

André Weil: The Apprenticeship of a Mathematician. 1992. Birkhauser Verlag, Basel.

The name of André Weil is well known to all mathematicians, even if few of them are able to understand everything he has done in mathematics. He has ranged far and wide, and with great depth, over the subject. Let me mention just one of his lasting contributions to mathematics. From the start of his mathematical life, he held the view that algebraic geometry and number theory cannot be separated from each other. This has not only given his work in these fields their special character and originality but has been one of the major influences in changing the face of these subjects.

Weil's interests are by no means confined to mathematics. They include all the cultures of the world's people, both past and present, their language, literature, art, music, and much else besides. One cannot help looking forward eagerly to a book by such a man dealing with important aspects of his life.

The present book is a translation from the French of Weil's *Souvenirs d'apprentissage* made by Jennifer Gage. It describes his peregrinations up to the time he came to the University of Chicago on the initiative of Marshall Stone (the start of what people at the University of Chicago call the Stone age of mathematics).

Weil's childhood was spent in an atmosphere which was loving, principled and strongly inclined towards intellectual pursuit. His descriptions of his parents, and of his sister, Simone, are captivating. Simone Weil is, of course, as famous among non-mathematicians as her brother is among mathematicians. Weil does not discuss Simone at any length, but the passages in which he does are very interesting, and make one wish that there were more of them. Weil refers to S. Pétrement's biography of his sister for further detail, but that is surely a poor substitute for what he himself could have said. Weil's scholarship and taste, even in school, are remarkable. There cannot be many schoolchildren to whom the work of the great printers such as the Estienne family and Aldus Manutius would mean anything.

While at the École Normale

Supérieure, he not only worked on mathematics, but also absorbed all kinds of literature, including Kalidasa's *Meghaduta* under the guidance of the great Indologist Sylvain Lévi. He also then formulated his philosophy of the inseparability of algebraic geometry and number theory. There followed travels in Italy and Germany, and contact with such mathematicians as Volterra, Zariski, and Siegel, and the completion of his doctoral thesis.

Weil then did his compulsory military service and was beginning to look for a 'real job' when, in 1929, Sylvain Lévi put him in touch with Syed Ross Masood who had just become Vice Chancellor of the Muslim University at Aligarh. Masood offered Weil a chair to teach French Civilization, changed it



later to one in mathematics; it is not clear if Masood even realized that Weil was a mathematician.

The chapter dealing with Weil's two years in India is quite remarkable. It shows an instinctive understanding of the ways and thought of educated Indians; I think it fair to say that most westerners, even those who spent much longer in India, never reached his level of understanding. He immediately set about raising the level of mathematics at Aligarh and succeeded in bringing T. Vijayaraghavan there. [I might add that Vijayaraghavan spoke with great admiration of Weil, both as a mathematician and otherwise. He told me once how surprised he had been by Weil's interest in Sanskrit.] But Weil's efforts brought him into opposition with bureaucracy,

which used silly excuses to force him to leave. Weil managed not only to see more of India than most Indians do, he even was able to meet such people as Mahatma Gandhi and Jawaharlal Nehru. With Zakir Hussain, the future President, he formed a lasting friendship.

Weil returned to France, took first a position at Marseilles, then moved to Strasbourg where Henri Cartan was already on the faculty. Weil describes at some length his participation in Bourbaki during these years.

Bourbaki is the name under which a group of outstanding young French mathematicians undertook to produce a series of monographs which aimed at building up all the mathematics essential to the majority of mathematicians from a system of axioms which was explicitly laid out. Whatever one might think of the extent to which this was achieved, and whatever reservations one might have about individual monographs, there is no denying the great influence these books had on the mathematical community. For example, they were used extensively by the members of the School of Mathematics of the Tata Institute of Fundamental Research in Bombay. These members were therefore highly interested and delighted when Jean Delsarte, one of the founding members of Bourbaki, told them how the idea of a joint venture of this kind was born. Some of these young mathematicians, Weil and Delsarte among them, were at a lecture of Élie Cartan in which he used a form of Stokes' theorem. Since they could not find a satisfactory proof in the literature, they had no alternative to building, jointly, the foundations, at least up to a point where this theorem could be proved! Weil describes all this and much more, the amusing incident and the seriousness of purpose, in a way which is riveting to a mathematician.

The longest chapter in the book is entitled (in the English version) '*The War and I: A Comic Opera in Six Acts*'. He did not enlist in the army; instead, in 1939, he went to Finland with his wife. Circumstances led to his being taken for a Soviet spy by the Finns, and he was returned to France through Sweden. Weil's description of these events is often very funny, sometimes moving. He went to prison, on trial as a deserter, but joined the army after his trial. The vagaries of war took him to England,

whence he returned to France to be demobilized.

This chapter is also the most personal in the book. He speaks at some length about his reasons for not enlisting in the army: about the *Bhagavad Gita* and the effect that an act of Siegel during World War I had on him. All this makes fascinating reading, although I have to confess that I do not really find these reasons convincing. The chapter also contains interesting excerpts of letters he wrote to his wife and to his sister.

The rest of the book deals with Weil's attempts to be reunited with his wife and the other members of his family,

and his efforts to find a position suited to his abilities and achievements. That this culminated in his appointment as a permanent member at the Institute for Advanced Study, by way of Sao Paolo and Chicago, is indeed the happy ending. Weil ends the book characteristically by adapting the opening lines of Dante's *Divina Commedia*.

I should say a word about the translation by Jennifer Gage. For the most part, it reads quite well, although Weil's style with language is hard to reproduce. There are, however, some things I find unsatisfactory. To give only one example, Ms. Gage's translation of

the last three lines of the sonnet on pp 118-119 is very odd. But despite some infelicities, this translation will be welcomed by the many people unable to read this remarkable book in Weil's own words. It is a book which is well worth reading, providing, as it does, some idea of the extraordinary personality of André Weil.

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Extracts from *Andre Weil: The Apprenticeship of a Mathematician*

Some time ago when we wrote to some scientists about the possibility of bringing out a theme issue of Current Science on D. D. Kosambi the polymath, Virendra Singh of Tata Institute of Fundamental Research responded by sending us André Weil's Souvenirs d'apprentissage to indicate the high esteem Weil had for Kosambi. With difficulty (and a dictionary) we translated the text and were able to flavour and enjoy its subtle humour and incredible beauty. Richard Askey of the University of Wisconsin wrote to us suggesting Current Science should review the 'Autobiography of André Weil' which had just come out. We did not realize that this was a translation of Souvenirs. We were fortunate in persuading Raghavan Narasimhan of the Chicago University to review the book. When asked he was against publishing extracts. He wrote: 'I do not think there are any individual passages that one can isolate in the book. It really needs to be taken as a whole.' We agree. However, with apologies to Narasimhan we publish a few extracts mostly about Weil's sojourn in India so that our younger readers may get a flavour of this remarkable man — with multifarious interests who 'integrated algebraic geometry with number theory'. We are especially grateful to the publishers Birkhäuser Verlag for graciously giving us special permission to reproduce these extracts. This book is a must in all libraries, public and private.

— Editor

... my mother rushed to the principal, telling him: "If my son is ranked first without even having attended the ninth form, it must mean he's in a section that is too easy for him. I want you to transfer him to another class; otherwise, he'll end up doing nothing." The astonished headmaster replied, "Madame, this is the first time a mother has ever complained to me that her son's class rank is too high." But my mother was not one to brook opposition to her wishes.

... How proud I was to see my name in print for the first time! Soon it was appearing regularly, and then one glorious day, my solution was published in *Revue de Mathématiques Spéciales*.

... Is it mere coincidence that in India Panini's invention of grammar had preceded that of decimal notation and negative numbers, and that later on, both grammar and algebra reached the unparalleled heights for which the medieval civilization of the Arabic-speaking world is known?

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... I have often said that a gifted pupil is best off

having an excellent teacher every two or three years to provide the impetus he needs, with the rest of the time filled in by a more ordinary instructor.

... Annandale's English dictionary, which includes an introduction to Indo-European linguistics and Grimm's Law as well as fairly detailed etymological information going as far back as Sanskrit. I dreamed of one day being able to read, in the original, the epic poems written in all these languages. My romantic notion of these epics later led me to seek out the advice of Sylvain Lévi.

... Also, my precocious and romantic attraction to Sanskrit gave one of my father's friends the idea of introducing me to the leading scholar in the field of Indian studies, Sylvain Lévi.

... When Sylvain Lévi received me at his home in the Rue Guy-de-la-Brosse, he said to me: "There are three reasons for studying Sanskrit," and he enumerated them: I believe they were the Veda, grammar, and Buddhism. "Which of these is yours?"

... At the end of the year, wishing to devote part of my