip Frank, Hans Hahn, and Olga Hahn, Neurath shared an interest in new trends in theoretical physics, mathematics, logic, and philosophy. In 1922, the mathematician Moritz Schlick was appointed to Ernst Mach's former chair at the University of Vienna.⁵⁷ Beginning in 1924, with Schlick's initiative, the Vienna Circle started to meet regularly and discuss their philosophical interests. Regular participants included Neurath, Hahn, Rudolf Carnap, Kurt Gödel, Karl Menger, Herbert Feigl, Friedrich Waismann, Rose Rand, and Olga Hahn, later Neurath's wife.

42

"The circle was open to women" as Malachi Hacohen notes. "The presence of women was insignificant, however, in comparison to other liberal circles, such as those around Bühler and Ludwig von Mises. Philosophy was not, in interwar years, an expanding profession likely to attract women."⁵⁸ Justifying Hacohen's claim, it is not by chance that both Rose Rand and Else Frenkel, a woman who irregularly

43

attended the meetings, were practicing psychology. In 1930, Frenkel was employed at the psychological institute of the University of Vienna, and she led the department of biographical psychology, working together with Karl and Charlotte Bühler. From 1930 to 1937, Rand worked at the Viennese Psychiatric Clinic and was the only woman whose name was in the protocol list of the Vienna Circle meetings.⁵⁹ She was admitted to the group when still a graduate student, something that Schlick did not do often.⁶⁰ The core group remained quite exclusive anyway as a personal invitation by Schlick was required to attend. In 1938, Carnap highly recommended Rand for an exchange fellowship to the United States, praising her knowledge in logic and philosophy of science. Later, Popper pronounced her "a philosopher of distinction."⁶¹ She became known, however, as the one transcribing the meetings of the circle.

The gathering point for every Thursday evening meeting was a small lecture room at the Physics Institute at Boltzmannsgasse 5, next to the Radium Institute.⁶² Loyal to the Viennese coffeehouse culture, the group continued the meetings in Café Herrenhof in the inner city.⁶³ The mathematician Walter Mayer, "one of the little mathematics crowd that met in the Café Herrenhof," introduced one more woman, the mathematician Olga Taussky-Todd to the circle.

44

It is important to mention that the Viennese coffeehouse, one of the most important public institutions in the city, was in general not gender exclusive. Among other places, it was in the same coffee shops of the Viertel that women associated with their male colleagues, exchanged ideas, and made themselves visible. In 1900 Vienna, the bourgeoisie Viennese women such as the Jewish mother and daughter Josephine and Franzl von Wertheimstein formed salons. In the interwar years, women of the middle class met in the city's coffeehouses.⁶⁴ By the 1920s, coffee shops around the university were crowded with female students along with male colleagues.

45

When it opened in 1918, Café Herrenhof stood as the meeting place of those who were "politically and erotically revolutionary." These included artists, Freud's students, writers, and many representatives of the exact sciences. Taussky later recalled that after getting acquainted with the group at this coffee shop, she took a course by Schlick, attended one of his seminars, "and even later [attended] the meetings of one of his private circles. He ran an even more esoteric circle to which I could later have been admitted, but by that time, I had withdrawn from these studies in order to spend more time on my mathematical pursuit."⁶⁵

46

47 Drawing on the above instances, it is clear that the Radium Institute was not unique as the only Viennese scientific organization with a concern for gender politics. While they held municipal power, the socialists set the stage for a radical program of social reforms, some of which had a direct impact on the Radium Institute. As a counterbalance to their lack of national political influence, the socialists in Vienna tried to create a state within a state, paying particular attention to city services such as public housing, education, and the welfare system. A key figure in transforming the latter was Julius Tandler. His efforts to reshape the public health and welfare system of Vienna put his ties to the physics and medical community of the city to use and gave Stefan Meyer and his institute the chance to play an important role in the socialists' reforms. At the same time, Meyer's connections to Tandler offered practical opportunities for financing some of his personnel, including women.

48 Tandler, a prominent anatomist, was one of the few Jews with a chair at the medical faculty of Vienna's university.⁶⁶ His inside knowledge of Vienna's medical system and his strong socialist ideology made him an ideal guide for the Social Democratic reforms in public health. Appointed as the city's councilor of welfare in 1920, Tandler was soon able to reshape the medical clinics and the general hospital of the city. An increased budget was essential in improving the quality of services and making them accessible to all citizens.⁶⁷

49 Among other initiatives, Tandler's socialist program promoted new scientific methods in medicine, including the use of radium. In 1929, he asked Meyer to provide the municipal hospital in Lainz with 5 grams of radium. Eventually, he envisioned a more ambitious project such as the establishment of a radium station and a pavilion for cancer therapy.⁶⁸ Hoping to profit from the long experience of French physicians, Tandler visited Paris twice in 1919. During the summer of 1930, he went to the Radiumhemmet in Stockholm, one of the leading centers for radium therapy in Europe.⁶⁹ A few months later, at a city meeting at the *Rathaus* (city hall) on December 20, 1930, Tandler was ready to promote his plan.⁷⁰ He depended heavily on Meyer's help to realize this ambitious and costly endeavor. As Emil Maier, a physician at the hospital in Lainz, informed his colleagues in Stockholm, Meyer and his personnel at the Radium Institute offered not only to provide the radium but also to build a "radium gun," a device with a strong radium

preparation used in cancer therapy.⁷¹ Furthermore, as Maier added, "The consultant of the municipality of Vienna for the radium purchase is Herr Professor Stefan Meyer."⁷²

The pavilion for radium therapy opened in 1931 and a year later, the radium station was established.⁷³ Known as the Physikalische Laboratorium am Strahlen-Institut, the station functioned as the point of entry to the field of radium therapy for two of the Radium Institute's collaborators. Franz Urbach directed the Physikalische Laboratorium and worked on radium dosimetry and instrumentation from 1932 to 1934 when Hilda Fonovits-Smerekker succeeded him.⁷⁴ Through his connections to Tandler and the physicians at the hospital in Lainz, Meyer offered both of them the chance to cross the scientific boundary between physics and medicine, bringing their expertise in instrumentation and experimentation from the Radium Institute to the municipal hospital. Radium became the vehicle for such exchanges. As we shall see, these kinds of career paths were common in the institute's laboratory throughout the 1920s and early 1930s. 50

The Transitional Period: The Radium Institute During the Early 1920s

Inside the walls of the Radium Institute, postwar politics took on interesting dimensions. Franz Exner's academic politics in the period before the First World War and his affiliation to the Austrian Academy of Sciences enabled physicists to acquire their own quarters, expanding the scope and effectiveness of their research. In the Habsburg Empire, the institute became a source of power for physicists and their emblem in the international scientific world. However, by the end of the war, the transformation of national politics from a monarchy to a republic and the financial deterioration of Austria posed new challenges to the physicists of Vienna. Austria did not include Bohemia anymore; that part of the old Habsburg Empire now belonged to Czechoslovakia. Redrawing the political map of the area meant more than demobilizing soldiers and the rearrangement of populations. 51

The cost to the institute was the loss of their main source of radioactive materials, the St. Joachimsthal mines in Bohemia. "Dr. Ulrich was expelled last summer from Joachimsthal," Meyer complained to Rutherford. "He does not know the Czech language, and as nobody in Joachimsthal speaks it, it was quite unnecessary, but this crime was sufficient to dismiss him."⁷⁵ Ulrich, who served as the mines' 52

director before the war, found shelter as a guest at the institute and continued his work, but the main advantage of the Viennese over the rest of the radioactivity community was now gone.⁷⁶

Meyer was kept busy seeking financial resources to ensure the survival of his institute, supporting the experimental work of his colleagues, and engaging in academic politics for the sake of his research personnel. Although he was not yet the official director, Meyer had been acting as the main administrator and the leader of the research carried out in it since the establishment of the institute. With Franz Exner's retirement imminent in 1920, he seemed about to become his undisputed successor. Surprisingly, in a letter to Rutherford on February 8, 1920, Meyer expressed his concerns. The shift in directorship was not an easy issue; it was connected to the relations to the neighboring institutes, the political situation in Austria, and the culture of physics that Meyer wanted to establish in Vienna. 53

Professor Exner is now 71 years old and will leave his institute soon. We want his successor to give lectures on experimental physics based on theoretical foundations in courses of 2 years. The best men, I think, we can get for the post are Jäger or Schweidler or Mache or Benndorf. Personally I myself do not want to be in the combination as long as one of these gentlemen, to whom I am in terms of heartily friendship are to get the charge. Now there is also Ehrenhaft, who pushes himself forward in a very intrusive way and who has some acquaintance in the momentary reigning government sustain his candidature. I would be very much obliged to you, if you would write me as soon as possible your opinion on the works of Ehrenhaft and if there is anybody in England who believes in his "sub-electrons." I cannot deny that I do not sympathize with his scientific way or with his personage but as I am not willing to be guided by my own prejudices, I would be very pleased to have your objective judgment.⁷⁷

Rutherford's response came a few days later. He did not find Ehrenhaft's scientific work convincing but could not comment on his personality. As he mentioned, he had no acquaintance with him. He was definitely surprised, as he "always supposed he [Ehrenhaft] was one of the band connected with the Radium Institute."⁷⁸ 54

In fact, Felix Ehrenhaft was one of Exner's students. The son of a physician, he was born in 1879 in Vienna. He studied physics with Exner and in 1904, he became an *Assistant* at the first Physics Institute under Victor von Lang.⁷⁹ His main focus was on theoretical physics and, with Exner's retirement, Ehrenhaft envisioned himself as his successor, utilizing some political connections. Meyer's main concern, on the other hand, was to sustain the experimental research at the 55

Radium Institute. Besides ensuring that Exner's successor would be able to teach and so favor experimental physics, Meyer needed the connections to the Physics Institute for practical reasons.

The use of instruments and library resources was essential for the research at his institute. As it turned out the issue was finally resolved by political intervention, since Exner's retirement resulted in the reorganization of the physics institutes. On October 1, 1920, instead of becoming the director of the second Physics Institute, Ehrenhaft was appointed head of the newly established third Physics Institute which focused on general physics.⁸⁰ The same year, Gustav Jäger, one of Meyer's close collaborators, succeeded Exner in the directorship of the second Physics Institute while Meyer was officially named the director of the Radium Institute.⁸¹ 56

The end of the First World War proved to be a difficult time for both the country and the institute. As Meyer wrote to Rutherford, "The so-called peace has aggravated the difficulties enormously and I fear, we will not be able to continue scientific work, if at all we continue our life."⁸² 57

Inflation was out of control—the Austrian currency had only 2 percent of its prewar value—and food and energy sources were in short supply. Meyer's institute could not afford to purchase even the most prestigious science journals.⁸³ Without knowledge of the foreign literature, research became problematic. Although the academy was supposed to cover the running costs of the institute, it was able to appropriate only 64 dollars a year. The upkeep of the building—servants, mechanical needs, light, heat, and water—as well as Meyer's and his assistants' salaries were actually paid by the University of Vienna. Although the value of radium owned by the institute was up to 300,000 dollars before the war, it had now dropped to 200,000 dollars, as some of it had been sold to defray certain costs of maintenance since the war.⁸⁴ As a temporary solution and in response to Meyer's gentle request, Rutherford kindly arranged to purchase the radium that had been lent to him before the war by the Austrian Academy of Sciences. By the end of the year, Meyer received a check for over 500 pounds which contributed to the ongoing research at the institute and temporarily relieved its financial problems.⁸⁵ Additionally, some of the institute's international friends provided the institute's library with subscriptions to *Nature*, *Philosophical Magazine*, and a number of the other prominent scientific journals necessary for keeping up research at the institute.⁸⁶ 58

One significant problem was that the institute's former staff and key figures who had worked there during the 1910s were now scattered around Europe. Hönigschmid had moved to the University of Munich, Horovitz left for Warsaw, and Hevesy went to Budapest. Paneth had accepted the position of an *Extraordinarius Professor* at the University of Hamburg in 1919 and Karl Herzfeld took over his tasks as *Ausserordentlicher Assistent* for a short time.⁸⁷ 59

In December 1919, the duties of an assistant were turned over to Hilda Fonovits, but without a salary.⁸⁸ Born in Vienna in 1893, Fonovits was one of the women who received her education at the University of Vienna during the First World War. A student of Exner and of the theoretical physicist Gustav Jäger, Fonovits graduated in June 1919 with a doctoral degree in physics. Her dissertation focused on the factors necessary to obtain alpha ray saturation.⁸⁹ Her practicum was done at the Radium Institute and thus her first article was published directly from her dissertation and appeared in the *Mitteilungen* in 1919.⁹⁰ Just a year later, in December 1920, Fonovits was formally accepted as *ausserordentlicher Assistentin* in the institute with a monthly salary of 1,000 Kronen.⁹¹ 60

In the meantime, Fonovits married and as Hilda Fonovits-Smerekker held a joint appointment as *Assistentin* to the Second Physics Institute and the Radium Institute during 1920–21.⁹² When her son was born in 1922, she found it difficult to combine motherhood with a scientific career. In a letter to Meyer, she confessed that "Unfortunately, I have not been successful despite all my searching in finding a reliable employee to substitute for me during the day for my child's care and so it is impossible for me to keep my position as an assistant."⁹³ Fonovits was ready to give up her career in order to fulfill the obligations of motherhood. "I am very sorry," she admitted, that "I have to quit the job I loved, but I have not found a way to combine my professional and domestic duties."⁹⁴ The position was then given to Sebastian Geiger, a Swiss engineer, who retained it for two years.⁹⁵ In June 1924, Gustav Ortner, who had received a doctoral degree in physics from the University of Vienna at the end of 1923, succeeded him.⁹⁶ 61

The position of the *ordentlicher Assistent* also became vacant just after the end of the First World War as Victor Hess accepted the job of *ausserordentlicher Professor* at the University of Graz. The physicist Karl Przibram succeeded him in 1919.⁹⁷ The son of Gustav Przibram, a Hungarian Jewish industrialist, Karl belonged to a dynasty. His mother, Baroness Charlotte Schey, came from one of Vienna's richest families. As Przibram described it, "In my parents' house the prevailing spirit was 62

that of the cultivated Jewish, middle-class liberal era with its unconditional belief in progress and its open-mindedness to all the achievements of the arts and sciences."⁹⁸ Raised in this stimulating environment, Przibram studied physics at the University of Vienna under Exner and Boltzmann and then moved to the University of Graz to work with the physicist Leopold Pfaundler.

During the academic year 1902–3, Przibram visited the Cavendish Laboratory in Cambridge to work with J. J. Thomson. In 1905, he completed his habilitation at the University of Vienna and worked as *Privatdozent*. In 1912, with Meyer's encouragement, he entered the Radium Institute with a research project on coloring and luminescence caused by radioactive rays. In 1916, he was honored with the title of *ausserordentlicher Professor* at the University of Vienna. Przibram was the obvious choice to succeed Hess at the institute. In 1921, he discovered the phenomenon of radiophotoluminescence. He also worked extensively on the coloring of crystals and the fluorescence of fluorites. His investigations led to one of the two main research projects of the institute throughout the 1920s and 1930s and attracted a number of women researchers. His main collaborator was Maria Belar, but he also worked with Elisabeth Kara-Michailova, Luisa Gröger, Marie Hoschtalek, and Berta Zekert. 63

Information on the professional staff members who held the main administrative positions at the institute—the director and the two assistants—is summarized in Table 03/4. It also contains information on the affiliation of these scientists with the University of Vienna up to 1938–39. 64

Hans Pettersson: Bringing a Propitious Wind to the Radium Institute

In November 1921 in the midst of the institute's postwar reorganization, Meyer received a letter from the Swedish physicist Hans Pettersson asking permission to use the facilities for his own research.⁹⁹ Hans was the son of Otto Pettersson, the founder of oceanography in Sweden and a professor of chemistry at the Stockholm Högskola. He studied physics at Uppsala University under Knut Angström, who encouraged him to work on radioactivity. His first published paper on the heating effects of radium appeared in 1910.¹⁰⁰ From October 1911 to August 1912, he worked at the University College in London under William Ramsay, a close friend of his father.¹⁰¹ It was the dominant Otto who had arranged his son's early involvement in radioactivity research in Ramsay's laboratory, giving him "a year of freedom to go around the world."¹⁰² 65

Arriving in London, Pettersson had little idea of what he was supposed to work on and Ramsay suggested the construction of a microbalance for his dissertation topic. In this early work, Pettersson addressed the problem of accurate physical measurements and aimed to construct a balance with a sensitivity of more than 1/250,000 mg.¹⁰³ Working with Ramsay, Pettersson acquired skills invaluable for his later experimental research in physics. His daughter characterized him as "a devil at building apparatus." It is not by chance that in the following years after his return to Sweden, Pettersson showed a great interest in constructing instruments useful in oceanography.¹⁰⁴ In 1913, he was appointed to the staff of Svenska Hydrografiska Biologiska Kommissionen. A year later, he defended his dissertation and obtained a lectureship at Göteborg Högskola, torn between work in radioactivity and hydrography, a conflict his daughter Agnes Rodhe has described as a struggle between his father's wishes and his own interests.¹⁰⁵ His position as a lecturer paid so poorly that he had to work as an assistant hydrographer at his father's oceanographic station in Bornö to supplement his income.

66

In the summer of 1921, Pettersson approached Rutherford, suggesting some experiments with radium. Rutherford's response was not very encouraging for the young Pettersson for it implied that Pettersson would need his own radium sources. As Rutherford informed him, "I am not sure from your letter whether you have the use of 200 mg of radium for several years for your experiments." Rather than issuing the invitation Pettersson must have hoped for, Rutherford continued, "I am sorry that I will not be in Edinburgh this year but will be in Cambridge in the 4th week of September."¹⁰⁶

67

In his response, Pettersson mentioned that some years earlier, Stefan Meyer had offered him the use of radium at the institute in Vienna. "I am unfortunately not able to get any large quantity of radium in this country," Pettersson explained. He went on to wonder "whether Meyer is able to keep his offer open under the present state of things." Rutherford did not seem willing to extend a warm invitation and in his last response, he claimed that the laboratory would be closed for the first three weeks of September: "I am afraid that this will make it rather difficult to see you unless you are able to stay in England over some time." Even Pettersson's strategic mention of his father did not help: "My father, late chairman of the Nobel committee for chemistry, sends you his best remembrances."¹⁰⁷

68

Probably because his correspondence with Rutherford had not yielded results, Pettersson accepted an invitation from Prince Albert I of Monaco to work on the radium concentration of the deep sea sediments collected by the Challenger expedition.¹⁰⁸ Unfortunately, the Musée Oceanographique—the institute in Monaco—lacked the important apparatus that Pettersson needed for his work. At the end of 1921, aware of the low cost of living in postwar Vienna and the remarkable instruments at the Vienna Institute, Pettersson turned to Meyer, his old contact.¹⁰⁹ His request was very modest: besides measuring the radioactivity of sea sediments, he hoped to work on the disintegration of radioactive elements if a small amount of radium bromide could be made available to him.

69

Meyer had been hospitable to foreign scientists on other occasions and Pettersson offered a further incentive to accede to his request. In a postscript, he added, "I bring with me a sensitive thread electrometer with a voltammeter and my institute in Göteborg Högskola, Sweden, will provide me with the necessary resources for my work."¹¹⁰ Since the Radium Institute had a hard time supporting its own scientists, it would have been impossible to provide Pettersson with more than work space. By this point, Meyer had brought stability to the institute. The positions vacated by the old core workers had been redistributed to younger researchers and, most importantly, there were funds available and promising research projects to work on. In the following period, the personnel of the Vienna Institute produced an impressive body of work. Przibram's group contributed greatly to the understanding of radioluminescence and Pettersson's collaborators seriously challenged assumptions about the nature of the atomic nucleus put forward by Rutherford and his colleagues at the Cavendish laboratory in England.

70

Pettersson brought a new era of experimentation to the institute. The need for specialized personnel led a considerable number of women to engage in radioactivity research, elevating the Radium Institute to what Galison called a "Mecca" for women working on radioactivity research.¹¹¹ During the 1920s, researchers such as Ewald Schmidt, Max Kindinger, Blau, Rona, Karlik, and Kara-Michailova formed a closely connected group and boosted the institute to one of the most prestigious radioactivity centers in Europe. A number of female doctoral students such as Hertha Wambacher, Theodora Kautz, Erna Bussecker, Felicitas Weiss-Tessbach, Selma Schneidt, and Elsa Holesch oriented their research projects around the themes of Pettersson's group.¹¹²

71

When Meyer received Pettersson's letter, he could not have envisioned the drastic changes that the young physicist was going to bring to the institute. Friendly and hospitable as usual, he posted the note, "Willkommen," on the upper corner of Pettersson's letter, welcoming the chance of having one more international colleague on his staff. After Meyer's positive response, Pettersson and his wife, the chemist Dagmar Pettersson, finally settled in Vienna.¹¹³ Impressed by the "friendly and stimulating atmosphere" at the institute, Pettersson threw himself into intensive research on artificial disintegration, establishing a strong research team and enlisting a number of patrons to support the work.¹¹⁴ They both blended very nicely into Viennese culture and felt at home with the ethos of studying physics at the institute.

72

For the next three years, Pettersson divided his time between radioactivity research in Vienna and his lectures in Göteborg, feverishly searching for financial support. Amazingly energetic and ingenious, Pettersson approached Albert Einstein, securing his prestigious recommendation to the Swedish patrons. The connection seems to have been made through Otto Pettersson, thanks to his high status in the Swedish scientific community.¹¹⁵ During Göteborg's jubilee exhibition in 1923, Einstein lectured to a large audience. As Hans wrote to him afterwards, "Unfortunately, I had no opportunity to thank you during the Naturforschertag in Göteborg for your very friendly recommendation for the upcoming research on atomic disintegration that I worked on with Dr. Kirsch and Dr. Geiger."¹¹⁶ A long list of the needed instruments for his experiments followed his gracious opening and a detailed work program closed the letter.

73

Apparently, Pettersson had inherited father's gift for raising funds. Between 1923 and 1925, he secured the equivalent of 7,000 dollars from Swedish institutions, several societies, and patrons.¹¹⁷ At the time, "The total grant of the Radium Institute in material and equipment was equivalent to a sum of about 110 dollars per year which was totally inadequate and eliminated all intentions to investigate problems for which new instruments had to be bought or constructed."¹¹⁸ By the mid-1920s, the Austrian economy had stabilized by the flow of foreign loans. The institute was finally in the position to support its personnel.

74

Stefan Meyer: A Supportive and Politically Aware Director

As the Rayner-Canhams argue, one of the reasons women chose to enter the field of radioactivity was "the presence of supportive supervisors who acted as mentors for them."¹¹⁹ Elisabeth Rona's experience supports this idea. In early 1913, she chose to work with Kasimir Fajans on radioactivity instead of Georg Bredig on physical chemistry because the latter was an "autocratic German professor," a model that she hoped Fajans did not fit. Her second experience, an "exciting and pleasant" one, was with Georg Hevesy in Budapest. Rona was free to use her own imagination in her research and described Hevesy as someone who "did not feel the need to keep his students in their place." At the Kaiser Wilhelm Institute in Berlin-Dahlem, Rona felt also at home with Otto Hahn and Lise Meitner and said she was "fortunate to work in such a stimulating environment."¹²⁰ She spent almost two years at the radioactivity department starting in 1921. Similarly, during the interwar years, Meyer also played a decisive role in making opportunities in radioactivity research available to a number of women. 75

Of the 32 women who appeared as authors in the *Mitteilungen* between 1920 and 1934, 20 entered the institute as Meyer's students. He kept in touch with some of them even after their departure.¹²¹ On several occasions, he used his connections in the international scientific community on behalf of the institute's women. In 1930 for instance, he arranged for Berta Karlik to work at William H. Bragg's laboratory in London.¹²² Rona's later account of Meyer's personality and his role as a director comes as no surprise. 76

The atmosphere at the institute was most pleasant. We were all members of one family. Each took an interest in the research of the others, offering help in the experiments and ready to exchange ideas. Friendships developed that have lasted to the present day. The personality of Meyer and that of the associate director, Karl Przibram, had much to do with creating that pleasant atmosphere.¹²³

Blau especially appreciated Meyer's kindness after she experienced Robert Pohl's "authoritative style" of directorship at the physics institute in Göttingen where she spent the fall of 1932 on a fellowship from the Association of Austrian Academic Women.¹²⁴ The same collegiality is echoed in Otto Hans's recollection of Meyer: "As a special characteristic of genuine collegial loyalty toward his many coworkers, 77

I always have felt that he gave every individual far-reaching freedom in his work and allowed him always to publish alone, although for many investigations, he nevertheless was the intellectual stimulus.¹²⁵

Meyer's role was also crucial in supporting women's networks in the wider community of radioactivity researchers. The Norwegian radiochemist Ellen Gleditsch paid several visits to the Radium Institute over the years at his invitation.¹²⁶ Well-known in the field and active in feminist politics, Gleditsch functioned as a mentor of the younger women scientists, paying attention not only to their scientific work but to their personal lives as well. In 1934, with the perspective of one who was older and more experienced, Gleditsch warned Rona about the hazards of radioactivity. "My dear Elisabeth, pay attention before it is too late," she urged her when Rona was suffering from anemia.¹²⁷ Karlik greatly appreciated Gleditsch's warm friendship and took care of her when she spent time at the institute in late 1937.¹²⁸

78

Given the close collaboration between Meyer and Gleditsch, exchanges of publications, instruments, materials, and even research students between the two institutes became a common practice.¹²⁹ In 1934, Gleditsch arranged for her assistant Ernst Föyn to spend some time in Vienna. The visit led to an important research project on the effects of bombarding radioactive isotopes with neutrons, conducted in collaboration with Rona, Kara-Michailova, and Hans Pettersson.¹³⁰ The exchange of researchers was reciprocal. Rona and Karlik paid frequent visits to Gleditsch's laboratory while working at Pettersson's oceanographic station in Bornö, Sweden, over the course of several summers.¹³¹ Moreover, amid the political turmoil that characterized Vienna in the late 1930s, Rona and Blau found shelter at Gleditsch's laboratory.

79

Meyer was one of the best-loved and most respected persons in the international scientific community. The outstanding feature of his personality, as Paneth later recalled, was his "never-failing kindness."¹³² In his obituary of Meyer, Robert Lawson, recalls his "personal charm and good nature, his warm friendship and his innate kindliness."¹³³ Lawson, an Englishman, came to work at Meyer's institute in the end of 1913, but with the outbreak of the First World War, he was trapped in Vienna. When the police harassed him as an "enemy alien," Meyer came to his aid and kindly offered him research space in his laboratory until the end of the war.

80

"[Meyer] supplied me with money on trust and free of interest, the amount being left to my discretion, and he established intermediate but adequate contact with my parents."¹³⁴

There is no doubt that Meyer shaped the collegial ethos among his researchers and encouraged women to take active roles in the institute and in the international radioactivity community. Within the general political context of Red Vienna, however, Meyer's role takes on additional dimensions. A few liberal and well-placed men anywhere might have made occasional exceptions to incorporate a few women into their own scientific settings, but individual initiative is not enough to explain the more persistent phenomenon of women's participation in the Radium Institute. Changing attitudes toward women's fitness to work in science and creating opportunities to do so require more than kindness. It requires political intention.

81

Although Meyer was not a member of the party, it seems to have held the same progressive ideas about women's role in science and society as the Social Democrats. In his youth, following the lead of important figures in the Viennese physics community such as Exner, Ernst Mach, and Victor von Lang, Meyer contributed immensely to creating an environment friendly for women who wanted to pursue careers in physics. When the Radium Institute was established in 1910, Meyer had a remarkable degree of flexibility in administration and in setting the scope of the research, and he consistently supported women's participation there.¹³⁵ Rona writes in her autobiography of the particular effort he made in inviting her to join the institute's research team in the mid-1920s. In the summer of 1925, Meyer was spending his holidays in Bad Ischl, a summer resort in Austria, when he knocked unexpectedly on Rona's door and offered her a position in his institute. She was already a well-known physicist as she had previously worked with some of the main figures in the community of radioactivity.¹³⁶

82

Moreover, in a strongly anti-Semitic city like Vienna, the fact that Meyer was Jewish gave him a distinct standpoint. As Helmut Gruber argues, anti-Semitism was deeply rooted in Austrian society even during the years of Red Vienna. "It was the Viennese Jews prominent in professions and arts, in journalism and the rising mass media, in industry and high finance but especially in SDAP who were the targets of the hate campaigns which were a permanent fixture of the First Republic."¹³⁷

83

A Jewish woman seeking to be hired and then promoted to the University of Vienna faced very high odds. When Blau attempted to get a position as *Dozentin* at the university, she was told, "You are a woman and a Jew and together this is too much."¹³⁸ For those women who wished to remain in academia after their student years, it was clearly a disadvantage to be Jewish.¹³⁹ In Meyer's institute, however, that was not the case. Jews—both men and women—were welcomed and attained important positions as the cases of Przibram, Blau, and Rona attest. The gender profile of the Radium Institute's personnel between 1919 and 1934 indicates Meyer's influence on women's careers as well as the interrelation of socialist politics and women's participation in science. 84

The Gender Profile of the Institute's Personnel: 1919–34

The almanac of the Austrian Academy of Sciences from 1919 to 1934 serves as a first indicator of the gender profile of the institute's personnel. A survey of the director's annual reports published there reveals that over those 15 years, there 113 scientists, 43 women and 70 men, who conducted research at the institute. (See Chart 02/4.) 85

During this period, 83 of them—73 percent of the total—remained at the institute from one to three years. Because the institute occupied a prominent position within the international scientific community, a few of those researchers were visitors from abroad.

One such visitor was Frances Wick, an associate professor at Vassar College in the United States. Wick graduated from Cornell University in 1908. In 1918, she became the first woman to work on airplane radios and gun sights in the U.S. Army Signal Corps. She came to Vienna twice and spent more than two years at the institute, joining Przibram's research group on radioluminescence.¹⁴⁰ In the summer of 1925, another American woman, Marie Farnsworth, wrote to Meyer asking his permission to spend six months at the Vienna Institute. Farnsworth had graduated from the University of Chicago and worked as a research chemist at the U.S. Bureau of Mines. "It is my intention to apply for a Guggenheim fellowship for advanced study abroad for the academic year 1926," she informed Meyer. Her expertise was on separating protactinium from carnotite and she had previously worked as a consultant for physicians and hospitals.¹⁴¹ 86

Apart from the visiting researchers, most of the scientists who stayed for a short period at the institute were practicum students, taking advantage of the special training—the "radioactivity practicum"—that was offered every spring semester for young physicists.¹⁴² Most of the practicum students published one or two papers related to their dissertation topics in the *Mitteilungen* and then left the institute. Overall, nearly 39 percent of those short-term scientists were women. Table 04/4 shows a list of those researchers who remained at the institute for more than four years. One-third of these were women. 87

In 1927, in addition to the two assistants and the director, the Austrian ministry of education offered 5,000 schillings for the appointment of a *wissenschaftliche Hilfskraft* (scientific assistant) at the Radium Institute.¹⁴³ Ewald Schmidt was the first to obtain the position, which he held as a joint appointment with the Second Physics Institute. Attracted by the work on artificial disintegration, he entered the institute during the academic year 1924–25. Pettersson reported to his sister, "My third assistant, Dr Schmidt, is a jewel." He was surprised that Schmidt, who was married, could manage on a salary of just 125 sek a month.¹⁴⁴ A few months after his appointment to the Radium Institute, Schmidt quit the position for the prospect of becoming an *ausserordentlicher Assistent* at the Second Physics Institute.¹⁴⁵ 88

The next scientific assistant was Elisabeth Kara-Michailova. Born in 1897 to a prosperous bourgeoisie family, Kara-Michailova spent her childhood in Vienna and received a private education.¹⁴⁶ Her father, Ivan Kara-Michailoff, was a Bulgarian physician and her mother, Mary Slade, was an English musician. In 1907, her parents decided to move to Sofia where they played an influential role in the artistic and scientific life of the city. Ten years later, Kara-Michailova returned to Austria alone to enter the University of Vienna. Between 1917 and 1921, Kara-Michailova studied physics, mathematics, chemistry, mineralogy, and philosophy, eventually taking a major in physics and a minor in mathematics with Meyer and Jäger as the referees of her final exams. Even before she completed her thesis, Kara-Michailova entered the institute and collaborated closely with Przibram on determining the phenomenon of radioluminescence. During the autumn of 1923, she returned to Sofia as a guest fellow at the city's university for a very short period before she was soon attracted by Hans Pettersson's work on the artificial disintegration of light elements in Vienna. 89

In November 1928, Kara-Michailova was offered the position of *wissenschaftliche Hilfskraft* at the Radium Institute, "with the salary of an *ausserordentlicher Assistent*."¹⁴⁷ By the end of March 1933, however, both Austria and the institute 90

were deeply affected by the wider European political crisis. Financial problems prompted Meyer to address the dean of the Faculty of Philosophy on March 21, 1933. He sought to retain the position, even if at only half the former salary.¹⁴⁸ Kara-Michailova, meanwhile, had decided to apply for a Yarrow Scientific Research Fellowship, a grant that aimed to support female scientists. As she informed Meyer from her parents' home in Sofia, she could rely on the financial support of her father, who wanted her to continue her scientific research even if she was unable to extend her stay at the institute after March.¹⁴⁹

Karlik was the next to obtain the position. She had entered the Radium Institute as a practicum student in 1927. Karlik was born in 1904 to an upper-class Viennese family. Her father, Carl Karlik, was director of the national mortgage institution for Lower Austria and Burgenland. She lived in a small castle in Mauer, a Viennese suburb, where she always returned for her summer holidays during her adulthood. Adopting the status of her class, she learned to play piano and speak several languages while also taking classes on painting. Although she entered the University of Vienna in 1923, Karlik mainly wanted to take the exams that would enable her to become a teacher and study physics and mathematics on the side. The course of her life proved differently. Attracted by physics, she combined research at the Radium Institute and teaching at a *Realgymnasium* in Vienna. In 1930, her name appeared as the institute's collaborator at the almanac of the academy.¹⁵⁰ When Karlik took up the job of the research assistant on April 1, 1933, her monthly salary was reduced to 150 schillings from the 289.5 schillings that Kara-Michailova received in 1932.¹⁵¹

91

In addition to Fonovits-Smreker, Kara-Michailva, and Karlik all of whom were paid directly by the Radium Institute, Rona was appointed as an additional *wissenschaftliche Hilfskraft* for the academic year 1928–29 only. Erwin Zach, the Austrian-Hungarian general consul in Singapore, and the industrialist Ignaz Kreidl, whose son Norbert was working as a research student in Pettersson's group, funded her position.¹⁵² Rona, known as "the polonium woman,"¹⁵³ was probably the most experienced experimenter among the women of the institute.

92

By the end of the First World War Rona was already considered as an experienced scientist, working on chemistry, physics, and biology. Her earlier work on animal physiology in Berlin and her knowledge of chemistry qualified her for a job she was eventually offered by Francis Tangl as a biochemist and physiologist at the University of Budapest. Tangl needed a scientist to set up complementary courses in chemistry for his medical students and Rona fit the description. Nevertheless,

93

her task did not last long. The communist revolution in 1919 and the political upheavals that followed, forced Rona to resign in 1921; she was unable to bear the overload of work caused by the depletion in staff.¹⁵⁴

At the time, the radioactivity community was small enough for researchers to be noticeable and international enough to promote mobility and scientific exchanges among different institutes. Rona's work, first with Fajans and then with Hevesy, offered her such visibility in the community that Hahn provided her a grant and an opportunity to work with him and Meitner at their radioactivity department of the Kaiser Wilhelm Institute in Berlin-Dahlem. During the two years of her stay, Rona became proficient in separating thorium-230 from uranium ores and when the economic situation in Germany deteriorated, she was transferred to the Kaiser Wilhelm Textile Institute. As she explained, "Only institutions whose research was important to the nation's economy could receive grants."

94

When her grant in Berlin and the political turmoil in Hungary were over, Rona finally returned to Budapest in 1923. She had already gained experience not only in radioactivity but also in industrial chemistry and textile technology as well. This knowledge guaranteed her a position in one of the biggest textile industries in Hungary. Given the economic situation in Europe and the low status of women in academia, Rona was right in arguing that "industry offered some hope." The cruelty, though, of the industrialists and the lack of research opportunities forced her to resign in a year. Unemployed, Rona joined her family in the Austrian resort in Bad Ischl for summer holidays in 1924. It was there that Stefan Meyer offered her a position at the Radium Institute in Vienna.¹⁵⁵

95

Given the shortage of archival sources, it is difficult to draw any systematic picture regarding the financial support of those who conducted research at the institute. The *Institutsverrechnung*, a notebook briefly recording monthly revenues and expenses, shows that from 1925 to 1928, Kara-Michailova received monthly checks of 200 schillings. From 1928 to 1932 Rona was systematically paid 250 schillings per month, while Blau's monthly checks ranged from 100 to 200 schillings from 1929 to 1932.¹⁵⁶ A few *Bestätigungen* (receipts) signed by female scientists confirm that some of them were paid for chemical and photographic tasks they performed as well as for the preparation of radioactive sources. The same can be said for many of their male colleagues who appear either to have received monthly paychecks or have been paid for individual tasks.

96

A list of those who conducted research at and were paid by the institute indicates the exceptional gender politics of employment and opportunities for research that were offered to women. A survey of the *Mitteilungen* reveals the gender division of labor and the level of participation of men and women in the institute's ongoing scientific research. From 1920 to 1934, 98 individual authors appeared in the *Mitteilungen*; 32 were women and 66 were men. (See Chart 03/4.) **97**

Only six of the women and 15 of the men published more than two papers in the *Mitteilungen*. This confirms the pattern found in the almanac of the Austrian Academy—namely, that most of the practicum students remained at the institute only for a short period of time. Table 05/4 shows the publications of these people, using the *Mitteilungen* as the chief source. Surprisingly, women accounted for the 29 percent of the total. Moreover, if we exclude Pettersson and Przibram from the calculation, the productive women averaged about one more paper each than their male colleagues.

These women can be divided by age into two groups. The older generation who were born before the turn of the century had to overcome many educational obstacles. Most of them had private education and belonged to the Viennese upper class. Blau, for example, studied at the private Mädchen Obergymnasium. While education for women became more socially accepted and widespread in the interwar years, women came from less affluent families. **98**

One can safely conclude that women were among the most productive individuals working at the Radium Institute. Given the number of their publications and the time they stayed at the institute, it is obvious that they were not merely assistants and members of the laboratory support staff, setting up experiments and performing tedious preparatory tasks for their male colleagues. Instead, they made steady contributions to radioactivity research and were as scientifically productive as their male counterparts, publishing not only in the institute's journal but in other periodicals as well. Articles by Blau, Kara-Michailova, Karlik, and Rona often appeared in prestigious journals such as *Zeitschrift für Physik*, *Physikalische Zeitschrift*, *Naturwissenschaften*, *Journal of the Chemical Society*, and *Nature*. **99**

Further analysis of the coauthored papers that appeared in the *Mitteilungen* reflects the politics of collaboration in the institute. In the early years, many of the young female students collaborated with mature male researchers of the institute. For example, during the academic year 1919–20, Maria Hornyak was working under Meyer's supervision on the ionization of alpha rays in different gasses.¹⁵⁷ **100**

She then teamed up with Victor Hess and continued her research on alpha particles emitted specifically from polonium. Their coauthored article appeared in the *Mitteilungen* in 1920.¹⁵⁸

The stereotype of a male mentor and a female student broke down in the mid-1920s when women such as Kara-Michailova, Blau, Rona, and Karlik gained status in the institute and participated in its core research groups. Those women worked closely together, forming 19 percent of the total collaborations. Depending on the topic under investigation, they alternated research partners and they never abandoned their own research projects, publishing as sole authors at the same time. Karlik's account of her work to Pettersson is revealing: "I should have liked to use the old Em[emanation] for *my own experiments*."¹⁵⁹ Additionally, collaborations between men and women covered 29 percent of the total and were mainly formed within the core research group of the institute. These percentages map not only the ongoing research projects but, most importantly, they should be taken as indicators of the positions of men and women in the laboratory. Women led not only their own projects, but they had also a place at the workbench next to their male colleagues and became part of the team instead of interlopers. (See Table 06/4.)

101

Politics Matter, but How Much?

As we leave behind the days of bemoaning the "poor and excluded women" from science, one can recognize that women in the Vienna Institute were researchers in their own right. They were not anomalies in the laboratory or figures with secondary roles but well integrated in the radioactivity community. They were keen researchers, close collaborators with their male colleagues, and experienced experimenters. Some of them published extensively not only in the *Mitteilungen* but also in prestigious scientific journals of their time. A few advanced in the institute's hierarchy, gaining paid positions as assistants, or carried their knowledge on radioactivity to other institutions.

102

The high density of scientific and science-related institutions in the Mediziner-Viertel allowed for a continual exchange of personnel, ideas, practices, objects, and trafficking materials. Furthermore, it encouraged social interaction, most often spontaneous, given the close proximity of so many scientific institutes. "I had a very nice surprise the other day," reported Karlik to Pettersson. "I ran across Prof. Ewald from Stuttgart in the Währingerstrasse when going out to have lunch." Because of this unexpected meeting, "He came to the institute on Saturday

103

morning to see Prz.'s [Przibram's] crystals and then we had lunch together all three of us."¹⁶⁰ Paul Ewald, known for his dynamical theory of x-ray diffraction, was then Rector at Stuttgart's Technischen Hochschule. Karlik had met him at William Bragg's institute in England after a series of lectures he had given at Imperial College.

Intellectually and socially, women played a crucial role not only within the walls of the building at Boltzmanngasse but also in the Mediziner-Viertel. By the 1920s, they had resisted the space restrictions imposed upon their lives, claiming space of their own in the laboratory and in the city. Places such as the coffee shops, the city streets around the institute, and various other public sites involved in the daily routine of scientists and university students provided women with many occasions for social interaction and the exchange of information. Probably more socially engaged than any of her single female colleagues, Karlik was in the circle of some young Austrians with interests in music and democratic politics. 104

In a seminar for female grammar school teachers, Karlik became friends with Rosi Jahoda who was studying botany and zoology at the University of Vienna and worked at the Vivarium. Franz Urbach and Gustav Kürti, both physicists working at the Radium Institute, were also members of their group.¹⁶¹ According to Wolfgang Reiter, Karlik had more than amicable feelings for Kürti. Kürti, however, married Jahoda. Karlik retained her cultural and social contacts while splitting her time between teaching and physics research. In an interview with the Austrian radio station ÖRF, Karlik admitted to Reinhard Schlögl that she started her studies in 1923 with the intention of becoming a teacher. During her studies, however, she developed an interest in physics and decided to do her dissertation on radioactivity.¹⁶² Even though Karlik could have immediately sought a career in physics by remaining in the institute, she followed the safer option and accepted a position at a *Realgymnasium* in Vienna. 105

Men and women at the institute were friends, respected colleagues, close collaborators, and at times, as in the case of Felizitas Weiss-Tessbach and Gustav Ortner, intimate partners. Ortner was the successor of Sebastian Geiger in the position of the institute's second assistant and she was an extended member of Pettersson's research group. As a doctoral student, Weiss-Tessbach worked on the absorption of gamma rays of radium C.¹⁶³ Their marriage took place in 1931. Occasionally, men became the immediate reason for women's access to the Radium Institute. Anni Federn entered the field of radioactivity because of her husband Franz Urbach. The daughter of psychoanalyst Paul Federn, Anni was the 106

first woman to work at a juvenile court. To the social group that Urbach was acquainted with, which included Karlik, Anni provided the link to Vienna's psychoanalysts. After marrying Urbach, she started to study physics, carried out her practicum at the Radium Institute, and remained there even after the birth of their first son in 1934.¹⁶⁴

Yet women's personal lives and choices within the institutional and ideological boundaries of Red Vienna were still in many ways curtailed. It is important to note that although many of the female research students that stayed at the institute for short time were married or got married later, none of the women who worked at the core research group ever got married. While the male counterparts were married with families, most of these women remained single. Blau, Rona, Karlik and Kara-Michailova, all of whom fostered important careers in science, were unable to combine marriage and motherhood with scientific research. Fonovits got married, but when her son was born, she had to quit her job as the institute's assistant despite the socialists' efforts to provide day-care facilities for working mothers. 107

To conclude, women's active participation in laboratory life can be credited in large part to the social and intellectual interactions of the Radium Institute scientists that made the city of Vienna a crucial setting for science open to women, to Meyer's progressive politics, and to the political context of Red Vienna. However, because the socialists' power was restricted to the municipal level, people like Meyer had only a limited influence. Thus, the employment system of the University of Vienna, controlled by the conservative national government, remained fairly gender segregated. It is indicative that none of the women who were affiliated with the Radium Institute was promoted to the position of *Privatdozentin* at the University of Vienna before 1934. This had a significant impact on women's careers when the controversy over artificial disintegration between Pettersson's and Rutherford's groups was resolved in favor of the British at the end of the 1920s.¹⁶⁵ Soon thereafter, Petterson returned to Sweden and the loss of the key figure of the group led to disarray in the study of atomic disintegration. They also suffered from the ongoing financial crisis, which was already severe and growing steadily worse. Because the women at the institute lacked stable university positions and monthly payments from the state, they were the ones most deeply affected by the dissolution of Pettersson's group. Eventually, 108

the political upheavals of the 1930s dramatically affected the faith not only of the women who had worked in Pettersson's group but also of the entire Radium Institute.

Notes

Note 1: Hans Pettersson, Report to the International Education Board, April 1928, GUB (in English) (emphasis mine).

Note 2: Rayner-Canham, M. and G., *A Devotion to Their Science* (1997), 12.

Note 3: The Rayner-Canhams base their claim on Margaret Rossiter's work. See Rossiter, "Sexual Segregation in the Sciences" (1978); Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (1984); Rossiter, *Women Scientists in America: Before Affirmative Action 1940–1972* (1995). They also compare radioactivity to other subdisciplines of physics such as astronomy and crystallography. See for example, Portugal and Cohen, *A Century of DNA* (1977); Julian, "Women in Crystallography" (1989); Lankford and Slavings, "Gender and Science: Women in American Astronomy, 1859–1940" (1990).

Note 4: Rayner-Canham, M. and G., *Women in Chemistry* (1998), 94.

Note 5: Rayner-Canham, M. and G. *A Devotion to their Science* (1997), 18.

Note 6: See for example, Weidler Kubanek and Grzegorek, "Ellen Gleditsch: Professor and Humanist" (1997); Rayner-Canham, M. and G., "Stefanie Horovitz, Ellen Gleditsch, Ada Hitchins, and the Discovery of Isotopes" (2000); Sime, *Lise Meitner* (1996); Kurner, *Lise, Atomphysikerin: Die Lebensgeschichte der Lise Meitner* (1998); Rife, *Lise Meitner and the Dawn of the Nuclear Age* (1999); Crossfield, "Irene Joliot-Curie: Following Her Mother's Footsteps" (1997); Pflaum, *Grand Obsession* (1989); Pycior, "Marie Curie's 'Anti-Natural Path'" (1989); Pycior, "Reaping the Benefits of Collaboration While Avoiding its Pitfalls" (1993); Pycior, "Marie Curie: Time only for Science and Family" (1997); Rosner and Strohmaier (eds.), *Marietta Blau* (2003).

Note 7: On Petrova see Tesinska, "Women in the Field of Radioactivity: The Case of the Czech Physical Chemist and Radiobiologist Jarmila Petrova" (2004).

Note 8: Schürmann, "Promoting International Women's Research in Radioactivity" (2004).

Note 9: According to Horst Kant, from 1912 to 1938, there was close to 14 percent women in the Meitner/Hahn department at the Kaiser Wilhelm Institute for Chemistry in Berlin. However, the role of those women in the laboratory has not been researched. Kant, "Von KWI für Chemie zum KWI für Radioaktivität" (2002).

Note 10: Tausky-Todd, "Olga Tausky-Todd: An Autobiography" (1985), 314.

Note 11: Tuma, "Die österreichischen Studentinnen" (1993), 81–82.

Note 12: Rabinbach, *The Crisis of Austrian Socialism* (1983), 23.

Note 13: In November 1918, women were granted the right to vote for the National Assembly and the provisional assemblies and to stand for office. They won full legal equality under the constitution in 1920.

Note 14: Rabinbach, *The Crisis of Austrian Socialism* (1983), 26.

Note 15: Gruber, *Red Vienna* (1991), 20.

Note 16: Gruber, *Red Vienna* (1991), 63.

Note 17: Gruber, *Red Vienna* (1991), 148.

Note 18: Esden-Tempska, "Civic Education in Authoritarian Austria" (1990), 192.

Note 19: Prost, "Emigration und Exil österreichischer Wissenschaftlerinnen" (1987), 450.

Note 20: Rabinbach, "Politics and Pedagogy" (1978).

Note 21: Gehmacher, "Men, Women, and the Community Borders" (1998), 209.

Note 22: The *Technische Hochschule* opened its doors to women in 1918–1919. The following year, 20 women registered as matriculated (*ordentlicher*) students and 17 as non-matriculated (*ausserordentlicher*) and most of whom chose the field of technical chemistry; see Edith Lassmann, "Das Frauenstudium an den Technischen Hochschulen Wien und Graz", Lassmann file, IAWA, Virginia Tech Library. In 1919, the faculty of law did likewise, opening up the opportunity to women for the higher civil service, one of the higher status professions. See Heindl, "Zur Entwicklung des Frauenstudiums in Österreich" (1993).

Note 23: Lassmann, Edith. "Das Frauenstudium an den Technischen Hochschulen Wien und Graz", Lassmann file, IAWA. See also Seidler, "Das Frauenstudium" (1927), 18.

Note 24: Heindl, "Zur Entwicklung" (1993), 17.

Note 25: Anderson, *Utopian Feminism* (1992), 120.

Note 26: Prost, "Emigration" (1987), 468.

Note 27: The figures in this table are based on Renate Tuma's work on the female Austrian students in the University of Vienna; see Tuma, "Die österreichischen Studentinnen" (1993), 81.

Note 28: The figures in this table are based on Renate Tuma's work on the female Austrian students in the University of Vienna; see Tuma, "Die österreichischen Studentinnen" (1993), 88.

Note 29: Probst, "Emigration und Exil" (1987), 468. For example, during Red Vienna, the number of female physicians increased substantially because, starting in 1922, many were hired by the city of Vienna. Gamper, ". . . so kann ich nicht umhin zu wendern, dass nicht mehr Ärztinnen da sind . . ." (2000). See also Arias, "Die ersten Ärztinnen in Wien" (2000); Walzel, "Ärztinnen in Wien" (2000).

Note 30: Benetka, "The Vienna Institute of Psychology" (1995), 128.

Note 31: Benetka, "The Vienna Institute of Psychology" (1995), 130.

Note 32: Hachohen, *Karl Popper-The Formative Years, 1902–1945* (2000), 136.

Note 33: Gardner and Stevens, *Red Vienna and the Golden Age of Psychology* (1992), 2.

Note 34: Gardner and Stevens, *Red Vienna and the Golden Age of Psychology* (1992).

Note 35: Benetka, "The Vienna Institute of Psychology" (1995), 128.

Note 36: Janik and Veigl, *Wittgenstein in Vienna* (1998), 19.

Note 37: Gay, "Sigmund Freud: A Brief Life" (1989), xi–xxix.

Note 38: Janik and Veigl, *Wittgenstein in Vienna* (1998), 19.

Note 39: Mühlleitner and Reichmayr, "The Exodus of Psychoanalysts from Vienna" (1995), 98.

Note 40: Gardner and Stevens, *Red Vienna and the Golden Age of Psychology* (1992), 172–74.

Note 41: Gardner and Stevens, *Red Vienna and the Golden Age of Psychology* (1992), 10.

Note 42: Mühlleitner and Reichmayr, "The Exodus of Psychoanalysts from Vienna" (1995), 98.

Note 43: Gardner and Stevens, *Red Vienna and the Golden Age of Psychology* (1992), 126. For the SDAP's attitude toward psychoanalysis and Freud, see Gruber, *Red Vienna* (1991), 227.

- Note 44:** Burian, "History of the Vienna Psychoanalytical Society" (1999).
- Note 45:** Koestler, *The Case of the Midwife Toad* (1971), 22; Reiter, "Zerstört und vergessen" (1999), 586. On Vivarium see also Hofer, "The Beginnings of Biological System Theory," unpublished manuscript.
- Note 46:** Reiter, "Zerstört und vergessen" (1999), 592.
- Note 47:** Reiter, "Zerstört und vergessen" (1999), 595–96.
- Note 48:** Koestler, *The Case of the Midwife Toad* (1971), 23.
- Note 49:** The dispute between the two biologists concerned the existence of the nuptial pads of the midwife toad. For an account of the episode, see Koestler, *The Case of the Midwife Toad* (1971).
- Note 50:** Hofer, "The Beginnings of Biological System Theory," unpublished manuscript. See also Reiter, "Zerstört und vergessen" (1999), 608.
- Note 51:** Almanach der Akademie der Wissenschaften in Wien (1932–33), 263.
- Note 52:** Leonore Brecher, *Rigorosenblatt*, AÖAW.
- Note 53:** Hans Przibram to Exner, November 5, 1925, AÖAW.
- Note 54:** Almanach, Akademie der Wissenschaften in Wien, for the years from 1920 to 1934, AÖAW.
- Note 55:** Deichmann, *Biologists Under Hitler* (1996), 18.
- Note 56:** For Neurath's political engagement and philosophy, see Cartwright et al. *Otto Neurath* (1996), 56–82. For the cultural links between Neurath's and Vienna Circle's philosophical positioning and the Bauhaus architecture of Red Vienna, see Galison, "Constructing Modernism" (1996), 17–44.
- Note 57:** Cartwright et al., *Otto Neurath* (1996), 77.
- Note 58:** Hachohen, *Karl Popper* (2000), 187.
- Note 59:** Korotin, "Auf Eisigen Firnen" (1997), 301–3. See also Rose Rand's curriculum vitae, RR 2-5–21, ASP.
- Note 60:** Felix Kaufman, Letter of Recommendation to Rose Rand, 26 January, 1938, RRASP.
- Note 61:** Rudolf Carnap, Testimonial, February 6, 1938, RRASP. Karl Popper, Letter of Recommendation, 20 July 1951, RRASP.
- Note 62:** Reiter, "Vienna: A Random Walk" (2001), 478.
- Note 63:** Tausky-Todd, "Olga Tausky-Todd: An Autobiographical Essay" (1985), 317.
- Note 64:** Coen, *A Scientific Dynasty* (2004), 170–76. See also Herrberg, and Wagner, *Wiener Melange* (2002).
- Note 65:** Taussky-Todd, "Olga Taussky-Todd" (1985), 318.
- Note 66:** Sablik, *Julius Tandler* (1983).
- Note 67:** Gruber, *Red Vienna* (1991), 65–73.
- Note 68:** Meyer, "Die Vorgeschichte" (1950), 20; Alth, *50 Jahre Strahlentherapie Lainz* (1981), 12.
- Note 69:** Gard to Maier, August 8, 1930, AHL.
- Note 70:** Tandler to Ahlboom, December 20, 1930, AHL.
- Note 71:** Maier to the Radiumhemmet, December 30, 1930, AHL.
- Note 72:** Maier to Ahlboom, January 3, 1931, AHL.

Note 73: Alth, *50 Jahre* (1981), 12; Kogelnik, "The History and Evolution of Radiotherapy and Radiation Oncology in Austria" (1996), 224. With the absolute support of the Social Democratic Party and the city's mayor, Karl Seitz, Tandler also established a new pavilion for the cure of tuberculosis with 300 beds and modern facilities at the municipal hospital. At the time, tuberculosis was considered the "Viennese disease" given the exceptionally high numbers of patients; see Luger, *70 Jahre Krankenhaus der Stadt Wien-Lainz* (1977), 3.

Note 74: Urbach, "Einiges aus dem Physikalischen Laboratorium eines Krankenhauses" (1933); Meyer, "Die Vorgeschichte" (1950), 20; Bischof, *Frauen am Wiener Institute für Radiumforschung* (2000), 67. For a detailed account of Urbach's dismissal from the Radium Station see Reiter, "The Year 1938" (1995).

Note 75: Meyer to Rutherford, January 22, 1920, AÖAW (in English).

Note 76: Meyer, "Das erste Jahrzehnt" (1920), 11.

Note 77: Meyer to Rutherford, February 8, 1920, M191, CUL (in English).

Note 78: Rutherford to Meyer, February 18, 1920, AÖAW.

Note 79: Karlik and Schmid, *Franz Serafin Exner* (1982), 144.

Note 80: Hittner, *Geschichte des Studienfaches* (1947), 77.

Note 81: Almanach, Akademie der Wissenschaften in Wien (1920), 180, AÖAW.

Note 82: Meyer to Rutherford, January 22, 1920, AÖAW (in English).

Note 83: Meyer to Rutherford, January 22, 1920, AÖAW (in English).

Note 84: Augustus Trowbridge to Wickliffe Rose, April 2, 1925, Box 24, RAC.

Note 85: Rutherford to Meyer, July 25, 1921, AÖAW; Rutherford to Meyer, October 17, 1921, AÖAW; Rona, *How it Came About* (1978), 21–22.

Note 86: *Almanac of the Austrian Academy of Sciences*, (1921), 194–95, AÖAW.

Note 87: Ruthenberg, "Friedrich Adolf Paneth (1887–1958)" (1997); Meyer, "Die Vorgeschichte" (1950), 26.

Note 88: Bischof, *Frauen* (2000), 66.

Note 89: Hilda Fonovits, Curriculum Vitae, AUW.

Note 90: Fonovits, "Über die Erreichung" (1919).

Note 91: Meyer to the Professorenkollegium der Philosophischen Fakultät der Universität, October 27, 1920, AÖAW.

Note 92: Personalstand, Universität Wien, academic year 1920–21, AUW; Bischof, *Frauen* (2000), 67.

Note 93: Fonovits-Smerekker to Meyer, September 9, 1922, AÖAW.

Note 94: Fonovits-Smerekker to Meyer, September 9, 1922. AÖAW.

Note 95: File Mitarbeiter/Assistenten, AÖAW.

Note 96: Gustav Ortner, curriculum vitae, no 021, Rigorosenakt, AUW.

Note 97: Karl Przibram, "1920 bis 1938" (1950), 27.

Note 98: Berta Karlik, "Karl Przibram Nachruf" (1974) 380. The biographical information on Przibram comes from Karlik's Nachruf.

Note 99: Pettersson to Meyer, November 28, 1921, AÖAW. Most of the biographical information on Pettersson comes from an interview with his daughter Agnes Rodhe on September 22, 2001, Göteborg and with Artur Svansson, an oceanographer and biographer of Otto Pettersson, on September 21, 2001, Göteborg. See also Deacon, "Hans Pettersson 1888–1966" (1966).

Note 100: Svansson, interview by the author, September 21, 2001, Göteborg. Pettersson, "Contribution à la connaissance" (1910). See also Hans Pettersson's report to the International Education Board, April 1928, GUB.

Note 101: Karlik, "Hans Pettersson Nachruf" (1970), 305.

Note 102: Rodhe to Rentetzi, October 29, 2001.

Note 103: The same problem had occupied both his advisor Angström, who had made a balance as early as 1895, and Ramsay, who measured the density of a tiny amount of radium emanation using a balance made by his students Steel and Grant. For example, Ramsay and Whytlaw-Gray determined the atomic weight of radium using a minute quantity of pure RaBr_2 , verifying earlier measurements done at the Curies' laboratory; see Pettersson, *A New Microbalance and its Use*, 1914. It is worth noticing that the quantities of radium which Ramsay had been working on also came from the Bohemian mines. In 1907, Ramsay received a loan of 300 mg RaBr_2 from the Austrian Academy of Sciences with the commitment to share it with Rutherford. Soon after, the arrangement brought tension between the two British laboratories. That could explain the reasons for which Pettersson later on turned to Vienna for his radioactivity research instead of Rutherford's laboratory in Cambridge.

Note 104: Rodhe to Rentetzi, October 29, 2001. Pettersson, "Some New Instruments in Oceanographical Research" (1917); Pettersson and Angström, "Ein neues Totalimmersions-Aräometer" (1917); Pettersson, "Zur Technik der Dichtigkeitsbestimmung" (1917).

Note 105: Rodhe, interview by the author, September 22, 2001, Göteborg.

Note 106: Rutherford to Pettersson, June 24, 1921, GUB.

Note 107: Pettersson to Rutherford, July 4, 1921, GUB; Rutherford to Pettersson, July 12, 1921, GUB; Pettersson to Rutherford, July 17, 1921, GUB.

Note 108: According to Rodhe, Otto Pettersson was the one who approached the Prince of Monaco, a friend of his, and asked whether Hans could work in his laboratory. Rodhe to Rentetzi, August 11, 2003.

Note 109: Rodhe to Rentetzi, October 29, 2001. Pettersson had already contacted Meyer in 1914 from Bornö, asking his permission to perform some of his measurements in Vienna. (Pettersson to Meyer, April 26, 1914, AÖAW; Pettersson to Meyer, May 24, 1914, AÖAW).

Note 110: Pettersson to Meyer, November 28, 1921, AÖAW.

Note 111: Galison, *Image and Logic* (1997), 150.

Note 112: Kautz, "Ermittlung der Halbwertszeit" (1926); Kautz studied physics and mathematics at the University of Vienna under Meyer and Gustav Jäger, and graduated in 1926 (Kautz Theodora, Rigorosentakt 9216, AUW.) She left the institute to become schoolteacher. Meyer kept in touch with her and in 1934, he informed her that the granddaughter of the president of the Academy, Eduard Suess, was her student (Meyer to Kautz, May 11, 1934, AÖAW); Bussecker, "Verflüchtigungskurven" (1928); Bussecker graduated in 1929 after studying physics and mathematics under Meyer and Gustav Jäger as well (Bussecker Erna, Rigorosenakt 10210, AUW); Weiss-Tessbach, "Mikrokalorimetrische" (1928); Schneidt, "Das Electrochemische Verhalten" (1929);

Schneidt was born in Komotan, Bohemia and was a fellow student of Bussecker (Schneidt Selma, Rigorositakt 10442, AÖAW.); Holesch, "Über die Verdampfung" (1931). Holesch was a student of Meyer and Thirring. She graduated in 1931 (Holesch Elsa, Rigorositakt 11257, AUW).

Note 113: Pettersson to Meyer, December 14, 1921, AÖAW.

Note 114: Pettersson to Meyer, June 4, 1922, AÖAW.

Note 115: From 1910 to 1922, there had been a long debate on whether Einstein should be awarded the Nobel Prize or not. The Nobel committee, as Carl-Olov Stawström argues, was dominated by representatives of the Uppsala's strong empirical tradition; see Stawström, "Relative Acceptance" (1993), 299. Given his prestigious status within the University of Uppsala and the international community, Otto Pettersson must have known Einstein from that time.

Note 116: Pettersson to Einstein, August 18, 1923, AEA.

Note 117: For example, from 1923 to 1925 Pettersson received funds from the following Swedish sources: Längmanska Fonden, Lars Hiertas Minne, and the Göteborg Högskolas Oceanografiska Institution (Hans Pettersson's Finances, International Education Board, GUB).

Note 118: Hans Pettersson's report to the International Education Board, April 1928, GUB.

Note 119: Rayner-Canham, M. and G., *A Devotion to their Science* (1997), 18.

Note 120: Rona, *How it Came About* (1978), 3–13.

Note 121: The information is based on the individual Rigorositakten of all the women of the Institute, AUW Meyer to Dora Kautz, May 11, 1934, AÖAW; Meyer to Gertrud Wild, June 17, 1946, AÖAW.

Note 122: Bragg to Meyer, August 29, 1930, AÖAW; Meyer to Bragg, September 1, 1930, AÖAW.

Note 123: Rona, *How it Came About* (1978), 15.

Note 124: Blau, curriculum vitae, GDSCA, (in English). In a self-description written later (1963) than this one (1941), Blau mentions that she received the fellowship in 1933. (Blau, curriculum vitae, Leopold Halpern Papers) From letters to Meyer it becomes obvious that the earlier date is correct. See for example, Blau to Meyer, October 4, 1932, AÖAW; Blau to Meyer, December 12, 1932, AÖAW. On Blau's time in Göttingen see Bischof, *Frauen am Wiener Institut*, (2000), 75–76.

Note 125: Reiter, "Stefan Meyer" (2001), 119.

Note 126: Five years younger than Meyer, Gleditsch was one of the first women who entered the field of radioactivity before the First World War, collaborating closely with Marie Curie. Her scientific and friendly relationship with Meyer goes back to the First World War when Gleditsch supplied radioactive materials for the research that Horowitz and Hönigschmid were performing at the institute. Besides spending time at Curie's laboratory in Paris, Gleditsch worked with Bertram Boltwood in his laboratory at Yale University for a short period of time. The exact determination of the half-life of radium brought Gleditsch to the forefront of radioactivity research and established her as a specialist in the separation of radioactive substances from minerals. In 1916, she was appointed *Dozent* at the University of Oslo. Politically aware of the difficulties women faced in their scientific careers, Gleditsch became heavily involved in the International Federation of University Women, established in 1919. See Weidler and Grzegorek, "Ellen Gleditsch" (1997); Lykknes, *Ellen Gleditsch: Professor, Radiochemist, and Mentor* (2005).

Note 127: Gleditsch to Rona, August 19, 1934, AÖAW.

Note 128: Gleditsch to Karlik, May 4, 1937, AÖAW.

Note 129: In 1919, Gleditsch thanked Meyer for sending her his valuable papers and expressed hope to visit the institute in the future (Gleditsch to Meyer, April 27, 1919, AÖAW). In a letter to Gleditsch, Karlik assures her that she sent a microscope table, which should arrive soon in the mail (Karlik to Gleditsch, April 7, 1938, AÖAW).

Note 130: Föyn, Kara-Michailova, and Rona, "Zur Frage der Künstlichen Umwandlung des Thoriums durch Neutronen" (1935); Föyn, Pettersson, and Rona, "Künstliche Umwandlung des Thoriums durch Neutronen" (1935). Föyn remained at the institute for a year and worked closely with Rona (Meyer to Gleditsch, August 18, 1934, AÖAW; Gleditsch to Meyer, August 30, 1934, AÖAW; Meyer to Rona, September 12, 1934, AÖAW; See also *Almanac of the Austrian Academy of Sciences*, (1935), 196; (1936), 213, AÖAW). Later on, he worked on radioactivity of the seawater with Pettersson, Karlik, and Rona. (Föyn, Karlik, Pettersson, and Rona, "Radioactivity of Seawater" (1939). Meyer to Gleditsch, August 18, 1934, AÖAW; Gleditsch to Meyer, August 30, 1934, AÖAW).

Note 131: Rona to Meyer, September 9, 1935, AÖAW; Pettersson to Karlik, September 27, 1934, GUB.

Note 132: Paneth, "Prof. Stefan Meyer" (1950), 548.

Note 133: Lawson, "Prof. Stefan Meyer" (1950), 549.

Note 134: Lawson, "Prof. Stefan Meyer" (1950), 549. In 1919, Lawson moved to Sheffield having already developed close relations with most of his colleagues in Vienna. As Rutherford reported to Meyer in 1920, "Lawson came to see me in Manchester and gave me detailed news of all of you which I am very glad to hear. Lawson has now got a post in Sheffield and I hope is comfortably situated. He seems a very keen and prolific worker. I appreciate very much the kind way you looked after him in difficult times." (Rutherford to Meyer, January 13, 1920, CUL). In 1918, in collaboration with Hilda Fonovits, Lawson started to work on the number of ion pairs produced by alpha particles of radium C. After he left, she carried the study over without Lawson and presented her paper to the Austrian Academy of Sciences in 1922 (Fonovits, "Die Zahl der von einem α -Teilchen" (1922), 356).

Note 135: It was Annette Vogt who first drew our attention to a similar case of the so-called "Harnack Principle" for the employment of women in scientific institutes of the Kaiser Wilhelm Society. The principle named after the first president of the Society, Adolf von Harnack, describes the fact that each institute that belonged to the society was created in a new scientific discipline and specifically for one individual. Thus, the director of the institute was endowed with the absolute power to hire and fire his personnel. When the director was progressive, the "Harnack Principle" worked in favor of women's employment. (Vogt, "Von der Ausnahme zur Normalität?" (2003) 171.

Note 136: Rona, *How it Came About* (1978), 25.

Note 137: Gruber, *Red Vienna* (1991), 26.

Note 138: Halpern, "Marietta Blau" (1997), 197.

Note 139: Freidenreich, "Gender, Identity, and Community" (1998), 166.

Note 140: Rossiter, *Women Scientists in America* (1984), 118. Wick was in the institute during 1929–30 and 1930–31 and returned for one year in 1936–7. During her first visit, she suffered a serious infection as did Franziska Witt and Stefan Wolf, also members of

the institute; see *Almanac of the Austrian Academy of Sciences* (1930), 234. Also in 1926–27 the institute hosted R. Hasche from New Jersey and H. Raudnitz from Prague. (*Almanac of the Austrian Academy of Sciences*, (1927), 204.

Note 141: Farnsworth to Meyer, July 8, 1925, AÖAW. Although Meyer responded positively to Farnsworth's request, she probably did not come since her name appears neither in publication records nor in the almanac of the Austrian Academy of Sciences.

Note 142: Stefan Meyer, November 28, 1931. Spare report at the file *Mitarbeiten/Assistenten*, AÖAW.

Note 143: Stefan Meyer, November 28, 1931, *Mitarbeiten/Assistenten*, AÖAW.

Note 144: Pettersson to Mellbye, March 3, 1926, in Rodhe to Rentetzi, October 29, 2001.

Note 145: November 6, 1928, *Mitarbeiten/Assistenten*, AÖAW.

Note 146: For biographical information on Kara-Michailova, see Elisabeth Kara-Michailova, *Rigoresenakt* 5215, AUW; Tsoneva-Mathewson, Rayner-Canham, M. and G., "Elizaveta KaraMichailova" (1997); Sretenova, "Elizabeta Karamichailova" (2003); Nazarska, "Elissaveta Karamichailova" (2006).

Note 147: November 6, 1928, *Mitarbeiten/Assistenten*, AÖAW.

Note 148: Meyer to Dekan, March 21, 1933, Karlik's file, *Mitarbeiten/Assistenten*, AÖAW.

Note 149: Kara-Michailova to Meyer, January 18, 1933, AÖAW.

Note 150: *Almanac of the Austrian Academy of Sciences* (1931), 285, AÖAW.

Note 151: January 10, 1934, Karlik's file, *Mitarbeiten/Assistenten*, AÖAW; December 2, 1932, Kara-Michailova's file, *Mitarbeiten/ Assistenten*, AÖAW.

Note 152: *Almanac of the Austrian Academy of Sciences* (1929), 202, AÖAW.

Note 153: Rayner-Canham M. and G., "Elizabeth Rona: The Polonium Woman," *A Devotion* (1997).

Note 154: Rona, *How it Came About* (1978), 10. While Rona taught at the University of Budapest, she did not quit her research. In 1920, two articles came out based on her earlier work with Hevesy. Rona, "Über die Wirksamkeit" (1920); Rona, "Diffusionsgrösse" (1920).

Note 155: Rona, *How it Came About* (1978), 10–14. See also *Almanac of the Austrian Academy of Science* (1925), 216, AÖAW.

Note 156: *Institutsverrechnung* 1922–32, AÖAW.

Note 157: Maria Hornyak, *Rigoroosenakt*, no 4925, AUW.

Note 158: Hess and Hornyak, "Über die relative" (1920).

Note 159: Karlik to Pettersson, July 26, 1933, GUB added emphasis.

Note 160: Karlik to Pettersson, June 20, 1937, GUB.

Note 161: Reiter, "The Year 1938" (1995), 198.

Note 162: Bischof, *Frauen am Wiener Institut* (2000), 102.

Note 163: Weiss-Tessbach, "Mikrokalorimetrische" (1928).

Note 164: Reiter, "The Year 1938" (1995), 198. In the institute's kassa, where Meyer recorded the finances, Anni appeared to have received minor amounts of money probably for performing technical tasks (Kassa, 1933–1938, AÖAW). She remained in the institute until both she and Franz immigrated to the United States in 1939.

Note 165: On the resolution of the controversy, see Stuewer, "The Artificial Disintegration" (1985); Hughes, *The Radioactivists* (2003); Brown, *The Neutron and the Bomb: A Biography of Sir James Chadwick* (1997).