

THE 2008 ABEL PRIZE CEREMONY AND RELATED EVENTS

Report by

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It was the most exhilarating academic experience of my life to be present at the Abel Prize Ceremony in Oslo on 20 May, 2008 and witness the award of the Abel Prizes to my distinguished colleague John Griggs Thompson of the University of Florida and an equally eminent mathematician Jacques Tits of the College de France. The 2008 Abel Prizes of about \$1.2 million in total, were awarded to Professors Thompson and Tits by King Harald V of Norway for their monumental mathematical contributions that shaped modern group theory. The King and the Queen of Norway graced the Prize Ceremony which was attended by several Norwegian dignitaries, foreign diplomats, mathematicians and academicians from within and outside Norway, and members of the press. There were several events held in Oslo during May 19-21 related to the Abel Awards. I was invited to all these festivities and this is a report of these events in the order in which they took place.

Wreath laying at the Abel monument: Neils Henrik Abel (1802-29) is Norway's most distinguished mathematician, and indeed one of the greatest mathematicians in history! The Norwegians are justly proud of Abel and have his statue right inside the gardens of the Royal Palace in Oslo. This statue was made by Gustav Vigeland, a highly reputed Norwegian sculptor. On Monday, May 19 at 5:00 pm, one day before the Abel Prize Ceremony, there was a function at the Abel Monument during which the 2008 Abel Laureates John Thompson and Jacques Tits laid wreaths at the monument. By 4:30 pm, a crowd comprising mostly of mathematicians had gathered at the monument in eager expectation to witness this first of a series of events related to the 2008 Abel Awards. Before requesting the laureates to place the wreaths, Professor Ragnar Winther, Chairman of the Abel Board, pointed out in a short speech that the work of the 2008 Abel laureates is actually quite well connected to that of Abel and another great Norwegian mathematician Sophus Lie who made great efforts to honor Abel during the Abel Centenary in 1902. Thus Professor Winther said that it was of particular significance that Thompson and Tits lay these wreaths at the Abel monument.

Mathematicians dinner at the Norwegian Academy of Science and Letters: On May 19 at 7:00 pm, there was a dinner hosted by the Norwegian Academy of Science and Letters. The dinner was only for a select group of about 40 mathematicians and was held at the beautiful building of the Academy, a short distance from the Palace. For all other events, spouses were also invited. The only spouses at this dinner were Dr. (Mrs) Diane Thompson and Mrs. Tits. Professor Reidun Sirevag, Secretary General of the Academy, welcomed the gathering and said that the Abel Award honors mathematicians and recognizes the greatness and importance of mathematics. Thus the Academy felt that there ought to be an event in which mathematicians could meet and discuss among themselves and this dinner provided such an occasion.

During the dinner, an event of unusual importance took place, namely the release of a book containing three famous handwritten manuscripts by Abel, and the presentation of these books to the laureates. Professor Ole Didrik Laerum, President of the Norwegian Academy of Science and Letters, explained the incredible saga of these three manuscripts. Abel sent them to Leopold von Crelle, the editor and publisher of the *Journal für die Reine und Angewandte Mathematik*, otherwise known as Crelle's journal. Two of them were published in Crelle's Journal. After publication, the original manuscripts were not returned to Abel. Some time later, Leopold von Crelle sold these handwritten manuscripts to an Italian manuscript collector Libri. After Libri's death, the Abel manuscripts ended up in the possession of Prince Boncompagni who put them up for sale in 1898. The great Swedish mathematician Mittag-Leffler purchased these three manuscripts of Abel at the auction in Italy and kept them at his mansion. He published the third manuscript in his journal *Acta Mathematica* in 1902 for Abel's centenary. A few years ago Arild Stubhaug began working on Mittag-Leffler's biography, and while going through the collections in Mittag-Leffler's mansion, he noticed these three manuscripts of Abel. He then drew the attention of Professors Laerum and Sirevag of the Norwegian Academy of Sciences who then had discussions with Prof. Anders Björner, Director of the Mittag-Leffler Institute. It was a great gesture on the part of the Mittag-Leffler Institute and the Royal Swedish Academy of Sciences to turn over these manuscripts to the Norwegian Academy of Sciences. They have now been brought out in the form of a lovely book edited by Prof. Stubhaug and published by Scatec (Scandinavian Advanced Technology). After proposing a toast to Abel's memory, Professor Laerum presented both Abel laureates with a copy of the book. Upon receiving the book Professor Thompson said that he would like to say a few words. In an emotional response, Thompson expressed his gratitude to Abel for discovering such wonderful results and providing so much for mathematicians of succeeding generations to work on. Witnessing this important presentation at the Norwegian Academy, my mind went back to the Ramanujan Centenary in Madras, India in December 1987 in which I participated, when the first printed copy of Ramanujan's Lost Notebook was presented to Professor George Andrews. In a voice choked with emotion, Andrews thanked Mrs. Janaki Ramanujan for preserving the loose sheets that eventually bore the name "Ramanujan's Lost Notebook" and expressed his great appreciation and admiration for Ramanujan. I felt that Thompson's emotional response on Abel compared with that of Andrews on Ramanujan!

The 2008 Abel Prize Ceremony: The 2008 Abel Prize Ceremony was held at the Aula of the University of Oslo. The Aula is a stately building with large stone pillars at the entrance and having an impressive auditorium. The Aula is located close to the Royal Palace and faces a wide avenue that leads directly from the palace.

The ceremony was scheduled to start at 2:00 pm on Tuesday, May 20. All members of the audience occupied their seats by 1:45 pm before the arrival of the King and Queen at 2:00 pm. From 1:00 pm onwards, in front of the Aula, there was music by the Staff Band of the Norwegian Defence Forces to welcome the guests.

Seated on stage at the Aula were the Abel Laureates John Thompson and Jacques Tits, Mrs. Tits to be assistance to her husband, Professor Ole Didrik Laerum, President of the Norwegian Academy of Science and Letters, and Professor Kritian Seip, Chairman

of the Abel Prize Committee. The program started promptly at 2:00 pm when Their Majesties King Harald V and Queen Sonja arrived and occupied their seats up front in the central aisle from where they could witness the entire ceremony.

The ceremony began with music by three of Norway's noted performers - Ms. Randi Stene (vocal), Mr. Lars Anders Tomter (viola), and Mr. Ketil Bjornstad (piano). The music was both enchanting and uplifting. Following this, Professor Laerum made the Opening Remarks in which he briefly outlined Abel's life and contributions, emphasized the importance of mathematics in our lives, and described the objectives of the Abel Prize. Then Professor Seip briefly recalled some landmark results and ideas of group theory starting with the foundational work of Galois and Abel, and with as background, he highlighted the pathbreaking contributions of the laureates Thompson and Tits. He then requested King Harald V to present the 2008 Abel prizes to Thompson and Tits. It was a glorious moment. In his brief acceptance speech, Professor Thompson graciously acknowledged the crucial contributions of several mathematicians over the decades that helped achieve the classification of finite simple groups. This is a monumental mathematical accomplishment and Thompson led the worldwide effort of dozens of mathematicians. Out of modesty Thompson did not emphasize his own epoch making work in group theory. Jacques Tits in his equally modest acceptance speech, thanked his contemporaries and collaborators, and appreciated the great support given to mathematics by the the King and Queen of Norway, the Norwegian Academy of Science and Letters, and the Abel Foundation. The Abel Prize Ceremony was brief (lasting 40 minutes) and all arrangements were tastefully done and executed perfectly.

Press conference: Following the Abel Prize Ceremony, there was a press conference at 3:00 pm organized by Ms. Tora Aasland, Minister of Research and Higher Education. The press conference was held at the classic Hotel Continental (where the laureates stayed) close to the Aula. The minister said that she understands the importance of sound mathematical education and arranged this press conference to get suggestions from eminent mathematicians about how to address problems facing mathematics education at all levels. The students of the Abel Mathematics Competition for high schools were recognized just the day before and so one of the topics discussed was the importance of spotting and encouraging talented youngsters. Another was the declining interest among students to pursue mathematics in view of lucrative careers in other fields, and how to go about attracting students to mathematics.

The Abel Banquet: At 7:00 pm on May 20, there was a grand banquet at the magnificent Akershus Castle in Oslo. The Akershus has been recently renovated and is now used primarily for state receptions. Since King Harald and Queen Sonja were present at the banquet, dress was formal - black tie or national costume. My wife Mathura wore an Indian silk sari for the occasion. It was a pleasure for us to see the Norwegians (men and women) in their beautiful national costumes - these costumes being distinct for different regions of Norway. There were 160 guests in total at the banquet, and spouses were separated in seating so that we could meet different members. The banquet was attended by several Norwegian dignitaries, members of the diplomatic service from foreign countries, and eminent mathematicians. Before the banquet, there were brief speeches by Ms. Tora Aasland, Minister for Research and Higher Education, and by Professor Ari

Laptev, President of the European Mathematical Society. At the end of the banquet, we were treated to lovely music by members of the Norwegian Soloists Choir. It was indeed a very memorable evening in the company of extremely distinguished persons in a grand setting fit for the occasion.

A very interesting incident happened to me and Mathura as we were getting out of the Akershus Castle to return to our hotel. We wanted to take a taxi to the city center and we stopped an empty taxi at the Akershus which was ready to give a ride. But since the city center was not very far (according to the taxi driver), he was not inclined to give a ride. So Mathura and I decided to walk, even though we felt it was long walk, especially at night. Just then a chauffeur driven Mercedes pulled up and the person in the back seat got out of the car and offered us a ride to the city center. It turned out that he was the Mayor of Oslo! We were touched by his gesture of goodwill.

The Abel Lectures: Wednesday, May 21, the day following the Abel Prize Ceremony, was devoted to the Abel Lectures - four of them delivered at the Georg Sverdrups hus of the University of Oslo. The first two lectures by the laureates Thompson and Tits were in the morning, and the next two by Michel Broue (Director - Institut Henri Poincare and Editor in Chief of the Journal of Algebra) and Alex Lubotsky (Maurice and Clara Weil Professor at the Einstein Institute of Mathematics, Hebrew University) were in the afternoon. The audience were welcomed by Kristian Seip (Chair of the 2008 Abel Prize Committee) and Geir Ellingsrud (Rector of the University of Oslo). Sir John Kingman, FRS (University of Bristol, former Director of the Isaac Newton Institute in Cambridge, England and former President of the Royal Statistical Society), Member of the 2008 Abel Prize Committee, introduced Thompson who spoke on “Dirichlet series and $SL(2, Z)$ ”, his recent seminal work at the University of Florida.

For the past decade, Thompson has been systematically investigating upper triangular matrices. This was the theme of his invited one hour address in March 1999 to the American Mathematical Society at the meeting held on the campus of the University of Florida. In the past few years, Thompson has been studying the divisor matrix D from a group theoretic point of view. Here D is the infinite upper triangular matrix $[d_{i,j}]$, where $d_{i,j} = 1$ if i divides j , and 0 otherwise. Thompson discussed crucial connections with Dirichlet series such as the Riemann zeta function, with arithmetical functions like the Möbius function, and with $SL(2, Z)$. Certain aspects of this work are in collaboration with our colleague Professor Peter Sin of the University of Florida as pointed out by Thompson in his lecture. Thus Thompson continues to investigate fundamental problems even today.

Jacques Tits spoke on “Algebraic simple groups and buildings”, areas to which he has made pioneering contributions. He viewed groups as geometric objects and introduced what is now called Tits building. This encodes in geometric terms the algebraic structure of linear groups. Tits was introduced by Professor Hans Folmer (Humboldt University, Berlin), Member of the 2008 Abel Prize Committee.

The afternoon talks by Professors Michel Broue and Alex Lubotsky were on the great advances in group theory made possible by the fundamental contributions of the laureates. Broue spoke on “Building cathedrals and breaking down reinforced concrete walls”. He was introduced by Dusa McDuff (SUNY at StonyBrook), Member of the 2008 Abel Prize Committee. Lubotsky spoke on “Simple groups, buildings, and applications” He was

introduced by 1994 Fields Medalist Efim Zelmanov (UCSD), Member of the 2008 Abel Prize Committee.

There were several participants (mathematicians) who were registered for the two day Abel program, and the so Abel lectures which were excellently planned and executed, had a large and well informed audience.

The Abel Party: The concluding event was the Abel Party held at the Norwegian Academy of Sciences at 7:00 pm on May 21. There was a large gathering of mathematicians and members of the Norwegian Academy from other disciplines. It was nice touch to have live music at the party - American jazz in honor of John Thompson and French music on the accordion and viol in honor of Tits. It was a cheerful ending to a glorious three days.

Concluding remarks: It was a pleasure and a privilege for me to represent the University of Florida and the Mathematics Department at the 2008 Abel Prize Ceremony and related events, and to see my distinguished colleague John Thompson being given the greatest honor in mathematics along with the very eminent Jacques Tits. Events like this make us feel proud to be mathematicians and happy that our discipline is held in such high regard by the international community of scholars. The fine finishing touch to my visit was the momento I received at the Abel Party from Professor Laerum, President of the Norwegian Academy of Science and Letters, namely the book "Tracing Abel" of the three Abel manuscripts that were first presented to the Abel laureates during the mathematicians dinner on May 19. The epoch making works of mathematical giants like Abel from earlier times, and of distinguished mathematicians like Thompson and Tits of our day, are an inspiration for all of us engaged in mathematical research.

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