Moshé's Memoirs

as told, from time to time, to Daniel Sternheimer

Moshé was not reticent. He would speak about himself often. Since the colleagues who may read the scientific papers in this collection prepared in his honor might like to know something more about the man as well as the scientist, I shall try to retell his own stories, and those we shared. He spoke about himself – and about others – with amusement, pugnacity, profanity and a verve which are hard to reproduce, but I must try to imitate them because verve and enthusiasm for everything he did were part of Moshé's personality. A staid "life and times" of Moshé would necessarily miss the mark, widely. He was extraordinarily quick minded, had a unique intuition and a fantastic ability to interact strongly at the appropriate level with everyone, friend and foe alike. Quite naturally he occupied a special and often very large place in the lives of all those who ever met him. He was truly exceptional – mildly speaking.

Moshé was born in Tel Aviv, September 17, 1937, while it was still under the British Mandate. It was an auspicious date, the day after Yom Kippur and the anniversary of Bernhard Riemann's birth. His father, Shlomo, was a brilliant engineer who had been trained in the Dantzig Polytechnic School just before Hitler came to power. He was the son of a prominent Jewish family of Łodz and Warsaw and a Zionist practically from birth. He anticipated the fate of Poland and European Jewry so he refused a flattering invitation to join the faculty directly upon graduation; he went instead to Palestine. In a Tel Aviv café he met Anna Lunski, the youngest sister of one of the first beauty queens of Palestine – the model for Maroussia in Thomas Mann's *Der Zauberberg*! Anna was a psychology student and the daughter of a family of Russian industrialists. Her parents arrived in Palestine in 1922 with nothing but a collection of imperial 500 ruble bills but, through hard work, succeeded in rebuilding the family fortune. Shlomo followed his heart, settled in Tel Aviv and managed to bring over some members of his family before the war broke out. His talent and integrity brought him an appointment as chief engineer for public works under the mandate authority, so he moved to Jerusalem only to return to Tel Aviv after the end of the war. His official status did not inhibit him from giving technical advice to Menahem Begin's "Irgun", which was fighting and bombing the forces of the Mandate authority.

The members of Shlomo's family who remained in Poland were exterminated by the Nazis and their allies, except for a cousin named Stanisław who was a doctor and a communist. He had served in the International Brigade in Spain, then joined Chou En Lai in South China and spent the war years at his side. After the war he returned to Poland and in 1949 was named the first Polish ambassador to the People's Republic, but was imprisoned during Stalin's purge of the former members of the International Brigade. Chou's intervention saved him from trial

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and its inevitable verdict and sentence. He was rehabilitated under Gomułka and became Under-Secretary of Foreign Affairs, but was removed from that position in 1968 under Moczar, and not permitted to leave the country. Moshé met him in 1969, on the occasion of his first trip to Poland and acquired from him a taste for the Orient.

From infancy it was clear that Moshé was an unusual child. His mother hired a governess for him so that she could pursue her career, but Moshé would have none of her, so Anna had to renounce a professional life to take care of her son. She and Shlomo spoke to him in Hebrew, a grandmother, who always refused to learn that "language of the natives", spoke to him in Polish, and Anna's family spoke among themselves in Russian. Many of his father's friends spoke German. He learned English at the movies and in school, and Arabic in high school with a very fine teacher. Moshé, the enthusiastic polyglot, picked up French in France, with the predictable misadventures, like addressing a policeman as "Monsieur le flic", and rudiments of Swedish, Japanese, Italian, Spanish, Thai, Chinese and Turkish, all mixed with a heavy dose of slang which did not always emerge at the most opportune moments. Actually, Moshé caught the music of these languages and could imitate what he heard faultlessly and incomprehensibly.

Moshé's elementary and junior high school grades were unremarkable, except in mathematics for which his natural talents were already obvious. The rest was taught too slowly to interest him. This lasted until he got the highest grades in the "psychometric" tests since their institution, after which most of his teachers started to pay attention to their unusual pupil, and his marks leaped upwards. Nevertheless he loved to play hookey and pranks like writing a parody of a poem in the "Canaanite" style and passing it off on an unsuspecting teacher as a subject for a grave literary analysis. His teachers resented the pranks and sometimes punished him. As a result Moshé became an assiduous patron of the Tel Aviv cinemas.

At home, because of his father's position as a chief engineer for the Southern Command of the young Israeli Army, Moshé met Itzhak Rabin and he would later serve under Moshé Dayan and Ezer Weizmann. But he also took piano lessons with Daniel Barenboim's mother and acquired a solid technique. (A few years before his death he could still play the Hammerklavier sonata from memory, without too many dropped notes!) At one time he thought of making a career as a pianist or an actor, but ultimately chose mathematics and physics.

Towards the end of his high school years, Moshé's talent for mathematics and physics, nurtured by his father who was very gifted in these areas, became obvious. And in his turn Moshé gave private lessons in mathematics and physics to high school students, sometimes two at a time, for astronomical fees, but he was such a gifted teacher that his students got their money's worth and more. He once even bet his fee that he could coach a boy who was a disaster in math and get him through the "bagruth" (matriculation) exam. The lad passed, made a brilliant career after that, and Moshé won his fee.

Service in the Israeli Army used to be almost ineluctable and anyhow avoiding it would have been unthinkable for a child of Shlomo Flato, so incompatible as military discipline was with Moshé's quick-silver temperament, serve he did. In those days the most gifted high schoolers could go directly to the university, taking their basic training during their vacations and then serving three years as an officer. During one exercise in 1955 Moshé's platoon crossed the Jordanian border – by accident according to the official version – and ran into cross fire from the Jordanian troops. Moshé sized up the situation instantly and, in defiance of Israeli military rules and traditions, ordered "every man for himself", abandoned their equipment but saved himself and his two comrades. The bodies of the other seven soldiers were returned two days later at the Mandelbaum Gate in Jerusalem. Moshé's superior wanted to cast the blame for the bungled operation on the young lieutenant who was killed, but Moshé insisted on telling the truth, that the platoon fell into an ambush because of the poor preparation by the general staff of their "accidental" incursion into Jordanian territory. As a result of his impeccable honesty, Moshé suffered endless reprisals from this officer and was even sentenced to a month in prison for striking him during an inspection. Moshé being Moshé, he spent the month as the prison librarian and coached the commander in mathematics so that he could pass his "bagruth".

In the 1956 Sinai campaign he served in operations control, where his astuteness was generally appreciated (at some point, Dayan even told him "Sergeant, transmit your order"). But on one occasion, because the general in charge at that time insisted on following standard procedure instead of listening to the young sergeant that Moshé was then, forty soldiers were killed by "friendly fire", a fact Dayan would concede (without mentioning Moshé's advice) in memoirs published many years later.

Moshé passed the Hebrew University admission exams in physics brilliantly and studied with Giulio Racah and the several Nobel prize winning guest professors whom Racah had recruited. Moshé impressed them as much with his brilliance as with his awkwardness in the laboratory (he had "two left hands", which is what saved him from being sent to a technical high school). He never acquired the manual dexterity of an experimental physicist so he was condemned to be a theoretician and mathematician. It was at the University that I met Moshé who was a year ahead of me. (My mother's best friend was a cousin of Moshé's father, so when I needed course notes for Abraham Robinson's hydrodynamics course, it was natural to turn to Moshé.) Moshé hesitated between mathematics with Amitsur and theoretical physics, and finally chose the latter, asking Racah to give him a subject for his Master's essay. Racah posed a problem concerning symmetry breaking in the 3-dimensional space by crystalline material. Moshé solved the problem in three months by a method that Racah had difficulty in understanding. But since the problem was supposed to keep Moshé busy for a year, Racah added a second one, which Moshé nearly solved in a month – there remained only a very large matrix to diagonalize –, but he only submitted it to Racah at the last minute to escape a third assignment. This was a fine piece of work which, since it was not published at the time, Moshé decided to recycle as his "second thesis" for his Doctorat d'État (1965). Only then was it published, at the urging of the Sorbonne professor of spectroscopy to whom Moshé was referred then, who was ready to accept it for principal thesis: it had remained pertinent for five years, despite the rapidity of progress in crystallography! Moshé gave some additional notes on the subject, the debris of his thesis, to one of his students in Lyon, who has since made an honorable career developing and extending them.

In 1960, as part of his military service as Air Force lieutenant, Moshé was asked to prepare the first comprehensive theoretical program in mathematics and aerodynamics for Israeli pilots. When Moshé was responsible for that part of the course, a well-connected recruit failed; the decision was supported by the Air Force chief and by his brother-in-law, the chief-of-staff and father of the unfortunate recruit. After a year with the Air Force, Moshé was asked to become head of the theoretical group at an experimental nuclear reactor, without having to enlist in the army for five years as is the rule in Israel; in that capacity he sometimes refused politically motivated but scientifically hazardous instructions.

When Racah became rector of the Hebrew University, Moshé taught his course on group theory for a year, while still serving in the Air Force. The next year, while at the reactor, he was in addition asked to teach solid state physics at the religious Bar Ilan University. He accepted the appointment on two conditions that were typical of him: a taxi to drive him to the University, and an exemption from the obligation of wearing a skullcap in class. In 1962 Moshé obtained army permission to attend a summer school on theoretical physics in Italy, but an automobile accident on the way out of Dijon kept him in the local hospital for two weeks, followed by six months' treatment in Geneva and Tel Aviv. He used that time to finish work on his doctoral thesis on group theory in nuclear physics. His injury also earned him an honorable exemption from completing his military service.

In October 1963 Moshé came to France with a generous ASTEF grant. He had chosen Paris over CERN in Geneva or the USA because Racah had no power over him there, and because he wanted to add French to his other languages. He was assigned to Louis de Broglie's laboratory at IHP (Institut Henri Poincaré) and I helped him find a room nearby, in the rue Gay-Lussac. The room was as modest as the Bohemian student tradition required, but we – I was in Paris then, too and my studio was on the same floor – had income enough to live more comfortably than students' traditions permitted. Shortly afterwards I began working with Moshé, to the great displeasure of my official thesis advisor, Szolem Mandelbrojt, and I eventually passed my doctorate under Moshé's direction even though he was only nine months older than I. In 1963 we began a scientific collaboration that Norma Finkelstein would eventually call "a team" and another friend, "Moshé *et al.*", and which endured to his death. We were sufficiently similar in character and scientific profile to agree and cooperate on essentials, and sufficiently different to complement each other's work. Though I always remained in the shadow of

Moshé's vigorous personality, my only regret is that our collaboration terminated so abruptly, after only 35 years.

The arrival in Paris of the "sabra" bull-in-a-china-shop that Moshé was then, and remained to the very end, created quite a stir. He was recognized immediately by Louis de Broglie and André Lichnerowicz and became their close friend and, in the case of Lichnerowicz, scientific collaborator, until death. Lichnerowicz was devastated by Moshé's death and never recovered from the shock, himself dying two weeks later in the same hospital, also as a result of a stroke. Many of the ambitious physics students and scholars who were Moshé's competitors did not appreciate him and his vigorous demonstrations of the inadequacies in the theories proposed by the gurus in the field. This was the beginning of his often strained relations with the French physics establishment. Nevertheless, Moshé found an intellectual freedom in Paris that he could not have found elsewhere, and he flourished in it.

At the end of his scholarship year I persuaded Moshé to remain in France. It was not hard because I had the help from the fine Parisian restaurants and the chefs whom Moshé appreciated so much, as his expanding girth testified.

Jean Braconnier, then dean of sciences at Lyon, invited Moshé to join his faculty as an adjunct professor, even before he finished his doctorate. The offer was supported by Lichnerowicz and, in the CCU (national committee), by Alfred Kastler, who hoped to bring Moshé to Orsay to work with Chabbal in theoretical spectroscopy at Laboratoire Aimé Cotton. Moshé had the effrontery to refuse that offer, then the beaten path for ambitious young French physicists, to stray into the area of mathematical physics, which was then much less highly regarded. When he arrived in Lyon, Moshé discovered that the physics curriculum was out of date with "wave mechanics" introduced only after the Master's level, and quantum optics only sketchily treated. Nonetheless Moshé threw himself and some of his students into particle physics.

In 1965 Moshé defended his French doctoral thesis in Paris – that was before the University was broken up into the thirteen complementary and sometimes competing universities that we know today – before a jury chaired by Lichnerowicz. Since he was still a foreigner and had studied abroad, the difficulties of obtaining certificates and equivalences from the Sorbonne administration were epochal, and Moshé was more vigorous than patient. I leave the rest to your imagination. The CCU in physics refused to renew Moshé's appointment in 1967 because he had strayed from spectroscopy into a too original and mathematical approach to particle physics with which the establishment was uncomfortable, and that is an understatement. Also, his reputation as a scientific "trouble maker" was so well established that in 1966, during a very friendly conversation with a well-known theoretical physicist who happened to share a train compartment with him (and of course Moshé could not be in a train without talking to his neighbors), he was warned to avoid a guy named Flato, who would "shoot down" prominent physicists whenever they happened to say something incorrect in a seminar! But he was adopted by the mathematicians who were used to being hospitable to intellectual originality, and this was at a time when mathematical physics had not arrived at its current respectability.

Moshé was appointed to Dijon in January 1968. When he required the intervention of the union, the SNESup, to recover the three months' salary of the interval between the lapse of his appointment in Lyon and the assumption of his functions in Dijon, the union refused to help a "mandarin" and an Israeli to boot. This taught Moshé a lesson about the mentality of "apparatchiks" in all countries, that he never forgot. Despite the SNESup, he remained a leftist in the French scheme of politics because of his native generosity of character. He participated in the 1968 student revolution, joining the occupation of the IHP. When the revolution ended, several of the students who had joined Moshé in the IHP feared retaliation from their humourless professors, so Moshé brought them to Dijon. Despite his politics and the fact that some leading socialist politicians were personal friends, he generally got along well with centrists and even with right wing politicians; they appreciated his talent and good sense and named him twice to the national committee (in 1978 to the CCU in physics, and in 1996 to the CNU in mathematics).

Before Moshé's arrival in Dijon, the mathematics faculty was not too distinguished, though Maurice Gevrey, a fine mathematician, had taught there in the first half of the century. In Dijon Moshé brought distinction to his own field, of course, but also encouraged other domains. Not all his colleagues, even those he recruited, were always equally tolerant of competing specialties, but Moshé was an astute tactician and often prevailed in University committees to obtain decisions satisfactory to most of his colleagues.

Perhaps not so picturesque as Gulliver's, Moshé's travels and misadventures abroad would make an amusing book. Let me just mention the time he kept interrupting Murray Gell-Mann's Nobel Prize lecture with entirely pertinent questions that the new laureate was unable to answer, or the time he broke his foot in Araki's linoleum-covered bathroom, or the time he explained to the Taiwan immigration control that Moshé is spelled with an M, like Mao, which nearly landed us in prison! On the serious side, Moshé formed strong ties with the mathematics and physics communities in Sweden since 1967 – for 27 years he was a member of the advisory committee that proposes nominees for the Nobel prize –, in Poland since 1969, in China where he was named honorary professor of Fudan University in Shanghai, and in Japan. He always loved the Orient and its cuisine, but he distanced himself from China after the Tiananmen "event". Aside from bringing European developments in physics and mathematical physics in his baggage, he made friends with foreign colleagues all over the world and, when he created *Letters in Mathematical Physics*, he made a point of soliciting articles from all of them, helping to integrate Eastern scientists into the community of Occidental scientists. The International Association of Mathematical Physics, which he also initiated, had much the same mission in a period when the iron curtain was as much an intellectual barrier as a political one. Moshé was recruited by UNESCO in

1975 to evaluate graduate studies in mathematics, physics, chemistry, biology and economics in Thailand (at the request of the Thai government). His frank report, still known there as the "Flato Report", contained recommendations for various reforms, many of which have gradually been introduced.

Though Moshé was greatly appreciated abroad, he was frequently at odds with many French physicists. When Louis Leprince-Ringuet retired from Collège de France in 1971, the physics establishment proposed a single candidate, a then talented theoretician who had been groomed for three years to be named to that chair in experimental physics. Jean-Claude Pecker urged Moshé to draft a "project" for a chair in theoretical physics so that the professors of that venerable institution – no irony intended, it was created in 1531 and has included among its members some of France's greatest scientists and scholars, in areas ranging from ancient history to the most up-to-date mathematics – might have the courtesy of a choice. Moshé's candidacy enraged the physics establishment, frightened the union, provoked a demonstration, and I must admit he was not always a model of tact when he paid the obligatory courtesy calls to the professors who would vote on his project and candidacy. Despite all of that, and the unofficial quota for Jews in the Collège, which was already filled, Moshé obtained a respectable score and would probably have been elected to one of the next vacant chairs, but he found the affair disagreeable, and he was not sure that he was willing to undertake a Collège de France professor's traditional obligation of lecturing each year on his own new research. Being expected to come up with new results year after year, until retirement age (at 70 in the Collège), intimidated Moshé, strange as it may seem to all of us who knew his self-confidence, because he took all his obligations with the utmost seriousness, and made a point of always giving much more than was demanded of him.

Moshé had too much intellectual energy to be constrained by his chair at Dijon, his guest lecturing, LMP, IAMP and his participation in the intellectual life of Paris. He had to break out. When his friend, Yvette Chassagne, was named Chairperson of the Board of the Union des Assurances de Paris, he created for her a scientific council to advise the UAP on ways of anticipating advances in science (including economics) and scientific technology that would inevitably influence its business strategy. Moshé insisted that the members of the council be unpaid, to insure their intellectual independence, and he convinced many of France's intellectual stars and future stars to participate. Again, I shall resist the temptation of name dropping and of mentioning the science and technology that was in fact produced by what was supposed to be merely a consulting council.

The articles in this collection deal with areas in which Moshé worked and, in many cases, extend his ideas and results. I shall not anticipate here the many articles based on Moshé's scientific achievements to avoid redundancy, and because Moshé and I worked so closely. Distinguishing his work from mine in our joint publications may be a good exercise for a historian of science desperately searching for a thesis subject, but is not too important here.

Let me only add that Moshé was as generous a personality as he was a vigorous scientist and bon vivant. He was a devoted son and brother, and Uncle Moshé to the children of all his colleagues and friends, following and encouraging their childhood and adolescence and then their studies and careers. Frank and even tactless as he often tended to be, he could also offer sensitive moral support to younger and older colleagues when they suffered personal losses or losses of confidence. All of Moshé's friends who are so numerous and distinguished – mentioning them by name here would be presumptuous – will miss him terribly. His premature death leaves a void in the scientific community that will surely be filled, possibly by several of his friends and collaborators, and void in our lives that only time will blur.

PS. This in an English version, "verkurtzert und verbesert" by Bertram Schwarzbach, from the longer and less discreet French text written by Daniel Sternheimer for the Conference, which is available in postscript and pdf formats on the web site of CMF1999, `http://www.u-bourgogne.fr/monge/cmf/cmf1999/inaugural.html`.