

Pierre Laszlo

A Life and Career in Chemistry

Autobiography from the 1960s
to the 1990s



Springer

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Pierre Laszlo
Sénergues, France

ISBN 978-3-030-82392-4 ISBN 978-3-030-82393-1 (eBook)
<https://doi.org/10.1007/978-3-030-82393-1>

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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Introduction

Amateurs of baroque music keenly hear the difference between an ancient harpsichord and a modern instrument, even when the latter is a reconstitution. Richness of tone makes the difference between the old and the new. Why are we, the self-labeled sophisticate moderns, unable to match the prowess of yesteryear? In short, because the tone of an instrument is a multiparameter feat. Harpsichords are based on plucking strings. A plectrum activates each individual string. The plucking submits to a wealth of parameters: in addition to strong or weak, the plectrum can hold on to the string, roll, twist and turn, bite, scratch, whip it, all variants that contribute to the tone.

The analogy is to the historian, whose position is akin to that of the modern instrument builder. He or she is unable to recapture the rich tone of the past, in its many-stranded fabric. The task resembles hauling water with a basket, to use a cruder metaphor.

Far from an ego-boosting adventure, this book is meant primarily for future historians of twentieth-century chemistry. They will be able to peruse it, not necessarily for the ostensible information about my times, more efficiently for implicit and revealing tidbits. And that is the value of this unjustly decried genre, the autobiography.

I submit mine in a spirit of modesty, not self-deprecation. I wrote it because the reading of autobiographies of scientists was an important part of my education and of espousing scientific research as my career, instead of other endeavors that were equally tempting, literature foremost. Which autobiographies?

I will cite only these: Benjamin Franklin's, Pierre-Gilles de Gennes's, Benoît Mandelbrot's, Laurent Schwartz's, and Jacques Friedel's. From each, I learned the virtue of being different and forging ahead.

In addition, prior to engaging in this exercise in frankness and memorization, I worked on portrait-drawing in words. At the time of writing, the early summer of 2020, I have penned and published the portraits of nearly 70 alumni of the French École polytechnique, all of whom had their training in the sciences and some of whom became scientists themselves.

How then can a single person help to preserve bits and pieces of the past? By contributing a tone of voice, maybe. Not shying away from one's singularity. Describing one's sights, encounters, and experiences.

Thus, I submit that personal histories may guide science history. By heeding such an axiomatic precept, I feel very much a product of my time, of the sixties when I became a member of the scientific community—a notion also from that time and worth reexamining. An injunction from that period was to make a contribution. Which is exactly what this book will strive for.

A feature of the sixties appealed to me and thus may feature predominantly in this memoir. An epistemology of combinatorials, which applied to both linguistics and chemistry—I will only mention at this point my published suggestion to teach chemistry as a language, which would help to tackle the exponential accumulation of chemical knowledge during the last century.

Why bother writing an autobiography? Assuredly not for self-glorification: science has lavished on me all kinds of rewards; I do not have a need to add to them. A more lasting note is to pass on the experience of rising to a variety of challenges. My take on the autobiographical foray is to stress the personal, in my case the permanent tension between science and the humanities, between chemistry and literary studies, between Hephaistos and Athena—to put it under the aegis of Greek gods. Let me note in passing, a point I probably will not have the time and space to elaborate further, the absurdity of keeping separate histories of art and of science. Regarding the latter, I witnessed the changing of the guard: a switch rather than a mere shift. In the past, historians of science had a dual training in science and in history. Double doctorates were not unusual. Such an exacting training has now been jettisoned. History of science has undergone a takeover by sociologists, some of whom are dropouts from scientific studies, even sometimes scientiphobes who blame science on the fallout from technology—the term technoscience is revealing—thus putting in the same disposable bag two developments characteristic of the past century, advancement of knowledge and consumerism. Which is axiologically wrong, akin to blaming philosophy for the political ills of today's world.

Why do we need history of science? What is good about it? The advancement of knowledge, far from being linear (Whig historiography), is replete with twists and turns. New departures are the norm. They originate from ideas, hence from people: yes, I am an idealist; Plato had it right. To chronicle these abrupt changes is the task of the science historian. The reward is archival work, very tedious as a rule but relieved by occasional bursts of life, which suddenly spring at you from yellowed documents.

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Family and Upbringing

1

I am the son of immigrants. I was born in Algiers in August 1938. Both my parents were Hungarian.

My father, François Laszlo (1907–1976) (in Hungarian, László Ferenc; in like manner to many among his contemporaries thus named in honor of Franz-Josef, then the beloved Emperor of Austria and Hungary) attended a secondary school run by the Piarist Fathers. He received top grades in every subject. He could even speak Latin! After graduation, he attended the Technical University in Budapest—the uppermost in the country—and obtained a degree in mechanical engineering (Fig. 1.1).

Throughout life, he remained proud of being an engineer. Whatever his position in R&D or business, his calling card simply read “François Laszlo, *ingénieur*.”

He complemented his degree with one year of additional training at the Politecnico, in Milano. After his return to Hungary, he was hired in a manufacture of harvesters. Because of the Depression this job lasted only for a year.

My grandparents gave him their savings to help find a job outside Hungary, then crippled economically. Algeria was his choice.

At the time, in 1930, it was a French colony. France had—maybe still has to a degree—a tradition of ignoring foreign degrees. My father was thus unable to work as an engineer. He had to work as a technician—at first to a vintner in Boufarik, the city where the softdrink Orangina was devised and first manufactured; later on as a draughtsman, in Algiers—he had to remain as such, at least formally, until after World War II, when he could return to the university in Grenoble and get a French degree (Fig. 1.2).

This was in 1946: my Dad qualified in a single year for both a BS in mathematics and an engineering degree in hydraulics. But I am getting ahead of my story.

I know less of my mother’s life, she died when I was 7, giving birth to my first brother. Named Madeleine Aczel (1910–1945) (Aczel Magda in Hungarian) she was younger than my father by three years. An only child, after attending the only secondary school in Budapest for girls, she supported herself doing free-lance work as a commercial correspondent, primarily in German. Her real interest, though,

Fig. 1.1 My father, François Laszlo, in the Thirties. Often, he was impeccably dressed. Photographer unknown, author's collection



was poetry. A devotee of Heine and Rilke in German, of Villon in French, she wrote poems in Hungarian.

She and my father dated when he was at the University in Budapest and before he spent a year in Italy. I do not know if they were formally engaged. In any case, as soon as he had settled in Boufarik, she joined him there—travelling by herself across half of Europe—she was very strong-willed. They were married a few weeks later, in November 1932. He was 25, she was 22. Soon afterwards, they moved to Algiers (Fig. 1.3).

Magda Laszlo then re-invented herself. Not as a French language poet, but as an Eastern European instructor in dance, more accurately in rhythmic gymnastics. My mother was very much influenced by the teachings of modern dancers and theorists such as Isadora Duncan (1877–1927) and Émile Jaques-Dalcroze (1865–1950). She opened a dance studio in our apartment in the center of Algiers. Soon, it was popular with French young ladies of the bourgeoisie and it raised the social status of my parents and made them a number of close friends: Pierre Goinard (1903–1981), a brain surgeon, and his wife Henriette Goinard (1909–1991), an intellectual in like manner to Magda (I was named after Dr. Goinard). In addition, my parents knew



Fig. 1.2 A house in Algiers, my father helped design and build. Photo by Henri Eichaker

Albert Camus (1913–1960), then a Communist and a journalist in the local newspaper *Alger Républicain*.

During the Thirties, my parents used their Central European contacts to provide intelligence to the French Army Deuxième Bureau, some officers of whom—one named Malgrat—became their friends. The information, I imagine, had to do with German war preparations.

From 1934 to 1938, François Laszlo worked for an architectural firm in Algiers. He designed a movie theater. He also filed for a patent on use of compressed reeds as a building component. Both these projects outgrew the architectural blueprints he was paid for.

Then, he changed jobs. He moved from an architectural firm to one specialized in hydraulics, specifically irrigation systems, a necessity in the hot Algerian climate. This company was a subsidiary of Neyret-Beylier-Picard-Pictet, based in Grenoble, in Continental France—a name later shortened to Neyrpic—mostly active in manufacturing turbines for hydroelectric plants.

Everything changed for our small family at the beginning of 1940, during the period known as the Phony War. The three of us moved in March 1940 from the safety of Algiers to the very relative safety of Grenoble. Why such a move, that brought us much closer to danger—and to near-starvation towards the end of the war?

The directorate at Neyrpic, a not very large family-owned company, asked this gifted young Hungarian engineer, whose salary was to them a bargain, to join the

Fig. 1.3 My mother Magda, in Algeria in the early Thirties (author's collection)



group of engineers in Grenoble. In addition, a conjecture on my part, the French intelligence officers in charge of François and Magda Laszlo may have ordered them to accept the invitation and continue their valuable intelligence work in France.

On that point, my father indeed continued during the Occupation years to provide intelligence to his *Deuxième Bureau* contacts. Moreover, he joined the Resistance network in Grenoble headed by a priest, known as Abbé Pierre (Henri Grouès, 1912–2007), involved in exfiltrating threatened Jews, children in particular, to the safety of neutral Switzerland. I have a recollection of witnessing the joyful relief of my parents after my father had escorted a Monsieur Simon across the Swiss border in Annemasse, during a week we spent in nearby Juffly-Fillings, in the Haute-Savoie.

My mother was also politically active. Grenoble had a manufacturing plant for artificial silk, using the Viscose process. This procedure had been first used in Hungary. Accordingly, Hungarian workers, females predominantly, had been imported for their familiarity with the tricky process. Magda Laszlo made it her task to unionize them and raise their political awareness.

What do I owe to my parents, culturally in addition to genetically? A whole lot. Being hardworking, with the example of my Dad throughout his life—he died in 1976 from a combination of deep depression and an unfortunate liver-destroying medical treatment.

Being bookish, Magda especially being very well-read, I have—and do not cherish—a recollection of her reading to me Schiller (1759–1805) in the original German, I was only 5 or 6. What an ordeal! I was attentive, as she had ordered me to, but could not understand a thing.

Her favorite French writer was the pacifist Romain Rolland (1866–1944), who introduced her to the Indian poet Rabindranath Tagore (1861–1941). My parents would collect me from school, on Saturdays at 4 in the afternoon, for a cherished small ritual: first, in a bookstore where they would buy me a book, any book of my choice; and second to a pastry shop, where I could be gratified in like manner.

As already mentioned, my mother died in June 1945, when I was not quite 7. I vividly recall the harsh gymnastic exercises she was tutoring me through every morning until then. As a consequence of her death, not only were they discontinued but in addition my body underwent a silent protest, I became very stiff for the rest of my life while also inheriting the bad back both my parents suffered from!

While never saying so explicitly, my father projected to me the literary skills of my mother. In his eyes, I had inherited them. I did my best to own up to these expectations. This went with another outstanding characteristic of his personality: to him I was an individual, worthy of respect for my differences—not simply an extension of his.

My parents of course spoke Hungarian to one another—but only French to me, wanting me to be well inserted into their chosen new country. Accordingly, I never knew Hungarian and was never able to speak it fluently. However, having it heard it being spoken, with my brain unwittingly trying to make sense of the foreign words, gave me something of an ability: I am good at languages. Linguistics have always fascinated me.

My mother's untimely death—she was only 34—led to my father being an amazing parent, he somehow managed to being in his affection and care both father and mother. In one respect, her death led to a radical switch. She had raised me very much as a daughter. Blond with blue eyes, I wore curls until aged about 4. Prior to her death, I had attended *Lycée de filles*: a small group of boys, about 10, in a whole class of girls, about 30. She feared for me the brutality of boys. In October 1945, I started attending *Lycée de garçons*.

I owe to my father another asset: this is the "*François Laszlo, ingénieur*" feature of self-assertion, of not being intimidated by titles or positions of prestige. I have never shied away from addressing anyone and, conversely, I have seldom been guilty of pulling rank. Being just myself is my anchor and pedestal both.

Let me return here to my Dad lacking a French degree. In 1946, with an intervention from Abbé Pierre who had become a representative in the National Assembly, he gained French citizenship. He enrolled at the University in Grenoble and within a year earned a BS in mathematics—and was tempted to go on and

become an academic—and an engineering degree in hydraulics. Thus, at long last, his take-home salary was commensurate with his contributions to the Neyrpic plant.

He then remarried, with another Hungarian lady, Fodor Ella (1913–1999). She had a daughter, six years younger than I and had lost her husband in the war. She was amazing in her generosity and warmth. She managed to build a genuine family out of scraps, so to say: her daughter Ilona (b 1944), myself and my brother Jean-François (b 1945), plus my other brother Jean-Louis, born to them in 1954.

I owe her, most of all, my love of classical music. She was a very good amateur pianist. Through her, I gained a deep-rooted admiration of Bach. In my early teen years, I vividly recall my listening repeatedly to the Wanda Landowska's (1879–1959) recordings—among the first LPs—of the “Well-Tempered Clavier” on the harpsichord. Later on, she and I communed likewise in admiration for another genius of the keyboard, Glenn Gould (1932–1982).

What my three parents taught me, in addition to love of music and literature, to not being intimidated by numbers and equations? Self-worth, as already pointed at. Hence, fierce individualism. As wrote Henri Michaux, “*Qui chante en groupe mettra lorsqu’on le lui demandera son frère en prison*” (Who sings in a group, when asked, will put his brother in jail). The power of imagination, of conceiving personal projects and following through on the idea. My father made a recommendation, followed gratefully: when you have completed a chapter of study, before turning to the next, publish a book on it. Which I am doing here, now that I have reached 80. What will the next chapter consist of, I wonder!



Luck in life is a gift from the Gods. I am a lucky person. As part of my luck, I had outstanding teachers.

The first was Mademoiselle Guillet, in kindergarten, which I attended at *École maternelle de la Bajatière* in Grenoble for two or three months in the spring of 1944. Why was she memorable? She was utterly unconventional—I submit one of the marks of a great teacher. She taught us how to write, not with a pencil, not with a pen—the then ubiquitous *porte-plume*, pen holder that you dipped into an inkwell. She taught us to write with a paintbrush, in the manner of Chinese or Japanese calligraphers. The ability thus gained stayed with me. It is so important to write very legibly, so that going through one's lecture notes is made easier, a talent that became precious much later on, when I attended *classe préparatoire* (more on that later).

Another admirable feature of Mademoiselle Guillet was her ability at improvisation. One morning, for instance, she declared: "we won't have class today. There are *hannetons* (May beetles) in the courtyard. Come along, we'll look at them." And she launched into biology, pointing us to what to observe in those insects—now more or less extinct due to pesticides, making them a sight of the past.

After the schoolyear was over, in mid-July 1944, when I was a little short of six, my parents then entrusted me to her care for tutorials. She did it out of generosity, not for money; and taught me how to read, in less than a month. The universe of books, henceforth, was mine. My ability to read made me skip first grade, I entered *dixième* (second grade) in the fall of 1944.

I'll jump now to Monsieur Guittard, who taught the *huitième* (4th grade), in 1946–47, at Lycée Champollion, the secondary school for boys in Grenoble. In those years, all the teachers there were men. A lady might show up, exceptionally and very briefly, when there was no other option.

In any case, Guittard exuded competence and the joy of knowledge. I idolized him. He taught most of the subjects, French, arithmetic, history and geography, etc. He also introduced a light dose of science, using a *leçon de choses* book: each of the topics was given a double page, with a narrative, a picture and a summary meant to be memorized.

There was an incident that year I was involved in. I went back home from the school shattered and sobbing. I had received a grade of zero on a test. My father went to the school to investigate. The teacher was convinced that I had cheated, since my paper was 100 percent identical with the material in the book. Fortunately, my Dad was able to convince him that it was utterly consistent with my excellent memory.

Monsieur Guittard had a highly beneficial influence on me. In the aftermath of my mother's death, no doubt as a consequence, I started stuttering badly. My father signed me up for afterschool tutorials with Monsieur Guittard. After a few such sessions, the problem disappeared. Monsieur Guittard must have told me things to boost my self-confidence.

Was I lucky again with Monsieur Francès (1904–1984), who taught mathematics in classe de *sixième* (6th grade) during the 1948–1949 year, also at Lycée Champollion. He was a phenomenon, a force of nature, a born teacher and a lover of astronomy.

He was a big man, a colossus. Grenoble is in a rugby-playing region and he belonged to a rugby team. His physical strength was legendary. Was it mythical? He had the reputation of having bodily carried out of the classroom and thrown out a miscreant pupil; I don't believe it was a tall tale.

I vividly recall indeed a ploy of his that, we the students, rejoiced in setting up. We would remove his chair from behind the desk and set it at a distance, by the door. The break over, he would reenter the classroom, grab the chair gingerly from its back, hold it horizontally with his fingers, carry it in this manner and delicately set it down again behind the desk.

But he was also a born teacher. He loved maths and he had a talent for conveying his enthusiasm for the subject. Moreover, he rejoiced in teaching fresh minds in the very first year of secondary school. I'll mention him again in this narrative.

My first inkling of chemistry came a year or two later from our biology teacher, Monsieur Bertrand. Irascible and grumpy, his one redeeming feature was his geology avocation, that he shared with his students. He must have been a devoted amateur mineralogist. When he mentioned that hobby, he became illuminated from the sheer beauty of the stones he had unearthed and studied. Later reading some of Ernst Jünger's writings, I was struck by this common vein with Bertrand's lecturing digressions. Bertrand even attempted explaining to us the chemistry involved in the colors of minerals.

Aged 12, I accompanied my father when he was sent to Brazil by the Neyrpic company—setting dams on the Rhône river had completed the French hydroelectric infrastructure. He had the mission of exploring Latin America for potential new markets. A few months later, the rest of the family followed. During the fall of 1951, I was at Lycée Pasteur in São Paulo. I completed there the *troisième* (ninth grade) in a couple of months.

Following which, after we had moved to Rio de Janeiro, I attended there the *Liceu franco-brasileiro*, in the Laranjeiras district. During our first year in Rio, I was in *première* (tenth grade). All our classes, except for the Portuguese language, were taught in French.

Some of the teachers were very good. One was exceptional, Senhor Bahiana, who taught us chemistry. For a Brazilian, his name was rather short, Henrique de Paula Bahiana.

A mention in passing: his brother-in-law, Georges Neu (1909–1995) taught us physics. Georges Neu was an alumnus of *École polytechnique*. He graduated in 1930. His younger brother Charles Neu (1914–2000) also attended *École polytechnique* and graduated in 1935 in the *Corps du Génie Maritime* (naval engineering). This may explain Georges's visit to Brazil, where he fell in love with and married in 1938 Maria Alicia de Cunha Bahiana. Georges Neu was an excellent physics teacher. I recall his presentation of geometrical optics, including a very didactic description of how a *cataphote* (retroreflector) works.

But I want to emphasize here my introduction to chemistry, thanks to Professor Bahiana. He taught, at Liceu Franco-Brasileiro, in a small amphitheater lecture room, outfitted with a demonstration bench and a hood.

Seating arrangement in this classroom was not optional. Professor Bahiana had the girls in the class sit in the front—starting at Lycée Pasteur in São Paulo, the classes I attended had both boys and girls—and the boys behind them. The sitting rows were separated from the rostrum by a railing.

After a couple of lectures, Professor Bahiana made me sit on the other side of the railing at a desk, smaller than his. He gave me a dual assigned task. I had to equilibrate, i.e., set the correct coefficients, the chemical equations he wrote on the blackboard. Plus I was his assistant in the demonstrations.

Which was a source of great tension (and huge fun). He instructed me as they began. He had a vantage point, the threshold to the door into the classroom: a single step would ensure his safety in the courtyard, should the worst occur.

Meanwhile, I would go on preparing a mix and transferring stuff into flasks. In doing so, I had a dilemma, the Professor was issuing instructions from his distant location and my classmates, who yearned for a gigantic pyrotechnic show, whispered to me to double the amounts in order to create a fiercer explosion!

All in all, I learned quite a bit of experimental chemistry—and I held on to all ten fingers. Professor Bahiana may have been shy about running demonstrations himself, but he was quite a wizard on practical matters: he taught us for instance how to fake sparkling wine with tartaric acid and gave us the recipe for Berthollet's powder (sugar and potassium chlorate, to which I shall return). Plus, he did not fail to teach us rudiments in the history of chemistry. Fluent in French, masterly in teaching imaginatively, this Brazilian gentleman had a powerful intuition: how else account for his choosing me to be his assistant? Truly, he was a great teacher.

During the winter of 1953, we returned to Grenoble. Reneging on his promise of a one-month vacation in Mégève, a mountain resort, my father enrolled me in January 1954 in the already started (in October) final year of secondary school, again at Lycée Champollion. Only 15, I was not set on a definite career. My parents pushed for me to become either a physician or a banker, neither of which appealed to me. The section I attended was *Sciences Expérimentales*, that prepared to medical school. Lucky guy that I am, the maths teacher was again Monsieur Francès. In early summer of 1954, I graduated from the *lycée*.

Into what, I had no idea. I was seduced by two very distinct courses, both preparing for the entrance examination to the *École normale supérieure*, either in philosophy and literature, or in the sciences. Both would entail attending a *classe préparatoire*—*prépa* for short—, offered at Lycée Champollion. In France, the system of *prépas* is parallel to the universities, at a higher level of difficulty. A comparison, but not wholly adequate, is with liberal arts colleges in the US.

Upon telling my Dad about both this goal and my undecidedness, he said, “let’s go and talk to the head at Lycée Champollion.” This person, Raymond Schiltz (1902–1984), recommended the sciences option; for which, my training in maths being too weak, I would have to do again the final grade of school, in the section known as *Mathématiques élémentaires*. It was taught, in maths, by Monsieur Francès (1904–1984)—a fact which weighed in my enthusiastic acceptance of the suggestion.

And indeed the material he taught was almost totally new to me: trigonometry and spherical trigonometry, algebra, classical geometry in both the plane and three dimensional space, derivatives and integrals, some elementary number theory, logarithms, . . .

In addition, Monsieur Francès felt free to tell us at some length of his avocation, navigation and astronomy. He taught us about the planet: longitude and latitude, their determination; time zones and the dateline; great circles and *loxodromie* (rhumb line). And he proceeded to teach also about stars and the solar system. Once again, he was just great.

After I passed again, rather easily, the graduating exam of *baccalauréat*, a normal course of study would have had me attending a *prépa* known as *Mathématiques supérieures*, also at Lycée Champollion.

It entailed studying descriptive geometry. Which in turn demanded skill in drawing for which I was utterly lacking—perhaps in reaction to my father being so good at it, after having been compelled to be a draughtsman as well as an engineer for a quarter of a century.

Once again my Dad deferred to my wishes. He pulled a stunt, finding the only *prépa* in the whole of France that lacked descriptive geometry in its cursus. It existed in Paris, at the Lycée Saint-Louis, and was known as *Normale Sciences Expérimentales*—NSE for short. Its function was to recruit future naturalists into the *École normale supérieure*. The covert—never mentioned explicitly—formula of NSE was to match the best French students with the best French science educators: no wonder if most of us (90%?) became university professors!

The encyclopaedic format of NSE consisted basically of three subjects, maths, physics/chemistry and biology. These were taught by Chazal, a Bourbaki mathematician, Privault who taught us botany and zoology, and Deluchat for physics and chemistry. All three were graduates from *École normale supérieure* (ENS). All three taught their science as it had become by the first World War, i.e., basically the big corpus the nineteenth century had assembled.

I shall delve into Deluchat’s teaching because it was truly admirable, a jewel. René Deluchat entered ENS in 1923, from Lycée Jules Ferry in Limoges, where he captained the rugby team—an avocation he continued at the ENS. There, he came

under the spell of physics, as taught by Georges Bruhat and embodied in several of his monographs; his favorite in physics was thermodynamics. He also became close friend at that time with the writer Jean Prévost (1901–1944), who had entered the ENS in 1919 and who would become a hero in the French Resistance during Occupation by the Germans.

While at the ENS, Deluchat—a workaholic—came under the spell of chemistry as well. He achieved a doctorate in that subject, preparing novel acetylenic derivatives, under the guidance of Robert Lespieau (1864–1947).

After his certification from the *agrégation* (a top level examination for teachers) he taught secondary school in several small cities, Pontivy, Vendôme and Chartres (one year in each), prior to being appointed in Paris, at the *prépa* in Lycée Buffon. He began teaching physics and chemistry at NSE in the fall of 1952.

What was remarkable about his teaching? Briefly: clarity, beauty of expression, wit and a sense of drama. He taught chemistry not from the outside as a physicist, then the norm, but from inside. In addition, he prided himself and we hugely benefited from him running the chemistry laboratory sessions. He loved handiwork and tinkering and it showed.

A word in passing about Professor Deluchat indulging an idiosyncrasy of mine. During the lab sessions, in-between experiments, I would make chemograms by mixing chemicals on a piece of filter paper and admiring the resulting color mix. I even toyed with the idea of making a career of it—this was the time of Abstract Expressionism. Deluchat knew what I was doing, it was completely foreign to the curriculum but he nevertheless indulged this fancy of mine.

I should add Madame Barberon to even a short list of teachers who strongly influenced me. She was a secondary school teacher and I served a one-month internship in her classroom at the Camille Sée Lycée in Paris. She had a forceful presence and a commanding voice: I vividly recall her commenting after my first lecture in her class, “you are like all beginners, you don’t know how to set your voice.” She was extremely liberal, giving me total freedom in the material I presented. Which included a practical demonstration of conservation of rotational momentum, which I explained to the students was applicable to making a skiing turn. The students at Camille Sée were only girls.

The same year 1961 as that internship, I attended the classes in mathematical methods of physics (MMP) taught by the great mathematician (Fields medalist), Laurent Schwartz (1915–2002). In addition, he was a born teacher: lively, with an arresting presence, a virtuoso in presenting most simply very complex material. My recollection of MMP is colored by a rather dramatic failure of mine. During the mid-term exam, I was among the very few to succeed in solving the problem and getting a good grade. However, even though the final exam was of exactly the same type, I failed miserably at it.

The last teacher I shall mention here was Paul Schleyer (1930–2014), whose graduate course in organic reaction mechanisms I studiously audited at Princeton in 1962–63. What was outstanding about it was the amazing extent of the attendant bibliography. Paul had read everything pertaining to the subject matter, which he presented both clearly and forcefully.

If I became a scientist and a chemist, a teacher as well, I owe it to the remarkable men and women described in this chapter. What, in my opinion, then contributes to the make-up of a great educator? An unconventional mindset, capable of maintaining the attention of students. The uncanny ability to self-project. A voice that somehow connects inside the mind of students. A charismatic personality, that induces admiration—creating the desire in students to raise themselves to the expectations of the teacher, however high.



Premises from Childhood and Adolescence

3

Georges Bernanos (1888–1948) wrote "*Si je recommençais ma vie je tâcherais de faire mes rêves encore plus grands; parce que la vie est infiniment plus belle et plus grande que je n'avais cru, même en rêve.*" (If I had to start my life over I would strive to make my dreams yet bigger; because life is infinitely more beautiful and greater than I have ever believed, even in dreaming).

My whole being agrees. Moreover, Bernanos forcefully insisted that we need to connect or to reconnect with *l'esprit d'enfance*—the childhood mind or spirit, a French expression whose translation does not convey the full meaning. This chapter details how my life as a scientist has its roots in childhood and adolescence.

I stood apart from many other children in one respect, from Denise in particular: she and I lived in Grenoble across the street from one another and were best friends from age 4 or 5 and still are. She loved vacations and I loved school, biding my time during vacations, when learning was suspended, yearning that I was for school to resume.

Not that I did not adore play and being playful, another trait I owe to my father. Even though he was often introspective and sad, he had a superb sense of the feast, the festival, the joyful festivity.

Denise and I played together a lot. I recall games of hide and seek, hopscotch, showing off in costumes, riddles, newspaper and magazine competitions (we won one together), etc. With other children, we would engage in cops and robbers, in its numerous variants—of course opting for the outlaws side (Fig. 3.1).

My experience of chess is minimal and I suspect I would have been poor at it. French children play *jeu de l'oie*, a favorite of mine: a dice throw determines one's position on a circuit dotted with traps. The first player to complete it wins the game. My initiation into golf, years later, took place of all courses in St. Andrews, Scotland. The analogy to *jeu de l'oie* became there obvious to me. Both are metaphorical for life, with its traps—such as nowadays electronic gadgets, social networks, addictions—and the attendant disappointments.

The quest for the advancement of knowledge is no laughing matter but an admirable endeavor. Science is also play—a point I have expanded on in the



Fig. 3.1 Denise Jacquemin, my lifelong and oldest friend, since early childhood,. A daring person as this picture, from a climb in the Vercors range, eloquently shows. Now retired, she was a professor at the Université Stendhal, Grenoble, in linguistics (permissions in process)

American Scientist monthly. Words are revealing. In French, “to play” translates as *s’amuser*, the converse of *muser*, with the meaning of “being idle.” The *muser* verb is a cognate of *museau*, “muzzle” in English; it referred originally to a buck sniffing for a doe in heat. From the contrast between work and play, earning one’s living or indulging in sex, in French it acquired the less graphic meaning of idleness. Science is thus a hybrid activity, being both work and play.

But back to my childhood. At first, reading children books, I was fond of funny characters, such as General Dourakine in the Comtesse de Ségur novel of that name, or the grumpy and gouty grand-dad in *Little lord Fauntleroy*. I loved *Savant Cosinus*, *Sapeur Camember* and *Famille Fenouillard*, three illustrated books—they pioneered comics in the 1890s—authored under the pseudonym Christophe by a leading French botanist, Georges Colomb (1856–1945). They were great fun.

But I came especially under the spell of Jules Verne (1828–1905) and his *Voyages Extraordinaires* series of novels. They fleshed out the maths and sciences from school. For instance, what Monsieur Francès taught about time zones and the dateline came alive in *Around the World in 80 Days*; his explanation of longitude and latitude, of the skills of navigation using a sextant and a clock, were embodied in *The Children of Captain Grant*, a story of children looking for their stranded father around the globe, along a whole parallel. I admired geographical exploration and

explorers: Roald Amundsen (1872–1928), Frijtdorf Nansen (1831–1930), Jean-Baptiste Charcot (1867–1936) and his doomed “Pourquoi-Pas?” boat.

Physics-wise, Jules Verne was a precursor: the concept of black holes occurs in the above-mentioned *Children of Captain Grant*; their worldwide quest can be argued to occur in a time-space continuum, anticipating upon Einstein’s relativity, which Laurent Schwartz (1915–2002) admirably explained in his “Mathematical models in physics” classes. Chemistry-wise, Jules Verne was very much taken with nitrocellulose as a burning powder and explosive, also with its use as collodion for bandaging wounds, etc.

My joint vacations with Denise took place in a village, Colombe, about a one-hour drive from Grenoble. A cousin of her mother, Madeleine Thuillier (1908–1981), owned a farm there. We would typically spend summer months on this farm. The house was a dilapidated former castle-mansion, complete with the remnants of a watchtower. It was set on a hillside in the so-called *Terres Froides* area, in-between Grenoble and Lyon. I cherish my recollections, not only of games with Denise, also harvests in the scorching summer sun, the harvester coming to the farm to process wheat, the huge ensuing meal for all the gathered hands, grape harvesting as the summer waned, our following the adventures of a detective in a Catholic weekly magazine . . . (Fig. 3.2)

Multi-varied life on the farm had remained stable for centuries. I term myself very lucky to have experienced it, with its long-gone features, such as male and female tramps roaming the countryside and being welcome guests at our lunch table; attending the huge centuries-old nearby Beaucroissant fair; Madeleine making her own butter, her own cheeses; impressive delirium tremens crises of Rémy Thuillier (1893–1949) her alcoholic brother; her devotion at the local Catholic church; impassioned Easter time sermons by a Franciscan monk; Denise and I looking after the grazing cows and milking them; hunting a cow who had escaped into the woods to give birth; witnessing the bull on the farm impregnating cows brought to him by other farmers from Colombe or nearby villages; goats and the hostile geese on the property; and so on and so on.

Another experience would prove to be seminal to my activities as a chemist, much later. There was, a stone throw from the farm, a small clay pit in a sunken lane. Denise and I would gather some clay, marvel at its plasticity, mold it into small artefacts—typically earthen pots and dishes—and sun-dry them. The *Terres Froides*—the Cold Dictirict—owed their name to the soil being rich in clay. Clay swelling makes it retain considerable amounts of rainwater, slow to evaporate given the impermeability of the soil, that accordingly remains colder and for a longer time than in neighboring areas. Hence the harsher winters characteristic of *Terres Froides*.

I shall return in this chapter to this acquaintance with clays. I’ll turn now to another important step in my becoming a scientist. This was my acquisition of English.

During the same period of the late 1940s as my stays in Colombe together with Denise, I started taking vacations, summer ones typically, in England—to be more precise, in Southwell, a little city in Nottinghamshire. I was hosted there by the

Fig. 3.2 Denise and I,
ca. 1943



Bramwells. My parents had signed me up for an exchange program with an English family. The Bramwells consisted of Nellie the wife, Austin the husband and Katherine the daughter. Katherine was older than I by a year or two. She came only once to Grenoble, as she had no interest in learning French. But her parents took a liking to me and I to them. They were my English foster parents, I was calling them indeed Mummy and Daddy.

Austin ran a shoe store on the main street of Southwell, at 30 King Street, with the house in the back. He also made shoe repairs in a small attached shed. Nellie assisted him in the shop. They were terrific hosts, very generous and loving, intent upon helping me discover England and showing me around: the sights in London, the Minster cathedral in Southwell, the steel works in Sheffield, Shakespeareana in Stratford-upon-Avon, the Lincoln cathedral, the seashore at Skegness, etc.

England at that time still utterly differed from France. The food was totally new to me. The English were still under post-war rationing. Daily life had a different content, in the type of meals, their schedule, work and play activities. The townscape itself was made of sights novel to me, whether fish- and-chips stores, newsagents, the huge red mailboxes or yet a bowling green. The social structure enforced strict separation between the middle class (to which the Bramwells belonged) and either

the lower middle class or the upper class. Needless to say, about to see Elizabeth's crowning, I became fascinated with the British monarchy.

Yet another difference struck me, the British tolerance and even fondness for eccentricity. French society by comparison was much more uniform and stifling. The Bramwells were such an example: Nellie and Austin were archers. I accompanied them to competitions. Their bows were much too stiff for me to handle though, one had to be very strong to use them. Robin Hood was their patron saint. I was taken, in nearby Sherwood Forest, to the so-called Robin Hood oak-tree.

To them, darts complemented archery: every evening, we repaired to the shoe store, hung a dartboard and had a go at it. Most of the time, Austin, with a good eye and a very accurate throw, won.

I was something of a curiosity in Southwell as the only foreigner. Circumstances for my learning the English language could not have been better, it was total immersion. I opened up totally to that extremely different culture. The language was challenging, the spelling of a word does not imply its pronunciation. But I was fortunate with a good memory to draw on. During my second stay with the Bramwells, the following year, I suddenly realized one day I had started to both think and dream in English.

This was a precious acquisition: I entered the scientific community in the Sixties, when English was the lingua franca and leaders in my field of chemistry were all Anglophones.

The Bramwells did not speak any foreign language. They were representative in that of the British.

I discovered television at the Bramwells, which helped my English. The BBC still enjoyed a monopoly. It showed the fascinating to me game of Twenty Questions: a panel had to identify some object from so many questions. Some targets were exotic and recondite. The example I recall—I was flabbergasted they managed to identify it—was "a blotch on the escutcheon!" Twenty Questions introduced me to what being a scientist entailed: a wide-ranging curiosity, finding the most revealing questions to be asking, building in one's mind the most appropriate evolving picture from the answers. And of course being playful and creative.

Other key experiences prepared me, between ages of 8 and 18, to becoming a scientist. One was reading the monthly magazine *La Houille Blanche* in my father's line of work. I was fond of it because of a single feature by a so-called Professeur Cyprien Leborgne—an anagram to Neyrpic Grenoble. The pseudonym belonged to Pierre Danel (1902–1966). A graduate from *École Centrale*, he headed the small group of engineers at Neyrpic, to which my father belonged (in spite of being paid as a draughtsman). My father termed Danel a genius. He was a scientist amongst the engineers, he could have made a career as a successful academic.

Why did I like so much his chronicles in *La Houille Blanche*? Entitled "*Miscellanées*," they belonged to *science amusante*, they were whimsical and witty—to me a joy. Examples were:

1. A marble sarcophagus, resting on the ground on two small blocks, with a lid itself in marble, is the seat of a curious phenomenon: water gathers there, practically pure and