Gösta Mittag-Leffler: A Man of Conviction

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1 Book Review

This is a biography of Gösta Mittag-Leffler (1846 - 1927), a prominent figure in Swedish mathematics. Mittag-Leffler was instrumental in bringing the mathematical developments of the great scientific centers of the time to the backwaters of Sweden. As a matter of fact, he became one of the most influential operators in mathematics of his time, mediating between the French and German schools. The author – Arild Stubhaug – has already written biographies of the Norwegian mathematicians Niels Henrik Abel (1802–1829) and Sophus Lie (1842–1899).

To make the presentation more vivid, Stubhaug begins with a snapshot from 1899/1900 when Mittag-Leffler (with his wife Signe and his personal physician Wettervik) went on a trip to Egypt, in an effort to calm his nerves and to try to cure the physical ailments that kept troubling him with the warm sun and the dry desert climate. It is explained how the Mittag-Lefflers met Selma Lagerlöf and her close friend Sophie Elkan; they even stayed at the same hotel in Egypt. Selma Lagerlöf (1858–1940) was a renowned writer of novels who received the Nobel prize for Literature in 1909.

Magnus Gustaf (Gösta) Mittag-Leffler had two brothers, Leopold Fredrik Alexander (Frits) and Artur Lorens Olof Abraham (Artur), and a sister, Anna Charlotte Gustava (Anne Charlotte); they all used Leffler as the last name, as it was from their father Johan Olof (Olle) Leffler (1813–1884). Mittag-Leffler added Mittag to his last name as a tribute to his mother's side of the family; his mother was Gustava Vilhelmina Leffler (née Mittag; 1817–1903). His sister Anne Charlotte Leffler (1848–1892) was a writer of drama, short stories, and novels. She became friends with the famous Russian mathematician Sofia Kovalevskaya (1850–1891, née Korvin-Krukovskaya) and together they wrote the drama *The struggle for happiness* in 1887. In those years the role of woman in society was about to be recast, and both Leffler and Kovalevskaya were pioneering the change. Anne Charlotte died of appendicitis in 1892 in Naples, leaving behind a son, Gaetano. His brother Frits Läffler (1847–1921) was a linguist but suffered from mental illness like his father Olle, whereas his other brother Artur Leffler (1854–1938) was an engineer who later was involved in Mittag-Leffler's various business ventures. His father Olle was a successful rektor (headmaster) of a school in Stockholm, and a member of the Parliament, before he fell mentally ill in 1870. The onset of his illness meant that the family's economic situation worsened drastically beginning in 1870, at a time when the talented young Gösta was a student in Uppsala.

Mittag-Leffler was already interested in mathematics in high school. He obtained his undergraduate degree (*filosofie kandidatexamen*) and later his PhD degree (1872) at Uppsala University, with the grade *laudatur*, where his thesis was influenced by Hjalmar Holmgren (1822–1885). Uppsala was a university town laden with centuries of traditions, and not a place where novel scientific thinking could flourish. The ill fate of his father probably propelled the young Mittag-Leffler to do his very best to succeed in science, and he decided to go to the mathematical centers in France and Germany to learn about the latest developments. He successfully obtained the Byzantian travel scholarship, which enabled him to visit Paris, Göttingen, and Berlin, in the period 1873–1876. While in Paris he interacted with Charles Hermite (1822–1901) and Henri Poincaré (1854–1912), in Göttingen with Ernst Schering (1824–1897), and in Berlin with Leopold Kronecker

(1823–1891) and most notably with Karl Weierstrass (1815–1897) and his unofficial student Sofia Kovalevskaya. The connection with Kovalevskaya led to an 1876 visit to St-Petersburg, Russia, and after that, he went to Helsinki where a position as a university professor was available. He presented his Habilitationsschrift in Swedish on the theory of elliptic functions, a topic of current interest in the circles around Weierstrass. Mittag-Leffler surprisingly won the competition for the position, with a positive evaluation by the appointed expert Lorenz Leonard Lindelöf (1827–1908). In 1877 he was appointed professor of Mathematics in Helsinki. Being a professor was a sign of distinction in those days, and Mittag-Leffler took advantage of his position to connect with the higher social circles in Helsinki. In those days, Finland was a Grand Duchy of the Russian empire, but Swedish was rather commonly spoken, especially in the wealthier layers of society.

In Helsinki, Mittag-Leffler assumed a rather extravagant lifestyle, living beyond his means, as he had been doing since the travels to continental Europe. This was made possible by friends and acquaintances from Sweden; one of these was his friend from high school and the university days, Johan Hagströmer (1845–1910), who was from a well-off family. Mittag-Leffler's contact with the politically influential Gustaf af Ugglas (1820–1895) – whose son Samuel he tutored while studying at Uppsala – helped him to return to Sweden from Finland. Gustaf af Ugglas had served as Swedish finance minister 1867–1870. It was easy for a person like af Ugglas to help Mittag-Leffler obtain a professorship in Stockholm, at the newly founded Stockholms Högskola (Stockholm College, nowadays Stockholm University), and the appointment was finalized in 1881. In the meantime Mittag-Leffler courted Signe Lindfors (1861–1921), the daughter of major general Julius af Lindfors (1831–1903). The couple married in 1882. Some unpleasantness from interaction with the fennoman movement probably played a role in the decision to leave Helsinki for Stockholm.

Mittag-Leffler decided to enter the world of business, and in 1882, he was a co-founder of the insurance company Victoria. Another significant event from 1882 was his founding of the renowned mathematical journal *Acta Mathematica*. Later, influenced by Weierstrass, in 1884, he secured a position for Sofia Kovalevskaya at Stockholms Högskola. This was no small feat given the difficulties women encountered in academia at that time. As it turns out, Kovalevskaya was not very happy with her job in Stockholm, and tried to leave repeatedly. The year before, in 1883, her husband Vladimir Kovalevsky committed suicide following financial troubles. Later, she met Maxim Kovalevsky (1851–1916) and had a tumultuous affair with him which extended over several years. Kovalevskaya was oriented toward the nihilist movement, and her sister Anna was a devout communist. She obtained the *Prix Bordin* from the French Academy of Sciences in 1888. Kovalevskaya died suddenly of an infection (probably pneumonia) in 1891 in Stockholm.

In 1889, Mittag-Leffler made sure that Poincaré was given the *mathematical prize of Oscar II*, a prize which it was hoped would be awarded regularly in the future. However, it was awarded only once. In contrast, the *Nobel prize* is awarded every year, and receives a lot of attention. The money was donated by the industrialist Alfred Nobel (1833–1896), and the prize was awarded in 1901 for the first time. There is no Nobel prize for mathematics. As a matter of fact, there is an anecdote which supposedly explains this by Mittag-Leffler's having an affair with Nobel's wife. There is no real substance to the story, but Stubhaug writes that if there ever was any kind of rivalry between the two Swedes over a woman, then the woman was Sofia Kovalevskaya.

As a member of the Swedish Royal Academy of Sciences (KVA) with political clout, Mittag-Leffler wielded influence over the choice of Nobel prize laureates. He was instrumental in seeing to it that Marie Curie (1867–1934) was awarded the Nobel prize, not once but twice. He also made several unsuccessful attempts to give the prize for Physics to Poincaré. It should be mentioned that over a number of years Mittag-Leffler would

throw a private party every year in December for that year's Nobel laureates at his private villa in Djursholm.

Mittag-Leffler's main mathematical contributions date back to the 1880s. After that period, he devoted most of his time to his private business ventures (mostly related to hydropower stations and associated chemical processes) and to scientific politics; he even tried his hand in ordinary politics. Nonetheless he kept a keen interest in the various scientific advances that were made with time, such as Kristian Birkeland's discovery of a technique to make a nitrous fertilizer (saltpetre) from nitrogen in the air. In the biography, he is contrasted with Ivar Bendixson (1861–1935), who as his own scientific prowess waned – it is claimed – he assumed that science did not advance too much anymore. Mittag-Leffler and Bendixson disagreed about the future of Stockholms Högskola: Mittag-Leffler wanted it to develop into a research school, while Bendixson wanted it to become a traditional university like the ones in Uppsala and Lund. Eventually, Bendixson prevailed, and Stockholms Högskola is now Stockholms Universitet (Stockholm University).

His marriage with Signe was childless. This probably explains why Mittag-Leffler and his wife in 1916 decided to donate their private villa and most of their personal wealth to KVA to establish a mathematical research institute. After Mittag-Leffler's death in 1927 the Mittag-Leffler Institute lay more or less dormant, with Torsten Carleman (1892–1949) serving as its first director after Mittag-Leffler himself. The more active institute we know today was made possible by the efforts of Lennart Carleson (1928–) who was appointed director in 1969. He raised the additional financing necessary to realize the original intentions of Mittag-Leffler.

Mittag-Leffler was a celebrated mathematician, with six honorary doctorates, and memberships of forty-five scientific societies, such as KVA, the Royal Society of London, l'Académie de Sciences (Paris) and the Russian Academy of Sciences (the Imperial St-Petersburg Academy of Sciences).

Stubhaug's research for this monumental biography relies on a wealth of primary and secondary resources, including more than 30000 letters that are part of the Mittag-Leffler archives. The effort needed to turn all that material into an easily readable presentation is impressive. However, the reader who may hope to find out whether there was a romantic aspect in Weierstrass' and Mittag-Leffler's support for Kovalevskaya will be disappointed. The book will be of great interest to both mathematicians and general readers interested in science and culture.

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