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*

... 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?

* * *

... 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

vacation to reading a Sanskrit text, I went to Sylvain Lévi for advice. From a shelf in his library, he pulled a small volume bound in red velvet. It was a "native" (to use the term in vogue at the time) edition of the *Bhagavad Gita*. "Read this," he told me. "First of all, you cannot understand anything about India if you haven't read it"—here he paused, and his face lit up—"and besides," he added, "it is beautiful."

. . . The beauty of the poem affected me instantly, from the very first line. As for the thought that inspired it, I felt I found in it the only form of religious thought that could satisfy my mind.

. . . I also attended Meillet's lectures on Indo-European linguistics and Sylvain Lévi's on Kalidasa's *Meghaduta*. These two teachers were without peer.

. . . Then came Lévi's commentary, and finally he would offer a French translation, always both beautiful and precise. This poem consists principally of a long speech made by a Yaksha in love to the "messenger cloud" (the *meghaduta* of the title) which will relay it to his distant best-beloved.

* * *

. . . For a year or two already, I had been saying to Sylvain Lévi that I would gladly go to India. One day in 1929 he telephoned me: "Are you serious about going to India?" "Of course." "Would you be willing to teach French civilization?" "French or any other, I don't care; to go to India I'd teach anything they want." "Well, get a cab and come right over to my place." At Sylvain Lévi's, I found a tall man who filled the room with his broad frame, stentorian voice, and ringing laughter.... He was named Syed Ross Masood. It was to him, I later learned, that E. M. Forster had dedicated his *Passage to India*.

. . . Finally I received a cable: "Impossible create chair French civilization. Mathematics chair open. Cable reply." I cabled. Shortly thereafter, I indeed received my travel allowance.

* * *

. . . referred to in Anglo-Indian jargon as the "British Raj." In every post office, even in the most far-flung corners of India, barely touched by civilization, one could inquire about the home-mail, and straightaway one would be told the day and the precise hour of its departure. Leaving punctually on the appointed day, the mailboat sailed for Marseilles, and the mail arrived just as punctually as its destination, more regularly and perhaps faster than it does today.

. . . These friends also helped outfit me for my stay . . . But they made me purchase the indispensable bedding which was to become my travel companion for as long as I was in India. It was made up of a thin mattress, a pillow, a pair of sheets, and a mosquito net,

all rolled up in a heavy-canvas carrying case. On a train, one would spread it out on the berth; when visiting friends, one would set it up on the cot provided by the host.

. . . no electric fans. Instead there was the *panka*. This was a piece of cloth suspended from the ceiling and set in motion by means of a long string in the lazy hands of an unfortunate boy stationed in the corner of the verandah . . . Although I am not a great fan of progress, I was pleased when electricity was installed in our house.

. . . It is true that there was no need of a separate room for such a guest; a patio or porch with a cot was all the traveler needed to unroll his bedding. The bathroom was rarely equipped with running water. It was rare for an Indian to invite an Englishman to his home, and the latter would have been ill at ease had this happened. But to the Indians, I was not a colonizer. It is true that in many ways the French treated the Indochinese far worse than the English did the Indians, but the Indians knew nothing of this, and although I knew it I was not about to tell them.

* * *

. . . Afterwards my nights were indeed more tranquil. As the hot season came on, I had my bed carried onto the roof. Never before had I fully experienced the beauty of sleeping under the stars. As I was later to observe in Brazil as well, the night sky in tropical regions is sublimely clear and pure, and the stars there look brighter and more numerous than in our temperate climates. At least it used to be so; nowadays, people, say, pollution has changed all that.

. . . How then can I find words for the effect the Indian sky had upon me when I had the chance to contemplate the spectacle? And how can I describe the moonlight in these latitudes, without verging on the ridiculous? It is so strong one can read a newspaper by it—though that would be a sorry use for it.

. . . One full-moon night in Aligarh showed me something even better: this was Fatehpur Sikri.

. . . Until the early morning hours we wandered around the ghost town. We could not get enough of exploring the galleries and the women's quarters, enclosed by elaborately carved stone fences which once allowed them to gratify their curiosity about passersby, without themselves being seen. The moon was reflected on the tile roofs and pierced through the windows' latticework, illuminating the walls with its surreal light. I do not remember how late it was when we finally tore ourselves from this spectacle, which today no traveler can witness. Or has some enterprising Indian promoter already organised a "Sound and Light" show there, at so much a head?

* * *

... Moreover, despite its official designation, the university [Aligarh] prided itself on not being sectarian; there were a small number of Hindu students, for the most part recruited locally, and a *pandit* to teach Sanskrit and Hindi. In fact a majority of the Aligarh townspeople were Hindu, and Muslim and Hindu coexisted on good terms. At least, I had the good fortune during my stay there not to witness any of the intercommunal strife which today remains a festering wound in Indian society.

... Kashmir was then a "native state", part of the British Empire, of course; the primarily Muslim population was supposedly governed by a Hindu maharajah. The country was extremely peaceful, and tourism was its major source of income. Tourists were exploited mercilessly but, as in Italy, always with a smile, and any tourist who could defend himself was treated none the worse for it – quite the opposite, in fact. It was in Kashmir that I earned my stripes in bargaining, that indispensable part of Oriental life, my initiation into which had begun in Italy; as the Italians say, *the East begins in Naples.*

* * *

... I obtained some funds from Masood and entered into negotiations with bookstores in Leipzig.

... The books arrived from Leipzig, a rather nice collection of basic texts and periodicals, which I had chosen with great care as a foundation for serious scientific work.

... I took it upon myself to institute a certain number of changes not only in the curriculum, but also in the examination system, which was, quite frankly, absurd.

* * *

... No one at the university was able to tell me whether I would be able to find replacements. The only Indian mathematician whose name I knew was Ramanujan, and he was long since dead.

... In the course of these travels, I also discovered that India is not as poor in mathematicians as I had first feared. I met several in the north, and I saw a great many more in the south when, in 1930, the Indian Mathematics Society held its annual reunion in Trivandrum.

... In Madras I met Ananda Rau, a very gifted analyst, and Vaidyanathaswamy, also a friendly soul and a mathematician not lacking in talent, though rather limited in scope. In his company, I made the trip from Madras to Trivandrum.

... I appointed Kosambi for the following year. He was a young man with an original turn of mind, fresh from Harvard where he had begun to take an interest in differential geometry. I had met him in Benares (now Varanasi) where he had found a temporary position.

... It took me no time at all to see that this list contained the name of only one mathematician, in the sense I ascribe to the word: this was a pupil of Hardy's, by the name of Vijayaraghavan, who had to his credit several articles on approximation and Tauberian theorems, but no degree, and who was therefore not on the Scotsman's short list. I ran to the nearest telegraph office and told him to include Vijayaraghavan in the list. As soon as I saw him in Aligarh, I was positive that my choice was the right one. ... His impeccable Oxford English, which he spoke with a slight Madras lilt, and his no less impeccable turban of raw silk made him acceptable to everyone else as well.

... Vijayaraghavan had just arrived for the start of the academic year. As his name indicates, he was a brahmin from southern India. He came from one of those villages in the Tamil-speaking country where the traditional civilization of India survives in what is probably its purest form. His father had been a widely-respected *pandit.* ... Having failed his examinations as a young student in Madras, he had left to study with Hardy at Oxford, and had just returned to India when I met him. He was a very sharp mathematician, doubtless overly influenced by Hardy; but having no diploma, he hardly stood a chance of obtaining a post in any Indian university, much less in a Muslim university like Aligarh, but for the happy accident of my presence there. ... Even his mother, the reigning matriarch of the family, took me under her wing after observing on my first visit that I not only tolerated but relished an extremely spicy dish – which she had prepared. I am convinced, in the secret hope of scaring me away once and for all. I was the first European who had ever been admitted to her home.

... In one of the most beautiful stories of the *Chandogya Upanishad*, a young man named Satyakama ("lover of truth") seeks to become the disciple of a renowned master. According to the rule, he must be a brahmin by birth. Questioned on this point, he replies, without the least hesitation or discomfiture, that he knows nothing of his birth. His mother told him that he was conceived during a time of great activity in the house, and she does not know who his father is. Her name is Jabala and his is Satyakama. "I am therefore Satyakama Jabala," he concludes: that is all he knows. "Only a brahmin could speak so truthfully," the master responds, and he accepts the boy as his disciple.

... At the slightest prompting, and even totally unprompted, he would launch into tales from his beloved *Mahabharata*, or sometimes he would quote and comment on poems – gnomic, erotic, or mystic, in Sanskrit or in Tamil. Ancient Indian culture is one of the richest in the world. It ranges from the most abstract refinements of logic, grammar, and metaphysics, through the steamiest sensuality, to the purest

mysticism. Vijayaraghavan took me beyond the initiation I had received at the hands of my Parisian masters; it is to him that I owe my true immersion in these cultural riches.

... Throughout his travels to Europe and America, I am positive that he was always absolutely faithful to his wife, just as he always remained a strict vegetarian. I think it was not so much that infidelity, or the act of eating eggs or meat, constituted a sin in his eyes; if he had, for example, eaten meat without knowing it, he would not have felt any remorse afterwards... For him sin meant breaking a vow that he had made of his own free will. One day in Paris, when he had spoken of a woman with obvious admiration, my father asked him if he did not feel any "temptations." Vijayaraghavan replied: "I can enjoy looking at a Rolls-Royce, and take pleasure in imagining for an instant that it belongs to me, without being tempted to steal it." When, in the course of his travels, he felt the "prickings of the flesh," to use Rabelais's humorous expression, he would fast for two or three days. If only he had fasted more often! When I met him, he was already extremely corpulent. In the long run, his heart was unable to withstand the effort of moving such a weighty mass.

* * *

...Masood... had obtained from the Nizam of Hyderabad (under whom he had served as minister) funds for two richly endowed chairs, in physics and chemistry. To the chemistry chair he appointed a young Englishman whose merits I could not appreciate but whom I found friendly, and who became my neighbor. In physics, Masood thought it a triumph when he pushed through the appointment of a German whose only qualification was a letter of recommendation from Einstein, and whose merit in Einstein's eyes could only have been that he was an unemployed Jew – for he never displayed any other qualities. At that time, many European scholars thought that any European was good enough for a colonial country. To make this appointment official, procedure required that an *ad hoc* committee be convened with the participation of an outside specialist. The mistake was made of inviting the celebrated C. V. Raman, a Nobel laureate who himself had a student seeking a position at that very time. I believe this student was not without merit; in any case, he was without a doubt superior to Masood's candidate. I was also a member of the committee. Masood was in Europe, and cabled his orders. To contravene him would have touched off a serious crisis, and my fellow committee members, who were moreover utterly unqualified to judge the substance of the issue, would never have taken such a risk. Raman, justifiably outraged, threatened to cry foul and create a scandal. Vijayaraghavan joined forces with me after the committee meeting to dissuade him from doing so. An outcry would only have exacerbated an already highly uncomfortable situation.

. : . Thanks to Kosambi. I was not alone. I met Chowla in Delhi and made plans to hire him. In truth, my sole concern had been to gather together – it did not really matter where – a team of young mathematicians who truly loved their work. I believed that such a group would have a decisive effect on the future of mathematics in India. Perhaps my reasoning was sound, but to make this goal a reality I would have had to have more time, and first of all to have made myself unassailable.

... Returning to Aligarh from Europe, I found the situation there to be rapidly deteriorating, for the university as a whole and for me in particular... Vijayaraghavan was no longer there. During my absence he had successfully applied for a position in Dacca, where he had already moved. I was shocked and dismayed. Later he told me that, after I had left for vacation, Masood had spoken to him, telling him that he, Masood, had plans to get rid of me, and offering him my position. Vijayaraghavan was so horrified by this deceitful move, which I of course did not suspect in the least, that he took the first opportunity he could to flee with all possible haste.

... I had some regrets that my efforts had failed, b it at least they had succeeded in creating bonds of friendship among Vijayaraghavan, Kosambi, and Chowla, the three young mathematicians who seemed to me the most promising at the time. I also regretted having to leave India without having found the time to study Urdu and Persian seriously, as I had meant to do. In any case, I was in no hurry to return to France.

* * *

... My friend and I took our meals together, observing Madras custom: wearing the traditional *dhoti*, we sat on the floor and were served by his mother and his wife. The physicist Krishnan (Raman's student, who had shared, if not his teacher's Nobel prize, at least the work leading to the discovery for which the prize had been awarded) was a close friend of Vijayaraghavan's. We visited him among the rosebushes in his garden. Our group was completed by Shotyen Bose, the S. N. Bose of what is known as Einstein-Bose statistics.

Radhakrishnan ... offered to make me head of his department of mathematics. I was looking forward to returning to France soon; nevertheless, after consulting with Vijayaraghavan, it seemed to me that, for the sake of mathematics in India, I did not have the right to refuse - provided that I be given *carte blanche* in choosing a team of mathematicians. I was then told that local politics made this condition impossible, and nothing came of this plan, save that Chowla was named to the post several years later.

* * *

... When I had arrived in India, Gandhi was on the verge of launching his campaign of civil disobedience through his famous march to the sea to protest the government's tax on salt. At Aligarh Muslim University, people made a show of not taking him seriously. . . . They were not ready to comprehend that Gandhi was about to unleash a groundswell powerful enough to engulf all of India, simply by preparing a handful of salt in a small pot at the seaside.

... Just as during the monsoon season Indian newspapers kept track of its progress from Cape Comorin to the Himalayas, likewise, during the spring of 1930, they followed the progress of Gandhi's march. At every turn the crowds swelled. Just as he had hoped, Gandhi was soon imprisoned, and the nationalist party, called the Indian National Congress, was declared illegal. Careful preparations had been made for this eventuality. The personnel destined to remain clandestine were hand-picked and limited to the minimum number possible. The party had branches in every village. As the known members of the local organizations were put in prison they would designate successors, who would join them there in turn. . . . Civil disobedience owed its fairly bloodless success to the fact that Gandhi was taking on not Hitler or Stalin, but the English. He never said this explicitly, to my knowledge, but he was far too much of a realist not to know it.

... Vijayaraghavan and I found ourselves sharing a small table with Gandhi. My friend introduced us to each other. Just then we were served tea – in coffee cups. Gandhi laughed, "It's easy to see you're not English," he said softly. "An Englishman would never have countenanced such a breach of etiquette."

... Another day, it happened that the Viceroy (this was Lord Irwin, later to become Lord Halifax) wished to avoid interrupting the talks for dinner, and invited Gandhi to eat in the palace. Gandhi said, "That would not be possible; Miraben has already prepared my meal." The Viceroy suggested having the food prepared by Miraben brought to the palace, and Gandhi accepted. Thus, in this palace to which so many highly-placed Indians had considered it an honor to be invited even for a simple cup of tea, which no one would enter except in formal dress, where no one ate but from the finest china, Gandhi, dressed in his *dhoti*, ate his plate of lentils – the typical fare of the humblest Indian peasants – served to him by the Viceroy's liveried servants. This incident had an obvious symbolic value.

* * *

... What was happening with mathematics all this time? There was no idleness on that front either. I had reached an impasse with Diophantine equations. Hadamard's advice in such cases was to abandon the problem for a few years, in order to return to it later with a fresh mind. In his seminar, he often emphasized what was then called the "ergodic hypothesis". On this topic, he had never gone beyond Poincaré and Boltzmann. Even before leaving France, I had thought of applying von Neumann's recent work on unitary operators in Hilbert spaces to these problems ... In any case, I went back to Poincaré's celebrated theorem on the rotation number; I found a proof – an elegant one at that – that I hoped would make it possible to generalize the theorem to tori of more than two dimensions; but this intention did not pan out. I wanted in any case to extend it to all differential equations of the first order without singularities on the torus, and also, later, to the equations on compact surfaces of higher genus.

... I had more success with functions of several complex variables. I had been thinking about these for quite some time, and before leaving Paris I had had several conversations about them with Henri Cartan, which had renewed my interest in the subject; perhaps our discussions also had some influence on his work. French tradition taught that the theory of functions of one variable is dominated by the Cauchy integral; in truth, it is only one of a number of tools available, but I thought I had made significant progress by proving a formula that extended the Cauchy integral to very general "pseudoconvex" domains.

Every mathematician worthy of the name has experienced, if only rarely, the state of lucid exaltation in which one thought succeeds another as if miraculously, and in which the unconscious (however one interprets this word) seems to play a role. In a famous passage, Poincaré describes how he discovered Fuchsian functions in such a moment. About such states, Gauss is said to have remarked as follows: "*Procreare jucundum* (to conceive is a pleasure)"; he added, however, "*sed parturire molestum* (but to give birth is painful)." "Unlike sexual pleasure, this feeling may last for hours at a time, even for days. Once you have experienced it, you are eager to repeat it but unable to do so at will, unless perhaps by dogged work which it seems to reward with its appearance. It is true that the pleasure experienced is not necessarily in proportion with the value of the discoveries with which it is associated.

... I sent him a wire saying: "New theory of functions of several complex variables born to-day," to which he jokingly replied: "Congratulations. Wire mother's health." . . . On my way home in May 1932, when I stopped in Rome to see Vito Volterra and explained my formula to him, he jumped up out of his chair and ran to the back of the apartment, crying to his wife: "*Virginia! Virginia! Il signor Weil ha dimostrato un gran bel teorema*" ("Mr. Weil has proved a very beautiful theorem!")