

The Rockefeller Foundation and Centers of Mathematics: Richard Courant from the University of Göttingen to New York University

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As a doctoral candidate in the History and Sociology of Science Department at the University of Pennsylvania, my research has focused on the cultural history of the American mathematics community in the twentieth century. My dissertation considers New York University's Courant Institute of Mathematical Sciences as its central case study, through which I analyze the career of its founder, the German Jewish émigré Richard Courant (1888-1972), and the institute in which it was modeled after, the Mathematical Institute at the University of Göttingen. Richard Courant was the director of the Göttingen Mathematical Institute when he was dismissed by the Nazi government in 1933; prior to this time, he had overseen the construction of the Göttingen Mathematical Institute's new building funded largely by the Rockefeller Foundation (RF). The RF later supported Courant as a refugee scholar at Cambridge University in 1933, then as an émigré in his placement with New York University in 1934, and throughout the following decade with grants supporting his expository mathematics publications and the development of New York University's (NYU) mathematics graduate program.

My understanding of the RF's involvement with mathematics in general has been largely informed by the work of Reinhard Seigmund-Schultze.¹ His publications have detailed the RF's efforts to internationalize mathematics in the interwar period, its involvement in supporting displaced scholars, and its development of mathematical centers. My research at the Rockefeller

Archive Center (RAC) allowed me to build upon this important work by examining in detail the RF's involvement with the University of Göttingen's Mathematical Institute, Richard Courant's career, and later NYU's mathematics department.

The International Education Board (IEB) records contain a plethora of archival materials concerning the IEB's interest in the University of Göttingen's Mathematical Institute. The key correspondence (1925-1928) regarding the Göttingen Mathematical Institute was between the American mathematician George Birkhoff, IEB President Wickliffe Rose and the IEB Physical and Biological Sciences Director Augustus Trowbridge. Subjects included the landscape of academic mathematics in Europe, the IEB fellows studying mathematics at Göttingen, and the development of the new Mathematical Institute building. Of particular note are Trowbridge's logs, which contain valuable insights on the mathematical community in Göttingen, as he visited the institute in October 1925 and July 1926. His first trip in October 1925, included visits with James Franck, Richard Courant, Max Born, and others in which they discussed the role of the IEB.² Trowbridge also met with David Hilbert, Carl Runge and others, during which time they discussed the economic conditions in Germany. Trowbridge was also able to attend a mathematical seminar and meet at least a dozen IEB-funded fellows and possible candidates.³

Following this preliminary trip in October 1925, Trowbridge returned to the Mathematical Institute at Göttingen in July 1926. During this second trip he met with Birkhoff, Hilbert, Courant, Runge, Born, Franck, Wilbur E. Tisdale, Robert Pohl, and Edmund Landau. It was during this trip that the group discussed the possibility of the IEB supporting the various mathematical groups in their effort to become organized in one building near the physics and chemistry institutes. According to Trowbridge, "He [Courant] outlined briefly the advantage which might be expected from such a grouping, the central idea being that something like a

laboratory—with research rooms, central library, and etc., would do for mathematics what the building of physical laboratories for research had done a generation or more ago for the marked development in recent years in the research field in these sciences.” Trowbridge further articulated that Courant was concerned that mathematics students would, “miss the frequent contacts which any laboratory students naturally get with their fellow students,” pointing to the situation in Göttingen where the mathematics students and faculty were rather spread out and had limited shared space in an “overcrowded common room in a university building.”⁴

In notes on the conference held in July 1926, between Trowbridge, Franck, Birkhoff, Courant, and the Göttingen curator Valentiner, possible plans for a building to house the Mathematical Institute were discussed, and described as follows: “The erection of the Mathematical Institute will not be an isolated set, but a link in a chain of measures by which mathematical and physical work in Göttingen will be perfected, stabilized and made more effective. It is part of the general plan to realize the wish for enlargement and increase of working facilities, real and personal, and to meet the requirements of the Mathematical Institute.”⁵

The importance of a built space—in addition to fellowships—was reiterated in Birkhoff’s document entitled, “Final General Memorandum for Dr. A. Trowbridge” which he submitted on September 8, 1926. Following his IEB-funded travels to Italy, France, Belgium, Holland, Germany, Switzerland, Denmark, and Sweden, Birkhoff presented his thoughts on how best to strengthen mathematics in the United States, as well as in Europe. He wrote,

- “the principal material factors to be considered here (in Europe) or in America are:
- a) aid to graduate study,
 - b) laboratory, library and publication facilities,
 - c) posts and centers,
 - d) honors, lectureships, prizes, aid for travelling, etc. In addition there are certain immaterial factors such as:
 - e) popular support, tradition and leadership.”⁶

In Courant's October 2, 1926 proposal to Trowbridge and the IEB he emphasized the importance of having close proximity between the new Mathematical Institute building and the Physics Institute. Courant stated, "The close association of mathematics and physics has at all times been a characteristic feature—and the strength—of the Göttinger tradition, in our special sphere. I need only recall the names of Gauss, Weber, Dirichlet, Riemann, H. Minkowskis, Felix and Klein. The last name entertained for decades the project of establishing a fixed home for mathematics and physics where both sciences would be cared for on the broadest possible basis, and in intimate mutual conjunction. In this way, a series of new buildings and establishments has come to the front, the object of which appears to be the concentration of all University activities connected with our special domain in one big campus."⁷ During the following month, the proposal was refined to meet the IEB's suggestions. At the November 19, 1926, Adjourned Fourth Annual Meeting of the International Education Board, the finalized proposal for a new mathematics institute building and the expansion of the physics institute were approved. William Brierly of the RF wrote to Courant that the IEB would grant \$275,000 toward the new Mathematical Institute and \$75,000 toward a new wing for the Physical Institute. It was expected that the Prussian Ministry of Public Instruction would guarantee an annual contribution of at least \$25,000 for maintenance of the institutes.⁸

In addition to the correspondence directly pertaining to the math and physics institute at the University of Göttingen, the RAC also contain IEB annual reports that offer insight into the broader philosophy of the Board. In Volume I the history of the Board is discussed. Established in January 1923, the IEB was founded "for the purpose of cooperating with foreign institutions and agencies engaged in the conduct and promotion of education." It was to supplement the

already existing General Education Board (GEB), which focused on the United States. The IEB was also established to include science under its purview:

“Scientific progress is a world-wide movement. A step forward is made here, another there. In incalculable ways suggestions and discoveries originating at different points are brought together to achieve results which no one could have predicted or imagined. It is therefore extremely important that advanced workers have knowledge of one another’s problems, methods and results; that young men now in training, who give promise of substantial development, should, in their formative period, enjoy the stimulus to be derived from contact with productive scientists in other countries.”⁹

With this philosophy, the IEB offered traveling fellowships for physics, chemistry, biology and math.¹⁰

The political and economic environment within which the IEB was established was described in Volume II. In this report, the impact of World War I on the scientific community’s communication was expounded upon: “The war and its economic aftermath had thrown up a barrier to the interchange of scientific experience on an international scale. It had become financially difficult for advanced workers to continue their fundamental training outside their own countries, and for distinguished authorities to visit their colleagues in other lands for the purpose of exchanging ideas—practices which past experience had shown to be highly advantageous.”¹¹ The purpose of the IEB travel fellowships was to support young scientists and mathematicians a “richer background of scientific experience than a man can obtain in his own country.”¹² In the year ending June 30, 1924, the IEB supported forty fellowships for international travel; the following year, the IEB provided ninety-nine additional fellowships and renewed sixteen of the original fellowships.¹³ Volume III reiterated the growth of the fellowship program, noting that for the 1925-1926 year, ninety-seven new fellowships had been awarded and twenty-nine renewed.¹⁴ With regards to the countries in which mathematicians were seeking

to spend their fellowships, it was stated that, “In mathematics there is a marked migration toward France, Germany, and Italy.”¹⁵

Just four years after the new Mathematical Institute opened the Nazi government dismissed Richard Courant from his position as Director of the Mathematical Institute. The RF played a fundamental role in securing Courant’s next two positions of employment, first for the 1933-1934 academic year at the University of Cambridge and then again for the 1934-1935 and 1935-1936 academic years at NYU. During these years, the RF contributed \$2,000 to Cambridge under a Paris Special Research grant for refugees and \$4,000 over two years to NYU under the Special Research Grants for Refugees Program towards Courant’s salary.¹⁶

In a 1943 Rockefeller Foundation Trustees Bulletin, there is a discussion of Courant—among other émigré mathematicians sponsored by the RF—and their impact on the American mathematics community. “They are serving as teachers, research workers, and consultants in many important posts. As the pressure of war intensifies the military and naval demand for mathematics, and more and still more mathematics, the services of these highly trained brains become indispensable.” The Bulletin also specifies Göttingen as being the “chief outside contributor to present-day American mathematical resources,” noting that sixteen former Göttingen faculty members were then in the United States.¹⁷

The RF’s support of Richard Courant and NYU’s mathematics department continued throughout the 1930s and into the 1940s. Courant received several grants-in-aid from the GEB to support a series of courses titled “What is Mathematics?” which was targeted to secondary school mathematics teachers. According to Courant’s original proposal to the GEB the course objective was, “to bridge the gap between highly specialized mathematical research and mathematics as an element of general education. In particular, it is hoped that by such courses

we can contribute towards vitalizing high school instruction in mathematics.”¹⁸ In September 1938, the GEB approved Courant’s request, noting that he had offered similar courses while in Göttingen.¹⁹ In a combination of two grants, the GEB awarded Courant and NYU a total of \$1,500 “to enable him to prepare for publication of his manuscript on the teaching of mathematics as part of general education.”²⁰ In 1941, The GEB again awarded Courant a grant-in-aid; this time, to support the publication of the content from his “What is Mathematics?” course.²¹ This work eventually led to the publication of the text, *What is Mathematics?* by Oxford University Press in 1941. The GEB also contributed \$6,500 to NYU and Courant to publish lecture notes from mathematics courses covering advanced mathematical content, including partial differential equations of mathematical physics, propagation of waves, and theory of functions of a complex variable.²²

The RF’s involvement with the NYU mathematics department continued through the 1940s. RF minutes from January 18, 1946 describe the RF’s \$60,000 grant to NYU’s mathematics department for the development of applied mathematics over the five-year period of July 1, 1946 to June 30, 1951. The minutes describe the RF’s decision to support NYU mathematics within the context of the post-WW II world.

“The war focused a strong light upon our national technical resources, and threw into sharp contrast our elements of strength and weakness. Our national weakness in applied, as contrasted with pure, mathematics was thus emphasized and made very clear. After the National Defense Research Committee had been operating for about two years, it became evident that applied mathematics was critically needed in a wide variety of research and development projects connected with the war. There was then formed an Applied Mathematics Panel, which had the duty of bringing mathematics to the useful service of all branches of the National Defense Research Committee, as well as to all branches of the Armed Forces.”

The minutes continue to detail that the NYU mathematics department was very applied-focused and had developed during the war years. The RF grant was to support advanced training and

research in applied mathematics by providing funds for faculty hiring, guest professors, library resources, scholarship, and fellowships.²³

When the 1946-1951 grant was nearing its expiration, Courant, Friedrichs, and Stocker inquired with Warren Weaver about the possibility of a grant renewal.²⁴ The RF denied their request. Weaver detailed the reasons for this in his response to their request. He began by stating that the situation with regards to applied mathematics in the U.S. was rather different than it had been a decade ago, when programs such as NYU's and Brown's were more unique. Weaver stated, "I think that it is unquestionably true that the support given to those two institutions has been of some recognizable help in connection with changing the general attitude towards applied mathematics, and towards helping to establish some effective centers for training in this field." Because of this success however, Weaver continued that, "The period of pioneering help is now over, and the problem of continuing regular support in this field is one to which the Rockefeller Foundation does not feel that it can contribute."²⁵

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The ideas and opinions expressed in this report are those of the author and are not intended to represent the Rockefeller Archive Center.

ENDNOTES:

¹ See: Reinhard Siegmund-Schultze, *Rockefeller and the Internationalization of Mathematics Between the Two World Wars: Documents and Studies for the Social History of Mathematics in the 20th Century*. Basel, Switzerland; Boston, Massachusetts; Berlin, Germany: Birkhäuser, 2001; Reinhard Siegmund-Schultze, *Mathematicians Fleeing from Nazi Germany: Individual Fates and Global Impact*. New Jersey: Princeton University Press, 2009. Other relevant sources include: Constance Reid, *Courant*. New York: Springer-Verlag New York, Inc., 1996; and Robert E. Kohler, *Partners in Science: Foundations and Natural Scientists, 1900-1945*. Illinois: University of Chicago Press, 1991.

² “Germany 1—University of Göttingen, 1924-1928,” Folder 484, Box 34, Series 1.2, International Education Board Archives (IEB), Rockefeller Archive Center Archives (RAC).

³ “Germany—General, 1924-1926,” Folder 482, Box 34, Series 1.2, IEB, RAC.

⁴ “Germany—General, 1924-1926,” Folder 482, Box 34, Series 1.2, IEB, RAC.

⁵ “Germany 1.1—University of Göttingen, Institute of Mathematics and Mathematical Physics, 1926-1930,” Folder 485, Box 34, Series 1.2, IEB, RAC.

⁶ Birkhoff to Trowbridge, September 8, 1926, Folder 171, Box 12, Series 1.1, IEB, RAC.

⁷ Courant to Trowbridge, October 2, 1926, Folder 485, Box 34, Series 1.2, IEB, RAC.

⁸ Courant to Trowbridge, October 2, 1926, Folder 485, Box 34, Series 1.2, IEB, RAC.

⁹ IEB Annual Report, February 3, 1923—June 30, 1924, IEB, RAC, p. 5.

¹⁰ IEB Annual Report, February 3, 1923—June 30, 1924, IEB, RAC, pp. 6-8.

¹¹ IEB Annual Report, 1924-1925, IEB, RAC, p. 6.

¹² IEB Annual Report, 1924-1925, IEB, RAC, p. 8.

¹³ IEB Annual Report, 1924-1925, IEB, RAC, p.6.

¹⁴ IEB Annual Report, 1925-1926, IEB, RAC, p. 12.

¹⁵ IEB Annual Report, 1925-1926, IEB, RAC, p. 16.

¹⁶ “Grants to Richard Courant,” May 21, 1943, Folder 1874, Box 152, Series 200 D, Record Group (RG) 1.1, Rockefeller Foundation Archives (RF), RAC.

¹⁷ “Confidential Monthly Report,” Trustees Bulletin, Number 54, January 1, 1943, pp. 6-8, RF, RAC.

¹⁸ Courant to Havighurst, September 21, 1938, Folder 6228, Box 686, Series 1.3, General Education Board Archives (GEB), RAC.

¹⁹ “Grant-in-Aid, General Education,” September 29, 1938, Folder 6228, Box 686, Series 1.3, GEB, RAC.

²⁰ “Grants to Richard Courant,” May 21, 1943, Folder 1874, Box 152, Series 200 D, RG 1.1, RF, RAC.

²¹ “New York University (NYU)—Applied Mathematics, 1941,” Folder 1873, Box 152, Series 200 D, RG 1.1, RF, RAC.

²² “NYU—Applied Mathematics, 1942-1946,” Folder 1874, Box 152, Series 200 D, RG 1.1, RF, RAC.

²³ Minutes of the RF, January 18, 1946, Folder 1874, Box 152, Series 200 D, RG 1.1, RF, RAC.

²⁴ Courant, Friedrichs, and Stoker to Weaver, December 29, 1950, Folder 1874, Box 152, Series 200 D, RG 1.1, RF, RAC.

²⁵ Weaver to Courant, January 23, 1951, Folder 1874, Box 152, Series 200 D, RG 1.1, RF, RAC.