



ELSEVIER

Contents lists available at ScienceDirect

Molecular Aspects of Medicine

journal homepage: www.elsevier.com/locate/mam

Review

How I became a biochemist
For Bill Whelan's Festschrift

Edmond H. Fischer *

Department of Biochemistry, University of Washington, Box 357350, Seattle, WA 98195, USA

ARTICLE INFO

Article history:

Received 2 July 2015

Accepted 2 July 2015

Available online

People have often asked me what attracted me toward science. Well, in truth, I never asked myself that question. I never thought about it in those terms. I went into science because I just liked it. I thought it was exciting, but I never tried to rationalize why. In retrospect, I probably would say that I was attracted by all the things that science had taught us about us as human beings, about the world that surrounds us. All the knowledge it had given us over the centuries. And for this reason, I'm interested in just about any aspect, any field of science. Not that I'm knowledgeable about them, not by a very long shot. But I'm just curious about what's happening around us, about what's going on in science. Mostly about all the things we don't know, the puzzles and great mysteries of science that have not yet been solved, but will.

As to what attracted me toward scientific research, I believe it is the systematic way one has to proceed. The kind of logic one has to apply to solve a given problem. Science builds on science, where every result obtained suggests a number of questions, and every question asked suggest the next experiment, never knowing when the next big breakthrough will occur. The fact that one cannot order at will a great discovery, or "buy" it at any cost, because there is no way of predicting when and from where it will come. That if one knows where to start from on a research project, one never knows where one will end up.

I became interested in science really quite early, in fact, when I was 14 or 15, in the mid thirties. I had read a couple of books such as de Kruif's *Microbe Hunters*, about people like Robert Koch, Ignaz Semmelweis, and, very particularly Louis Pasteur for whom I had an immense admiration. He and his collaborators were those who had discovered the plague and leprosy bacilli. They had shown that plague was transmitted by fleas, typhus by lice and malaria by mosquitos. They had produced the first vaccine against rabies and anthrax. He and his collaborators had also done extensive work on tuberculosis and because my father had tuberculosis, I wanted to become a bacteriologist, dreaming, of course, to find a cure for this dreaded disease. Unfortunately, my father who was a chain smoker died of TB in 1941 well before I could even enter the field.

For my 16th birthday in 1936, I had asked my parents for a microscope. They lived in Shanghai, China, where I was born. So they asked my oldest brother who was 7 years older than me and was studying at the Swiss Federal Institute of Technology in Zürich to buy one for me. I expected to receive the usual ordinary play instrument, but no. From the School's thrift shop, he got a superb old Leitz microscope, a real professional instrument with 4 oculars and 3 lenses including one of the most powerful immersion lenses available at that time. So, armed with this incredible machine, and together with my very best friend Wilfried Haudenschild who loved to tinker with instruments, we thought we could solve all the problems of the world. For what would correspond to 4 dollars a month, we succeeded in renting a room in an attic which we converted into a "laboratory". Ours even had a window, which was a luxury.

* Department of Biochemistry, University of Washington, Box 357350, Seattle, WA 98195, USA. Tel.: +12065237372.

E-mail address: efischer@u.washington.edu.

<http://dx.doi.org/10.1016/j.mam.2015.07.002>

0098-2997/© 2015 Published by Elsevier Ltd.

I won't dwell on the "research projects"(?!) we undertook. Suffice it to say that, among these, we wanted to work on viruses. Of course, we knew nothing about nothing and certainly nothing about viruses other than they required a living system in which to grow. But then, it should be remembered that in those days before WWII, one knew not much about viruses. Genes and genetic information were thought to reside in proteins, and nucleic acids were considered bizarre, essentially inert biological materials. So we wondered if we could find ways to grow viruses in a cell-free system. For that purpose, we even succeeded in buying a second-hand, old but professional autoclave and built ourselves a bacteriological incubator with sheets of asbestos.

Our main project was triggered by a talk that was given at the Aula of the University. The newspaper had announced with great fanfare that the famous Russian biologist Alexander Gurwitsch would speak about "Mitogenetic Rays" which he claimed to have discovered. By pointing horizontally the tip of the root of an onion (or of a lily) close to the vertical root of another onion, he saw under the microscope a 20% increase in cell division in the targetted area. Inserting a glass slide between the two roots blocked the effect, but not a quartz slide, from which he deduced that what he called "biophotons" were generated in the ultraviolet range of the spectrum. We were fascinated by his talk. For two naïve and totally clueless seventeen year olds, it was a revelation. A sort of epiphany; the solution to our problem. We were sure that Gurwitsch's biophotons were the missing element required for viruses to grow *in vitro*. Could one grow viruses in a cell free system by showering them with mitogenetic rays?

Now, which virus to work on? According to the extensive book by Calmette – Guérin entitled "Le Bacille de la Tuberculose" which I had bought a couple of years earlier at one of the book stalls along the left shores of the river Seine in Paris (I had also bought for essentially nothing the original book by d'Hérelle entitled "Le Bactériophage"), someone had claimed that the tubercle bacillus might contain "un principe filtrant". Some kind of virus-like particles that would pass through porous ceramic filters called "Bougies Chamberland" that would retain all bacteria, but from which they could sometimes regenerate TB bacilli. Could mitogenetic rays trigger/activate that process? Of course, there was no way we could work with pathogenic TB bacteria but we found out that non-pathogenic "pseudotuberculosis Mycobacteria" also existed. So we decided to write to the Institut Pasteur in Paris to ask if they could provide us with some, even though we suspected that they would never send anything to two unknown private individuals. So we had some paper printed with the grandiose letterhead of "Academie de Bactériologie et de Chimie" (we called our lab l'ABC) and sent the letter off. We were quite sure that we would never hear from the IP but to our total amazement, we did receive a couple of weeks later two test-tubes containing two strains of non-pathogenic pseudotuberculosis bacteria grown on a solid agar medium: *Mycobacterium phlei* and *M. agri*. We also needed quartz test tube that would allow uv rays to go through, and got two from Iena. So we grew the bacteria in different liquid media that we had dug out from some bacteriological treatise; filtered the cultures through our Bougies Chamberland;

collected the filtrates in our quartz test-tubes and stuck them in a very actively fermenting culture of Backers Yeast which, we thought, had to shower our test-tubes with massive doses of mitogenetic rays. We used a variety of conditions, but absolutely nothing grew. Of course, it was an ill-conceived and stupid experiment because any negative result wouldn't tell us whether there was no "principe filtrant" or no "mitogenetic rays". As it turned out, it soon became evident that neither viral-like particles derived from TB bacilli nor mitogenetic rays ever existed. In spite of the fact that in 1941, Gurwitsch was awarded the Stalin prize for his discovery of mitogenetic rays, his studies rapidly fell into disrepute to the extent that the Nobel laureate Irving Langmuir dubbed them as "pathological science".

While we had an enormous amount of fun with that project and a couple of other ones, we soon realized that we were getting over our heads playing with bacteria. So, in desperation and as a last resort, we sought the advice of our Collège Calvin biology teacher Mr. Minod, a botanist whom we respected very much. When he heard our story, he hit the ceiling and practically entered into cardiac arrest. No, No, No! he shouted. You have to put an immediate end to all that nonsense, to all you are doing, and go speak with Professor Fernand Chodat, Chairman of Bacteriology at the University of Geneva. So there we went to see him, unannounced, going as if we were going to the dentist, or more like sheep marching to the slaughterhouse. We were certain that he would either refuse to see us, or if he did, he would simply kick out of his office those two crazy kids. But miraculously, he took us in, and sitting us in front of his desk, he listened to our long story without saying a word though, once in a while, he would shake his head and roll his eyes to the sky. When we were through, he still remained silent for such a long moment that we began to get worried. But then, finally, shaking his head a last time, he said: "Tell you what. It's the end of the school year and summer vacation is upon us. If you want, I'll give you a bench in the lab and we'll have you go through the bacteriology lab course we give to medical students". We couldn't believe our ears. We were absolutely dumbfounded, stunned and, of course, elated. For us, for the first time, we would have a chance to work in a real professional laboratory. His chief assistant Martin, a tall fellow in his upper forties, was really amused to see those two weird kids dying to spend most of the summer in a large empty lab. He took us under his wings and had us go through all the procedures and manipulations we were supposed to go through. For us, it was an unconditional paradise.

This summer has always been one of our brightest and most exciting memories, to such an extent that we remained totally oblivious to the darkening clouds that accumulated at the horizon. Indeed, as the summer ended, on September 1, 1939 at 4:30 am, the Swiss radio announced that WWII had exploded.

September 1 was also the day one had to register at the University and declare to the secretary Mr. Blanc what studies one wanted to engage in. Since I wanted to become a bacteriologist, I had asked Professor Chodat how I should best proceed. I'll always remember what he told me. He said: "You know, if you really want to become a research bacteriologist, you should study chemistry first because nowadays,

Download English Version:

<https://daneshyari.com/en/article/1995588>

Download Persian Version:

<https://daneshyari.com/article/1995588>

[Daneshyari.com](https://daneshyari.com)