

Called Too Soon by Flames Afar: Niels Henrik Abel and His Times

Reviewed by Jesper Lützen

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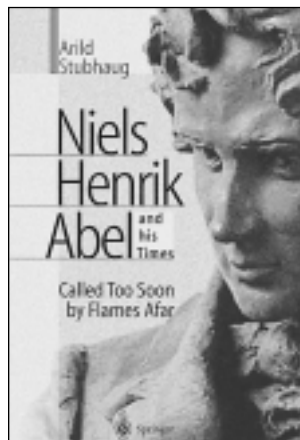
Arild Stubhaug, translated by Richard H. Daly
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August 5, 2002, marks the bicentennial of the birth of the Norwegian mathematical genius Niels Henrik Abel. Many mathematicians will celebrate this occasion at a meeting in his native country.¹ But one can also celebrate the occasion at home by reading the new biography by Arild Stubhaug. It is an extremely well-written account of Abel's short life (1802–29). It compares favorably with Oystein Ore's biography *Niels Henrik Abel: Mathematician Extraordinary*, translated in 1957 from the Norwegian original *Niels Henrik Abel; Et geni og hans samtid* (1954), which is highly recommendable and was until now the most complete source on Abel's life.

Stubhaug's book is almost twice as long as Ore's. Does this reflect that much new Abel material has been uncovered since Ore wrote his book? Not really. To be sure, Stubhaug has found some new traces of Abel's life, but the primary material dealing directly with the mathematical genius is still rather scant: his published mathematical papers, a few unpublished drafts, letters (in particular from his travel abroad), some official records, his friends' letters and diaries, obituaries, and a few other recollections from people who knew him. How does this material support a biography of 580 pages?

It could have served as a basis for an even longer "scientific biography" in which Abel's mathematical



ideas were analyzed. One could have tried to reconstruct how Abel successively developed his ingenious algebraic theorems and his revolutionary new approach to elliptic integrals and functions, in particular his idea of dealing with the problems in a complex rather than a real setting and his idea of considering the inverse functions

rather than the elliptic integrals themselves. One could have contrasted these ideas with those of Abel's predecessors, such as Lagrange and Legendre, with those of his contemporaries, such as Gauss, Jacobi, and Galois, and one could have analyzed the importance of Abel's work for the later development of mathematics. One could have tried to analyze the unpublished drafts that Abel left unfinished at his untimely death, and one could have tried to reconstruct the ideas about integration in finite terms that he wrote down in a paper that was later lost, as well as his ideas on different algebraic subjects that he hinted at on various occasions but did not have the time to develop.

Such an internal mathematical analysis—which would, so to speak, take the mathematics as the main actor—is, however, not what Stubhaug presents. His book is a real biography, in which the person Abel is the central object of study. The book is so long because the author wants to reflect Abel's life in the world in which he lived—not so much the mathematical world he was a part of, but rather the Norwegian society he grew up in and inhabited for most of his short life. It is the rich description of this local and regional society and its interaction with Abel that is the main novelty of this biography and that makes it so interesting to read.

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¹The Abel Bicentennial Conference took place June 3–8, 2002, at the University of Oslo.



The church in Gjerstad, Norway. Abel's life.

Stubhaug vividly describes Abel's family background, the living conditions in southern Norway, and the very exciting national Norwegian and Scandinavian political and cultural events that directly or indirectly influenced

Abel's life. When I, as a Scandinavian reader, got hold of the 1996 Norwegian original of Stubhaug's book, *Et foranskutt lyn: Niels Henrik Abel og hans tid*, I was extremely interested to learn how the knowledge I had about Abel's life and work was connected in a meaningful way to the cultural, social, and political history of the time, which I knew only superficially from school. The book is written in an elegant and captivating literary style that made it almost impossible for me to put down. Stubhaug, who has studied mathematics, history, and literature and has published poems as well as papers on literary and cultural history, deservedly won the most prestigious Norwegian literary prize (*Brageprisen*) for his biography of Abel.

When I heard that the book had been translated into English, I was a bit worried. Would it be possible to render the captivating literary style in a translation? It turned out that my worries were unfounded. As far as I can tell, the translation by Richard H. Daly is also a very good read. The style of the translation is also literary and pleasant. There are some, admittedly somewhat trivial, problems with the translation. For example, on page 147 the word *Domkirke*, meaning "cathedral", is not translated, and this is unfortunate because the connection to the Cathedral School being discussed at this point in the book becomes unclear. The most glaring problem, however, is the translation of mathematical terms and phrases. Here are some examples: solve algebraic equations with root indicators (page 204), equations of the fifth magnitude (page 205), great and small infinities (page 210), Newton's concept of marginal value (page 210), the Radon Transformer (page 285), the reverse function (page 301), Abelian theorem of limitation values (page 344), the Sylowian propositions (page 552). A mathematically trained reader can easily interpret these somewhat peculiar phrases, and since the mathematics is not the main issue in this book, the bad translations should not detract from its merits. It is remarkable, however, that such a highly respected mathematics publisher as Springer-Verlag did not ask a mathematically trained person to change these mistranslations, which lend an unintentionally comical flavor to the mathematical passages.

Although mathematics is not the main issue in Stubhaug's book, it is also not marginalized completely, as it has been in recent Hollywood productions about mathematicians and scientists. Stubhaug clearly conveys the message that Abel's greatness is to be found in his mathematics. He briefly explains the mathematical problems Abel addressed, the methods he used, and the results he arrived at. These explanations will be suggestive to people with some college knowledge of mathematics, and they are brief enough that they will not put off a mathematically untrained reader. Abel's mathematics is also presented in its historical context. However, rather than describe the technical mathematical developments that preceded Abel's discoveries, Stubhaug tends to tell stories about the mathematicians behind the developments. For example, rather than try to explain the problems concerning the solution of polynomial equations by radicals and the content of Lagrange's papers that Abel read and used, Stubhaug tells stories about the person Lagrange (whom Abel never met) and the exciting story, involving Tartaglia and Cardano, about the discovery of the solution of the third- and fourth-degree equations. And instead of trying to explain Galois theory, except in the most general terms, Stubhaug tells the dramatic story of Galois's life. He also recounts the history of Fermat and his last (translated literally as "great") theorem and other good stories from the history of mathematics. Some of them have the character of anecdotes, but generally the historical facts are accurate except for a few details, such as the claim that Pascal was the first to determine the area under a cycloid. Stubhaug also succeeds in conveying the importance and ingenuity of Abel's mathematics by quoting contemporary and later evaluations of it.

But the main purpose of the biography is to place Abel in his local environment. The first third of the book introduces Abel's family and the early nineteenth-century southern Norway he grew up in. At that time Norway and Denmark were ruled by the same king. Abel's family had come to Norway in the seventeenth century from Abild (whence the name Abel) in Northern Schleswig, which also was ruled by the Danish-Norwegian king. Abel's grandfather was a parish vicar at Gjerstad near Risør in the coastal region of southern Norway. Abel's father, Søren Georg, attended the Cathedral School in Helsingør, Denmark, and studied theology at Copenhagen University before he married the daughter of the richest merchant in Risør and became a vicar at Finnøy near Stavanger. Here the young couple had their first two sons in 1800 and 1802. They named the second son Niels Henrik after his maternal grandfather. Two years later the family moved back to Gjerstad, where Søren Georg took over as vicar after the death of his father. Niels Henrik grew up

in Gjerstad with four siblings. He was taught by his father and later by a hired teacher. Only few concrete facts and anecdotes about Abel are preserved from this period of his life. Still, Stubhaug succeeds in weaving an interesting net of stories pertaining to the Abel family and the region, allowing the reader to get a feeling for Abel's childhood.

In particular, Stubhaug gives a biography of Abel's father, who was an interesting person in his own right. All his life he subscribed to the positive, rational beliefs of the Enlightenment, which he had absorbed during his studies in Denmark. These ideals saturated his social work as a vicar, his organization of a local reading society (where even books by Voltaire were read), his later political work, and his widely read catechism, which stressed the "enlightened reason of Jesus". He was active in the Norwegian defence against a possible English invasion and was consequently decorated as Knight of the Order of Dannebrog by the Danish-Norwegian king. When Norway was forced into a union with Sweden in 1814 in the Treaty of Kiel, father Abel defended the country's independence and its new free constitution. He took an active part in the condemnation of Nicolai Wergeland's book about Denmark's transgressions against Norway, and yet his own catechism was severely criticized by university professors who were inspired by the Danish reformist Grundtvig. They accused him of being "the father of falsehood", who had led a whole generation of young Norwegians into eternal damnation. The following year he was (probably unjustly) suspected of being the author of a very bold and infamous publication against the new Swedish rule. When he was persuaded by a scoundrel to present defamatory accusations against some of the members of the Norwegian Parliament, of which he was twice a member, he was finished as a public figure. He died two years later.

In the meantime, in 1815, Niels Henrik Abel had been sent to the Cathedral School in Christiania (Oslo). At this point in the book, the focus gradually shifts away from Abel's family and toward the academic and public life in Christiania, described vividly and with great insight. Abel lived for much of this time with his elder brother, who also studied at the Cathedral School. His brother, however, gradually became more introverted and indifferent to school work and in the end had to be taken out of school. Niels Henrik did not distinguish himself in any particular way at first. In fact, he was passed to the third year on probation. During that year (1818) he got the young Michael Holmboe as his mathematics teacher, and with Holmboe's help he quickly developed a mastery of this subject. In other subjects Abel continued to be an average student, but in mathematics Holmboe declared him to be a genius.

In 1821 Abel entered the university in Christiania that his father had helped to establish in 1811. Here he read the masters of mathematics and after two years began to publish small papers in a newly founded Norwegian scientific journal. Soon it became clear that Abel could not learn more mathematics in Christiania, and in 1823 he went to Denmark for a few months to talk to Degen, who in 1821 had already examined Abel's purported solution of the quintic and had made Abel realize his error. This led Abel to his first major mathematical result, the proof of the impossibility of the solution of the quintic by radicals. Moreover, Degen had directed Abel's attention to the theory of elliptic functions, which Abel later revolutionized. Degen recognized Abel's genius but could not teach him more.

In 1824 Abel was given a stipend that after a year's preparation allowed him to embark on a trip to Europe's mathematical centers. Before entering university, Abel had begun to meet with other young students interested in science, and now in the summer of 1825 he embarked on his great voyage together with four of these friends. He had applied for a stipend to visit Göttingen and Paris, but, following advice from von Schmidten in Copenhagen, Abel stayed a long time in Berlin, where he became good friends with Crelle. This turned out to be the most important result of his travel. Immediately recognizing Abel's genius, Crelle invited Abel to publish in the new journal he founded while Abel was in Berlin. After a very pleasant and productive stay in Berlin, Abel traveled with his Norwegian friends through central Europe to Venice and over the Alps to Paris. He was not particularly eager to visit the formidable Gauss in Göttingen, and he enjoyed the company of his Norwegian friends and the prospect of seeing the wonders of Europe so much that he put off his promised visits to Paris and Göttingen as long as possible. After one year on the road he finally reached Paris, where he stayed for a rather miserable half year before returning to Christiania.

The last part of the book deals with Abel's final two poverty-stricken years in Norway, where, in a competition with Jacobi, he composed within twenty months 13 papers, of which the longest was 126 pages! We read about how Abel obtained a temporary university position as a substitute for Hansteen and about his fatal attack of tuberculosis and untimely death on April 6, 1829.

The person Abel becomes increasingly more visible in Stubhaug's story, starting with the description of Abel's years at the Cathedral School. The reason is obviously that there is more source material available. In particular, Abel's letters during the voyage through Europe allow Stubhaug to follow not only the route of the young mathematician but also his good and bad experiences and his

changing moods. These letters provide a fine testimony of Abel's personality, but in a certain sense the earlier parts of the biography can also be considered as an attempt to explain his personality, which Stubhaug describes as being two-sided. Everyone who met Abel seems to have liked his mild and modest manners. He was rather shy when he was around people he did not know, but when he was

in the company of friends, he often acted as a jester. He loved to swim, to play cards, and to go to the theater, and he easily charmed the ladies. He enjoyed company, and when he was alone he often suffered from odd and melancholic moods. His moods could change abruptly from boyish high spirits to utter depression.



Except in Abel's mathematical work, which seems always to have made him happy, he was not a particularly deep thinker and probably did not analyze his own changing moods. Stubhaug ascribes them to the incongruence between the positive, optimistic, rationalistic view of life instilled by his father and the realities of Abel's own life, which turned out to be miserable on many accounts. His father died a broken man, his mother disgraced herself by sleeping with a servant and drinking excessively even on the day of her husband's funeral, and his brothers did not do well in life. Abel's upbringing did not prepare him to face such misery. Stubhaug interprets many things in Abel's life as resulting from his inability to relate to the realities of everyday life. He speculates about whether Abel's early engagement to Christine Kemp, whom he met in Copenhagen in 1823, was a way for him to avoid the complications involved in dating the fairer sex and whether his great love for the theater was due to his longing for the regulated, planned course of events that he found in the plays.

Moreover, Stubhaug suggests that to some extent Abel gained so much pleasure from concentrated work in mathematics because the work allowed him to escape from the real world, which he did not master, and to immerse himself in the clear and unambiguous world of mathematics, which he mastered so perfectly. While this analysis may capture some essential elements of Abel's personality, it is somewhat at variance with the fact that after his father's death Niels Henrik Abel was

the only one who took care of the family. He made sure that one of his younger brothers got an education and that his sister got a good job. He also took care to pay his family's debt, in particular the rather large amount that his father had pledged to pay annually to the university. This seems to suggest that although life often disappointed him, Abel did not run away from its challenges, but faced them and dealt with them quite successfully.

While the cultural historical context, described so vividly in this book, throws light on Abel's personality, it does not explain his mathematical genius. Genius of this magnitude is probably inexplicable by sociological means, and in Abel's case only very meager input from his environment was enough to bring it forth. Only during his first year with Holmboe did he have a teacher who could properly teach him something. After that he was in contact only with mathematicians who could not really advise him. To be sure, his father's enlightened ideas and the enthusiastic atmosphere in the new university and the new Norwegian nation provided fertile ground for investigations in natural sciences. Abel's friends were thus attracted to the natural sciences, but Abel's love for pure mathematics is unexplained. In a sense he might be called the first pure mathematician. His only contribution to applied mathematics contained a devastating error, as pointed out by Schumacher.

A recurrent theme in Abel biographies is that he never got a permanent position as professor of mathematics and lived in poverty during the last years of his life. This issue is dealt with in a sober way by Stubhaug. While explaining how Abel was disappointed by and sometimes bitter about his lack of an appropriate job and salary and how he had a hard time making ends meet, Stubhaug does not point any accusing fingers or blame any specific person or organization. The issue would not have been a major one had Abel lived longer. Many young talents have had to wait some years before their scientific production earned them an appropriate job. If Abel had lived only a little longer, he would have been a professor. In fact, two days after Abel's death Crelle wrote a letter telling Abel he would be offered a professorship in Berlin. It is also likely that developments in Christiania and Copenhagen would have resulted in job offers from the universities there.

A comparison with Abel's near-contemporary Galois is tempting. There are many similarities between their lives and work. Both died very young, both worked in pure mathematics and with similar theories. Both had ingenious memoirs neglected by the Paris Academy of Sciences and in particular by Cauchy, who was so absorbed in his own work that he did not report on the works of his younger contemporaries. But there are also essential differences. Where Abel seems not to have inherited

his father's strong political and social involvement, Galois was an uncompromising political radical. Where Abel was generally liked by people who met him, Galois had a problematic personality. Where Abel wrote in a clear style, Galois's papers were written in a highly inaccessible style. All these differences go a long way toward explaining why Abel's genius was discovered early and why he became internationally recognized for his mathematical discoveries during his lifetime, whereas Galois's work was totally ignored during his short life (except perhaps by Cauchy, who did not find time to tell others about it). Galois received little encouragement in his mathematical endeavors, whereas Abel was encouraged and supported by many scientists such as Holmboe, Hansteen, and some of the other professors in Christiania, who privately paid Abel's living expenses during his early student years, as well as by Degen and in particular by Crelle. Except for the circle around Férussac's *Bulletin*, the Parisian mathematicians ignored Abel while he was in Paris and managed to overlook and even misplace his most wide-ranging memoir. Nevertheless, a number of leading academics later took the unusual step of writing to the Norwegian-Swedish King to encourage him to give an appropriate job to his most ingenious subject.

Stubhaug's biography of Abel is a scholarly book in the sense that it is based on a careful scrutiny of a great number of primary and secondary sources and presents interesting analyses and combinations of these sources. As far as the style is concerned, however, it is a literary work. That one does not find many lengthy footnotes or references to sources certainly makes the book more pleasing to read. But the lack of references is a problem for a reader who would like to know the basis for the claims made in the book. The book contains a very useful and complete annotated bibliography, and in many instances it is rather clear where Stubhaug may have found a particular piece of information. In other cases, though, it is not so clear, for example in the many places where Stubhaug writes: "It was (later) said that...". In fact, it is sometimes unclear whether Stubhaug is reporting a fact that is unambiguously supported by the sources or whether he is inferring a probable course of events. For example, Stubhaug reports that father Abel's wedding was "most certainly...celebrated with all the pomp and circumstance typical of a trading house of the time," and then he continues with a page-long description of the wedding. Is this based on an eyewitness description, or is it Stubhaug's reconstruction based on his great knowledge of the cultural history of the time?

The book is divided into eight parts. The first is an introduction and a long section entitled "A Short Life", which presents a summary of Abel's life. Its point of departure is Abel's death and his legacy,

and this gives the author the occasion to summarize the most important events in Abel's life and the main themes of the book. This stylistically clever device prevents the reader from getting lost in the details of the more comprehensive presentation that follows. In addition, the appendix contains a brief chronology of Abel's life and some commentaries and complementary readings that provide material that for some reason did not make it into the main presentation. Moreover, there is a list of Abel's published works as well as the aforementioned annotated bibliography and a useful index of names. The book is beautifully illustrated with 51 figures.

There is no doubt that this book is a great contribution to our knowledge of Abel and his time. For a historian of mathematics it presents a great improvement vis à vis Ore's book, both for its richer cultural context and because it lists the sources. For a Scandinavian reader who is seriously interested in the cultural history of this part of the world, it is also to be preferred to Ore's book. Whether an international reader, in particular an international mathematical reader who wants to celebrate the Abel bicentennial, would prefer Stubhaug's biography over Ore's is a matter of taste. In fact, the books are in many ways rather similar. They are both well written, they both focus on Abel rather than his mathematics, and they both put his life in the context of the times in which he lived. The main difference is the amount of cultural history presented. For example, where Ore writes about Abel's interest in the theater in rather general terms, Stubhaug provides long descriptions of various plays that Abel might have seen in Christiania or during his travels abroad. For a Scandinavian reader these summaries of plays by Holberg, Wessel, Ewald, Oehlenschläger, and others provide a valuable cultural background, but I am not so sure how interesting they are for an international public. As another example one can mention the way the two authors deal with father Abel's social work in Gjerstad. Ore mentions it rather briefly, whereas Stubhaug goes into more detail, describing father Abel's attempts to improve farming and industry and how he tried to reduce famine during the English blockade by encouraging his parishioners to eat horse meat. Stubhaug also sets all these undertakings into perspective. Those who might find this much cultural history to be excessive may want to stick to Ore's book. For those who want this richer cultural context, I warmly recommend Stubhaug's new book.

