TEL AVIV – WIKO – TEL AVIV IN THREE MONTHS

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Born in 1956, in Santiago de Chile. Grew up in Caracas, Venezuela, where he graduated in mathematics in 1977. M.Sc. in Mathematics (1983) and Ph.D. in History and Philosophy of Science (1990) at Tel Aviv University. Since 2003: Director, Cohn Institute for History and Philosophy of Science and Ideas, Tel Aviv University. Since 1997: Editor, *Science in Context* (Cambridge University Press). Publications include: *Modern Algebra and the Rise of Mathematical Structures* (1996, second revised edition, 2003); *The Literary World of Jorge Luis Borges* (in Hebrew, 1997); *David Hilbert and the Axiomatization of Physics (1898–1918): From „Grundlagen der Geometrie" to „Grundlagen der Physik"* (2004). – Address: Tel Aviv University, Ramat Aviv, 69978, Israel.

Three months spent in the middle of the year at Wiko are a unique experience and a great privilege. This is almost a truism for anyone in the academic world, but it is immensely truer for someone coming from the Israeli academic world, especially if one is currently charged with an administrative duty. The unusually lengthy and snowy winter this year in Berlin only made even more patent the contrast between the sweaty, hectic corridors of Tel Aviv University and the almost absurdly peaceful atmosphere of the Grunewald. Sitting in my room in the third floor of the main building, overlooking the Wallotstraße and the nearby, snow-covered pond, I had generous amounts of quality time and absolute silence to pursue some academic work such as I haven't done for years. I am truly grateful for the invitation, for the devoted help of the entire staff, and for the open friendship of the Fellows.

The intensive work done during these three months served as a starting point for a research project that will occupy me in the near future and that I had indeed planned to undertake in coming to Berlin: the history of Fermat's Last Theorem. Fermat's Last Theorem (FLT) is a rather esoteric mathematical result, devoid of any applications in or outside mathematics. At the same time, the statement of the theorem requires no specific mathematical knowledge to be fully comprehended. The theorem was definitively proved in 1994 as a consequence of Andrew Wiles' proof of the Taniyama-Shimura conjecture. FLT and its history immediately became a widely publicized media item. However, contrary to its public image, FLT was a problem to which mathematicians devoted very little serious research effort throughout the years. In my research I pursue questions such as the following:

1. What makes a problem more or less important in the eyes of mathematicians, and how do their criteria change along time?
2. How important was FLT considered to be ever since its formulation?
3. How has the story of FLT been told through the years and especially after Wiles' proof?

One aspect of my research is the internal dynamics of the preoccupation with this theorem within the mathematical community: who were the mathematicians and institutions involved in the investigation of this theorem, how was the theorem presented in textbooks and treatises, and, above all, how was its history constructed and how was the myth associated with it developed since the time of Fermat to the present day.

One focus of special interest is the work of Harry Schultz Vandiver (1882–1973). Working at the University of Texas, Austin, Vandiver was among the very few mathematicians who made considerable progress in research related to the proof of FLT between 1900 and 1970. Still, his approach to this problem has very little in common with the approach that finally led to Wiles' method of attack. His name was completely forgotten in the "victory parades" that followed Wiles' achievement. Based on a wealth of unpublished archival material, I am attempting a reconstruction of Vandiver's mathematical world and the place of FLT within it. In particular, I focus on his use of calculation devices, including electronic computers after 1950, in a mathematical field where most practitioners at that time would have considered this sacrilegious. Among the many reasons why Vandiver's role in this story is unique and appealing is that he was an outsider to the community and a self-styled researcher throughout his life. He was a high-school dropout and he never had a formal, systematic college education in mathematics. It is interesting to see how this fact shaped his career and led him in directions that others would instinctively avoid.

Curiously, the unprecedented possibilities of implementing fast procedures for large-scale number-crunching brought about by the advent of electronic computers found one of its less receptive audiences among practitioners of mainstream number theory. This ironic situation can be explained by looking at the main research trends that shaped the formidable progress of the algebraic theory of numbers from the second half of the nineteenth century on. Central to such trends was a conscious attempt to develop powerful conceptual tools that would allow the solving of outstanding problems in the theory "purely by ideas" and with "a minimum of blind calculations".

This conceptual approach was developed by mathematicians like Dedekind and Hilbert on the basis of ideas appearing in the work of Ernst E. Kummer in the 1850s. At the core of Kummer's own work, however, one does find the kind of massive computations with particular cases that will essentially disappear from the algebraic theory of numbers in the decades to come. This is in particular the case with his result of 1859 that FLT is true for all prime exponents less than 100. Although extending this result beyond 100 involved no more than straightforward (if tedious) computations of new values of so-called Bernoulli numbers, no mathematician undertook such computations before 1930. Work in this direction was then undertaken not by leading number theorists, and Vandiver was the most perspicuous figure among those who did.

Against this historical background, I am interested in investigating the mathematical, sociological, and institutional aspects of the early use of electronic computers in number theory by focusing on the works of Vandiver and two younger collaborators, Derrick Henry Lehmer (1905–1991) and Emma Lehmer (1906–), all of whom were involved in calculations related to possible solutions of FLT. Their rather idiosyncratic work is of considerable historical and mathematical interest, in particular concerning the question of the incursion of computer-assisted methods into mathematics at large. No less important is the fact that analyzing their mathematical colleagues' ambivalent and changing reactions to their achievements provides a useful vantage point for understanding institutional and ideological aspects of the development of the discipline in the twentieth century.