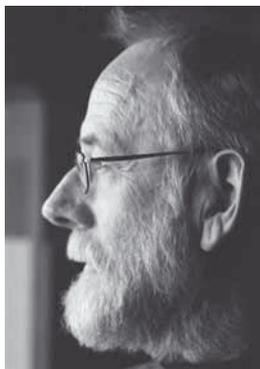


# Interview with Arild Stubhaug

Conducted by Ulf Persson (Göteborg, Sweden)



Arild Stubhaug

*Arild Stubhaug, who is known among mathematicians for his biography of Abel, has also produced a noted biography of Sophus Lie and is now involved in the project of writing a biography of the Swedish mathematician Mittag-Leffler and the mathematical period in which he was influential. Following up the interview, we will also have the privilege of giving a sample of the up-coming work in a forthcoming issue of the Newsletter.*

***You are an established literary writer in Norway, and if I recall correctly you already had your first work published by the age of twenty-two. You have written poetry as well as novels, what made you start writing biographies of Norwegian mathematicians in recent years?***

In recent years..., that is not exactly correct. I started the biography on Abel back in 1988 and during the eight years I worked on it I also concomitantly published three collections of poetry. I started to write about Abel and his times for many different reasons. To write poetry – however exciting it may be by itself – has turned into a narrow groove of work, not to say a marginal one. It is difficult to get new poetry properly recognised and appreciated, maybe because of the steadily diminished importance and influence it exerts in the development of language, in particular as regards to innovative constructions. Thus I wanted to try out alternative means of expression. Mathematics has always been a source of fascination. Abel was somewhat of a hero early on, and the historical interest was kindled when I lived in a town called Arendal in the south of Norway, where the past is still alive and moreover kept alive in a special way.

***What are your qualifications for writing about mathematicians? As a young man you studied a variety of subjects at university, including mathematics and the history of religion. Am I correct, and if so would you be able to explain what to most of us may appear to be a strange combination.***

It is correct. Mathematics was initially my primary interest. But this was back in 1968, and many other things caught my interest and engagement – especially the great priority that was accorded verbal expression at the time. Whatever could be caught and formulated in language became more important than anything else. By and by,



Arild Stubhaug with a statue of Gösta Mittag-Leffler

language turned out to be the most interesting subject of work for me. After mathematics I studied Latin, history of literature and eastern religion purely out of personal curiosity and desire. At that time such a combination could never be part of a regular university degree, hence I have never been regularly employed.

***But why Mittag-Leffler? Abel is one of the greatest mathematicians ever, this is an uncontroversial fact, and his short life has all the ingredients of romantic tragedy. Lie may not be of the same exalted stature, but of course the notion of “Lie”, in group-theory and algebra, is a mathematical household word. But Mittag-Leffler? I think that any mathematician would be hard pressed to come up with a single significant result that has been attributed to Mittag-Leffler. The theorem of Mittag-Leffler is of course duly mentioned and can be seen as an elementary precursor of sheaf-theory but clearly it is rather light-weight and hardly anything to get very excited about.***

Many people have indeed asked me: is Mittag-Leffler really worth such an ambitious biography? The reason for expressing such doubts may be that one easily confuses biography with a celebration of genius. Many have a romantic tendency to make its subject into an object of wonder rather than simply trying to understand the individual concerned as a human being. It is as if one would conceive biography solely in terms of an adventure story, neglecting its more mundane aspects. I do not believe that the differences between us humans are necessarily where we usually look for them: As if somebody by virtue of genius would live on a different planet. The crucial differences are of a far less grandiose nature, consisting in the way key decisions are made or points of views are formed by the individual, rather than by a fundamental otherness. But it is true that the main motivation to write about Mittag-Leffler was of course not because of his direct scientific contribution, but you can exert a crucial influence on mathematics without proving any theorems. Gårding, in his book on Swedish mathematicians until 1950, hails Mittag-Leffler as the father of Swedish mathematics. What makes it different to write about mathematicians rather than artists, politicians, explorers and other classical subjects of the

genre, is that the subject matter of mathematicians is incomprehensible to most readers. This puts even tougher demands on the approaches one chooses to present the subject. I believe that by the choice of Mittag-Leffler you will be able to write a biography of a mathematician in a way that can hold the interest of non-mathematicians, as I do not only want to give a portrait of Mittag-Leffler the man, but also to use him as a springboard to describe an era and a concomitant mentality. Behind this lies a basic conception of what constitutes the human. An individual is to a great extent a mirror of his or her times. If we take ourselves or people to whom we are very close as our point of view, we realise that the way we express ourselves is largely determined by whom we express ourselves to, i.e. our contemporaries. Not writing with the corresponding perspective means depriving the reader of a necessary sounding-board for understanding, automatically present whenever we read about our own contemporaries.

*To write a biography of Abel must have been a challenge, because there is so little documentation, but with Mittag-Leffler the challenge is of quite a different sort, as we find here an embarrassment of riches instead. With Abel one got the impression that you included everything you had manage to ferret out, but this will of course be impossible when Mittag-Leffler is concerned. In fact the habit of writing letters and keeping diaries has, much to the consternation of historians, waned during the 20th century. Thus ironically the subjects of which we can really present full-rounded biographical pictures are those of the 19th century, and of course Mittag-Leffler is exceptional even among those as he really kept a systematic account of his epistolarian output, keeping copies of essentially all the letters he ever penned. Are you first going to produce a preliminary text, a gross version so to speak, say a thousand pages long, out of which you will distil a net version of suitable length?*

*Finally, you have earlier told me that you are able to follow Mittag-Leffler day by day, something I doubt that you can do with your own life. But with all that documentation, are you really able to see the forest for all the trees? In particular do you feel that you really get to know Mittag-Leffler, or in spite of all the writing does nothing remain but exalted verbiage hiding the man and his innermost thoughts?*

Let me confront those questions one by one. It is true that Mittag-Leffler's Nachlass is impressive, some 75 meters of correspondences, diary-notes, articles and drafts thereof, of which about 60 meters are archived at Kungliga Biblioteket.<sup>1</sup> There are about 3000 correspondents and I estimate the number of letters to be around 20000. It certainly takes time to go through so much material and to try and digest it. This is why I feel that this biography cannot be rushed, there is so much potential that I feel must be realised before I let go of the work. Besides the

idea of having at some later date to start all over again and redo in greater detail is just too daunting to be contemplated. As to the final version it may happen that in the end I will be forced to make a distillation out of a gross version, but for the time being I have not committed myself to any a priori length, and I am still working under the assumption that the format will have to comply with the contents. The ultimate aim is to weave together the different strands of history relating to that of the individual, especially his intellectual development and that of mathematics. The enormous material available simply forces such a biography; namely that of writing Mittag-Leffler, the father of modern Swedish mathematics as noted above, into a context, in the same way in which great artists, politicians, barons of commerce etc have traditionally always been understood.

As to Mittag-Leffler remaining opaque in spite of all the things he wrote I do not agree. In fact I feel that I know him inside and out. Especially in his early letters, he is not committed to any preconceived image of himself that he wants to live up to and sustain. On the contrary, they testify to a desire to express any kind of anxious excitement arising out of his encounters with new people and new thoughts. The young Mittag-Leffler looked upon his own self as exciting a subject of investigation as anything else. Perceptions, feelings, ideas, ways of thinking... nothing was too insignificant or too grand for that matter to be touched upon in letters or in diary notes.

This is the fourth person I am writing a biography on, and I must admit that on the whole I feel that I know those people better than those in my actual vicinity. And Mittag-Leffler, by virtue of the rich and extensive documentation available, maybe in even higher degree than those previously portrayed.

*The British biographer Peter Ackroyd<sup>2</sup> claims somewhat paradoxically that the writing of a biography makes more demands on your imagination than the writing of fiction. Would you care to comment on that?*

It reminds me of a remark that at its time was attributed to the French writer and philosopher Voltaire, to the effect that Archimedes displayed more imagination than Homer. A statement that needless to say epitomizes the opposition between a classical concept of erudition and a more modern one based on scientific methods and paradigms of thought, in recent years actualized by the discussion of the two cultures of Snow.

Ackroyd's statement is interesting, provided one defines imagination not only as unfettered fabulation but as the power to survey and deal with a large, amorphous and many-faceted load of material; because if so the writer of biographies is in more need of it than a weaver of fiction. The more constraints are imposed on the ways imagination can be articulated, the greater the necessity for surveying and balancing. The narrower the latitude, the more the demand for an imagination of precision. It becomes like comparing a tightrope walker constrained

<sup>1</sup>Literally the Royal Library in Swedish

<sup>2</sup>Known among other things for his biographies of T. S. Eliot and Charles Dickens and in later years of the city of London

to his suspended line of rope with one who is free to walk on the surface of the ground, the latter may sway and dither, it does not matter much, while the former must engage his complete concentration to avoid falling off...

***As a writer of biographies one may work as a historian most of the time, seeking out the relevant sources, reading and summarizing. Do you find that this aspect of your work takes almost all of your time, or will there at least in the final write-up be enough time for fashioning a literary narrative? If you had the option of choice what would you prefer, the historically correct narration you have been assigned to produce, or a freer dramatization of his life?***

I would claim that what might appear a straightforward account in practice will put the same kind of demands on writing skills as that of a dramatization. To arrange facts in such a way that they form a wave in which the reader is carried away by the feeling of making his own discoveries, conclusions and drawing of parallels with his own life, is a form of dramatization that demands its due share of work. To structure the extensive material in such a way that all components fit seamlessly together as strands of the great warp which will constitute the final book, I consider as a truly literary challenge.

***For whom is this biography really written? Is it for the mathematician, and thus we are inevitably talking about an international audience? Or is it for the educated Swedish public, because much of the subject matter lends itself to the painting of a panorama of the Oscanian period<sup>3</sup> of much concern and interest to the Swede, but maybe of less interest to a wider public.***

First I would like to repeat what I mentioned before. The material cries out to be articulated according to its intrinsic nature, and this of course has been my leading star so to speak. It is true that Mittag-Leffler knew everybody who was somebody, he was active not only scientifically, but also knew all the main artists, writers and intellectuals in general in Sweden. As the 20th century broke he was down in Egypt consorting with the great writer Selma Lagerlöf. Thus the biography ought to be of interest to any educated Swede, and in fact it will appear by a Swedish publisher that has brought out many works on Swedish history. But I believe that the micro-cosmos I present will intrigue readers with no previous acquaintance. After all, there have been successful popular histories of the late Habsburg Empire, which present similar intimate hotbeds of intellectual ferment, albeit on a grander scale. Then of course Mittag-Leffler had a unique perspective on mathematics, he did indeed know all the important players and maintained personal friendships with a few of them and

<sup>3</sup>King Oscar II, grandson of Bernadotte erstwhile Napoleonic Marshal and later an almost unwitting founder of the present Swedish Royal dynasty, as well as great great grandfather of the present King, reigned from 1872 to his death in 1907, a period thus coinciding with the late Victorian period, and as the case of his British relative, the personality of the King very much epitomized it for better and for worse.

extensive correspondences with a wider circle. Such matters will inevitably pander to the curiosities of mathematicians in general.

***One thing that surely is going to interest an international audience is the relationship between Mittag-Leffler and Nobel and how it might have influenced the (unfortunate?) fact that there is no Nobel Prize in mathematics. The story that Mittag-Leffler had an affair with Nobel's wife can of course be discounted (for obvious reasons) right here and now, but that does not invalidate the general question. Personally I believe that Nobel was a practical man and that his ambitions for the prize were very down-to-earth, and that he in fact never had an inkling of the scientific prestige the prize would eventually be accorded. The thought to award the esoteric subject of mathematics must never have entered the mind of the businessman Nobel.***

It is of course true, as you indicate that Nobel was never married. But it is not true that Nobel and Mittag-Leffler never had anything to do with each other. I have unearthed previously unknown correspondence between the two, and although their exchanges were polite they were not particularly cordial. When Nobel announced that he was going to make a major donation,<sup>4</sup> Mittag-Leffler wrote him a long letter pleading for support for a professorship for Sonja Kowalevski. Nobel wrote back that the donation was made to the memory of his mother and thus his intentions were more of supporting charities than scientific advancement. And he also added, which I find remarkable in its gratuity, that Mille Kowalevski would be much better served staying in St-Petersburg, a "milieu" far better suited to a lady of her gifts and abilities, rather than to remain a winged bird in a cage in provincial Stockholm. I do not think it is utterly unreasonable to suspect that there might have been some kind of rivalry between Mittag-Leffler and Nobel as regards to Kowalevski, who as a beautiful lady was accustomed to expect attention of a gallant kind.

Also, it is not true that the prize was even initially thought of as a practical one, and the fact that Nobel had neglected both what would later turn into the University of Stockholm<sup>5</sup> and mathematics in his will was commented upon early on, leading to speculations unfavourable to Mittag-Leffler. I doubt that the issue will ever be fully resolved, just like most other historical bones of contention, but personally I do not hold it unreasonable that the relation between Mittag-Leffler and Nobel did in fact influence the latter to the detriment of mathematics. In fact once, at the very end of his life whilst dining at a restaurant, Nobel caught sight of Mittag-Leffler walking in the street outside. He is then reported to have remarked that there goes the worst scoundrel in the country, meaning in matters financial.

<sup>4</sup>One in 1890 and thus not to be confused with his ultimate donation in his will

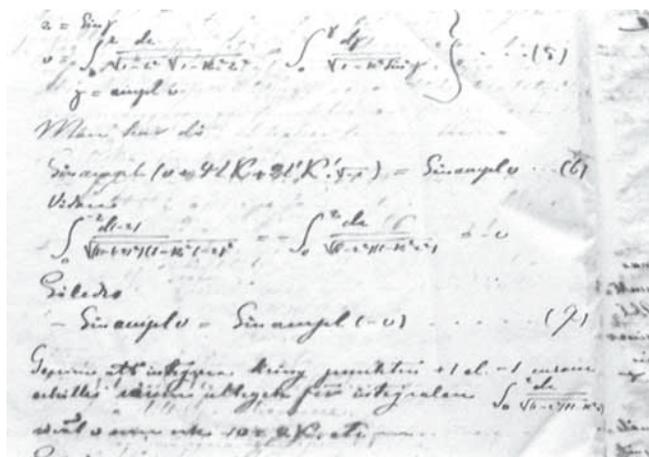
<sup>5</sup>Stockholm's Högskola, only in the 1950s formally designated as a University, was an independent institution of higher learning guided by very progressive ambitions

*The name of Sonja Kowalevski is also one to which Mittag-Leffler is ineffably linked. Can we mathematicians not take pride in the fact that we pioneered the introduction of women into science? And the fact that there are so few women in mathematics is not due to any oppression of the same, a conclusion otherwise so easy to jump at. Mathematical talent is supposedly very easy to recognise, so although Mittag-Leffler, as a publicist friend of mine has remarked, may have been something of an arch-conservative, he recognised talent where it was due, and thus ironically in this regard at least can be seen as ahead of his times.*

It is true that Mittag-Leffler did everything he was capable of to promote Sofia Kowalevski. He also tried to get her elected to the Swedish Academy of Sciences, but its President infamously remarked that if we are going to include women, where on the scale of creation would we then stop? That president was not, needless to say, a mathematician. Mittag-Leffler also took a very keen interest in the literary career of his sister, and he once remarked to her in a letter, how important it is that works of art should not be viewed from a perspective of gender, warning her about being identified with the parochial concerns of the blue-stockings. What is much less known than his championship of Kowalevski, is that he also intervened for the benefit of Marie Curie. Initially it looked like only her husband and Becquerel would have received the prize, but Mittag-Leffler had actually written to Pierre Curie, explicitly asking about his wife's contribution and the lengthy reply which he got, he forwarded to the Nobel Committee. Awarding Marie Curie the prize was a pivotal decision, and I think that Mittag-Leffler deserves a lot of credit for it. In fact to return to the issue of the Nobel Prize, Mittag-Leffler played a very active role. He unsuccessfully tried to lobby for Henri Poincaré (in connection to which I have discovered a wonderful picture taken of Poincaré on his visit to Djursholm in 1905) and later for Einstein successfully. For many years he arranged a dinner for the laureates at his sumptuous Villa in Djursholm on the day after the awards (although when Marconi got his prize in 1909 he scheduled it the day before, as not to have to invite what he thought was a humbug).

*Mittag-Leffler is often presented as an imposing but vain figure, appearing not a little ridiculous. He is also censored for his faibles for high-society. His relations to women, although correct, seem formal and artificial. In his letters as a boy and a young man he comes across as exemplary and very chaste telling his mother everything. It is hard to reconcile this dependant and introverted young man with the extroverted figure that won the confidence and respect of so many of the leading mathematicians of the day, and successfully, not to say brutally, brokered many a business deal.*

It is true that his letters to his mother are very intimate and honest. Definitely more so than to his wife, although the latter had their fair share of glow of conventional passion, at least during the initial courting stage. In fact there is nothing that he is able to confide to friends or to his diary that he is not also able to confide to his mother. To



One of Mittag-Leffler's notebooks – written on almost transparent paper

some extent this might illustrate the tenor of his times, in which women, especially as mothers, were objects of adulation. But Mittag-Leffler clearly goes beyond this. One may partly explain this by his being stricken as a child by a serious disease, through which his mother nursed him back to health. This must have created a strong bond. Relations with his father were more distant, as was not unusual at the time, and they certainly were not helped by his father's mental collapse when Mittag-Leffler was in his early twenties. His father was restrained to mental institutions for the rest of his life and was a source of worry and maybe above all of embarrassment. Mittag-Leffler was quite clear about his strong relation to his mother. He writes to her that any marriage he would conceivably enter was to be one of convention, giving explicitly as an explanation his strong attachment to her. He eventually married a young and beautiful girl, who was also very rich. But the marriage was not particularly happy and resulted in no issue, which one surmises must have been a source of common disappointment not to say sorrow. His relation to his sister, who like his well-known protégé died rather young, was also very close, and he took a great interest in her writing career. Her death, as well as that of Kowalevski which had preceded it, left him shattered.

Admittedly early on in his career he cultivated useful relations with nobility. It is revealing to learn of his initial scepticism not to say distaste and the ease with which he discarded such reservations. As to why he managed to establish such fruitful ties with the leading mathematical lights, one simply should ascribe this to his personal charm. When he travelled on the continent in his late twenties he was a striking figure, tall and handsome, able to carry on cultivated conversations, and also, although not in a historical sense, a more than competent mathematician. He became a personal friend with several of his teachers (Hermite, Kronecker, and of course Weierstrass, just to mention a few), participated in several scientific conferences, and established a net of contacts with many of his contemporaries. In short he was brought *à jour* with international mathematical research on the cutting edge, or more precisely, he established solid personal contacts with the greatest mathematicians and their schools, giving him standards of excellence he was to maintain for the rest of his life.

It is also true that he did amass a fortune, although the First World War seriously eroded it, but I think one should not conceive this ambition in purely personal terms. His worldly and financial success had a definite purpose, namely that of promoting mathematics. I believe that those standards of excellence he acquired in his first encounter with continental mathematics, this awareness and conviction of what a first-rate mathematician or scientist really represented, had a deep impact on Mittag-Leffler, and provided him with a basis from which to both judge his contemporaries and to determine his own positions on various issues. Of course it could appear arrogant and disparaging when he would apply those standards of excellence to his colleagues in the north and the scientific scene in which he found himself. Naturally many people around him thought that he was living in his own world with his head in the clouds. As founding editor of *Acta Mathematica* (from 1882), Mittag-Leffler confirmed his claim as an arbitrator of mathematical taste and importance, and the journal quickly became one of the leading ones in the world, providing the fundamentals of his international standing.

Mittag-Leffler was a scientist at heart, he strongly believed in the Victorian concept of progress, especially the scientific one. He had inscribed over the fireplace words to the effect “by the emergence of number thought was born and beyond the number thought does not reach”.<sup>6</sup> An inscription that has inspired much later scorn, but to me it illustrates his deeply set idealism. Man was not just a tabula rasa on which experience and external stimuli was scratched, but was endowed with a higher spirit actively engaged in the world and its understanding.

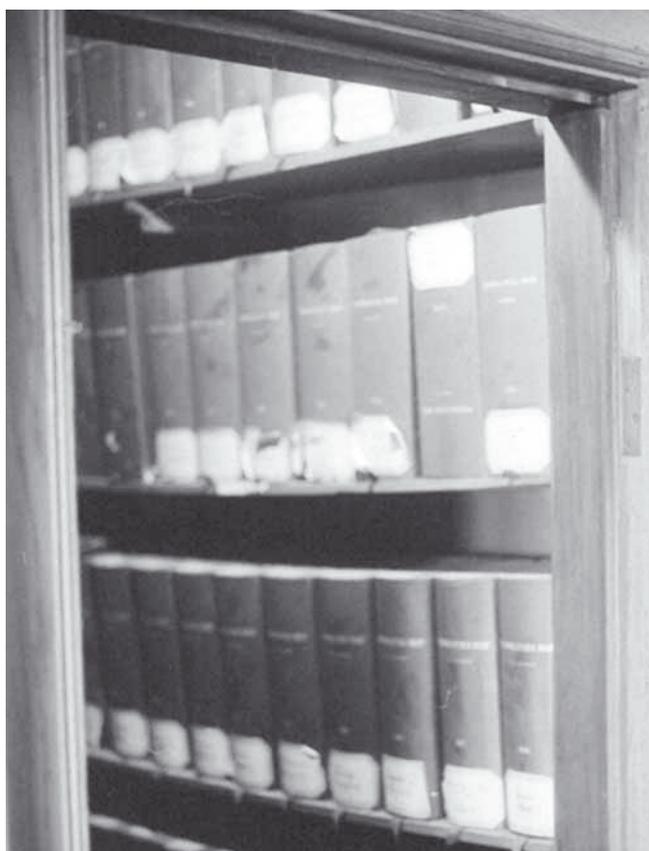
***Mittag-Leffler left a tangible legacy. His Villa, in which we now find ourselves, thanks to the efforts of Lennart Carleson, has served for almost forty years as the kind of institution he had envisioned. Do you think he looks down from his heaven, or wherever his ultimate destination happens to be, with satisfaction?***

The question is of course impossible to answer, at least literally. However, I think that an institution of mathematics with no examinations was his dream. In fact he tried to turn Stockholm’s Högskola into such a one. Mittag-Leffler was not a classical scholar, and the requirements of learning Latin had been an ordeal to him, and to his mind an utterly meaningless hurdle in the pursuit of mathematics. Such personal experiences strongly coloured his view of education, which must be thought of as progressive, once again disproving his archconservative image.

***If you were asked to make a comparison between the writing on Abel, Lie and Mittag-Leffler respectively, what would you then emphasize?***

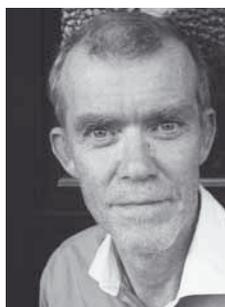
The main differences are not primarily to be found in the

<sup>6</sup>It comes out much better in Swedish with the ambiguity of the word number that can also mean speech. “Talet är tänkandets början och slut. Med tanken föddes talet. Utöver talet når tanken icke.”



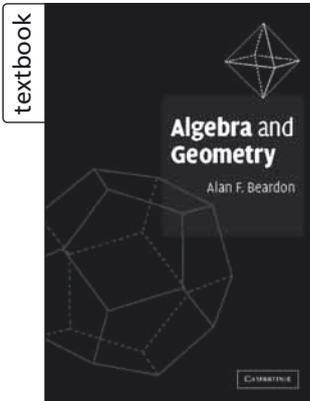
**The mathematical correspondence of Mittag-Leffler is kept in locked closets at the Mittag-Leffler institute**

actual work of writing, although the difficulty may be even greater this time around, but that we are talking about three profoundly different personalities. What strikes one first is Mittag-Leffler’s gradually acquired consciousness of and faith in his position as a prominent scientist, and the uses to which he put it. Abel never really understood his position and influence; he was standing outside, banging at the door, but was never let in. Lie kicked in the door by brute force and appropriated the position that clearly was his due. Mittag-Leffler simply had the key.



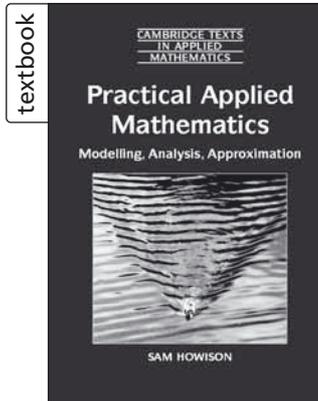
*Ulf Persson [ulfp@math.chalmers.se] has been professor at Chalmers University of Technology in Gothenburg (Göteborg) since 1989. He earned his Ph.D at Harvard 1975 as a student of David Mumford. Works in Algebraic Geometry, especially compact complex surfaces. Hobbies include mathematical pictures programmed directly in Post-Script. Has served as the President of the Swedish Mathematical Society and has been actively engaged in public debate on mathematical education. Publishes occasionally reviews on scientific-philosophical matters in the Swedish press and is the editor of the newsletter of the aforementioned Swedish Mathematical Society.*

# For the Books that Count



**Algebra and Geometry**  
**Alan Beardon**  
 Unified introduction to the key topics of algebra and geometry, based on a successful course at Cambridge. Web support is available.

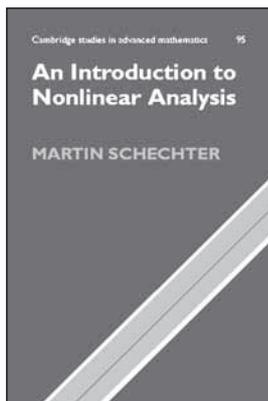
£48.00 | HB | 336pp  
 £21.99 | PB



**Practical Applied Mathematics**  
**Modelling, Analysis, Approximation**  
**Sam Howison**

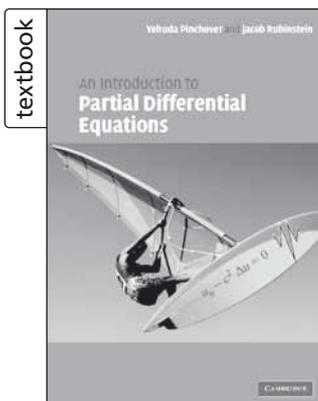
Illustrates how the reader's knowledge of applied mathematics can be used to describe the world around them.

**Cambridge Texts in Applied Mathematics, 38**  
 £65.00 | HB | 340pp  
 £28.00 | PB



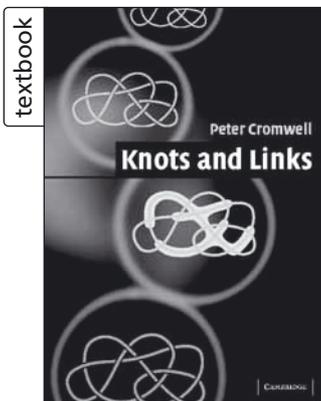
**An Introduction to Nonlinear Analysis**  
**Martin Schechter**  
 A guide to solving non-linear problems, using simple exposition and easy proofs.

**Cambridge Studies in Advanced Mathematics, 95**  
 £40.00 | HB | 376pp



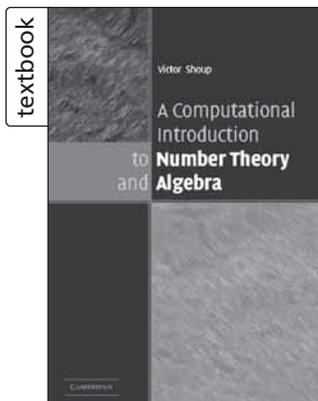
**An Introduction to Partial Differential Equations**  
**Yehuda Pinchover and Jacob Rubinstein**

A first course in partial differential equations for students of mathematics, physics and engineering.  
 £65.00 | HB | 383pp  
 £26.00 | PB



**Knots and Links**  
**Peter R. Cromwell**  
 Richly illustrated textbook on knot theory for undergraduate students. Modern in style and content with minimal prerequisites.

£70.00 | HB | 346pp  
 £25.00 | PB



**A Computational Introduction to Number Theory and Algebra**  
**Victor Shoup**

This introductory book emphasises algorithms and applications, such as cryptography and error correcting codes.  
 £30.00 | HB | 512pp

# Institut Mittag-Leffler, Stockholm

## History of the institute

As mathematics research institutes go, Institut Mittag-Leffler (IML) is one of the oldest. On his 70th birthday in 1916, Gösta Mittag-Leffler and his wife announced that they would bequeath their villa, their library and their considerable fortune to the Royal Swedish Academy of Sciences, in order that a research institute for mathematics be established on the premises. The will also included instructions for the running of the institute. The model he used was the Pasteur Institute, which he thought was a good example of an institution that devoted itself to pure research, without having to spend time on undergraduate teaching. At the time, the couple was still very rich, so the prospects for the new institute must have seemed quite bright.

Unfortunately, during the latter part of WWI, and in the years after, the fortune dwindled. In fact in 1922, Mittag-Leffler was on the verge of bankruptcy (his wife Signe had died in 1920) but the situation was saved, in part due to a loan from the Swedish government. When he died in 1927, however, there was not enough money in the estate to run a research institute on the lines Mittag-Leffler had suggested, so the Academy decided to appoint a caretaker director, Torsten Carleman, to see to the buildings and library. Other activities were to be put on hold until more money could be found. Carleman was not a very practical man, so apart from one or two seminars, neither fund raising nor much in the way of mathematics was undertaken in the years up to Carleman's death in 1949.

A new effort to breathe some life into the Institute was then made by the Academy. Lars Ahlfors and Arne Beurling were offered the directorship, but when both declined, the effort was given up, and a new caretaker director was appointed, Otto Frostman.

It was not until the mid 60s, when Lennart Carleson was appointed to a so-called personal professorship by the Swedish government – a very rare occurrence – that the wishes of Mittag-Leffler could start to be realized. The personal professorship meant that Carleson could move to Djursholm and take up the directorship. He also managed to secure money from the Walleberg foundation and from an insurance company to have parts of the main building renovated and rebuilt to be able to function as a research institute, and to build a number of apartments for visiting researchers.

## Format of the institute

The format of the Institute, conceived by Carleson, was more precise and certainly more practicable than Mittag-Leffler's original ideas, and has been kept even after Carleson left as director. In fact, it has also been the model for other institutes. Carleson's ideas, stature, and contacts in the world of mathematics were instrumental



The Mittag-Leffler villa

in the formative years of the Institute, and he is to be credited for shaping it and making it into an institution which enjoys considerable respect in and out of mathematics and Academia.

The IML runs year-long or semester-long research programs; topics are chosen by the board of the Institute. For each program a committee is appointed to draw up the specifications of the program and to decide on whom to invite. One or two specialists are also nominated as research directors for the program, and are expected to be present during the semester/year. Mathematicians are invited to spend time at the Institute, without any duties other than to be present and devote themselves to their science. Short visits are frowned upon, everybody is expected to stay for at least a month, and we always try to invite one or two to remain for the whole program. The Institute offers free housing, and contributes to the increased expenses of having to live abroad. At any given time about 15 senior researchers are in attendance, and with few exceptions, they all live on the premises.

Concurrently with the senior visiting program, there is a junior visiting program for post docs and advanced graduate students. About 10 are usually present. A number of scholarships are offered for this category. In particular, Scandinavian participants can often subsist on scholarships, grants or salaries from home, plus a small contribution from the institute to cover the extra expenses.

The junior visitor program is a strong part of the *raison d'être* of IML. The requirement that everybody stay for a substantial amount of time makes it less daunting for the young to get to know the established names, and to start working with them. It is easier to approach a famous professor in the congenial atmosphere of the Institute than having to run him down in the corridor of a university department on his way to a faculty meeting.

During the long reign of Lennart Carleson, who was director for 16 years, the topics of the scientific programs were close to his interests. It is a testimony to the enormous breadth of his mathematical appetite that, despite this, the



Guest buildings

programs of the Institute covered such a wide range. Over the last 20 years, even more diversification has taken place, with topics from algebra, combinatorics, logic and various branches of applied mathematics having been added to the long list of analysis programs. The next few years will see PDE (wave theory), algebraic geometry, moduli spaces, and stochastic differential equations join the list.

## Facilities

With few exceptions, all visitors can find accommodation in the Institute's own apartments. In addition to two older houses, and the apartments built at the end of the 60s, a new set of flats was built five years ago. Although of varying type, they are all comfortable, and some also have room for accompanying spouses and families. In all, from 100 to 150 visitors spend time at the Institute each year.

The pride of IML is its library. Gösta Mittag-Leffler was an avid book collector, and the mathematics part of it was left to the Institute. The collection of older books is admirable, and about 250 of the most important journals are subscribed to. The so-called upper library room is a delight to the eye as well as to the mind. It was designed by the architect Ferdinand Boberg, and must have been one of the most beautiful private library rooms of its day. Directly adjoining this room is Gösta's former study, with a spectacular view over the Baltic inlet of Askrikefjärden.

For a small organisation, keeping up the computer system is always a problem. We have been lucky enough to have our own systems manager for several years now. All visitors get their own desk with a work station (or laptop connection), although most will have to share an office.

The IML also publishes two well-known scientific journals, the *Acta Mathematica* and the *Arkiv för matematik*. The *Acta* was started by Gösta Mittag-Leffler in 1882, while the *Arkiv* was taken over from the Royal Swedish Academy in 1971. Although subscription handling and distribution have now been out-sourced, the editorial work and part of the typesetting is done within the Institute's walls.

## Budget and Administration

Compared with some of our sister institutes, IML is run on a shoestring budget. The overall costs amount to about EUR 1,000,000, for which we think we do quite a lot. This figure includes staff salaries, upkeep of buildings, library acquisitions, and the scientific program. The Mittag-Leffler Foundation, which under the auspices of the Academy has grown considerably in the 78 years since Mittag-Leffler's death, provides money for the infrastructure, while the scientific programs are financed through contributions from the research councils of the Nordic countries and various foundations and programs. The staff of seven are all dedicated to taking care of the visitors and the house and grounds.

Although formally a part of the Royal Swedish Academy of Sciences, the IML has always led a rather independent life. The Academy of course keeps an eye on us and our finances, but rarely interferes. Oversight and leadership is provided by the Board of the Institute, comprised of the members of the mathematics class of the Academy, and representatives from the other Nordic countries: Denmark, Finland, Iceland, and Norway. In fact, Gösta Mittag-Leffler insisted on the Institute being a Nordic institution, with equal opportunities for all. On average, about one third of the visitors are from the Nordic countries. To get an input of a more international kind, the Board has retained the kind help of advisors, currently William Fulton and Peter Jones.

## The location

The original Mittag-Leffler villa, built in 1891 and rebuilt and added to in 1897, 1903 and 1907, is a magnificent house with an almost Italian renaissance facade and a total area of some 900 square meters. A few rooms are kept essentially in their original state, and provide an Art nouveau atmosphere of a rather unique kind. Of course, the offices, both of the staff and the visitors, are of a more prosaic nature. The surrounding park, some 25,000 square meters, is home to owls and deer, lots of wild flowers and oak trees. Most visitors seem to enjoy the rather secluded location in a suburb of Stockholm. There are shops and a couple of restaurants nearby, but those needing specialty stores or nightlife activities have to go to the City, which can be reached in about half an hour via bus and the underground.

### Future programs

Fall 2005: Wave motion

Spring 2005: Algebraic Topology

2006/2007: Moduli Spaces

Fall 2007: Stochastic Partial Differential Equations

### Detailed information

can be found on the institute's

web site <http://www.ml.kva.se>



<http://www.springer.com/978-2-287-25171-9>

Sophus Lie. Une pensée audacieuse

Stubhaug, A.

2006, X, 567 p., Softcover

ISBN: 978-2-287-25171-9