



Programme 2009



The Abel Prize Ceremony

19 May 2009

Procession accompanied by the “Abel Fanfare”

Music: Klaus Sandvik. Performed by three musicians from the Staff Band of the Norwegian Defence Forces

Their Majesties King Harald and Queen Sonja enter the hall

Soroban

Arve Henriksen (trumpet)

(Music: Arve Henriksen)

Opening by Øyvind Østerud

President of the Norwegian Academy of Science and Letters

Eg veit i himmerik ei borg

Trio Mediæval, Arve Henriksen

(Norwegian folk tune from Hallingdal, arr. Linn A. Fuglseth)

The Abel Prize Award Ceremony

Professor Kristian Seip

Chairman of the Abel Committee

The Committee’s citation

His Majesty King Harald presents the Abel Prize to Mikhail Leonidovich Gromov

Acceptance speech by Mikhail Leonidovich Gromov

Closing remarks by Professor Øyvind Østerud

President of the Norwegian Academy of Science and Letters

Till, till Tove

Trio Mediæval, Arve Henriksen, Birger Mistereggen (percussion)

(Norwegian folk tune from Vestfold, arr. Tone Krohn)

Their Majesties King Harald and Queen Sonja leave the hall **Procession leaves the hall**

Other guests leave the hall when the procession has left

Professor Øyvind Østerud

President of the Norwegian Academy of Science and Letters

Your Majesties, Excellencies, dear friends,

On behalf of the Norwegian Academy of Science and Letters I take great pleasure in wishing you all welcome to the Abel Prize award ceremony for 2009. Niels Henrik Abel was born in 1802, but it is only the seventh time the prize to commemorate his work has been awarded. Had it not been for political events around the time of his centenary, we might have had more than 20 awards behind us. The plans to mark the centenary of Abel's birth involved three great events – a festival in Kristiania, as Oslo was then called, and in Abel's homeplace of Froland; a dignified monument in Kristiania city centre; and an international Abel prize in mathematics every fifth year. There were great festivities and a monument – the one made by our sculptor Gustav Vigeland and which indeed stands at Abelhaugen near the Royal Palace. But there was no mathematics prize in 1902.

Another of Norway's great mathematicians, Sophus Lie, was active in organising a prize in Abel's name. International support was mobilised; King Oscar II was supportive. The Scientific Society in Kristiania, a precursor of the present Academy, drew up the statutes for the prize. The dissolution of the Union with Sweden in 1905, and the political turmoil leading up it, however, put an end to these plans. Another hundred years were to pass before the Abel Prize for mathematics was realised.

The Abel Prize has a complex objective: it is designed to reward a prominent mathematician for pioneering work; it is to be an international prize that involves the world's leading mathematicians and their organisations; and it is to have ripple effects that strengthen mathematics in schools and society generally, both in Norway and abroad. It is for that reason that school competitions and teachers' prizes are part of the award ceremonies.

Abel lived in difficult conditions and died of tuberculosis before reaching his 27th birthday. His breakthrough as a major mathematician was thus posthumous. The international mathematics community was crucial to Abel's development, as the subject was a small one in Norway. Eventually he obtained a scholarship to study abroad; he was in Copenhagen, worked closely with leading German mathematicians, then transferred to Paris and continued to work there. Shortly after his death a letter arrived at his Norwegian home saying he would be given a professor's chair at the University of Berlin.

But if the young Niels Henrik had not had an alert, committed and responsible teacher, we would probably have no Abel prize to award today. The prize that is now being given

to a skilled mathematics teacher in the upper secondary school is called after Abel's own teacher, Bernt Michael Holmboe. There is every reason to remember Holmboe, who was Abel's mathematics teacher at Christiania Cathedral School from when Abel was 16. Holmboe discovered Abel's talent, inspired him, encouraged him, and took the young pupil considerably further than the curriculum demanded. He pointed him to the professional literature, helped him with overseas contacts and stipends and became a lifelong colleague and friend. After Abel's death he edited the first collected edition of Abel's works. By then Holmboe was himself a professor at the Royal Frederician University of Christiania, what we now call the University of Oslo. His story is a lesson on the importance of good teachers.

Abel was a talented mathematics pupil in the heyday of Latin. Latin was then the very core of classical education and gentlemanly culture, not just a subject for the privileged to study. With its rather complicated grammar, Latin was seen as the ideal training for intelligence and general abilities. In time, mathematics was to usurp some of this role.

At the same time, in Abel's time there was a conflict between mathematics as an abstract number theory on the one side, and mathematics as concrete and practical calculation on the other. Abel's teacher Holmboe wrote textbooks emphasising the theoretical and abstract, but at the same time he was a teacher at the military academy and lent his mathematical abilities to the development of the first insurance companies in Norway. It was no coincidence that many great mathematicians of the 18th, 19th and 20th centuries were to be found teaching in European military academies: mathematics was a necessary handmaiden of government and war, engineering and communications, insurance and commerce.

Abel lived at a time of professional flux, at the same time as his personal involvement was theoretical and abstract, without concern for practical applications. Even if mathematics has an enormous practical importance, and is the key to very many other subjects, there is something about mathematics that invites the language of aesthetics – purity of form, simplicity (even in the midst of complexity), elegance, even beauty. In the history of mathematics, practical utility has often been an unintended side-effect.

There is an external feature of the world of mathematics that often surprises scientists from other disciplines: it is how young mathematicians can be when they make their breakthroughs. Abel died before he was 27, but he had great contemporaries who died even younger. Many made their contributions in their twenties or even younger. On the other hand, mathematicians can also do pioneering work all their lives, even after modern society gives them their pension. Their careers can be very long. Here the mathematicians can remind us more of the great artist and composers than of scientists in many other subjects.

The Abel Prize pays homage to Niels Henrik Abel, to mathematics and some of our own time's most prominent mathematicians. Let me congratulate the year's very deserving laureates.

Professor Kristian Seip

Chairman of the Abel Committee

Your Majesties, Your Excellencies, ladies and gentlemen,

The 2009 Abel Prize is awarded to Mikhail Gromov for his revolutionary contributions to geometry.

Geometry is one of the oldest fields of mathematics. It originated thousands of years ago when knowledge arose from the need to answer practical questions, such as how to estimate the size of a given piece of land. Geometry is still involved with the study of concepts such as shape, distance, size and position of objects, and properties of surfaces and spaces. As in antiquity, research in geometry is closely related to questions dealing with the physical world we live in, but today this link concerns also the greatest questions about our universe.

Geometry underwent revolutionary change during the last 50 years. Mikhail Gromov has led some of the most important developments, producing profoundly original general ideas that have resulted in new perspectives on geometry as well as other areas of mathematics.

Riemannian geometry developed from the study of curved surfaces and their higher dimensional analogues, and was later important in the development of the theory of general relativity. Gromov played a decisive role in the creation of modern global Riemannian geometry, a modern field originating in classical Riemannian geometry.

Gromov is one of the founders of the field of global symplectic geometry. His most famous work within this area led to the theory of Gromov–Witten invariants, which is now an exceptionally active field of study linked to a part of modern theoretical physics called quantum field theory. This work also led to the creation of symplectic topology and gradually penetrated and transformed many other areas of mathematics.

Gromov's work on groups of polynomial growth introduced ideas that forever changed our understanding of discrete infinite groups. He discovered the geometry of discrete groups and solved several outstanding problems. His geometrical approach rendered complicated combinatorial arguments much more natural and powerful.

Mathematics is now such an extensive and overwhelmingly complex scientific edifice that hardly anyone is capable of understanding in detail more than a small piece of it. Most mathematicians will by and large, therefore, stay within and take part in shaping an ever smaller part of the subject. It is a sign of grandness when mathematical work within one field not only influences other parts of mathematics but is so profound and powerful that it has a transformative impact on other central areas of the subject.

Mikhail Gromov is a remarkably creative mathematician. He is always in pursuit of new questions and is constantly thinking of new ideas for solutions of long-standing problems. Gromov's work will continue for a long time to be a source of inspiration for many important mathematical discoveries.



Photo: Åsa Maria / Kolonihaven

The musicians

Trio Mediaeval

Trio Mediaeval consists of singers Anna Maria Friman, Linn Andrea Fuglseth and Torunn Østrem Ossum.

Since its conception in 1997, the trio has released four recordings on the German label ECM Records: *Words of the Angel* (2001), *Soir, dit-elle* (2004), *Stella Maris* (2005) and *Folk Songs* (2007), which was nominated for the Norwegian music award Spellemannsprisen and a Grammy. All their recordings have made it on to the US Billboard Top 10 Bestsellers List. The trio's repertoire spans three main areas: polyphonic mediaeval music from the UK and France, contemporary works, and Norwegian folk music and mediaeval ballads. Trio Mediaeval has performed live and on radio and television all over Europe, USA and Canada, and performed its first concert in Asia at the Hong Kong Arts Festival in February 2008. The group has worked with musicians such as Arve Henriksen, Jan Bang, Birger Mistereggen, Trygve Seim, Frode Haltli, Bang-on-a-Can (New York), the Tord Gustavsen Trio and the contemporary music ensemble MusikFabrik (Köln). Trio Mediaeval was Artist in Residence at the 2007 Festspillene i Bergen.

Birger Mistereggen

Percussionist

Born in 1967, and raised in Rendalen in Østerdalen, Birger Mistereggen has lived in Oslo since 1983. He trained at the Norwegian State Academy of Music and researched Norwegian drumming traditions for his dissertation. He holds a permanent position as percussionist and timpanist with the Norwegian Radio Orchestra (Kringkastingsorkestret) in Oslo and is much in demand as a freelance musician performing classical music, contemporary music, jazz and folk music. He also teaches at Tromsø University College, and is guest lecturer at the Ole Bull Academy in Voss and the Norwegian State Academy of Music in Oslo. Birger Mistereggen has been an associated member of VAMP since 2007.

Arve Henriksen

Trumpeter

Born in 1968, Arve Henriksen studied at the Trondheim Conservatory from 1987–1991, and has worked as a freelance musician since 1989.

He has worked with many musicians, including Jon Balke (with whose Magnetic North Orchestra he has played extensively), Anders Jormin, Edward Vesala, Jon Christensen, Marilyn Mazur, Audun Kleive, Nils Petter Molv  r, Misha Alperin, Arkady Shilkloper, Arild Andersen, Stian Carstensen, Dhafer Youssef, Hope Sanduval, the Cikada String Quartet, The Source and more. He has played in many different contexts, bands and projects, ranging from working with koto player Satsuki Odamura, to the rock band Motorpsycho via numerous free improvisation groups. He is currently working with Supersilent, the Christian Wallumrod Ensemble and the Trygve Seim Ensemble.

He has composed music for Bale Jazz, Vossa Jazz, "My own private furry" (dance performance) and for "FRED" (theatre performance). He was Artist in Residence at Moers Jazzfestival 2006, and he has been a part of the European Jazz Launch project 2004–2006.



Photo: Johanna Diehl



ABEL
PRISEN

www.abelprisen.no