

Interview with Nelio Bizzo

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1. You have a long career in Brazilian science education, with books, courses, classes and presentations of great reach and repercussion. What are the biggest problems that you perceive regarding this field?

I appreciate the generosity of the introduction. I have been working for many years in the field of science education, and, indeed, the difficulties are immense. I always believed that the biggest problem was the lack of resources, but today I can say that this definition is inaccurate. Today our group has funds for research, but we realize that the university institutional organization is somewhat accommodated with the lack of resources. When you get resources for 30 scientific initiation scholarships, post-doc scholarships and for the purchase of equipment, the feeling is that the institution is disappointed in you... That is right, they are disappointed. The resource will create "problems" that did not exist before, when there was no money for anything? You will need space, internet, money for mail... If you can afford to buy a notebook in December, you risk arriving in April without having overcome all the internal bureaucracy to use it for research. So I ask: after solving the problem of lack of funds, how long will it take to unburden the university? It is necessary to reorient the logic of the institutions, and, at the same time, researchers cannot stop looking for resources that can, in fact, sustain relevant research. Things have been turned upside down because of this long penury. Today it is sad to open the CNPq website and see that there are no research calls seeking proposals. Science is being asphyxiated in Brazil along with the victims of COVID-19.

2. Your career has been very involved with the teaching of Biology, with successful textbooks. In your opinion, what are the challenges faced in teaching this subject in Brazil?

I participated in the foundation of several associations, such as SBEnBio, ABRAPEC and ABFHib, and I am active in several others, such as SBPC, SBG, RNPE and IOSTE, because I believe that we need to act collectively to change the reality of education, from theory to the classroom floor. My work with textbooks had, precisely, this pretension, that is, to act directly in the classroom. But I am considered a creator of "authorial" books, that is, books that are not copies of the best-selling books. I proposed, for example, to update a series of contents, such as the one on blood donation. In a country with major arbovirus problems like Brazil, we need to talk about donors of platelets and plasma, and not only of red blood cells and whole blood. In this case, the AB type becomes the universal donor of plasma and platelets, items much needed for the treatment of dengue and various therapies against cancer, for example, one of the main causes of death in modern times. I discussed this and another case, along with a

colleague from Italy (Silvia Caravita), in a 2012 Journal of Biological Education article.

Authorial books should plant ideas, not simply repeat what everyone else says. I think my role is to seek innovation, because the way science is taught in Brazil is demonstrably inefficient.

3. The undergraduate courses (teacher training) have suffered setbacks in Brazil, with many courses being closed, others with a reduced number of students, especially in face-to-face courses, with the migration to distance learning courses. What is your perception of the current moment in Brazil regarding teacher education?

It is a very complex question, but I believe that the growing commodification of education and the destruction of social security in the country are emptying the profession. With the initial teacher training subordinated to the BNCC, the idea prevails that the teacher is not an intellectual, but a technician who has been trained to apply certain content and who loses his professional competence with each new curricular guideline. It is not without reason that those who sell teaching materials are also in the teacher training market. It is a strategy of verticalization, increasing the loyalty of students, who will continue to be loyal clients in the profession. I fought against this when I was in the National Education Council, but I found little echo in the organized society. This technical vision of education ends up being good business for many companies that think only of profit and not of the good of the country. Without good teachers there is no way to build a nation.

4. On this topic, with your experience in teacher education, what would you say to a young student about the teaching career in Brazil, and in particular about the career of science and biology teachers?

They are ending your dream... (what else to say when looking at the Ministry of Education today?)

5. You have worked a lot with the topic of teaching evolution in your academic life. What are the challenges for teaching this topic? Any particularities in Brazil?

Brazil today is experiencing gigantic educational setbacks. The promise to destroy what had been built is being taken seriously. It is unbelievable that, in the middle of the 21st century, we have a minister of education who denies biological evolution and school education, a CAPES president who would like to make creationism "a counterpoint to the theory of evolution" in basic education, and a general coordinator of teaching materials who wants to introduce in the BNCC the discussion of "creationist theory", summarily eliminating the study of natural selection. They are proposing discussions of the eighteenth century, the period before the bourgeois revolutions. The educational regression is immense! We are

heading toward cultural and scientific insignificance before the world.

6. Regarding this subject (biological evolution), how do you see the denial of its teaching, which has occurred especially because of creationist groups present in Brazil?

Obscurantism and scientific denialism cause harmful damages to the country and its people, who pay with their lives. And according to the theory of evolution, the world knows that the country's current health policy can cause a vaccine-resistant variant of the virus to emerge here. Brazil is now seen as a threat to the health of the planet! It is no secret that the barriers to the movement of Brazilians around the world will be the last to be removed.

7. Some consider that the intelligent design hypothesis, which considers evolution to be directed by a superior intelligence, would be a way to accommodate religion and science in relation to Darwinian theory. How do you analyze this proposition?

Intelligent design is nothing more than rehashed creationism, a rehash of the ideas of an Anglican theologian that Darwin made sure to insert as an epigraph in the "Origin of Species" itself, curiously only after the second edition. He himself uses the expression, "intelligent design" in the first half of the 18th century. And it was Darwin who showed that the argument makes no sense. Only Aristotelian thought deludes itself with the idea of intelligent project, seeing perfection and final causes in everything. Chapter VII (Instinct) of the Origin of Species ends with any possibility of seeing intelligent design in animal behaviors.

8. You have developed, and are developing, several researches in the field of education. What would you say to a young researcher that intends to start investigating in this field? What are the tips and challenges for scholars in this field?

The problems and difficulties, which were already great, are now enormous, like ideological persecutions. We are facing huge setbacks, in which science and intelligence itself are seen as satanic manifestations that should be burn at the stake. This has even been promised for Paulo Freire's books!

9. International experience also marks your professional trajectory, as a visiting professor, research partnerships, and co-authored publications, among others; tell us a bit about the path to achieve this kind of collaboration.

Studying at USP since I was an undergraduate, I always had professors who had studied at the best institutions in the world. I always heard descriptions of sophisticated laboratories, of institutions where there are none of the precariousness that we face daily.

So, when I became a teacher myself, I immediately had the idea of looking for training abroad, in the best places in the world for what I intended to study. I had the privilege of having had Professor Myriam Krasilchik as a professor since I was an undergraduate, who agreed to be my advisor for my doctorate. She had a great international experience and through her I met people and organizations that were very important in my life. She encouraged me to study the teaching of evolution and the idea of researching Darwin's manuscripts at Cambridge University was a consequence of everything I had learned at USP. IOSTE, an organization of which I was vice-president and president, had Professor Myriam as one of its founders. These examples were very important to me and all I did was expand these contacts, in other organizations, linked to the UN and to various universities, in Europe, the United States, the Orient and Australia. Studying and working for extended periods in Europe allowed life-changing experiences for me and my family. I think that the university is somehow embedded in a community that transcends the boundaries of the city, the state, and the country. Advancing the frontier of knowledge is not a backyard task. It is necessary to think big!

10. You publish at a high level, books, abstracts, and articles; last year, for example, you published in one of the most important scientific journals in the world, Science. Please list some tips for our readers, who are already researchers and for those who intend to be, to seek and achieve this standard of publication.

The publication of a scientific article is never the result of an isolated initiative, that is, it cannot be a mushroom on a summer's morning. This latest article in Science Advances has resonated in more than twenty newspapers, websites, and magazines around the world. One might think that it is the result of inspiration, but in fact it is the result of the effort of many people and the participation in networks of researchers from many countries. It is also the fruit of much perseverance, and of facing many difficulties. My advice can only be to go deep in what you do and not give up. By the way, inspired by this question, I invited the other two authors of the article to write a text about the "making of" the article. It should come out soon as the result of a conference organized by the State University of Maringá and will be widely available. We describe the difficulties, which were not few, but also the pleasant surprises. In short, it is worthwhile!