History of Intellectual Culture

http://www.ucalgary.ca/hic • ISSN 1492-7810
2017-19 • Vol. 12, No. 1

The Role of Serendipity in the Forced Migration of Felix Haurowitz (1896–1987): Prague–Istanbul–Bloomington

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Abstract

Out of the estimated 650 émigré scholars and scientists who were dismissed from their academic positions under Nazi Germany between 1933 and 1934, 190 (largely Jewish) emigrated to Turkey, constituting 29 percent of the total. The figures may vary, but they are certainly significant. The circumstances of their arrival pose the greater interest. While individuals were facing insurmountable obstacles in trying to find a safe haven in other countries, such as the United States or the United Kingdom, they were officially invited by the Turkish Republic to take up highly paid contractual university positions. Not only were their travel expenses paid, but also they could bring their families and belongings, as well as laboratory equipment and assistants. Having survived the war years, some chose to remain, some even returned to Germany, but the majority moved to the United States. They left a profound legacy, affecting all aspects of Turkish culture and arts, all disciplines of higher education, medicine, and science, as well as related institutions. Curiously, this unique phenomenon seems to have received very little attention in the English scholarship of the subject or the period until this century. Among this group of translocated émigré physicians and scientists was the eminent biochemist Felix Michael Haurowitz (1896–1987), whose work on antibody formation laid important groundwork for later advances in psychoimmunology and neuroimmunology. Haurowitz was forced to leave Prague upon the Nazi occupation of Czechoslovakia in 1939. He moved first to a secure academic position at Istanbul University, then to a brilliant scientific career at Indiana University (1948). In this article, the complex effects of translocation on Haurowitz will be explored, with emphasis on the role of serendipity in his career and science. A related question briefly considered is: What are the necessary and sufficient conditions that enable a scientist or physician to successfully continue experimental research despite translocation to an unfamiliar milieu?*

Prologue: The Pozzo Illusion — An Analogy for Translocation

Over the nave of the church of St. Ignatio in Rome is an impressive cupola by Andrea Pozzo (1641–1709). To view this architectural masterpiece, the visitors are guided to a particular spot. When the viewer shifts to a different location, however, the whole monumental edifice seems to collapse. The appearance of a

* The manuscript for this article is partially based on a previous invited presentation, entitled "The Unique and the Universal Features in Translocation: The Case of Felix Haurowitz (Prague – Istanbul – Bloomington 1938–48)," which was held at the 2016 double-panel on "Personal Stories and Institutional Narratives from German-speaking Émigré Physicians, Scientists, and Academics between the 1930s and the 1960s" at the annual meeting of the Canadian Society for the History of Medicine (CSHM) and the Canadian Historical Association (CHA) in Calgary. The gracious financial support from the Federation for the Humanities and Social Sciences Aid for Interdisciplinary Sessions Fund is hereby acknowledged.

permanent, three-dimensional, solid structure turns out to be only an illusion of perspective, dependent on being at a particular location.[1] The dramatic experience of the Pozzo illusion can help us visualize the impact of forced translocation, as in the mass emigration of German-speaking scientists and physicians between 1933 and 1948. They were uprooted from their own environments to locations of unfamiliar cultural, linguistic, and scientific traditions. The permanence and stability that they had taken for granted turned out to be an illusion, once shattered, never to be regained.

"*… of a generation that will not be seen again*."[2]

Introduction[3]

Felix Michael Haurowitz (1896–1987), viewed as one of the major scientists in twentieth-century biochemistry, serology, psychoimmunology, and neuroimmunology, had to leave the German University of Prague, in his native city, upon the Nazi invasion of Czechoslovakia in 1938. He spent the rest of his life first at Istanbul University in Turkey and, beginning nine years later, at Indiana University, Bloomington, in the United States. It will be argued here that in neither of these two countries did Haurowitz find a position through his own planning and efforts, which in the United States were considerable but met with failure. Nor did he find one through the special organizations that were formed to assist the academics who were dismissed from their jobs first in Germany as the Nationalist Socialist government came to power in 1933 and subsequently in Nazi-occupied countries.[4] Haurowitz's survival and success in getting the two

[1] The cupola frescoes of the Church of Sant Ignazio represent a Baroque masterpiece of his illusionistic technique (*quadropara*). See Andrea Pozzo, *Perspective in Architecture and Painting* (an unabridged reprint of the English-and-Latin edition, 1693). *Perspectiva pictorum et architectorum* (New York: Dover, 1989).

[2] On Haurowitz, in, Frank W. Putnam, *Felix Haurowitz 1896–1987, A Biographical Memoir* (Washington, DC: National Academy of Sciences, 1994), 133–63; esp. 135. Based largely on the submitted autobiography of Haurowitz (October 1975) upon Haurowitz's election to the Academy's membership upon request by the Home Secretary of the National Academy of Sciences of the United States.

[3] I would like to thank Frank Stahnisch for initially inviting me to explore this immensely complex subject of translocation of German-speaking academics in Turkey. There is a vast amount of unpublished material in the form of memoirs, correspondence of the émigrés in multiple languages, and related papers in the State archives of the Turkish Republic, libraries of the Universities of Istanbul and Ankara, as well as the Lilly Library of Indiana University and others in the United States. Please note that Haurowitz's trilingual (German, Turkish, and English) correspondence with colleagues (1920–1960s) is archived at the Lilly Library of Indiana University. In addition, there is substantial correspondence in the Linus Pauling archives in Colorado. Hence any research is "work in progress" outside studies of individual cases. The existing studies, pertaining to Turkey, derive largely from a few standard works that are based on primary sources; see, for example, Horst Widmann, *Atatürk Üniversite Reformu: Almanca konuşulan ülkelerden 1933 yılından sonra Türkiyeye gelen ö.retim üyeleri–Hayat Hikayeleri–Çalışmaları–Etkileri*, trans. Aykut Kazancıgil and Serpil Bozkurt (Istanbul: Üniversitesi Cerrahpaşa Tıp Fakültesi Atatürk'ün Yüzüncü Doğum Yılını Kutlama Yayınları, 1973), 25–26; Arnold Reisman and Ismail Capar, *The Nazis' Gifts to Turkish Higher Education and Inadvertently to Us All: Modernization of Turkish Universities (1933–1945) and Its Impact on Present Science and Culture* (New Orleans: Mississippi State University, 2004), 7, 9–10, 23–24, 31, 32, 33; accessed 20 April 2018, http://dx.doi.org/10.2139/ssrn.624525; Arnold Reisman, "Exiled in Turkey from Nazi Rule: Eminent Biochemist Felix Haurowitz Became Indiana's Adopted Son," *The Journal of the Center for the Americas* 4, 1 (2004): 1–26; Arnold Reisman, *Turkey's Modernization: Refugees from Nazism and Atatürk's Vision* (Washington, DC: New Academia Publishing, 2006), 410–12; Arnold Reisman, "German Jewish Intellectuals' Diaspora in Turkey: 1933–1955," *The Historian* 69, 3 (2007): 450–78; Arnold Reisman, "They Helped Modernize Turkey's Medical Education and Practice: Refugees from Nazism 1933–1945," *Gesnerus* 65, 1 (2008): 56–85; and Emre Dölen, *Türkiye Üniversite Tarihi, 1933–1946*, vol. 4, (Istanbul: İstanbul Üniversitesi, 2010), section 6.5.

[4] There is a substantial body of scholarly studies on the challenging questions raised by the complexity of the subject. See Mitchell G. Ash and Alfons Soellner, eds., *Forced Migration and Scientific Change: Emigre German-Speaking Scientists*

academic appointments was due to serendipity — a chain of entirely unsolicited opportunities coming together by chance. This article will present the crucial role serendipity played in Haurowitz's translocation to Turkey and subsequently to the United States, which has not previously been explored.

In a comparative analysis of their subsequent impact on Haurowitz's scientific career and research in both countries, the features that were unique to Haurowitz's experience and those that were shared with other émigré scientists will be identified. The milieu that Turkey provided is of particular significance, as German-speaking émigré scientists, in various disciplines but from similar backgrounds and scientific traditions, arrived as a group in a totally unfamiliar culture and language, to remain together at the same institution over a sustained period of time. This contrasted with the experiences of most émigrés, who were individually dispersed to other countries at diverse jobs and institutions.[5] Focusing on Haurowitz, the aim is to extend our understanding of what factors following displacement contribute to the continuity of scientific research and, conversely, impede it.[6] The related questions to be considered are: What forms does continuity in research take? What role does serendipity play in these forms?

Prague to Istanbul

At the outbreak of the Second World War, Felix Haurowitz belonged to the faculty of the medical school of the German University in Prague, where he had also received his graduate degrees (MD in 1922; D.Sc. in 1923), with a growing scientific reputation.

On 10 October 1938, Haurowitz received an enquiry as to whether he would be interested "in a teaching position in biochemistry at the University of Istanbul." It came from Hans Winterstein (1879–1963), *professor ordinarius*, and head of the Institute of General Physiology at Istanbul University Medical School (1933–1953), which was accompanied by an "unofficial request" for Haurowitz's "cv and list of publications." The offer was unsolicited but coincided with two unrelated, parallel events. First, it arrived immediately after Germany's acquisition of the Sudetenland on 1–10 October 1938. Second, the position at Istanbul University had become vacant due to the departure of the director of the Institute of Biochemistry, Werner Lipschitz (1892–1948), for the United States. After six years (1933–1939), his contract with the Turkish government had ended. Two of his assistants, Ernst Bueding (1910–1986) and Ernst W. Caspari (1909–1988) were also leaving.[7]

Haurowitz seemed a perfect candidate for the position: a scientist with an international reputation, whose academic position was seriously threatened by the imminent German invasion of the rest of Czechoslovakia. The unsolicited offer came from a colleague (born in Prague), who could envisage through

and Scholars after 1933 (Washington, DC: German Historical Institute and Cambridge, UK: Cambridge University Press, 1996). For recent investigations, see Frank W. Stahnisch and Guel A. Russell, eds., *Forced Migration in the History of Twentieth Century Neuroscience and Psychiatry – New Perspectives* (New York and London: Routledge, 2017), 74–76, 90–94; and Frank W. Stahnisch and Guel A. Russell, eds., "New Perspectives on Forced Migration in the History of Twentieth Century Neuroscience," special issue of the *Journal of the History of the Neurosciences* 23, 3 (2016): 2–19, 219–26.

[5] For an example of the contrast in the experience of an émigré psychologist, Wilhelm Peters (1880–1963), who went first to Britain, then to Turkey, see Guel A. Russell, "A Variation in Forced Migration: Wilhelm Peters (Prussia via Britain to Turkey, and Muzafer Sherif (Turkey to the United States)," *Journal of the History of the Neurosciences* 23, 3 (2016): 219–226.

[6] For a broader comparison, which is outside the scope of the present paper, see Ash and Soellner, *Forced Migration and Scientific Change*, which deals with the impact of biographical and socio-cultural elements on the innovative contribution of the émigré scientists and scholars to science." A critical review of the scholarship and analysis of the "loss and gain" thesis is undertaken in Stahnisch and Russell, eds., "New Perspectives on Forced Migration."

[7] Widmann, *Atatürk Üniversite Reformu*; Reisman, "Exiled in Turkey from Nazi Rule," 1–26; Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 450–78.

personal experience the consequences of the Nazi occupation for Jewish academics. Dismissed from the University of Breslau in 1933, Winterstein had translocated to Turkey and remained there for twenty-four years.[8]

At the time Haurowitz did not seem to fully realize his impending danger. In fact, he had made no plans to leave his home country. His optimism about the situation in Prague is indicated by his cautious response to Winterstein as late as 31 January 1939:

> Thanks for all your efforts. Of course, I am a bit nervous about initiating anything at this end without official documentation to assure me that I will be permitted to enter Istanbul officially. But I am not that impatient because it is pretty quiet here and as far as I can judge it will remain quiet."[9]

He was also reluctant "to abandon his research lab and student co-workers." With the occupation of Czechoslovakia, however, the situation dramatically changed. The German University was incorporated into the Third Reich, and Haurowitz found himself deprived of his "privilege to teach and to examine." Only then did he decide to visit Istanbul, to see whether he would be able to continue doing research there. Having found the conditions favourable, he accepted the Turkish position.[10] Within two weeks of the invasion of Prague (15 March 1939), Haurowitz was on a train to Istanbul with his wife and two children. Most of their property had been seized, but they were able to take their furniture and books with them. As Haurowitz's son commented years later, "None of the Jewish members of our family who stayed behind survived the German occupation."[11]

Neither leaving Prague nor official entry into Istanbul posed a problem for Haurowitz. Turkey remained politically neutral (non-hostile) toward Germany until almost the end of the war. Accordingly, the Turkish Republic not only had a consular presence in the increasingly Nazi-occupied countries in Eastern Europe, but more important, continued its 1933 policy of hiring foreign academics who had been dismissed from their jobs under the Nazis. This was in keeping with advancing its higher-education reforms and served "the interests of the state."[12] Thus Haurowitz was officially invited to take up a needed university appointment that had become vacant. The Nazi government also supported the translocation to Turkey of Jewish and politically "undesirable" academics, for self-serving reasons. Underlying their compliance with the requests of the Turkish Republic was the broader policy of the previous Weimar government to expand German cultural influence, in addition to the military advantages of keeping Turkey neutral against the Allied powers.[13]

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[8] Hans Winterstein, "Skizzen aus meinem Leben. Aerzte unserer Zeit in Selbstdarstellungen," *Hippokrates* 33, 1 (1962): 79–83.

[9] Haurowitz (1975) in Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 450–78.

[10] Haurowitz in Putnam, *Felix Haurowitz 1896–1987,* 33.

[11] Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 455. For the excerpts from the *Memoirs* of Haurowitz's two children, see ibid., Appendix, 14–19. These include the "Memoir of Dr. Alice (Haurowitz) Sievert" (14–16), who grew up in Turkey and received her PhD in the United States, and the "Memoir" of her younger brother, Dr. Martin Haurowitz (16–19), who subsequently changed his name to Harwit. He is an emeritus professor of astronomy at Cornell University, Ithaca, NY, and former Director of the National (US) Air and Space Museum in 1987; he resigned from this latter position in May 1995 for his handling of plans to display the *Enola Gay*, the B-29 bomber that dropped the first atomic bomb on Japan in 1945.

[12] Izzet Bahar, *Turkey and the Rescue of European Jews* (London: Routledge, 2014), 192–3, 197.

[13] Although the Reich would have preferred to send Aryan and especially Nazi professors in the early 1930s, few were actually willing to go. Those who went served as covert agents, spying on the Jewish academics at Istanbul University. See Julius Schwietering, "Hennig Brinkmann – Scholar Spy," in *Linguistics and the Third Reich: Mother Tongue, Fascism,*

The Academic Milieu: A "German" University in Istanbul

Haurowitz transferred directly to an academic position that was secured by a renewable contract. He was also promoted to a full professorship as director of the Institute of Biological and Medical Chemistry at Istanbul University, in keeping with the 1933 policy of the Turkish Republic. The émigré faculty were given appointments, at least in title, commensurate with or higher than their former positions in Germany.[14] This situation was unique in contrast to the experience of most individual émigrés in countries such as Britain and the United States.[15]

As a result, Istanbul University had the highest concentration of German-speaking émigré academics in the world.[16] Out of the 600 who had lost their jobs by 1933, an estimated 25 percent went to Turkey. Although some left Turkey, most remained throughout the war and beyond, until their retirement.[17] For example, 138 academics and assistants were identified in recent research from 1997 as scientifically active in Istanbul or Ankara during the Second World War, and fourteen held chairs.[18] Thus upon arrival, Haurowitz found himself within a "community of scientists" in every field, undoubtedly eminent in their own areas. Most had been born in the 1880s and 1890s and had risen to directorships at some of the most distinguished German institutions, such as Berlin, Breslau, Frankfurt am Main, Freiburg, Goettingen, and Heidelberg.[19] Thus, Haurowitz moved from a German university in Prague to a German university in Istanbul.

Problem of Identity — *Bildung*

Like most of his colleagues displaced under the Nazis, Haurowitz was not a practising Jew. He had kept silent about his Jewish identity since childhood. As a safeguard against exposure to anti-Semitism, his parents had sent him to a Catholic school in Prague. His own children were baptized at birth, sent to an

Race and the Science of Language, ed. Christopher M. Hutton (London: Routledge, 1993), 74–77; Russell, "A Variation in Forced Migration," 219–26.

[14] Emre Dölen, "Cumhuriyet Döneminde Türkiyede Kimya," *Proceedings of the V. Türk Kültürü Kongresi. umhuriyetten Gu¨nu¨mu¨ze Tu¨rk Kultu¨ru¨nu¨n Du¨nu¨¨, Bugu¨nu¨¨ve Geleceği Songül Boybeyi* 1, 1 (2004), 43, 47–48.

[15] For example, Carl Oppenheimer (1874–1941), the editor of *Enzymologia*, was forced to move from Berlin to Holland, see in Ross Aiken, "Enzymologia. Edited by Carl Oppenheimer," *Journal of Physical Chemistry* 41, 2 (1937): 340. When his journal ("the only joy in my professional life") too was finally taken from him, Oppenheimer felt that he had lost everything: "The war has put an end to all my plans and dreams" (Correspondence: 26 November 1938 – January 1939). While Haurowitz, who had contributed to the journal, was trying to get Oppenheimer a position at Istanbul University, he had become quite ill and died in 1941; Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 460f.

[16] Regine Erichsen, "Scientific Research and Science Policy in Turkey," *Cemoti – Cahiers d'études sur la Mediterranée Orientale et le Monde Turco-Iranien* 25, 1 (1998), 1–21, accessed 19 April 2018, http://journals.openedition.org/cemoti.

[17] Norman Bentwich, *The Rescue and Achievement of Refugee Scholars: The Story of Displaced Scholars and Scientists, 1933–1952* (The Hague: Martinus Nijhoff, 1953); Regine Erichsen, "Die Emigration deutschsprachiger Naturwissenschaftler von 1933 bis 1945 in ihrem sozial- und wissenschaftshistorischen Wirkungszusammenhang," in *Die Emigration der Wissenschaft nach 1933*, eds. Herbert A. Strauss et al. (Munich: K.G. Saur, 1991), 73–105; Reisman, *Turkey's Modernization*, 410–12.

[18] Heinz Sarkowski and Heinz Götze, *Springer-Verlag Pt. 1: 1842–1945: Foundation, Maturation, Adversity.* (Berlin: Springer, 1997), 337–402, 449; Ragip Ege and Harald Hagemann, "The Modernisation of the Turkish University after 1933: The Contributions of Refugees from Nazism," *The European Journal of the History of Economic Thought* 19, 6 (2010): 1001–30.

[19] Horst Widman, *Exil und Bildungshilfe: Die deutschsprachige akademische Emigration in die Tuerkei nach 1933* (Bern: Herbert Lang and Frankfurt am Main: Peter Lang, 1973).

evangelical grade school, and brought up as Protestants, celebrating Christmas at home. "Religion was never mentioned."[20] This was not unique, as recalled by Haurowitz's son:

> I don't ever remember my father using a Yiddish or Hebrew word or phrase and, to the best of my recollections, none of the other professors we visited from time to time, or their wives or children did either. So it may not be surprising that I was totally taken aback, one day when I was about fourteen, when Father pointed out that he and Mother were Jewish. Since I was Protestant, I had assumed my parents must be, too. My father was the most honest and ethical person I have known. Never knew him to tell me anything that I could not totally trust. He also was deeply agnostic. He had been painfully aware of anti-Semitism long before [Adolf] Hitler [1889–1945]. He always said that he would not change his religion because people would think he was doing it for personal gain. But he wanted to keep his children from having to suffer anti-Semitism. . . . For many Europeans, who had witnessed anti-Semitism for many decades, integration seemed a way to break these mutual hatreds. Religion seemed best when ignored.[21]

Haurowitz could identify with his Jewish colleagues who were products of the *Bildung* tradition founded in the eighteenth-century concept of a "rational elitism." It was a way of intellectual integration into German society, which turned out to be an illusion.[22] Thus, in a country of totally unfamiliar culture and language, Haurowitz found himself within a thoroughly familiar environment of German-Jewish faculty of a similar intellectual, scientific, and social background.

The Scientific Milieu

Haurowitz found the conditions for research at Istanbul University initially satisfactory, which was not surprising. The Institute of Biological and Medical Chemistry had been established for more than two decades, despite a chequered history. It was set up with a research laboratory between 1915 and 1918 by visiting foreign faculty, largely from Germany,[23] including the biochemist Hans Winterstein and the chemist Fritz Arndt (1885–1969). Both had returned to Istanbul in 1934 and remained until 1954/55.[24] Werner Lipschitz (1892–1946), whose position Haurowitz was taking over, had previously been director of the Institute of Pharmacology at the University of Frankfurt am Main from 1929 to 1933.[25] He had further

[20] Putnam, *Felix Haurowitz 1896–1987*, 135.

[21] Haurowitz qtd. in Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 460f.

[22] George L. Mosse, *German Jews Beyond Judaism* (Tel Aviv: Hebrew Union College Press, 1983), 344; Izzet Bahar, "German or Jewish, Humanity or Raison D'état: German Scholars in Turkey, 1933–1952," *Shofar: An Interdisciplinary Journal of Jewish Studies* 29, 1 (2010): 48–79, 82–84; Izzet Bahar, "Turkey and the Rescue of European Jews," 192–3, 197.

[23] Ali Riza Berkem, "Türkiye'nin son 70 Yılında Kimya Alanında Gelişmeler," in *Tük Dünyasında Kimya Bilim ve Eğitim Tarihi*, ed. Ahmed Hulusi Köker (Istanbul: Kayseri, 1993), 112–15; Lale A. Burk, "Fritz Arndt and his Chemistry Books in the Turkish Language," *Bulletin of the History of Chemistry* 28, 1 (2003): 42–53; Dölen, "Cumhuriyet Döneminde Türkiyede Kimya," 47f.

[24] Arndt's General Chemistry Division (separate from medicine and biology) at Istanbul University was held up as a model of success. İsmet Gürgey (2005), "Türkçe Âşığı Bir Bilim Adamı: Ord. Prof. Dr. Fritz Arndt," *Türk Dili* 206, 1 (2005): 87–88; Şükrü Aras, *The Foreign Biochemistry Authors Coming to Turkey during the University Reform in 1933 and their Contributions* (Istanbul: Istanbul University, Institute of Health Sciences, PhD Thesis, 2012), 30–115. The laboratory was destroyed by fire at Zeynep Hanım Konağı, the building where it was housed, and had to be entirely rebuilt and refurbished. Cf. Yazar Kadıoğlu, *Türkiye Bilimsel ve Teknik Araştırma Kurumu'nun (TÜBİTAK) Kuruluşu ve Türk Bilim Hayatındaki Yeri* (Istanbul: Istanbul University, PhD Thesis, 1998), 197.

[25] Widmann, *Atatürk Üniversite Reformu*, 25f.

developed the Institute of Biological and Medical Chemistry between 1933 and 1939 at Istanbul University together with Fritz Arndt, professor of chemistry from Breslau.[26]

For an emerging interdisciplinary subject as biochemistry, a significant number of émigré faculty worked in related areas in leading positions at some of the best institutions in Germany. For example, Phillip Schwartz (1894–1877) in pathology and pathological anatomy, and Hugo Braun (1881–1962),[27] Director of the Institute of Microbiology, were both from the University of Frankfurt am Main, as well as Siegfried Obendorfer (1876–1944) in experimental (practical) pathology.[28] Tibor Peterfi (1883–1953), a biologist with a focus on cytology, had worked at Nobel laureate Emil Fischer's (1852–1919) laboratory at Berlin.[29] Max Sgalitzer (1884–1974), head of the Department of Radiology, came from the German University of Prague.[30] Friedrich Reimann (1897–1995), in haematology, had arrived in the same year as Haurowitz, also from the German University in Prague, as director of the Institute of Medical Research.[31] Friedrich L. Breusch (1903–1983), in organic and inorganic chemistry, was formerly director of the Chemistry Department of the Institute of Pathology at the University of Freiburg.[32] During his stay at Istanbul University (1937–1971), he worked with Haurowitz and then set up the second Institute of Chemistry.[33] Trained German-speaking refugee technicians and assistants in chemistry were also employed at the university.[34] Estimates suggest that between 1933 and 1950, almost as many refugee assistants as professors.[35]

[26] Burk, "Fritz Arndt and his Chemistry Books," 44f.

[27] Braun remained at Istanbul University until 1950, when he accepted the directorship of the Tuberculosis Research Institute in Munich, Germany, retiring in 1957. İnan Kalaycıoğulları, *Cumhuriyet Dönemiinde Türkiyede Bilim* (PhD thesis, University of Ankara, 2009), 593. Haurowitz's ongoing correspondence with him is at the Lilly Library in Bloomington and contains views of their experience at Istanbul University.

[28] Widmann, *Atatürk Üniversite Reformu*, 25.

[29] Peterfi's scientific career was broken by the political persecution following the Communist revolution in 1919 and emigrating to Prague, Czechoslovakia, Jena and Berlin, Germany, and eventually Cambridge in England. The final period at Istanbul University is regarded as the apogee of his achievement where he created a device (named micro-manipulator) to conduct his research on microscopic examination of living cells, which paved the way for the development of microsurgery. He returned to Budapest, Hungary, only after the war, but was already mortally ill, unable to continue his research. See Reisman and Capar, *The Nazis' Gifts to Turkish Higher Education*, 23f.; Tibor Donáth, "Tibor Péterfi, The Founder of Micromanipulation," *Orvostort Kozl* 56, 1–4 (2010): 215–22.

[30] Míla Rechcigl, Jr., *Encyclopedia of Bohemian and Czech-American Biography*, vol. 3 (Prague: Czechoslovak Society of Arts and Sciences, 2016).

[31] Widmann, *Atatürk Üniversite Reformu*, 25.

[32] Breusch had arrived in 1937 and remained in Istanbul until 1971, becoming a professor in organic chemistry in 1941, and publishing textbooks in Turkish. When Breusch left for Turkey, he had been conducting joint studies on the effect of the changes in the diet of mice on the formation and breakdown of cholesterol. He and his colleagues found that cholesterol is synthesized when needed and destroyed when in excess. See Joseph S. Fruton, *Proteins, Enzymes, Genes: The Interplay of Chemistry and Biology* (New Haven, CT, and London: Yale University Press, 1999), 378.

[33] Kalaycıoğulları, *Cumhuriyet Dönemiinde Türkiyede Bilim*, 26.

[34] Paula Schwerin had worked (1933–1948) with Lipschitz (Joern Kobes and Jan-Otmar Hesse, *Frankfurter Wissenschaftler zwischen 1933 und 1945* [Goettingen: Wallstein Verlag, 2008]); Kurt Steinitz (1934–1948) in medical chemistry, Ernst Bueding (1935–36), Sara Gitla (1863?), Lisie Anhegger (1947–57), and Harry Rosenbaum (1935–45) with Winterstein. Aras, *The Foreign Biochemistry Authors*, 30–115; Widmann, *Atatürk Üniversite Reformu*, 26.

[35] Between 1933 and 1973, there were sixty-six German and Austrian professors, and eighty-two assistants, and thirty professors and nine assistants of other nationalities, totalling ninety-six professors and ninety-one assistants in various disciplines. In the sciences (excluding clinical medicine, pharmacy, and dentistry), there were thirty professors and eighteen assistants. Ege and Hagemann, "The Modernisation of the Turkish University," 956.

In addition to the exceptional faculty environment, Haurowitz had a relatively secure and safe haven at Istanbul University to continue his work without further disruption.[36] Yet, within two years of his arrival in Istanbul, despite the uniquely favourable circumstances, Haurowitz was already looking for a job in the United States. Why? Haurowitz had been hired, as were all émigré academics, to promote higher education as part of the Westernizing reforms of the Turkish Republic. Their foremost responsibility was to teach and prepare the younger generation to eventually take over so that Turkey would no longer depend on invited foreign experts, as had historically been the case. Interestingly, the emphasis in the selection criteria of émigré scientists had been international reputation in their disciplines.[37] In their contracts, however, the top priority was teaching, with limited scope for research, for which resources also proved to be inadequate.[38] The requirement to train students in the very basics of experimental science research posed a problem when émigré scientists and physicians needed a team of trained assistants to be able to continue their own research. Not surprisingly, most faculty preferred to work and publish with the assistants whom they had been allowed to bring with them.

Haurowitz appears to have successfully resolved this conflict within two years of his arrival. First, along with a number of notable émigré scientists such as Fritz Arndt[39] and Hugo Braun, he quickly and contrary to expectation became sufficiently fluent in Turkish to lecture without interpreters and to write a textbook in Turkish on biological and medical chemistry (*Hayatī ve Tibbī Kimya*). Second, he started publishing research articles in *Enzymologia* and other international journals of biochemistry and immunology, in both German and English, with the assistance of his Turkish students.[40] Although his rate of publishing journal articles was higher both in Prague and subsequently at Indiana University, he remained productive at Istanbul University.[41]

Access to Published Research

Nonetheless, his correspondence reveals problems during the war years that may account for his turning to the United States for a job. With no funds for subscribing to international journals, keeping up with the published research in his field became difficult.[42] For example, Haurowitz sent the manuscript of a paper prior to its publication for comment to Michael Heidelberger (1888–1991), a leading immunologist at the

[36] This security was relative with the presence of Nazi German spies to undermine Jewish academics, despite the protection of the Turkish government and the encroaching German military armies close to the Turkish borders. Schwietering, "Hennig Brinkmann – Scholar Spy," 74–77.

[37] Dölen, *Türkiye Üniversite Tarihi*, 6f.

[38] For some of the problems, see: Nilüfer Kuruyazıcı: "Farklı Bir Sürgün: 1933 Türkiye Universite Reformu ve Alman Bilim Adamları," *Alman Dili ve Edebiyatı Dergisi* 11, 1 (1998): 37–50; Dölen, *Türkiye Üniversite Tarihi*, 6f.; Dölen, "Cumhuriyet Döneminde Türkiyede Kimya," 43, 47–48; Izzet Bahar, "German or Jewish, Humanity or Raison D'état," 48–79, 82–84; Izzet Bahar, "Turkey and the Rescue of European Jews," 192–7.

[39] The task was perceived as impossible by, for example, Arndt, who was fluent in Turkish and had written textbooks. He publicly stated that what was needed was applied science, not research. He was criticized for failing to fulfil his obligations when all the resources were provided for him. Aras, *The Foreign Biochemistry Authors*, 30–115.

[40] Haurowitz successfully trained his students, as reflected by joint papers with both Turkish and German assistants. Between 1939 to 1948, thirty-three published papers (out of sixty-three) included Turkish assistants. On his recommendation, one of his Turkish assistants, Mutahhar Yenson, subsequently assumed the directorship of the Institute (1969–1981) after Haurowitz left for the United States. Cf. Şükrü Aras, Ferah Armutcu, and Gülten Dinc, "In the History of Department of Biochemistry of Istanbul Medical Faculty (1933–1957), Three German Scientists: Werner Lipschitz, Felix Haurowitz, and Zdenko Stary," *Biochemistry* 40, 5 (2015): 423–30.

[41] Putnam, *Felix Haurowitz 1896–1987*, 135.

[42] Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 450–78.

College of Physicians and Surgeons at Columbia University. Heidelberger's sharply critical response reveals the problem Haurowitz faced:

> If you do not agree with the referees[']' comments [which were included], that is your privilege, but you should not make a categorical statement contradicting published evidence without referring to the original material and giving your own evidence."[43]

After a detailed discussion, Heidelberger listed five articles from the *Journal of Experimental Medicine* that Haurowitz had not cited, and suggested that Haurowitz "present his views properly," and "explain their differences from those already in print."[44] The overlooking of these articles may indicate the extent of Haurowitz's difficulties in "keeping up to date with biochemical research done elsewhere."[45] As Haurowitz wrote in his professional correspondence: "Turkey has no money and will not permit buying foreign publications." He was not even able to get copies of his own articles published in the Netherlands.[46] In the year he left Istanbul University, Haurowitz published a textbook, *Chemistry and Biology of Proteins*, first in German (1948), and then in English (1950). It was praised for lucidity in a discipline that required bringing together "most of what is known about the structure, properties, and mode of action of proteins underlying modern biochemistry."[47]

With a staggering "1500 references and inclusion of original papers,"[48] the book would have certainly been prepared in Istanbul. In light of his difficulties in journal subscriptions, this may reflect the richness of his library that he had been able to bring with him from Prague, as well as those of his colleagues, such as Arndt.[49] In addition, he would also have used his series of reports on the research in his field, *Progress in Biochemistry*, which he had started in Prague and clearly continued in Istanbul, as it covered the years from 1938 to 1947. It was also published in German in 1948 (as *Fortschritte der Biochemie, 1938–1947*) in Basel, Switzerland.[50] That he was trying in Istanbul to keep abreast of the research elsewhere is also evident in his nominating for the Nobel Prize of two scientists from institutions as far apart as Harvard and Uppsala.[51]

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[43] Putnam, *Felix Haurowitz 1896–1987*, 135.

[44] After moving to the United States, Haurowitz had a more positive interaction with Heidelberger at a small conference in Bermuda, during an annual meeting of the Federation of American Societies for Experimental Biology. "One afternoon it rained, and Heidelberger and his wife, an accomplished violinist, and Felix Haurowitz, a fine pianist [and the originator of the antigen template hypothesis to explain the diversity and specificity of antibodies], entertained the gathering with an impromptu performance of wonderful chamber music," qtd. in Michael Heidelberger, *Biographical Memoirs, National Academy of Sciences (NAS)* 80, 1 (2001): 15.

[45] Putnam, *Felix Haurowitz 1896–1987*, 135.

[46] Haurowitz qtd. in Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 455.

[47] Philip Cohen, review of *Chemistry and Biology of Proteins*, by Felix Haurowitz, *Science* 113, 2938 (20 April 1951): 449.

[48] Ibid.

[49] Arndt's assistant in İstanbul for many years, Lotte Loewe's (b. 1900) comments in 1949 are of interest: "In the last 15 years the difficulties that affected our work were bad, contrary to the objectives, and inadequate infrastructure, and poor provision of building space. In the war and postwar years, added to these were insufficient chemical materials and equipment. Despite these, I can comfortably state that the present chemistry curriculum is equivalent to that in the 1930s at Breslau University. All of the scientific work that was completed at the Institute of Chemistry was published in the *Journal of the Faculty of Science* (Fen Fakültesi Dergisi). The library of the Institute of Chemistry was equipped with all the essential scientific books and studies up to 1941 in German, English, and French," accessed 19 April 2018, http://aaspot.net/forum/showthread.php?35151-Profesor-Arndt-bey-in-anilari; Yazar Kadioğlu, *Tu̇rkiye Bilimsel ve Teknik Araştırma Kurumu'nun (TÜBİTAK) Kuruluşu ve Tu̇rk Bilim Hayatındaki Yeri* (PhD thesis, University of Istanbul, 1998), 185–6, 197 (Translated from Turkish by the author.)

[50] Widmann, *Atatu̇rk Üniversite Reformu*, 25f.

[51] In 1948, Haurowitz sent in two nominations in biochemistry for the Nobel Prize in Physiology or Medicine: Edwin J. Cohn (1892–1953), Harvard Medical School, USA, and Arne W. Tiselius (1902–1971), Uppsala University, Sweden.

Haurowitz's *Chemistry and Biology of Proteins,* despite abundant praise, was also criticized for its factual content as a textbook: "unless it is conceded that the aims of modern pedagogy are the instillation of large numbers of facts in the student rather than the elucidation of principles and development of a critical attitude. . . ."[52] The distinction between rote learning and critical thinking reflects the challenges of the educational environment for Haurowitz and the earlier émigrés.

Absence of an Indigenous Scientific Tradition

In addition, the situation in Turkey was exacerbated by the lack of an established indigenous tradition in experimental laboratory sciences, as well as trained graduate and post-graduate students.[53] To the products of the intellectual culture of the Weimar Republic, this was an unbridgeable gap and in part may account for the émigré professors' arrogant and condescending attitude toward not only students, but also their Turkish colleagues; Haurowitz was among the notable exceptions.[54] Yet despite his long-term impact on the discipline in Turkey, the decline in the level of research with his departure exemplifies the difficulties of importing such a tradition.[55]

Conflict of Attitudes

Conflicts were evident with the Turkish faculty, who did not approve of the priority given to experimental sciences. They also resented the preferential positions and salaries (more than twice their own), as well as the condescending attitude of the foreign faculty toward them.[56] These factors made productive collaboration in teaching or research unlikely.[57] The hostility of some of the German-speaking faculty toward France, carried over to faculty and students who had been trained at French or Swiss institutions, further precluded professional relationships. Haurowitz's commented on this situation in his letter (28 April 1950) to microbiologist Hugo Braun (1881–1963), who was by then in Munich: "I never regretted the nine years I spent in Turkey, and I feel that the Turks conducted themselves towards us much better than some of the European professors [among us] towards the Turks."[58]

During the war, economic conditions in Turkey became increasingly onerous. In the 1930s, the Turkish government had allocated substantial resources and money for equipment and salaries.[59] The salaries, however, were not increased for many years, despite inflation, nor did they offer retirement protection.

Tiselius was awarded the Nobel Prize in Chemistry in 1948 for his work on the "Methods for separation and purification of serum components and their identification and use of these components." Haurowitz's Institution as University of Istanbul, and country as Turkey are listed in the Nomination database, *Nomination for Nobel Prize in Physiology or Medicine 1948*, nobelprize.org, accessed 19 April 2018.

[52] Cohen, review of *Chemistry and Biology of Proteins*, 449.

[53] See Regine Erichsen, "Die Emigration deutschsprachiger Naturwissenschaftler von 1933 bis 1945 in ihrem sozial- und wissenschaftshistorischen Wirkungszusammenhang," in *Die Emigration der Wissenschaft nach 1933*, eds. Herbert A. Strauss et al. (Munich: G. Suar, 1991), 73–105, for the problems associated with a lack of infrastructure in Turkey as well as in Palestine and Latin America. For a discussion of the general problems associated with settlement in new countries, see: Ash and Soellner, *Forced Migration and Scientific Change*.

[54] Kalaycıoğulları, *Cumhuriyet Dönemiinde Türkiyede Bilim*, 26.

[55] Dölen, "Cumhuriyet Döneminde Türkiyede Kimya," 47f.

[56] Bahar, "German or Jewish, Humanity or Raison D'état," 82–84; Ege and Hagemann, "The Modernisation of the Turkish University," 1030.

[57] Dölen, *Türkiye Üniversite Tarihi*, 408.

[58] Haurowitz qtd. in Reisman and Capar, *The Nazis' Gifts to Turkish Higher Education*, 31.

[59] Letter by the American Ambassador, 1936.

Like his colleagues, Haurowitz had to sell some of his furniture to survive.[60] At the end of the war, an estimated one-third of the émigré academics preferred to return to Germany "because it was not possible to reach an agreement for a retirement plan, good or bad, in spite of all the efforts of our Turkish colleagues. Those who did not have significant savings looked on their old age with trepidation."[61] Germany offered retroactive pension funds. What they could not receive from the Turkish government, they could claim in Germany.[62]

Failed Attempts — United States: Through a Glass Darkly

Haurowitz appears not to have considered returning to Prague. This may have been due to the complex political situation.[63] In 1946, Haurowitz sent his two children with his wife to the United States for their university education. He remained behind not only to fulfil his contractual obligations for two more years, but to ensure a position in the United States before relinquishing a secure job, which, despite financial hardships, enabled him to send money to his family.[64]

Starting in 1941, Haurowitz applied directly to institutions in the United States, such as Harvard, as well as indirectly exploring possible openings. His job hunt lasted for seven years. Although he had been able to procure a visa for himself and his family in 1943, his attempts to find a position through his professional network of contacts failed. Haurowitz's application to Harvard exemplifies one of the problems the émigré academics encountered. On 25 September 1941, Linus Pauling (1901–1994), the American biochemist, received an enquiry from archaeologist George Chase (1874–1952), the dean of Harvard University's Faculty of Graduate Studies in Art and Sciences, on behalf of university president James Bryant Conant (1893–1978): "it would be helpful if you would send us your estimate of Professor Haurowitz's standing and whether you have any suggestions about possibilities in this country."[65] Haurowitz had been in correspondence with Pauling since 1936, and to the enquiry from the dean, already suggestive of redirecting Haurowitz away from Harvard, Pauling replied on 12 October 1941:

> I have been greatly interested in his work for a number of years. In my opinion he is one of the leading men in the world in the field of the chemistry of proteins. His researches are characterised by imagination and good execution. His work on hemoglobin and on problems of immunology has been especially successful. I do not know at present of any opening for Professor Haurowitz in this country.[66]

Despite such a high recommendation from a scientist in the forefront of the field, Harvard's lack of an offer is attributed to a policy under President Conant of not hiring Jewish faculty.[67] Subsequently, Pauling supported Haurowitz's placement in 1947 at Indiana University, where President Herman B. Wells (1902–

[60] Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 455f.
[61] Fritz Neumark, *Zuflucht am Bosporus. Deutsche Gelehrte, Politiker und Kuenstler in der Emigration* 1933–1953 (Escape to Bosphorus: German Scholars, Politicians, and Artists in Exile 1933–1953). (Frankfurt am Main: Knecht, 1952), 153, 229.
[62] Bahar, "German or Jewish, Humanity or Raison D'état," 48–78.
[63] Anne Applebaum, *Iron Curtain: The Crushing of Eastern Europe 1944–56* (New York: Allen Lane, 2012).
[64] Putnam, *Felix Haurowitz 1896–1987*, 135.
[65] "Ava Helen and Linus Pauling Papers Archives at Oregon State University," qtd in Riesman and Capar, *The Nazis' Gifts to Turkish Higher Education*, 27f.
[66] Pauling qtd. in Reisman and Capar, *The Nazis' Gifts to Turkish Higher Education*, 23f. The correspondence between Pauling and Haurowitz encompasses the years from 1936 to 1947 and continued after Haurowitz came to Bloomington intermittently between 1951 to 1974.
[67] Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 460f.

2000) had a different policy, one of hiring faculty based on their achievement, without discrimination in religious or political affiliations — a policy that raised Indiana University to the rank of one of the top institutions in the country.[68]

The Dilemma: "Visa Granted — No Job Prospects"

Two years later, in 1943, the correspondence between Haurowitz and Max Bergmann (1886–1944) shows that the situation for the hiring of émigré academics had not improved. Bergmann, also a biochemist, had been at the Rockefeller Institute for Medical Research in New York City since 1934. He had lost his position as director of the Kaiser Wilhelm Institute for Leather Research in Dresden, Germany, where he had created one of the world's leading laboratories for protein chemistry. He too had been rejected earlier by Harvard.[69] Despite being granted an immigration visa to the United States in 1943 for himself and his family, and his friends and relatives in America encouraging him to move there, Haurowitz wanted to first find out whether any jobs were available in his field before leaving Turkey. He wrote to Bergmann (28 May 1943):

> I suppose that you are informed about the fate of the German professors emigrated to the United States. Have they found satisfying appointments? And do you think that I could find something?[70]

Bergmann's response, dated 8 July 1943 and written on Institute letterhead, was not reassuring at all:

> As a rule every scientist from abroad, even if he is famous the world over and is a Nobel Laureate, has to start here on a small scale, that is, with a small salary and one or two collaborators, and it depends on his achievement in his new position whether he makes progress. In general, it takes several months or one-half year for the newly arrived scientist to find a job and nobody gets a job offered to him before he has immigrated. [It] is not certain whether you would find a job to you're [sic] liking at once or not until after some time. During the last years, everybody could be sure of finding a job. Now, under war conditions, it is almost impossible to predict anything.[71]

Faced with the discouraging picture of future prospects, Haurowitz was reluctant to relinquish a secure job and join his family in the United States. He remained behind, with two more years on his contract at Istanbul University, which enabled him, despite financial hardships, to send money to them.[72]

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[68] James D. Watson, *Avoid Boring People: Lessons from a Life in Science*: *And Other Lessons from a Life in Science* (Los Angeles: Knopf, 2007), 3.

[69] Fruton, *Proteins, Enzymes, Genes*, 378.

[70] They hired few Jews through the 1930s and some into the 1950s. A national survey conducted by the Carnegie Commission on Higher Education in 1969, involving 60,000 faculty respondents, showed that Jews in the upper-age brackets were significantly low at American universities (3.8 percent vs. 79.0 percent Protestants and 13.7 percent Catholics). This changed after the Second World War. Prior to 1933, German universities such as Heidelberg, Breslau, Frankfurt am Main, Munich, Goettingen, Koenigsberg, and the German University of Prague individually employed more Jewish professors than did Harvard, Yale, Brown, and Princeton combined at the time and for over a decade beyond. See Seymour Martin Lipset and Everett Carl Ladd, "Jewish Academics in the United States; Their Achievements, Culture and Politics," *American Jewish Year Book* 72, 1 (2007) 89–128.

[71] Reisman and Capar, *The Nazis' Gifts to Turkish Higher Education*, 34–41.

[72] Putnam, *Felix Haurowitz 1896–1987*, 135.

Indiana University and Serendipity

When Haurowitz finally received an offer of a faculty position from Indiana University, it came not through the usual channels of his own search, but from an unexpected quarter. A series of coincidental events had come together in Bloomington: his daughter's enrolment there as an undergraduate, her lodging (as a paying guest) in the house of a chemistry professor, and the presence of the daughter of a close family friend from Istanbul University the wife of Hermann Joseph Muller (1890–1967), the Nobel laureate geneticist. Haurowitz's daughter Alice (b. 1929; later Alice Sievert) had applied to different schools; Indiana University was the first to respond and to accept her.[73] She could not get lodgings through the university due to priority given to former students returning from their military service in the Second World War:[74]

> My parents were relieved to learn that Thea Muller, the daughter of our family friend Dr. Kantorowicz, Professor of Dentistry at the University of Istanbul, lived in Bloomington. Alfred Kantorowicz (1880–1962) had served in Turkey in teaching and research in paediatric dentistry during 1934–1948. Her [Thea's] husband, Herman J. Muller was Professor of Genetics, and shortly thereafter he was awarded the Nobel Prize in Medicine (1946). Thea Muller introduced me to the family of Harry G. Day (1906–2007), a professor of chemistry. He and Mrs. Day accepted me as a lodger and treated me as a daughter from then on. They invited my mother to visit, and Dr. Day learned from her that Father was also a biochemist and was seeking a position in the United States. After reviewing my father's publications, Dr. Harry Day arranged for him to lecture at Indiana University in the summer of 1947.[75]

This is corroborated by Haurowitz's memoirs. He could not immediately accept the offer of appointment that followed as professor of chemistry to teach biochemistry; he had to return to Istanbul University for one more year to fulfil his contractual obligation. He also received an offer of the chair of biochemistry from the medical school in Basel, Switzerland. Although he was the unanimous choice of the medical faculty, the position was conditional on overcoming the cantonal government's preference of a Swiss citizen. As this process would have taken time, Haurowitz accepted the appointment at Indiana University and moved to Bloomington in July 1948. He was deeply impressed by the hospitality and warmth with which they were received not only by his "colleagues but also by the officers of the University, by neighbors, and by

[73] To add to their personal burdens, because of Turkey's neutrality the émigré professors, like Haurowitz, served as a communication conduit between colleagues left behind in Nazi-occupied countries and the relatives in free countries. Haurowitz correspondence; see Reisman, "Exiled in Turkey from Nazi Rule," 27f.

[74] Reisman, "Exiled in Turkey from Nazi Rule," Appendix, 16f.

[75] Kantorowicz was removed from office on 1 April 1933 on the grounds that he was a Jewish Social Democrat and was interned first in the Boergermoor concentration camp, then in Lichtenstein. He was released at the end of December 1933 by Nazi authorities, due to the intervention by the Swedish Royal House and a formal invitation through the Turkish Embassy in Berlin, and emigrated to Istanbul. He remained there from 1934 to 1948, teaching and conducting research in clinical dentistry. In October 1934, he was welcomed with special enthusiasm in Prague at an international scientific conference of the German dentists in the Czechoslovak Republic. For the Shah of Persia, he manufactured an upper- and lower-jaw prosthesis from rubber in 1935 at the Dolmabahçe Palace in Istanbul. Ibid. He was among those who returned to Germany in 1950, a year before his retirement. In recognition of his work, the Medical Library at Istanbul University was named after him. His research in fluoride to reduce dental decay led to the development of Crest toothpaste. Vicdani Doyum, *Alfred Kantorowicz unter Besonderer Beruecksichtigung seines Wirkens in Istanbul (ein Beitrag zur Geschichte der modernen Zahnheilkunde)*. Wuerzburg: Bayerische Julius-Maximilian University of Wuerzburg, Doctoral Dissertation, 1985).

almost everyone with whom we had to deal in our daily life." This made, as he put it, their "assimilation to American life very easy."[76]

Bloomington was certainly a different university environment from Istanbul for Haurowitz. It was neither German speaking nor multilingual. More significantly, the science was different from the German tradition of the 1930s as practised by his colleagues in Istanbul. America had been moving forward, abreast of Germany, with its own style of scientific practice.[77] From a situation of scientific survival, Haurowitz had moved into a challenging progressive community of research scientists strong in chemistry, biology, and genetics, a significant number of whom subsequently became Nobel laureates including Herman Joseph Muller (1890–1967) for the effect of X-rays on mutation in living organisms;[78] Tracy Sonneborn (1905–1985) for protein synthesis and non-Mendelian inheritance, involving interactions between nuclear genes and the cytoplasm;[79] Ralph Cleland (1892–1971) for cytogenetics, specifically of the Oenothera genus of plants;[80] Irwin Gunsalus (1912–2008) for bacteriology and biochemistry;[81] and Salvador Luria (1912–1991), an assistant professor in microbiology at the time, who too subsequently won a joint Nobel Prize in Physiology or Medicine for the replication mechanism and the genetic structure of viruses.[82]

His facility with languages enabled Haurowitz to teach in English. This time, however, his teaching included not only introductory but also graduate courses in biochemistry in proteins and nucleic acids. A graduate student who came over from Salvador Luria's lab was James D. Watson (b. 1928), also a subsequent Nobel laureate (1962).[83] Haurowitz's influence on him is established, although, curiously, not acknowledged by Watson himself.[84]

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[76] Haurowitz (1975) in Riesman, "German Jewish Intellectuals' Diaspora in Turkey," 450–78.

[77] Jonathan Harwood, "National Styles in Science: Genetics in Germany and the United States between the World Wars," *Isis* 78, 3 (1987): 390–414.

[78]See Elof Axel Carlson, *Hermann Joseph Muller (1890–1967): A Biographical Memoir* (Washington, DC: National Academy of Sciences, 2007), 32.

[79] Sonneborn was at Indiana University as an associate professor. There he stayed for the rest of his life, becoming professor in 1943, distinguished service professor in 1953, and distinguished professor emeritus in 1976. See John R. Preer, Jr., *Tracy Morton Sonneborn 1905–1981: A Biographical Memoir* (Washington, DC: National Academy of Science, 1981).

[80] See Ralph Cleland, *A Biographical Memoir* (Washington, DC: National Academy of Science, 1982), 121–39. He discovered lipoic acid, a vitamin-like substance (an enzyme cofactor) that has been used as a treatment for chronic liver disease, and pyridoxal phosphate, one of the active forms of Vitamin B6. In his role as assistant secretary general at the United Nations, he led the international body's research on genetic engineering.

[81] In 1982, he was the recipient of the Selman A. Waksman Award in Microbiology from the National Academy of Sciences.

[82] Salvador E. Luria won the Nobel Prize in Physiology or Medicine in 1969, with Max Delbrueck (1906–1981) and Alfred D. Hershey (1908–1997), for their discoveries on the replication mechanism and the genetic structure of viruses, nobelprize.org, accessed 19 April 2018.

[83] Watson went on to the University of Cambridge in England, to subsequently discover the structure of DNA with Francis Crick (1916–2004) and Rosalind Franklin (1920–1958) in January 1953. With Crick and Maurice Wilkins (1916–2004), Watson was awarded the 1962 Nobel Prize in Physiology or Medicine "for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material." https://www.nobelprize.org/prizes/medicine/1962/watson/biographical/, accessed 9 May 2019.

[84] Michel Morange, "What History Tells: Felix Haurowitz (1896–1987) – A Difficult Journey in the Political and Scientific Upheavals of the 20th Century," *Biosciences* 35, 1 (2010): 17–20. It is of interest that in his book *Avoid Boring People*, in relating his graduate years at Indiana University, Watson lists all the teachers with whom he took courses and who influenced him but does not mention Haurowitz anywhere.

Chain of Serendipity: His Impact

In Prague, Haurowitz had inspired Max Ferdinand Perutz (1914–2002), later a Nobel laureate, to study the crystallographic structure of haemoglobin. Perutz recollected in an interview how Haurowitz's initial advice gave him the crucial direction in his research:

> It came home to me that now I had been doing research in Cambridge for a year and I had no subject for a PhD thesis yet. And I really wanted a biological problem, and I remembered that a cousin of mine in Prague was married to a young Professor of Biochemistry, at the Charles University in Prague. I took the train to Prague and visited him. And I suggested to him that I could perhaps determine the crystal structure of the red pigment of haemoglobin, the haemin, but he pointed out to me that [Emil] Fischer [1852–1919] in Munich had already synthesised that and everything was known about it and there was really no point in determining its structure. But he said why not work on haemoglobin itself? And the idea appealed to me, but I wondered how I could get hold of crystals of haemoglobin. So Felix told me that there was a biochemist here in Cambridge, [Gilbert Smithson] Adair [1896–1979], who had actually crystallised haemoglobin, and I should try and ask him.[85]

Between 1925 and 1936 Haurowitz had made fundamental discoveries in his research on haemoglobin. What inspired Perutz was his discovery of the change in crystalline shape of deoxyhaemoglobin from hexagonal plates to elongated prisms when crystals are diffused with oxygen.[86] When this encounter took place in 1937, Haurowitz had, however, changed the direction of his research as the result of a phone call from a colleague.

Serendipity and Science

Scientists do not solve problems because they possess a magic wand — methodology and a theory of rationality — but because they have studied the problem for a long time.[87]

Fritz Breinl (1888–1936), a virologist, had just returned from year at the Rockefeller Institute in New York, with Karl Landsteiner (1868–1943),[88] the Austrian immunologist and Nobel laureate for his work on blood groups (1930). Stimulated by Landsteiner's work, Breinl wanted to see how the "mystery" of antibody production could be solved, at a time when little was known about the production of proteins. The collaborative research of Breinl and Haurowitz resulted in what came to be known as the "instructional theory of antibody formation,"[89] which, developed further by Linus Pauling (1901–1994), became

[85] Perutz was awarded the Nobel Prize jointly with John Cowdery Kendrew (1917–1997) "for their studies of the structures of globular proteins," nobelprize.org, accessed 19 April 2018.
[86] Putnam, *Felix Haurowitz 1896–1987*, 135.
[87] Paul Feyerabend, *Against Method* (London: Verso, 1975), 302.
[88] He continued to investigate blood groups and the chemistry of antigens, antibodies, and other immunological factors that occur in the blood, and introduced chemistry into the service of serology. Nobel Organization, *Nobel Lectures, Physiology or Medicine 1922–1941* (Amsterdam: Elsevier, 1965).
[89] See Felix Haurowitz and Fritz Breinl, "Chemische Untersuchung des Präzipitats aus Hämoglobin und Antihämoglobin-Serum und Bemerkungen über die Natur der Antikörper," *Hoppe-Seyler's Zeitschrift fuer Physiologische Chemie*, 192, 1(1930), 47–57. The collaboration was cut short by Breinl's death in 1936.

predominant.[90] Haurowitz remained committed to the role of antigens as a template for the formation of antibodies to explain both their diversity and specificity.[91]

His lifelong attachment to his theory, despite the increasing accumulation of contrary evidence and proposals of alternative models,[92] has been related to Haurowitz's personal insecurity due to his experience of translocation. By holding to what had initially made him famous, Haurowitz re-established continuity in a scientific career interrupted by the war. Furthermore, his persistence was viewed as a sign of his difficulty in acknowledging that the apparent "perfect" specificity of antibodies is, in fact, the result of chance variations and due to natural selection.[93] In other words, the predictable pattern in his research was thought to compensate for what he lacked in his personal life and career. But such a correlation, however plausible it may seem, is not warranted by any evidence.

First, Haurowitz's subsequent research career does not indicate any need on his part to hold on to past achievements — including his ventures away from biochemistry to clinical physiology and neuroserology — as it was marked by great honours. In 1960, he won the prestigious Paul Ehrlich Gold Medal in Germany, the highest honour in immunology and pathology. This was followed by his election to the German Academy of Sciences (Deutsche Akademie der Naturforscher Leopoldina), the American Academy of Arts and Sciences (1970), and the US National Academy of Science (1973). He also received an honorary doctorate of medicine from the University of Istanbul (1973), as well as an honorary doctorate of science from Indiana University.[94]

If he had suffered from loss of self-esteem,[95] he was certainly put in the limelight almost immediately upon arrival at Indiana University by Linus Pauling, the president of the American Chemical Society. Although they had corresponded and exchanged articles, Pauling had not previously met Haurowitz.[96] During the inaugural meeting of the Society's Southern Indiana Section (October 1948), Pauling spoke on "The Formation of Antibodies." His dramatic speech, as described by an eyewitness, is worth quoting:

> Pauling, to be better seen and heard in the large auditorium, climbed up on the lecture demonstration desk, which was large enough so he could walk back and forth. He began, "I visualized that if God was going to form antibodies, would form them in the simplest way, and these antibodies are therefore merely coiled up chains of amino-acids, and nobody ever thought of that before, except HAUROWITZ," and he turned and pointed at the Professor, sitting in the front row! He continued to present the various aspects of

[90] Lily E. Kay, "Molecular Biology and Pauling's Immunochemistry: A Neglected Dimension," *History and Philosophy of Science* 20, 2 (1989): 211–19.

[91] Fruton, *Proteins, Enzymes, Genes*, 378.

[92] Allan M. Silverstein, *A History of Immunology* (San Diego: Academic Press, 1988).

[93] Morange, "What History Tells," 19.

[94] Putnam, *Felix Haurowitz 1896–1987*, 135.

[95] Morange, "What History Tells," 20.

[96] As related by Haurowitz: in follow-up experiments based on Haurowitz's theory, Pauling claimed that he could synthesize antibodies in vitro by exposing slowly renaturing globulin to antigens. Linus Pauling, "A Theory of the Structure and Process of Formation of Antibodies," *The Journal of the American Chemical Society* 62, 10 (1940): 2643–57. Haurowitz repeated these experiments and showed that antibodies were not formed in this way. He wrote this up, sent the manuscript to Pauling to give him a chance to submit a correction, and offered not to publish in that case. Pauling's responded that Haurowitz should go ahead and publish his results, and let the scientific world be the judge. Haurowitz did publish his views (Felix Haurowitz, P. Schwerin. B. Tunc, "The Mutual Precipitation of Proteins and Azoproteins," *Archives of Biochemistry* 11, 3 (1946): 515–20) and later, a postdoctoral student of Pauling's working at the California Institute of Technology in 1948/49, was unable to replicate and confirm that claim. Edward Campaigne, "Haurowitz and Pauling," *Proceedings of the Indiana Academy of Science* 98, 3 (1988): 321–7.

> his theory, each time ending with a spectacular, "and nobody ever thought of that before, except Haurowitz."[97]

Haurowitz may have felt isolated in Turkey, but he quickly discovered, as he wrote to Hugo Braun (19 November 1950), who also was no longer in Istanbul: "My colleagues in the US seem to value my work." This was after his invitation as the "honoured speaker" at a symposium on antibody formation at the New York Academy of Medicine.[98]

Second, Haurowitz adhered to the template theory, as evidenced by continued follow-up research and publications as late as 1978, long after he was securely established and had gained distinction in his career in the United States.[99] Also, at Indiana University he was in an environment of highly specialized research in closely related fields, such as genetics.[100] Therefore the underlying reasons must be sought elsewhere than in the personal difficulties in his career. Historians have emphasized that Haurowitz "moulded" his models on protein and antibody synthesis based on the evidence from chemistry, and that he perceived scientific problems in a complex interdisciplinary field primarily as a "protein chemist."[101] In fact, historians have drawn attention to the contemporaneous existence of two kinds of immunologists,[102] the "chemists" and the "biologists," who spoke in different languages and hardly communicated with each other. Apparently, for decades they asked the same questions but formed the answers using different criteria, depending upon which aspect of the immune response each felt to be critical.[103] What reduced the distance between them was the modern synthesis with increased understanding of the mechanism of protein synthesis, the role of cellular receptors in the regulation of immune phenomena, and genetics.[104] Thus the grounds of Haurowitz's commitment to his scientific theory are more complex than is proposed.

Haurowitz had advanced the Institute of Biochemistry at Istanbul University between 1940 and 1948, making significant progress in his research with a team of assistants and trainees, despite the budget crisis brought on by the war and institutional limitations in laboratory research.[105]

Unforeseen Consequences

At the same time, his displacement to Turkey turned Haurowitz in an unexpected direction that, together with research, also subsequently enhanced his reputation. His highly praised *Chemistry and Biology of Proteins,* of which he was justifiably proud,[106] was published initially in German in 1948, the year he took up his new appointment at Indiana University. Its subsequent English version (1950) went through several editions, was translated into numerous languages, and became widely known. It was, however, prepared in Istanbul. He might not have undertaken to write a textbook at all if he had not gone to Istanbul, as he

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[97] Ibid., 324f.

[98] Reisman and Capar, *The Nazis' Gifts to Turkish Higher Education*, 23f.

[99] For his research focus in his articles between 1947 and 1979, see the bibliography in Putnam, *Felix Haurowitz 1896–1987*, and Morange, "What History Tells."

[100] Robert E. Kohler, *From Medical Chemistry to Biochemistry: The Making of a Biochemical Discipline* (Cambridge, UK: Cambridge University Press, 1982).

[101] Morange, "What History Tells," 20.

[102] Ibid.

[103] Silverstein, *A History of Immunology*.

[104] Domenico Ribatti, *Milestones in Immunology: Based on Collected Papers* (Amsterdam: Elsevier, 2017), 86–90.

[105] Mutahhar Yenson, "Ord. Prof. Dr. Felix Haurowitz and contributions to the Department of Biochemistry of Istanbul Faculty of Medicine, in *Proceedings, Symposium of Turkish-German Medical Relations (Sept. 24–25, 1981)*, ed. Arsian Terzioglu (Istanbul: Fatih Genclik Vakıf Matbaasi, 1987), 49–55; Kalaycıoğulları, *Cumhuriyet Dönemiinde Türkiyede Bilim*, 26.

[106] Putnam, *Felix Haurowitz 1896–1987*, 135.

had previously declined such a proposal in Prague,[107] but did so under the terms of the contract of his appointment by the Turkish government.

Haurowitz exemplifies the role of serendipity also in a broader context, where the reform objectives of the Turkish Republic paved the way for unforeseen consequences. Haurowitz had survived the war. If he had remained in Europe, he would have perished as all his relatives did.[108] This was true of all the émigrés in Turkey; they survived *en masse*, not only with their families, assistants, and technicians, but in an intellectual, scientific, and social enclave in one place throughout the war. The conditions, with various complex impediments (economic, political, institutional, and administrative), were less than ideal at best and hardly conducive to experimental science in certain disciplines.[109] The responses to the hardships, as in the case of Haurowitz, depended both on the research area, and on the research scientist.

Their overt achievements have been recognized. As a former émigré to Turkey, intimately familiar with the circumstances, commented:

> Although in the years following 1933, the number of German-speaking refugees in other countries especially in the United States, far exceeded those in Turkey, in no other place was the relative significance of German refugees as great as it was in Turkey and nowhere else did their work leave as permanent an impact.[110]

In addition to the overt achievements, also significant is a "dormant productivity," stimulated by the encounter with a different culture outside Europe. It led to a kind of "gestation period" of creative ideas, the results of which emerged only after the war, largely in the United States. This has been shown, for example in the creation of novel interpretations, new theories, and new disciplines — including the fields of biological psychiatry and interdisciplinary neuroscience — immediately following their arrival, in addition to contributions to scientific and other areas.[111]

Conclusions

The initiation of scientific disciplines was within the pedagogical objectives of the Turkish Republic. The émigré academics started an experimental scientific tradition in Turkey, which has slowly continued to develop up to the present. At the same time, a substantial number of scientists survived between 1933 and 1950 to contribute in varying degrees to scientific research, if not directly in Turkey, then in the United States via Turkey.[112] With the forced migration of academics from Nazi Germany in 1933, a major concern, as expressed by the Royal Society in Britain, was "saving the future of science."[113] In this sense, one could say that in the displacement of scientists, Turkey had gone beyond its reform objectives and inadvertently served the "future of science." This was an important role, but a consequence of serendipity.

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[107] Ibid.

[108] Haurowitz qtd. in Reisman, "German Jewish Intellectuals' Diaspora in Turkey," 460f.

[109] Kuruyazıcı, "Farklı Bir Sürgün," 37–50.

[110] Reisman, "They Helped Modernize Turkey's Medical Education and Practice," 82.

[111] Kader Konuk, *East-West Mimesis: Auerbach in Turkey* (Palo Alto, CA: Stanford University Press, 2012).

[112] Erichsen, "Scientific Research and Science Policy in Turkey," 1–21.

[113] G. Mitchell and M. Ash, "Central European Émigré Psychologists and Psychoanalysts in the United Kingdom," in *Second Chance: Two Centuries of German-speaking Jews in the United Kingdom*, eds. Werner A. Mosse, Julius Carlebach, Gerhard Hirschfeld, Aubrey Newman, and Peter Pulzer (Tuebingen, Germany: JCB Mohr, 1991), 101–21; esp. 121.

Postscript: The Personal Link

In my last year as a graduate student at Indiana University, I received an invitation to tea. To be invited by my German professors to an occasional dinner was not unusual (always a memorable occasion with special German cheese cakes and conversation); this invitation, however, was not from my own teachers. My mother, who had joined me in my last year, accompanied me. Curious with anticipation, we were ushered into a lush garden on a warm summer day where a table was set for tea with a mesh dome over a delectable cake. To our surprise, a mellifluous voice speaking elegant Ottoman Turkish welcomed us — it was Gina Haurowitz (1903–1983). I remember little of the conversation, but the surprising discovery that they had lived in Istanbul for nine years stuck in my mind. Felix Haurowitz was away.

The second tea invitation was from Thea, Alfred Kantorowicz's (1899–1979) daughter. Thea (1909–1986) was the wife of Hermann Joseph Muller (1890–1967), the Nobel laureate biochemist, of whom I had heard from my teacher, Herbert J. Muller (1905–1980), the historian and author of *The Loom of History* (1961), who would refer to him as "my distinguished cousin." The Kantorowicz family had also been in Turkey during the war years. With Hitler's rise to power, Alfred Kantorowicz, a professor of dentistry, was dismissed from the Institute in Bonn which he had developed. He was arrested and imprisoned in Bonn and then interned at numerous concentration camps. He was released from Lichtenberg through the intercession of the Swedish head of the International Red Cross and supported by the contractual offer of appointment from the Turkish government, as director of the dental school at Istanbul University.[114] As professor of dentistry and personal dentist to Mustafa Kemal Atatürk (1881–1938), he reformed dental education and paediatric dentistry in Turkey. The medical library at Istanbul University was later named in his honour shortly after his death in Germany in 1962. Hermann Joseph Muller had met his daughter, Dorothea (Thea), in 1938 at Edinburgh University, where she had gone after completing her medical studies in Istanbul. They were married a year later in 1939, when the Second World War broke out.[115]

I was surprised also to learn then that her parents had spent some time interned in a small town in the east of Turkey. Near the end of the war, Turkey, abandoning its neutral, non-hostile position toward Nazi Germany, joined the Allies. The German émigré academics in Turkey suddenly found themselves on the side of the enemy that had persecuted them. They became stateless, with no passports, no money, and limited options. Those whose university contracts had not expired appear to have been relatively safe; others, to avoid being made prisoners of war, could become Turkish citizens or leave for another country, neither of which was easy. Eventually, some returned to Germany. The Turkish government allowed others to remain in temporary internment in a provincial town until they found passage to the United States.

Decades later, at a conference at Istanbul University, in commemoration of the contribution of German medical faculty, I met the daughter of neuropathologist Philipp Schwarz (1894–1977), without realizing who she was. A psychiatrist and psychotherapist practising in Zurich, Switzerland, Susan Ferenz-Schwarz had spent her childhood in Istanbul, like the children of Haurowitz. In her keynote address in fluent Turkish, she movingly expressed how Turkey had given them not simply a safe haven during the war, but a home and a country.

At the time, none of this background was known to me. I realize only now, with regret, the missed opportunity to gain their personal views, about which most had remained silent. I had grown up totally ignorant of their immense contributions to Turkey. That I should be researching their lives, resurrecting their memories through the research invitation of my colleague Frank Stahnisch completes the intricate web of serendipity.

[114] Reisman, "They Helped Modernize Turkey's Medical Education and Practice," 83f.
[115] Carlson, *Hermann Joseph Muller*, 32.