Biographical Memoir
(Excerpts)

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Childhood memories of a scientist (Part Two)

These were some of the highlights of my early scientific education but I seem to remember equivalent pieces of biological sciences too. Elementary fact about how plants produce food, how ruminants digest cellulose, how fertiliser is needed to enrich the soil and so forth - all quite interesting and educational but, speaking for myself, not as exciting as chemistry or electricity.

My formal education began at the age of 5 in a private kindergarten run by a young lady who had studied in France and insisted on speaking French to the children at all times, presumably in the hope of allowing them to pick up another language. The only things I remember are the fun with the modelling clay, the wooden frame with various types of clothes fasteners to do and undo, useful experience for learning how to undo bras and suspenders (though I was far too shy a boy to put the knowledge into practice until very much later), and a precious few words of French such as "Je veux sortir" when one wanted to go to the loo - if remembered in time! And also a little ditty to recite to one's Dad on his birthday: "Cher Papa je t'aime beaucoup…" After all, he paid the bills!

Primary school didn't begin until the age of 7 (in my case at the age of 6, by special dispensation because my birthday is in mid-December). By that time I, along with most reasonably bright kids, had taught ourselves to read - one of the advantages of languages in which spelling is strictly phonetic. It started with the decipherment of shop signs on one's daily walks and led to story books and newspaper headlines - even though they made little sense. I also learned to write block capitals and I distinctly remember writing words sometimes from left to right and sometimes from right to left, seeing that it is purely conventional and for no logical reason. In primary school I learned to write cursive script - one letter each day. I missed the day the letter p was taught and hence, to this day, I alternate between two versions of the letter in my handwriting. We also learned our multiplication tables, by rote, in singsong drill "three sevens are twenty-one; four sevens are twenty-eight…." etc, in the Romanian language! Now, my mother tongue, and the language spoken at home was Hungarian, so apart from the content of the lessons I imperceptibly picked up Romanian too. Now, since I learned to add up numbers at home, taught by my parents, before I started formal schooling - simply to keep my active brain entertained, in those pre-television days, there remains the fact that, faced with a column of numbers to be added up (and too lazy to get a calculator), I can hear myself doing the sum in Hungarian. Conversely, doing a multiplication, I can hear myself

doing it in Romanian. "Cinci or sapte, treizecisicinci": Five times seven, thirtyfive. (cf. Cinque fois sept, trentecinque - in French - another Latin language). I heard it said that they used to catch spies during the First World War by giving them sums to do and observing their lip movements, which were always in sync with their mother tongue. But I hasten to add that I perform higher mathematical operations in English, which became my primary language a very long time ago and I hardly ever use the Hungarian that is still deeply buried in my head. As for Romanian, having not had the opportunity to speak it since coming to Australia, I can no longer speak it or even understand it fluently. I seem to have converted its almost purely Latin vocabulary into other Romance languages, namely French - in which I can be quite fluent, especially after a few days in a Francophone environment - and Italian or Spanish, which I can hardly speak at all - but which I understand sufficiently to follow on SBS news.

Having grown up in a very diverse and multicultural area, surrounded by Hungarian, German, Romanian and Serbian villages whose inhabitants learned to live with their "foreign" neighbours as part of the original multi-cultural empire of the Habsburgs, naturally all learned a smattering of each-other's languages mostly at the weekly market in town or, later, at school. They also learned to get along without despising each other any more than was necessary in order to preserve their ethnic identity and avoid becoming a melting pot. I distinctly remember after arrival in Australia, by which time I was fairly fluent in English along with several other languages, meeting local kids whose great difficulty in learning a second language stemmed from the fact they were totally unfamiliar with the concept that there are indeed languages other than English.

In my case, ESL doesn't stand for "English as a Second Language" but something more like "English as a Sixth Language"! Since my parents spoke Hungarian and my grandparents spoke German (as good citizens of the Austro-Hungarian Empire), German became my second language, followed by Romanian at school. Formal instruction in French started early in High School, since French was the official second language in Romania. Hebrew was taught to all good Jewish children, mainly straight out of the prayer books and out of the Torah - and it became my fifth language, greatly improved by a year spent in Israel, on our way to Australia when we emigrated, in 1952, when I was 17 years old. Before that, however, following the Russian "liberation" of Romania and the descent of the Iron Curtain in 1948, Russian became a compulsory subject in high School (replacing Latin), and I studied it for four years. Enough to learn the alphabet and a smattering of a few hundred words which are enough to get by without being bought or sold into slavery! So it became my sixth language of which I made good use in a visit to Leningrad (as it still was - but only just) in 1989 and in various interactions with Russian colleagues. Nothing unusual in that, for someone of my background - in fact my cousin Vic, who hails from the same town, also has "ESL" but in his case English is his Seventh language.

Although, as I mentioned, the language of instruction in my time was Romanian the school system ran along ethnic and religious lines. Apart from the "official" Romanian schools, there were Hungarian, German as well as Jewish schools. Remarkably, even during Romania's alliance with Germany during the Second World War, two Jewish primary schools, at opposite ends of the town, as well as the Jewish High School, were allowed to exist in this multicultural part of the world with remarkable tolerance and absence of conflict (apart from occasional minor gang warfare accompanied by mild anti-Semitic overtones). Of course I was sent to the nearest Jewish primary school for my four years of primary education, from 1942 to 1945. (Alas, it is no longer functioning as a school - it was boarded up and semi-derelict when I visited it in 1994). It was a good little school, attached to a Synagogue (which is still there) and a special school for religious education and Bible study, called a "*cheider*" - Hebrew for Chamber - where one learned one's "Aleph-Beth" (cf Alpha Beta) - ie the Hebrew alphabet and the rudiments of Hebrew language and culture - meaning the traditional prayers. The part of town where this school was located was inhabited by a more observant group of Jewish people than our family, so I had to get used to being a bit of an outsider - occasionally taunted as a *"sheigets"* (heathen) for not being quite as religious as most of my class-mates. I continued to regard myself as somewhat of an outsider, through a period of agnosticism in my adolescence and eventually as a 'card-carrying' atheist in my adulthood. Religion never made any sense to me and I never had any time for a God who insists on being praised and worshipped all the time while all kinds of atrocities are being perpetrated against His "chosen people".

The paradox is that, in spite of this, I feel a strong affinity with Jewish culture and "learning" and I am, in my own way, quite proud of my ancestry and its cultural traditions, especially of its non-religious aspects. For example, in comparing notes with a Greek friend not long ago, concerning the "Alpha Beta business" I was quite proud when I suddenly remembered that my grandfather gave me a spoonful of honey the first day that I started learning my Aleph Beth - a lovely tradition, intended to sweeten the process of learning. My father and grandfather were both quite definitely followers of the Jewish faith, though neither of them was strongly observant: they attended Synagogue on special occasions, such as the Jewish New Year, Day of Atonement, and other principal Jewish holidays, as well as weddings and bar mitzvahs. Alas, I don't much participate in such community activities (except the weddings, bar mitzvahs and funerals), but I do have fond memories of lighting Chanukah candles and partaking in Passover meals as a child and would probably "turn it on" for my grandchildren and great-grandchildren, if they lived near me. As it is, I am very pleased that my two daughters carry on a little of the traditions, largely as a result of their mother's influence.

So, most of what remains of my Jewish primary school education is a smattering of Hebrew, a nodding acquaintance with the main prayers (even if I don't believe much of their content) and memories of a few of the traditional tunes to which they are sung.

The main thing is that the teachers were kind and dedicated and shielded us well enough from the harsher realities outside the school and made us feel secure. Meanwhile the Holocaust was raging all around us at a distance of less than 100 kilometres in almost any direction and our parents felt much less secure as a consequence. To this day, it seems a miracle that our town was like an oasis in the midst of deportations and persecutions. It is true that there were economic sanctions against Jewish businesses, expropriation of Jewish properties, forced labour for the men (who could, however, return to their homes at night - possibly by bribing the Romanian guards[1]) and other extremely worrying anti-Semitic measures instigated by the occupying German forces. Nevertheless, we survived and were not deported to the death camps, unlike our kith and kin just a little distance away. My father lost two of his brothers who were rounded up in Budapest and died in a forced march to a death camp; my mother lost a sister who went to live in Serbia a matter of 100 or so km away and that's just the immediate family. I do remember many a solemn memorial service after the war and a succession of refugees from East, West and North several of whom were billeted with us for various lengths of time until they regained their strength sufficiently to return to what was left of their homes. But, as I said, we survived! How did this come about? A sensible explanation eluded me - my Father didn't know either - until only a few years ago. At a reunion of my Jewish high School classmates in Israel in 2005, I posed the question and the only sensible answer that was forthcoming was that it was just a matter of time. Had the war continued for a little while longer, and had not the Russians troops been advancing swiftly through Romania, eventually leading to its liberation on 23 August 1945, we would have joined our brethren in Terezienstadt, Buchenwald, Dachau or Auschwitz. A legend has it that, apparently, the orders were ready but the local stationmaster could never find the railway trucks needed to deport the Jews of Timisoara - the trucks were always elsewhere. He may have been a kind-hearted Romanian man (as opposed to some of the cruel Hungarian fascists a little to the North of us) but it is rumoured that he was the recipient of regular and substantial bribes from the local Jewish industrialists who, although their factories had been expropriated, managed to secrete sufficient resources to keep their families and indeed the whole community safe.[2]

The full story has not been documented, as far as I know - but the more I learned about the situation, the more miraculous it seems. From my point of view as a child, I am happy to say, I hardly knew of any privation - except for having my grandparents living in

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[1] Editor's note: Most Jewish men between 18 and 55 were deported to labour camps far away from their place of residence.

2 Editor's note: This is, indeed, a legend. A plan to deport the Jews was developed by the Romanian and German authorities, but shortly before its implementation, on 11 October 1942, Ion Antonescu cancelled the order. The interventions of Queen Mother Helen, Chief Rabbi Alexandru Safran, Wilhelm Fildermann, the president of the Jewish communities, Metropolitan Bishop Bălan, Baron von Neumann from Arad, politician Iuliu Maniu and others may have steered Antonescu from his deportation plan against the backdrop of his discontent with the Second Vienna Award and the situation on the front.

our apartment in rather crowded circumstances, and my father, who was a Hungarian subject living in Romania, having to disappear across to the Hungarian border from time to time, and my mother being a nervous wreck whenever that happened. Compared with various friends who were less fortunate and were more closely affected by the Holocaust, I did indeed live a charmed life and escaped unscathed and un-traumatised.

After the war, my grandparents returned to their house in another suburb, my father regained control of his factory and I went on to the Jewish High School for a couple of years, to continue my studies in Romanian, French, English, Geography, History, Music, Mathematics, and Science as well as Religious studies and sport (Athletics and Gymnastics). I can't remember much, except that I was bored a lot of the time, and got up to all kinds of mischief. Ironically, the ethnic/religious schools were abolished after 1948, when the communists took over. The education system was reformed, making 8 years of schooling compulsory, instead of 6, and so I had to move to another high school. It didn't do me any harm to mix in with the other kids from the German and Romanian schools and besides, the new school was co-educational and I was 13 years old and ready for a bit of biological education!

With my parents

Meanwhile, my father's factory was "nationalised" by the communists but he was left in charge, under increasingly difficult circumstances, such as having an ill-educated party apparatchik to answer to. Immediately after the war, a shortage of raw materials for the textile and leather industries was a great boon for my father's business because he began to manufacture replacement products from available materials. For example, by titrating castor oil with sulphuric acid, an excellent detergent is produced (sulphonated castor oil, or Turkish Red oil) almost as good as the synthetic detergent Teepol, which became available much later. Constructing crude apparatus on a semi-industrial scale, out of oil drums, (which had to be lined with lead to withstand the acid),

truck axles, stirring paddles made from lead sheet etc - he and his partner and a couple of faithful employees - one of them a brilliant practical mechanic - managed to supply the local textile industry with the much needed detergent. The stuff was manufactured in batches, slowly adding the acid to the oil while continually stirring and checking the acidity at frequent intervals. I think it must have been quite a lucrative proposition, producing a greatly 'value-added' product, because we enjoyed a couple of marvellous summer holidays, and a special trip to Budapest in 1947.

A shortage of leather tanning materials was remedied by another substitute product, of which I never knew the details, beyond the fact that it was called "Chrome tanning" and involved sodium or potassium bichromate. The local leather industry adapted to its use and business was good - until the communists wrecked it all.

Following two years of the co-ed school, I was ready to move on to Senior High School and I passed the stringent entrance exam of the elite boys' high school - the Lycee - named after an noted local educationalist called Diaconovici Loga. (The School is still there - I visited it, with my grandchildren in tow, in the year 2004). Before that however, I underwent an important formative experience that has coloured my views on Mathematics education. I never cease to tell the story to all and sundry - so here it goes: During my second year in the new primary school we began the serious study of Maths: Algebra and Geometry. I revelled in it – formulating and solving the typical linear equations as solutions to arithmetic puzzles, learning the rudiments of Euclidean geometry and proving simple theorems seemed like a lot of fun. However, I was away from school for a few days, on one occasion, with something like my chronic throat infections, and upon returning, I started to get the problems wrong. The Maths stopped making sense and I was falling further and further behind. It was my great good fortune that the shrewd old Romanian lady teacher noticed this and called up my mother and offered to find out what the matter was, in the course of a couple of private lessons (for which she would have been paid of course – there being no such thing as pure altruism. My mother agreed, of course, and in a very short time it emerged that I had missed out on crucial concepts while away from school. In algebra, it was the fact that $-1 \times -1 = +1$. One would be very unlikely to discover this for oneself at the age of 11 or 12 – and hence I was consistently getting things wrong in multiplying two binomial expressions, for instance. Once she explained it to me, I never looked back! Likewise in Geometry: I missed out on learning the Theorem of Thales, as the law of similar triangles is called in Euclid's books. Without knowledge and understanding of this theorem, the simplest geometrical proofs became too difficult or even impossible. Again, by teaching it to me in a private lesson, she filled in a crucial gap and I was back on the rails, never to look back. Imagine what would have happened if these vital lacunae had not been corrected: I would probably have performed worse and worse in maths, getting to hate the subject more and more as a repeated demonstration of my inadequacy and I may even have ended up as a lawyer, or worse. The point is that Mathematics is a quintessentially sequential subject: One thing leads to another and everything depends on what went

before. I daresay that most people who say that they hate Maths – a surprisingly large proportion of the population – may have had a similar experience at some crucial stage but may not have had the benefit of a smart teacher to pick up the problem and rectify it. The untreated problem would then grow worse and worse, leading to an ultimate bafflement followed by the hatred of a beautiful subject, which should appeal to all intelligent people! By that time it may be too late and a whole range of worthwhile careers would become simply inaccessible to the unfortunate victims of this common phobia. I am convinced that this explanation fits most cases and leads to a great deal of unhappiness and feelings of inadequacy, especially in our increasingly technological world. It also leads, eventually, to the chasm between people who understand how the world works and those - technophobes - who are the hapless victims of an apparently senseless universe. All because they hate maths, all because they missed out on some simple but crucial concepts, somewhere along the line. Perhaps it was sheer good luck that I struck an excellent teacher at a crucial time but I do remember several other excellent teachers – even though I can't recall all their names. I do, however, remember with gratitude the name of that old Romanian maths lady: She was Madame Soceru, bless her, quite sure to be long since dead – except in my memory.

I can't recall the names of many of the teachers in the Jewish High School – Liceul Israelit de Timisoara – except for an old history teacher, Mr Wagmann, who meted our regular punishments for inattention in class: One had to copy out large slabs of the textbook – a truly hateful task which took up a lot of my spare time (and wrecked my handwriting into the bargain, according to my Mother) all because I was terribly bored a lot of the time at that school and hence prone to all kinds of mischief. A more pleasant memory is that of Monsieur Bong, the French teacher who refused to utter a word other than in French and who, apart from his funny name, was quite a nice man and a very good teacher. Yet another was a Romanian football player who taught music, quite effectively, by composing little melodies on the blackboard to illustrate various musical concepts, such as syncopation. Religious Instruction was given by a very handsome young man, Rabbi Neumann, who later officiated at my Bar Mitzvah and, later still, became the Rabbi in one of the Synagogues in town and later still, the Chief Rabbi of the region. Interestingly enough, an indispensable condition for being confirmed in his first Rabbinical job was that he should get married within a year. This was a source of amusement to his adolescent pupils but illustrates a crucial difference between religions that insist on a celibate clergy, and this diametrically opposite precept in Judaism. I find the logic of the latter far more compelling!

Having successfully gained admission to Liceul Diaconovici Loga, where I spent years 9 and 10, I was surrounded by a very talented group of students, quite a large number of whom ended up as doctors, engineers, and scientists. Remarkably, of the several Jewish boys in my class, no fewer than three of us ended up as physicists: Peter Freund, a professor of theoretical physics at the University of Chicago; Nicky Kidron (Kauftheil), a nuclear physicist working for the Israeli Government, and myself. Possibly

pure coincidence, because although we had some competent teachers in Maths, Chemistry and Physics, none were really outstanding. Mr Schechter – I think that was his name – another of the Jewish refugees from Cernauti, (Chernowitz) who taught physics was perhaps better than we gave him credit for at the time. One other teacher stands out in my memory, although I forget his name. He was a nice old man who taught biology - an interesting course which covered most living creatures, starting with single-celled organisms such as the paramaecium and the amoeba, to multi-cellular organisms such as the hydra, then more complex invertebrates such as worms, then insects, amphibians, reptiles, fishes, birds and so on up the evolutionary scale to mammals and finally, man. I found the story fascinating - especially the great variety of invertebrates and their often extraordinary solutions to the problems of living. I was also fascinated by the essential unity of all mammals who all have pretty much the same basic structures and organs. There was just one major snag: The Stalinist-inspired dogma prescribed the teaching of Lamarckian, rather than Darwinian evolution - that is, it fostered the belief in the inheritance of acquired characteristics, rather than random mutations followed by the natural selection of the fittest. That somehow seemed to agree with Marxist-Leninist dialectical materialism, as proposed by that notorious pseudo-scientist Lysenko, who had Stalin's ear, and hence his heresies became the prescribed syllabus for biology teaching all over the soviet block. Naturally, the poor old-timer who taught us felt a revulsion against teaching such blatant nonsense and somehow managed to convey this to us while, at the same time, exposing the facts. "This is what I am supposed to teach you", he used to say, faintly ridiculing the idea that succeeding generations of giraffes grew longer and longer necks in order to reach higher branches, but he managed to convey the true Darwinian story at the same time, inviting us to make up our own minds. A memorable experience, in the light of what I learned later, through reading more biology and histories of biology, at an older age. I also seem to remember that the poor old teacher took to drink and died not much later. He seemed to be a kindly and humane teacher, unlike most of the others who were stern, distant and somewhat unapproachable – characteristic of most European teachers. This is in marked contrast to the friendly, approachable teachers that I found a couple of years later in Australia – but that is another story – we had to get here first!

Our emigration was expedited by another, more serious brush with Marxist dogma: A more sinister chain of events unfolded in my final year at that school. We were all supposed to learn some Marxist-Leninist philosophy as part of social science lessons and as part of all other subjects - not just biology - and we were all enrolled into the local chapter of the communist youth organization UTM (Union of Workers' Youth) modelled on the Russian junior communist party, the "Comsomol". The local "commissar" was an unpleasant peasant lad, comrade Marish, who had a huge chip on his shoulder and a strong and cruel streak reminiscent of the fascist youths of only a few years earlier. He decided that I was making a mockery of the dogma - which I may have been, because so much of it was patent nonsense, especially for adolescents. Things such as class warfare; the dictatorship of the proletariat; the capitalist conspiracy; the glorious alliance of the

workers and the peasants, and so forth. I was convinced by the observation of my parents and their friends that the fascist, anti-Semitic race hatred had simply given way to class-hatred, and comrade Marish succeeded in putting this into concrete form. He denounced me as a "class-enemy" and following a star-chamber type of "interview" for half an afternoon at UTM headquarters, at which not only my attitudes but my "class origins" were investigated - my father's occupation and home living standards - I was summarily expelled from the UTM. This seemingly unimportant development was bound to lead to the horrendous consequence that I would not have gained access to a University education, no matter how well I would complete high school. Indeed, another boy at the same school, son of a timber-merchant, with whom I caught up in Melbourne many years later and who was also expelled from the UTM, had to "rehabilitate" himself with several years of manual labour in the countryside before being allowed to study Chemical Engineering at the Timisoara Polytechnic. He later went on to an outstanding career, first in Germany and later in Australia. Maybe you can't keep a good person down for long - and maybe I would have had a similar fate. But this episode just underscored the urgent need to get out from under the communist tyranny and convinced my parents to try to hasten our emigration, to join the other members of our extended family in Australia.