Arild Stubhaug: *Gösta Mittag-Leffler. A Man of Conviction*
(Springer-Verlag 2010).
by Sigurdur Helgason.

The author is well known among mathematicians for his superb biographies of Abel and Lie. Being a Cand Mag. in Mathematics as well as in Literature he was in fact singularly qualified for such undertakings because he managed to convey the flavor of the mathematics involved without discouraging the non-mathematician reader.

It is therefore a matter of great interest that Stubhaug has undertaken the job of writing a biography of Mittag-Leffler. While M-L does not compare to the two above in mathematical output or creativity, the mathematician Hardy in 1927 maintained that no one had done more for mathematics during the last 50 years. And in fact many consider him as the father of mathematics in Sweden. Most mathematicians know his name from the Mittag-Leffler theorem in Complex Analysis. It is a counterpart to Weierstrass' theorem about constructing a holomorphic function with prescribed zeros except that now the poles and the singular part at each pole are prescribed.

Stubhaug's book traces Gösta Mittag-Leffler's life from childhood onwards. However, it starts with a kind of an appetizer, "Journey at the Turn of the Century". It describes Gösta's trip to Egypt with his wife Signe accompanied by his personal physician. This was one example of many extensive trips that M-L took during his life for health reasons. In fact he suffered from serious health problems throughout his life. Already as a child he suffered from serious pneumonia of a kind where the survival prospects were 0.1%. He credited his mother's care for his survival, and kept very warm contact with her all her life. He added her name Mittag to his father's name Leffler.

After his professorship in Helsingfors 1877-1881 M-L accepted a professorship at Stockholm's Högskola. His principal activities can be divided in four parts: (i) reforming Stockholm's Högskola toward research oriented program in mathematics more than was the case in Lund and Uppsala; (ii) founding in 1882 and carrying on with that journal Acta

Mathematica, which even today is a highly respected mathematical journal; (iii) investing in highly varied enterprises, carbide factories, railroads, waterfalls for hydroelectric production etc.; (iv) founding of the Mathematical Institute in Djursholm in 1916, jointly by 'makarna Signe og Mittag Leffler'.

At that time their fortune was estimated at 4 million kr., down from 7 million two years earlier. This would decline even further after the first world war. Towards the end of his life he had little left, partly because Signe's inheritance (she died six years before him) had through "The Witch [Hexan] W" (M-L's term) been in large part diverted elsewhere. After M-L's death the Institute was rather dormant except for the continued publication of Acta Mathematica. However, around 1970 Lennart Carleson managed to obtain funding whereby the Institute could function in the way Mittag-Leffler had planned and Carleson served for sixteen years as the Scientific Director.

Activities (ii) and (iii) were connected with very extensive travels all over Europe (and Egypt and Algeria). Many of these trips were taken for reasons of health and necessitated the company of a doctor.

Clearly M-L expected his biography would be written after his death. He always kept a diary, finally totalling 93 volumes, wrote about 20,000 letters to about 3000 correspondents, collected hundreds of articles and drafts thereof, as well as records of business dealings. Every item involved was kept. The "Nachlass" filled about 75 shelf meters. At the Mittag-Leffler Institute one can find series of leather bound volumes filled with nothing but visiting cards. The list of his "Vitenskapelige Utmerkelser" fills two pages (honorary degrees and memberships in scientific academies).

After defending his doctoral thesis in Uppsala 1872 he got a stipend to travel to Berlin and Paris for 2-3 years. He started in Paris and dutifully attended Hermite's lectures. These turned out to be a real challenge to M-L's familiarity with French because Hermite had difficulty walking so he did not use a blackboard. He just read the lectures from his manuscript at the lectern, most of which consisted of formulas for elliptic functions. He lectured 9-10 pm on Christmas Eve and continued Christmas Day at the same time. But M-L was clearly a dashing, charming fellow, and Hermite took great liking to him, invited him to dinner *en famille* with his two unmarried daughters present. But he advised M-L to go to Berlin and learn

from Weierstrass (" he is the master of us all"). In Berlin M-L had a very productive time and established contact with members of the brilliant Berlin school, particularly Weierstrass. While Weierstrass would have liked to keep him in Berlin, instead M-L apppied successfully for a professorship in Helsingfors. From Weierstrass he had heard about his brilliant student Sonja Kowalevski. Shortly before taking his position in Helsingfors he did meet her on a trip to St. Petersburg. To his mother he writes: "Som quinna är hun fortjusande. ... Denne dag er en af de märkligsta i mitt liv. (As a woman she is enchanting. ... This day is one of the most remarkable of my life.)" Through M-L efforts Sonja was appointed professor at Stockholms Högskola and he did his best to make life pleasant for her. This was often a difficult task.

Another woman scientist receiving significant support from Mittag-Leffler was Marie Curie. As a member of the Royal Swedish Academy he knew that Pierre Curie was a likely candidate for the Nobel prize and was aware that her name had not been mentioned. Mittag-Leffler then wrote to Pierre Curie and asked whether she was not a fully worthy partner in his work. He answered quite positively that if such a prize was contemplated she would be equally deserving. So they did indeed share the Nobel prize in physics 1903. A couple of years later Pierre died in a traffic accident and in 1911 the chemistry prize was accorded Marie Curie. At that time the Nobel committee was unaware of a scandal circulating in Paris concerning Marie Curie and Paul Langevin. Arrhenius, another member of the Swedish Academy, then wrote to Marie Curie expressing his opinion that it would be best if she would not come to Stockholm to receive the prize. Mittag Leffler took quick action and in several telegrams to Langevin insisted that she should come to Stockholm. She followed his advice with deep gratitude. Thus Mittag Leffler has the honor of preparing for the first female professorship in mathematics and the first female Nobel prize.

Stubhaug's description of these scientific political matters makes for fascinating reading. One also gets a clear image of M-L's business and investment affairs which during some difficult times caused him much grief and criticism. A marital crisis around 1897 caused by jealousies is described with great tact and sensitivity. While reading this book three times I often felt that I was back in Djursholm wandering through the Institute or along the paths near the seashore. The book is really captivating reading.

While M-L might have thought that his diaries could make an account of his life easy for a biographer, it took almost a century until Stubhaug had the courage to tackle this enormous challenge with reasonable completeness. The result is a fascinating account of M-L's life which at the same time gives a vivid picture of European mathematical milieu and activities during the period 1870 –1920.

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