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INTERVIEW

The BrJAC Editor-in-Chief paved the way for the journal's achievement of an Impact Factor

Marco Aurélio Zezzi Arruda holds a degree in Industrial Chemistry from the Methodist University of Piracicaba (1987), a master's degree in Nuclear Energy in Agriculture from the Center for Nuclear Energy in Agriculture (1990), and a doctorate in Advanced Analytical Chemistry from the University of Cordoba, Spain (1995). He completed a postdoctoral fellowship at the Center for Nuclear Energy in Agriculture (1995-1996). He began his carrier at the Department of Analytical Chemistry, Institute of Chemistry, State University of Campinas (IQ-Unicamp) in 1996. He has served in several administrative roles, including as a member of the Management Committee of the IQ-Unicamp Analytical Center (2002-2004 and 2008-2010) and as part of the Management Committee of the IQ-Unicamp and Federal Revenue of the Port of Santos agreement (2004-2005 and 2008-2009). He served as Head of the Analytical Chemistry Department at IQ-Unicamp from 2013 to 2017. Since 2003, he has served as a Member of the Advisory Board of the Brazilian Chemistry Association (ABQ). Between 2009 and 2019, he was a Member of the Board of Directors of the Brazilian Society of Mass Spectrometry (BrMASS). Additionally, he is a member of the Brazilian Proteomics Society (BrProt), Brazilian Chemical Society (SBQ), the Royal Society of Chemistry (RSC), and the Brazilian Association of Technical Standards (ABNT) for matters relating to nanotechnology. From 2018 to 2022, he served as Director of the IQ-Unicamp. Since May 2022, he has been serving as Deputy Executive Director of the Unicamp Foundation (FUNCAMP). Prof. Arruda has been a Full Professor in the Department of Analytical Chemistry at IQ-Unicamp since 2010 and has served as a Visiting Professor at the CNRS (Pau, France), the University of the Balearic Islands (UIB, Palma, Spain), and Universidad Nacional del Cuyo (UNCUYO, Mendoza, Argentina). He has received numerous accolades, including the Award for a Career in Pioneering Science from Proteomass Scientific Society (2015), the Zeferino Vaz Academic Recognition Award (2016), the Adilson José Curtius Medal (2018), the Sample Treatment Conference Award from the Proteomass Scientific Society (2020), the Inventors Award 2021 from INOVA, and the Special Tribute at the 20th ENQA (National Meeting of Analytical Chemistry). Most recently, he was honored with a Tribute at the 7th National Meeting of Analytical Chemistry (EspeQBrasil 2023). Prof. Arruda is the Editor-in-Chief of the Brazilian Journal of Analytical Chemistry and serves on the Editorial Boards of the Journal of Analytical Atomic Spectrometry and Metallomics. He is a Fellow of the Royal Society of Chemistry, and his biography has been featured in Who's Who in the World since 2009. He is the author or co-author of over 300 research articles, 11 book chapters, and 5 patents. He has edited 3 books, delivered over 50 invited lectures at national/international scientific events, and has been cited more than 11,000 times in the literature, with an h-index of 54 (Google Scholar). Throughout his career, he has supervised more than 60 master's and doctoral theses. His main research interests are in analytical chemistry, with a focus on bioanalytical applications, with an emphasis on speciomics, mass spectrometry, atomic spectrometry, and sample preparation.

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This interview is part of the BrJAC special issue celebrating the achievement of Journal Impact Factor.

BrJAC: What was your childhood like?
Prof. Arruda: My childhood was truly exceptional in the sense that I enjoyed every moment as a child and young adult. I was born in the city of Piracicaba, in the interior of the state of São Paulo, and spent my childhood in the city of Itapuí (only 7,000 citizens at that time), also in the interior of São Paulo, where my father, as a public-school teacher, taught primary school students, and my mother, as a housewife, gave us the necessary affection and supplementary education. I have always felt deep admiration for my father's work and my mother's dedication. In 1977, my father requested a transfer to the city of Piracicaba, where my family still lives today. Thus, I finished my primary school studies at the "Marquês de Monte Alegre" State Elementary School, which has a beautiful and extremely well-maintained building due to its private initiative. The school no longer operates there. Together with some friends, I began my high school studies at the Dom Bosco Industrial School, which, at that time, offered a professional night course in Chemistry Technician. Since I worked full-time as an office assistant, I was able to envision continuing my studies and, at the same time, the possibility of paying for them. Thus, at the end of my normal high school course, I received a diploma in Chemical Analysis Assistant, and still needed one more year to complete the Chemistry Technician course, which happened in 1984.

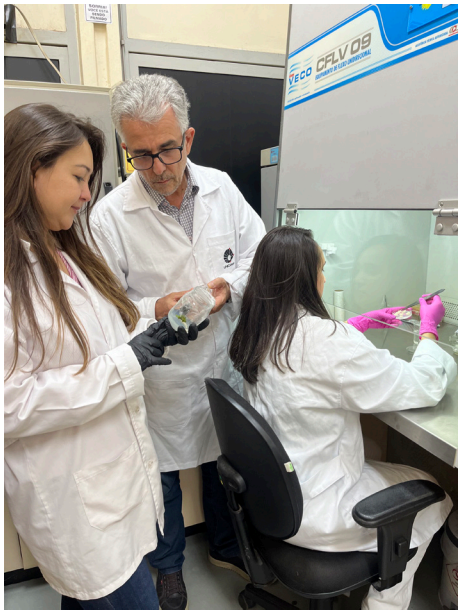
BrJAC: What early influences encouraged you to study chemistry? Did you have any influencers, like a teacher?
Prof. Arruda: As I mentioned in the previous answer, I always had my father as an example in the sense of long conversations about science and curiosities, and we even did a radio construction home course through the "Instituto Universal Brasileiro". Additionally, my master's adviser, Prof. Elias Zagatto, and my PhD adviser (Profs. Miguel Valcárcel and Mercedes Gallego) were other persons who influenced a lot my formation in chemistry (analytical chemistry). Then, I believe that my father and my advisers were the great propagators of this never-ending curiosity, which happened to me in my studies of Chemistry.

BrJAC: How did your career in chemistry start?
Prof. Arruda: After all this curiosity and technical training in chemistry, the high school course was truly exceptional, not only in terms of theory, but also in terms of practice. In fact, there wasn't a single week that we weren't in practical chemistry labs 2 or 3 times. So, despite the usual doubts of a teenager, all of this led me to start the Industrial Chemistry course at Unimep, continuing through my master's degree at CENA/USP, and then my full doctorate in Universidad de Córdoba, Spain. In fact, I never had any other intention than to follow in my father's footsteps, which was teaching. To do so, I focused my education on the field of chemistry, which has always been my life partner. Thus, in 1996, at the age of 30, I began my activities as a teacher/researcher at the Unicamp – Institute of Chemistry, Analytical Chemistry Department.

BrJAC: What has changed in your profile, ambitions and performance since the beginning of your career?
Prof. Arruda: Change is part of evolution. I think that, throughout my career, I have become a more understanding person, even more focused, but always open to change, to transdisciplinary work, to discussions and criticism, so much so that, today, I work in areas that I would never have thought of at the beginning of my career, such as omics, chemical speciation, and bioanalytics. My ambition...to be better every day, both from a personal and professional point of view.

BrJAC: Could you briefly comment on the recent evolution of analytical chemistry, considering its contributions?
Prof. Arruda: Like any area of science, analytical chemistry is a science that moves and evolves, whether due to the work of the researchers who work in it or due to the needs imposed by society. Thus, having a real notion of *Quo vadis*, analytical chemistry, is a challenge. Since it is an area that permeates so many others, it is difficult to establish its own limits, and, therefore, we must be careful not to make it seem like an area that merely serves as an advisory to others. Therefore, I think that four important contributions within analytical chemistry can be mentioned: healthcare, enabling rapid diagnostics (COVID-19), personalized

medicine, and early disease detection through advanced sensors and molecular profiling. Environmental monitoring, enhancing the detection of pollutants, microplastics, and emerging contaminants in air, water, and soil. Pharmaceutical industry, improving drug discovery, quality control, and safety through precise characterization of active ingredients and impurities, and, finally, agriculture and food safety, ensuring food quality, detected contaminants, and developed bio-sensing techniques to enhance crop protection and sustainability. In fact, the evolution of analytical chemistry has broadened its impact, making it indispensable in healthcare, environmental science, and industrial applications, while continuing to push the boundaries of sensitivity, speed, and sustainability.



Nanobiotechnology soy calluses production.

BrJAC: How does it feel to be part of the indexing of a scientific journal like BrJAC? What were the challenges?
Prof. Arruda: Well, it is an indescribable feeling of gratitude and duty fulfilled, although we will certainly have to work even harder to maintain (and increase) the journal's impact index. As for the challenges, there were countless. We went from a journal that worked on paper, and therefore all communication was done via the post office, which greatly impacted the delay in the entire publication process. So, the first challenge was to speed up the entire publication process, establishing an agile system for receiving, evaluating and publishing papers. Today, the time taken for this process has decreased considerably. I believe that this was the main action that took us to another level as a scientific journal, but other challenges were also overcome, such as giving even more credibility to the journal (BrJAC currently has a rejection rate of >60%), with a top-notch team of reviewers, with the implementation of programs to assess similarities/plagiarism, such as being part of ABEC (Brazilian Association of Scientific Writings), having a team of Editors and Advisors who are truly committed to working to make the journal increasingly solid, and having a staff that works with great dedication, professionalism, determination and joy. All of this is a construction, and I believe we are on the right track.

BrJAC: What are your lines of research? You have published many scientific articles. Would you highlight any?
Prof. Arruda: My research lines permeate through bioanalytics, atomic and mass spectrometry, and sample preparation. I think, for a researcher, the scientific manuscript is like a masterpiece to painters, for example. In fact, I have a passion for publishing, because this is a possibility to show our work to the world, and this is a way for pushing our students to be great researchers, and it is an opportunity to give our students the

possibility of progressing in their careers. It is not just publishing for the sake of publishing, but rather giving meaning to the work that is being done, and I really appreciate this dynamic. Of course, it has rough edges to smooth out, problems to be solved, but it is a path to improving the science as a whole, the scientific method, the students' experience in the academic environment, and catapulting their careers. So, yes, I have a few hundred published papers and highlighting one or another is a very difficult task. In order not to avoid this question, I will comment on a recent paper that was extremely challenging for my group, which involved some students, internal technicians from the IQ-Unicamp, and also company technicians. The paper proposed a step-by-step guide to multimodal coupling, involving an online coupling between a high-resolution organic mass spectrometer and a triple-quadrupole inorganic mass spectrometer, to evaluate chemical species in several samples. It was truly one of the hardest works I've ever done, and only two or three groups in the world have that expertise. Now we're one of them.

Facilities of the Spectrometry, Sample Preparation and Mechanization Group (GEPAM) at the Institute of Chemistry - Unicamp.

BrJAC: What is your opinion on the current advancement of chemical research in Brazil? What are the recent advances and challenges of scientific research in Brazil?
Prof. Arruda: Brazil has demonstrated notable strengths in areas such as natural products chemistry, green chemistry, agricultural chemistry, and nanotechnology. These areas leverage the country's rich biodiversity, agricultural capacity, and growing emphasis on sustainability. However, for Brazil to fully capitalize on its scientific potential, systemic issues such as funding instability, administrative inefficiencies, and brain drain must be addressed. With more consistent investment, stronger ties between academia and industry, and expanded international collaboration, Brazil could emerge as a leader in key areas of chemical research, particularly those that align with global trends in sustainability and health.

BrJAC: For you, what have been the most important recent achievements in analytical chemistry research? What are the milestones? What has changed in this post-COVID-19 pandemic scenario?
Prof. Arruda: Speaking of the pandemic itself, it boosted analytical chemistry in the area of diagnostics/prognosis, so much so that several colleagues ended up developing work in these areas. The pandemic catalyzed a wave of innovations in analytical chemistry, with a focus on rapid diagnostics, nanotechnology, and AI-driven data analysis. The tools and techniques refined during this period are now widely applicable to other areas of public health, environmental monitoring, and precision medicine.

BrJAC: There are, in Brazil and around the world, several conferences on chemistry. For you, how important are these meetings for the scientific chemistry community? How do you see the development of national chemistry meetings in Brazil?
Prof. Arruda: Scientific events provide opportunities for education, debate of ideas, proposal of joint projects, meeting colleagues and friends, and self-criticism. Thus, excellent events make us consider the level of research we are doing, compared to other colleagues/research groups. This is, in fact, extremely important not only for each researcher, but also for strengthening national science. Within this context, there are excellent events taking place in our country, which can point us in the right direction, or the "route adjustment" that, as researchers, we must make.

BrJAC: How important are awards for the development of science and new technologies?
Prof. Arruda: I always think that we are in this life to serve and not to be served. However, as human beings, researchers also like to be recognized and to be honored. If awards are conceived in a meritorious and not political way, by those who give them and by those who receive them as a career boost, then the award will have achieved its objective. Anything else is pure egocentrism.

BrJAC: For you, how important are national funding agencies for Brazil's scientific development?
Prof. Arruda: Without them, there would be hardly any possibility of conducting research in this country. Yes, they need to be constantly improved; Governments need to understand that without science the country cannot advance, and therefore investing in education and science should be a priority for any government, regardless of the party it represents. I remember a phrase by Derek Bok, from Harvard University, which sums up this answer well: "If you think education is expensive, try ignorance."

BrJAC: At the moment, the situation of scientific research in Brazil is one of decreasing investment. How do you see this situation and what would you say to young researchers?
Prof. Arruda: We need to contextualize this issue. Note that in recent years, Saudi Arabia, Qatar, Brazil, Indonesia, Mauritius, and Pakistan have recorded the greatest advances in the Global Innovation Index (in order of ranking), for example. Indonesia, Pakistan, and Uzbekistan continue to perform above expectations for the third year in a row, and in the case of Brazil, for the fourth year in a row. Brazil is investing in S&T something like 1% of its GDP, which is approximately US$2.9 trillion, in fact, much less than China, which spends 2.6% of its GDP, which is approximately US$8.7 trillion, or the US, which spends something like 3.1% of its GDP, which is approximately US$29 trillion. Thus, we still have a long way to go, and the advice I would give to the new generations is to produce research together, internationalize their research, and seek agreements with companies in the private sector.

BrJAC: What advice would you give to a young scientist who wants to pursue a career in chemistry?
Prof. Arruda: Respect, resilience, humility, focus, and never lose the sparkle in your eyes, the desire to know and learn more. As Pasteur said: "Wonder is the first step towards discovery".

BrJAC: What would you like to be remembered for?
Prof. Arruda: This is a complex question. Maybe I would like to be remembered as a professor/researcher who always tried to extol analytical chemistry as an eminently multi/transdisciplinary science. Analytical chemistry is everywhere.

GEPAM´s team.