Interview



Professor Matthieu Tubino, a researcher with a long academic career and strong humanist profile, exposed his ideas and memories to BrJAC

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Matthieu Tubino has been a professor at the Institute of Chemistry of the University of Campinas (Unicamp) since 1971. He began his teaching career as an Instructor MS-1 (level 1 university professor) and attained the position of Full Professor (MS-6). He graduated from the University of São Paulo with a degree in chemistry and holds master's and doctorate degrees from Unicamp and a postdoctoral degree from the Institut de "Chimie Minérale et Analytique" of the Université de Lausanne, Switzerland. His chemistry background covers the areas of chemical reaction kinetics, reaction mechanisms, qualitative and quantitative spot test analysis, flow injection analysis, ultraviolet–visible diffuse reflective chemical analysis, the development of experiments for chemistry teaching, and analytical methods for application in industrial matrices, including biodiesel and raw materials.

Dr. Tubino has been honored with several awards, such as the "Peróxidos do Brasil" award in 1989, 1997, and 1998; the "Governador do Estado" award, offered by the Secretariat of Science and Technology of the State of São Paulo, Brazil, in 1990; the Fritz Feigl award, offered by the Regional Chemistry Council, IV Region, in 2007; and the Honorable Mention for Licensed Technology award and the Inventors Award by the Inova Unicamp Innovation Agency in 2010.

What early influences encouraged you to study science? Did you have any influencers, such as a teacher?

My interest in chemistry came when I was about 13 because of my curiosity to understand the properties of matter and its transformations. Also, the fact that I had excellent chemistry and physics teachers in secondary school motivated me further toward choosing a science profession, in this case, chemistry. As for the professional quality of my secondary school science teachers, I should add that they were all graduates of the University of São Paulo (USP), which is a public university and a top university in Brazil.

How was the beginning of your career in chemistry?

When I was in the fourth year of my chemistry course, in 1970, in the so-called Department of Chemistry of the Faculty of Philosophy, Sciences and Languages of the University of São Paulo (shortly thereafter, this department became the Institute of Chemistry from USP), three colleagues and I were invited to work at the then-beginning Institute of Chemistry of the State University of Campinas (at that time, the acronym of this university was UEC; soon after, it became University of Campinas, Unicamp).

Shortly after the invitation, which was made in June 1970, the four of us went to the city of Campinas, SP, to visit the campus of that university. I can say that this campus was a vast cane field, no longer

cultivated, but some sugarcane clumps were still there. There was only the building of the university rectory and two more sheds. In one of the sheds, the Institute of Chemistry was located, along with other institutes and colleges. The building of the Institute of Chemistry was still under construction, and its occupation began in 1971. Given the conditions at that time, two of my colleagues gave up, but Professor José Augusto Rosário Rodrigues, deceased on October 11, 2019, and I agreed to stay in Campinas. Prof. José Augusto has since specialized in organic chemistry.

At that time, we were hired as instructors, that is, at the 1st level of the professor career, and we started our activities on March 1st, 1971. Although we were at the very beginning of our careers, we taught practical classes in the laboratory and also theoretical classes on general chemistry.

Those were hard years, both in terms of working conditions, as everything had to be done, and in political terms because the political regime in Brazil was dictatorial and no one felt safe, even those

who had no involvement with politics. At this point, I would like to pay a simple tribute to the memory of Professor Ana Rosa Kucinski Silva, from the Department of Analytical Chemistry of the Institute of Chemistry of the University of São Paulo (IQ-USP), who disappeared in 1974, a victim of the dictatorial government. I can testify about her professional competence and, above all, about her intelligence and sensitivity in dealing with people.

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In Campinas, UEC at that time, everything had to be done. We barely had any lab supplies. There was no library, so periodically we had to travel to São Paulo to consult with the IQ-USP library. This situation, at that time, brought difficulties for most beginners in their college career, causing some to give up. For another group, which I include myself in, this served as a stimulus to continue with building something new. We "got blood out of stone", as everything was difficult.

My master's and doctoral works were on the kinetics of decomposition of iron II complexes with diimines. Shortly after I completed my doctorate, I guided a master's dissertation (at the time, called master's thesis) in analytical chemistry, which made me decide to focus primarily on this area of research in chemistry. However, as can be seen from my publications, I have always tried to act broadly, having worked in various areas of chemistry, including chemistry teaching, which I consider of utmost importance.

What has changed in your profile, ambitions and performance since the beginning of your career?

Throughout my career, as with everyone, I matured both in terms of understanding society and the profession. What I understood most is that no matter how much one learns, there is much more to learn. The increase in knowledge opens doors and windows to other paths and to other views. And as this process progresses, it repeats itself *ad infinitum*. Looking back, we see that we walked a lot, but looking ahead, we see the road of knowledge merging with the horizon.

Thus, my possible ambitions of youth have gradually become a simple desire to know and, as far as possible, to help others in the acquisition of knowledge, wherever possible, including in the field of analytical chemistry.

Could you briefly comment on recent developments in analytical chemistry, considering your contributions?

Analytical chemistry has changed a lot in recent decades because of the evolution of electronics, to which chemistry as a whole has also contributed. Despite the importance of this evolution in analysis techniques, which is very desirable, it is not accurate to say, in my view, that there was a great evolution of analytical chemistry, but rather of the instrumentation available to perform analysis of matter. This advance was very great since it allowed us to not only reach increasingly lower concentration levels,

but also to perform a greater number of simultaneous determinations, even in complex matrices. It also provided the possibility of automation, etc.

I am concerned that in the teaching of analytical chemistry emphasis is no longer being placed on the content of chemistry as a whole, so as to provide the student with insights into a larger and better view of this broad science. However, despite this regret, I remain optimistic. I think that in the not-toodistant future a lot will change in terms of human knowledge and, certainly on another level, there will be a broad reevaluation of scientific knowledge.

What are your lines of research? You have published many scientific papers. Would you highlight any?

Through the paths that life leads us and because analytical chemistry is very important for the study and understanding of chemical processes, I dedicated myself, one way or another, to analytical subjects, whether they were direct, i.e., the development of new analytical methods, or indirect, in the application of analytical work, already known or even new, for the study of chemical systems of interest.

I do not think much about highlighting any of my papers. They were all made with great dedication. Just to illustrate, I mention the one referring to the oxidation of metallic mercury in nature. The idea

"The idea of such a study arose when watching a report on television about gold prospectors who used mercury in gold mining." of such a study arose when watching a report on television about gold prospectors who used mercury in gold mining. Many of them developed diseases that affect the nervous system. It was clear to me that, contrary to what was believed about the "chemical inertia" of metallic mercury, oxidation of mercury occurs easily in the prospector's body. This resulted in a doctoral thesis and two publications, one in a specialized journal and another in a cultural journal. In the case of

this work on mercury, the insertion of the researched subject in various sectors of knowledge, i.e., in environmental chemistry, toxicology, chemical kinetics, and analytical chemistry, is reflected.

Regarding the dissemination of my work in general, I have published, to this day, about 160 papers in Brazilian and foreign journals, as well as book chapters on college admission exams, and I have also filed some patent applications. In fact, I was never concerned with the volume of publications, but with the subjects concerning them.

Do you keep yourself informed about the progress of scientific research in your area? What is your opinion about the current progress of this research in Brazil? What are the recent advances and challenges in scientific research in Brazil?

I have been trying to keep myself up to date on the progress of science as a whole. Chemistry is part of human knowledge; therefore, we cannot just look at chemistry, otherwise, we would risk positioning ourselves only in the technological sector. True science is broad and impregnated by philosophy. Science, artificially divided by methodological questions, interrelates; science is one.

Science in Brazil is very misunderstood with regard to its importance for the development of society, both generally and individually. Without being aware of existing knowledge and without working for the evolution of knowledge, a society has no future. This is the biggest challenge: clarifying the importance of knowledge, which is acquired through its dissemination to the people as a whole, in a broad process, especially by the school, at all levels, for everyone, regardless of skin color, color of eyes, height, or social status. In the world, the societies of the future will be more intellectualized, and knowledge will be more widely disseminated and taught. If the same is not done in our country, its future will be obscure.

In scientific terms, at the present time in the world, we are waiting for something that will supplant the current knowledge. I am convinced that there will be paradigm shifts, similar to what happened in the late nineteenth century and the first half of the twentieth century. I think this should start in the coming decades because the current state of scientific ideas is trending towards stagnation, a fact that indicates that a restlessness will soon manifest itself, timid at first, but vigorous thereafter.

For you, what have been the most important recent achievements in the analytical chemistry research? What are the landmarks?

Advances in the field of chemical analysis have essentially taken place in terms of instrumentation, as I said earlier. Undoubtedly, developments in this regard have been enormous, with great benefits to society at large. Such progress was greatly influenced by the development of electronics (which was greatly influenced by chemistry and physics) and informatics, which clearly shows the importance of the interaction of different fields of knowledge that constitute human knowledge.

There are in Brazil and in the world several meetings on chemistry. To you, how important are these meetings to the scientific community? How do you see the development of national chemistry meetings in Brazil?

Scientific meetings in all areas have always been, and still are, of great importance for the dissemination and exchange of ideas. Nowadays, however, with the growing power of the means of communication, we must pay particular attention to the possibilities they offer to the world of science in order to increase the exchange of scientific information and its dissemination. In addition, these means of communication offer us a great opportunity to increase our contribution to society as a whole through the knowledge we can offer, aiming to promote its progress.

You have already received some awards. What is it like to receive this kind of recognition? What is the importance of these awards in the development of science and new technologies?

For anyone, it is always rewarding to have your work recognized. However, I do not think that the prizes awarded could have an important influence on the development of science. I believe that the application of knowledge developed in favor of humanity can be a much greater stimulus for the scientist. In some ways, the award process creates an atmosphere of competition. Little by little, human society and, therefore, the scientific community are replacing competition with cooperation. This change of attitude will greatly favor the move of science and the improvement of human society.



For you, what is the importance of the funding support for the scientific development of Brazil?

Support from funding agencies is fundamental for the development of national scientific knowledge. Without such funding, scientific activity in Brazil would tend to disappear. The argument that some people make about private scientific funding, in my view, is not valid since the private sector is focused on the profits it can make from technological innovation.

At the moment, the situation for scientific research in Brazil is one of decreasing investment. How do you see this situation, and what would you say to young researchers?

Current events in Brazil are very worrying as they tend to greatly undermine scientific research in the country. However, I would like to encourage young researchers not to give up on the scientific ideal. Using creativity, it is possible to do good scientific work, focusing their interest, curiosity, and effort on practical or theoretical subjects that are often not studied in other countries.

What advice would you give to a young scientist who wants to pursue a career in chemistry?

To pursue a career in chemistry, it is necessary to enjoy and be curious about matter, its constitution and transformations, within a universal context, including not only the material phenomenological aspects, but also its reflexes in society and nature. To give a solid foundation to these activities, the



professionals can never neglect to develop their general culture as well, in order to avoid narrowing their vision of the Universe. In fact, this thinking can be applied to all professions, especially those of an investigative nature.

How would you like to be remembered?

In terms of professional experience, I would like to be remembered as a person who has sought to perform his duties with seriousness and dedication. In this same professional environment, it would be good for me to be remembered as someone who has always strived to maintain good relations with all the people with whom I lived with.