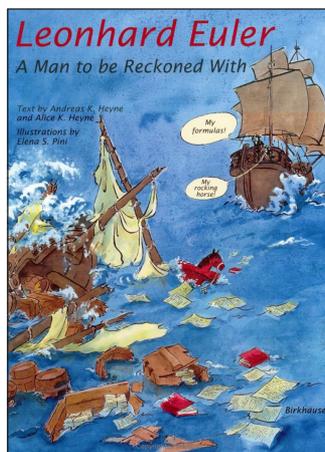


# Leonhard Euler, A Man to be Reckoned With

*Reviewed by Ivar Ekeland*



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**Leonhard Euler, A Man to be Reckoned With**

Andreas K. Heyne and Alice K. Heyne

Illustrations by Elena S. Pini

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What do mathematicians do? Mathematics. Do they do anything else?

Some of them become citizens of the world: they get involved in social issues and take political positions. Laurent Schwartz and Steve Smale, for instance, are in that category. Schwartz lost his position at the École Polytechnique for protesting publicly against the use of torture by the French army in Algeria. Smale was subpoenaed by the House Un-American Activities Committee for co-chairing the Vietnam Day Committee in Berkeley and attempting to stop troop trains. There were earlier examples, like Bertrand Russell or Paul Painlevé, who was drawn into politics by the Dreyfus affair and went on to become Minister of War in 1917 (at the time, governments had not yet hit on the Orwellian trick of calling war defense) and *Président du Conseil* (the equivalent of Prime Minister) in postwar France.

Still others, like René Thom, used mathematics as a starting point of other intellectual endeavors. Most mathematicians, however, only do mathematics: once they have entered that enchanted realm, they never leave it. I remember Antoni Zygmund

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telling me in Chicago, towards the end of his life, that the only thing he regretted was the time he had *not* spent doing Fourier analysis. Long gone is the time of Fermat, who did mathematics in his spare time, being otherwise occupied by his professional activities as a member of the Toulouse Parliament, presumably scribbling in book margins while listening to legal arguments. Nowadays all mathematicians are professionals, mostly working in universities, and they have little time for anything else. They are absorbed by their careers, which are entirely dependent on peer recognition, distilled by a hierarchy of professional bodies, ranging from recruiting and promotion committees to editorial boards, national academies, and the International Mathematical Union. Of course, in order to compare people, it is easier to have them all work on the same problems. This is why the mathematical community has devised an official set of important problems, and even attached a reward of one million dollars to each of them, so that even the blind can see the path to glory and follow the crowd.

If you ever have to write a biography, pick the first kind of mathematician: it will be very difficult to find anything exciting to say about someone whose entire adult life has been spent within the walls of universities, fighting for promotion, or trying to become a member of the national academy of science. This was the problem facing Andreas and Alice Heyne. Euler studied in Basel under Johann Bernoulli (the elder) and left his hometown and his mentor at twenty to take up a lectureship in Saint Petersburg (1727), where he eventually rose to the rank of professor. He moved to Berlin in 1741 and then back to Saint Petersburg again (1766), where he died in 1783, each time lured away by the prospect of higher

pay. The book faithfully records these successive moves, and this makes hardly exciting reading, even if Mrs. Euler is cast in the role of the greedy partner: “The salary in Berlin is much better” (page 20), “What about the salary, Leo? — It’ll be better than here in any case — Then, there’s nothing to be discussed” (page 37). Of course, as we all know, the tedium of academic life is happily relieved by department meetings and program committees. The book tries to convey that sense of excitement by showing a few sittings of the academy of sciences in Saint Petersburg, which is delicately compared to “a fruit salad” (whatever that means) and of the academy of sciences in Berlin, where the president, Maupertuis, is depicted trying to peddle his latest book to his colleagues. We are treated to elderly gentlemen in mortarboards dozing in armchairs while the speaker rambles on, and to a few angry scenes where combatants pull off each other’s wigs, revealing downy skulls—valiant efforts to be sure, but a career is not a life, and the fundamental problem remains: is there anything exciting to be said about Leonhard Euler?

Compare, for instance, the two wonderful biographies written by Arild Stubhaug, the first one of Niels Henrik Abel,<sup>1</sup> the second one of Sophus Lie.<sup>2</sup> Abel is a romantic figure, and a great story can be spun around the theme of the country boy who goes to the big city, only to be cheated of his treasure, and comes back to die in poverty, days before fame comes knocking at his door. Stubhaug does not indulge in this kind of theatrics: he writes a very balanced and accurate biography, giving due weight to Abel’s mathematical achievements and the intellectual life around him. The fact remains, however, that it is a tragic story: even if the legend is dispelled, it still colors the narrative and lends it a tinge of excitement. Fortunately for him, but unfortunately for us, there is nothing like that in the life of Sophus Lie. He was a giant of a man and also a giant of mathematics; he died at 57 of an illness that would easily have been cured nowadays, but this is hardly enough to lend glamour to the life of a university professor in Leipzig who seemed to have been mostly preoccupied with getting due recognition from Felix Klein.

The right way out is to write an intellectual biography. After all, these people spent most of their time on another planet, and it is the biographer’s task to give as full an account of these alien landscapes as possible. That means writing up the history of their mathematical discoveries and of the influence they had on contemporaries, a formidable task because it entails reading an immense number of books, articles, manuscripts,

and letters. Very few people, including mathematicians, have the ability, let alone the time, to do that (who has read Sophus Lie? who has read *all* of Sophus Lie?), but this is precisely what Stubhaug has done, setting aside several years of his own life to that task.

This is not what the authors of *Leonhard Euler, a Man to be Reckoned With* have set out to do. Here we have a very short comic strip: 45 pages, with three to ten drawings per page, completed by four pages of densely written text, giving a detailed chronology of Euler and biographical information about his contemporaries. I have enormous respect for the art of comics. I think that Joe Sacco and Chris Ware, for instance, are among the most powerful and creative artists of our time: they have shown that, by an appropriate combination of graphics and text, one can convey the whole range of human experience, from the horrors of war to the intimate suffering of loneliness, in a much more effective way than through writing or a photograph. The book here is nowhere near that class, nor was it its ambition, and it remains to be seen what a true artist could do with Euler’s life. As it is, Andreas and Alice Heyne are taking the standard way out when one cannot, or dare not, go into the science: turn the mathematician into an alien, at home in another galaxy, but out of place on planet Earth.

This is a time-honored trick. Ancient historians have recorded very little about the life of Archimedes, but they do tell us that, confronted by a soldier with a drawn sword on the day Syracuse fell to the Romans, the best Archimedes could muster in the way of self-defense was to tell the soldier archly: “Step out of my circles” (the geometric figures, drawn in the dust, which he happened to be working on). The theme of the “crazy mathematician” is alive and well today, and the book puts Euler firmly in that category. His craziness is of the gentler sort: he is childish. He is depicted at home, constantly surrounded by a swarm of children and grandchildren, playing with them, stealing his wife’s baking whisk to stir up the water in a bathtub. On one occasion she tells him “Really, Leonhard, the most childish person in this house is you.” When the ship carrying the Euler family’s baggage sinks with man and mouse, there are two parallel comments, by Leonhard and his grandson: “My formulas!” and “My rocking-horse!” (cover illustration). His youth in Basel takes up a disproportionate part of the whole book, and twice in later years characters pop up unexpectedly with the shibboleth: “Ych kumm aus Basel (I am from Basel)”, including an improbable fireman in Saint Petersburg who rescues Euler by carrying him forcibly down a ladder, away from his house ablaze and his unfinished calculations (Archimedes again). He even gets a chance to come back to Basel, when he is offered the chair of his former teacher, Johann Bernoulli I. Thank God for

<sup>1</sup>Niels Henrik Abel and His Times: Called Too Soon by Flames Afar, *Springer* 2000.

<sup>2</sup>The Mathematician Sophus Lie: It Was the Audacity of My Thinking, *Springer* 2002.

Mrs. Euler, who finds the right thing to say: “with the salary they’re proposing, it’s out of the question!” (page 29).

Another possibility for spinning a story out of Euler’s life is to turn the reader’s attention to the historical context. He certainly lived in interesting times. Travel was difficult and colorful: we are treated to two sea voyages, from Berlin to Saint Petersburg and back, complete with seasickness and shipwreck. Euler had daily interaction with the leading intellectuals of his day, some of whom make their way into the book: the Bernoullis, father and sons, Maupertuis,<sup>3</sup> Voltaire. Unfortunately, these appearances are fleeting: the Bernoullis seem mostly preoccupied with playing cards; Maupertuis, the president of the Berlin academy of science, is ridiculed for his French accent (which makes no sense at all: French was the language of high society, from Frederick the Great down, and all discussions in the academy would have been carried out in French). Voltaire advises Frederick the Great to found an academy in Berlin and disappears from the story; twenty pages later, he reappears as a portrait covered with darts in the dining room of Sans-Souci. How he sank from that exalted position of adviser to the king to an object of ridicule the reader is left to guess. This is a general feature of this book: there are too many unexplained allusions to contemporary events. On page 29, Maupertuis is depicted saying, “and I’m quite certain zat zis letter by Leibniz is a fake”—if you know the story of that letter, and how it connects to the least action principle, this is fine, but if you don’t, you won’t guess. I happen to be on top of that one, but I have no idea what went on during the battle of Hohenfriedberg, June 4, 1745 (page 24), nor at Kunersdorf (page 33) nor at Landshut (page 36).

This brings us to the great protagonists of that time: Frederick (the Great), Catherine (also the Great), Maria Theresa (not the Great, because there was only one, but still revered today), and her husband, the Emperor Franz I. They are shown at their most human: Frederick is nasty, Catherine is a nymphomaniac (there is an interesting nude scene where the imperial crown of Russia plays the role of the proverbial fig-leaf), Maria Theresa is a prolific mother and a domineering wife, Franz I is a couch potato. They take up much more space than the scientists, and their doings sometimes do not connect very well with the main story. However, what comes very graphically and distinctly out of this book is that Euler had direct access to two of the most important monarchs in Europe, the king of Prussia and the tsarina of Russia. Why would they be interested in a mathematician, whose main

claim to fame was to have invented the calculus of variations?

Historically, scientists have been very good at capturing and maintaining the attention of people in power. The example was set by Galileo himself,<sup>4</sup> who earned the support of the House of Medici by dedicating to them the newly discovered satellites of Jupiter. From then on, scientists were well aware of the importance of keeping the ear of royalty. Euler did his share, by maintaining a huge correspondence with Sophie-Charlotte of Brandenburg-Schwedt (pages 34–35). It is a public service that he performed for his fellow scientists, as Descartes and Leibniz did in their own time. This effort, however, has to be placed in a broader context. At the time, Prussia and Russia were struggling to reach superpower status in Europe, alongside France and the Habsburg Empire. Then, as today, scientific prestige was an important tool in the international arena: by creating national academies, Prussia and Russia were positioning themselves as major scientific powers, and nothing could make them more credible than attracting Euler, the leading scientist in Europe after the death of Newton.

Of course, science was not as involved in technology as it is now. This was long before the industrial revolution and long before governments became aware that mathematicians were able and willing to devise weapons of mass destruction. The book does bow to this modern view of mathematics, by showing Euler experimenting on ballistics with toy guns shot by his grandsons (page 25). However, this was not really the spirit of the times. As always, war was waged, not only on the battlefield, but also in people’s minds. Frederick or Catherine were not interested in science per se; they wanted to propagate ideas that would ultimately weaken their political opponents, the Habsburg Empire or the Russian boyars, by casting them in the role of unenlightened reactionaries, barring the way to progress. Their cause was eagerly embraced in France, where the aristocracy and bourgeoisie were trying to wrest the power away from the king and the land away from the Church. The emerging power wanted science on their side, as the established powers had religion on theirs.

The forces unleashed would result in the French Revolution and shake the European continent for two centuries. We are just emerging from that period and into a new one, where the ruling powers are not as clearly identified, and where the manufacturing of opinion takes entirely different paths. Scientists now play a much more passive role, and mathematicians have definitely been pushed to the periphery. This book serves as a colorful reminder of simpler times, when mathematics and politics had the freshness of discovery.

<sup>3</sup>On Maupertuis, see the excellent book by Mary Terall, *The Man Who Flattened the Earth*, Chicago University Press, 2002.

<sup>4</sup>See the book by Mario Biagioli, Galileo Courtier: The Practice of Science in the Culture of Absolutism, Chicago University Press, 1993.