



## **Prof. João José Bigarella (1923–2016)**

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## IN MEMORIAM



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### Prof. João José Bigarella (1923–2016)



An icon of Geology and the Geosciences in Brazil was born in Curitiba on 23 September 1923. João José Bigarella learnt to appreciate the mountains and the sea on his family's outings to Matinhos. There, he began to understand the dynamics of the sea, the importance of the preservation of the forest, the importance of the association between geology and geomorphology, and, through his grandfather, the magnificence of the Serra do Mar. In his own words "the landscape as a whole expresses the interdependence of rocky substrate, water, air, soil, flora and fauna."

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He had, then, learnt to be a naturalist before entering the recently founded Faculdade de Filosofia, Ciências e Letras of the Federal University of Paraná. The knowledge obtained during his course on the chemical sciences was to be complemented with his "reverence for Nature and the beautiful and the peace which he felt when in his natural environment." In 1953, he graduated as a chemical engineer, a course that completed his technical training in chemistry (1943) and industrial chemistry (1945).

Parallel to his academic preparation, he absorbed knowledge at the Paraná Museum, the first school of his scientific life. There, in 1944, he began to exercise his exceptional ability as a researcher and a year later entered the Institute of Biology and Technological Research (IBTP) – the present day Instituto de Tecnologia do Paraná – where he associated with Reinhardt Maack, another great name in the geology of Paraná and of Brazil. Bigarella fell in love with geology both there in the IBTP as in the Paraná Museum and began then to describe the natural world around him with a geological vision that entered him "through his feet," as he tirelessly repeated in his papers and lectures.

He was an acute observer of natural reality, which led him, among other things, to try to understand why the indigenous inhabitants' rubbish dumps, composed mainly of shells (and called sambaquis), were located far from the coastline. He went deep in his attempt to explain indigenous customs and as a result concluded that it was, in fact, the sea, which so deeply enchanted him, that had moved, in its cyclical to-ing and fro-ing and, at a deeper level, marked the beginning of his grandiose study of beach dynamics. He was a pioneer of this knowledge in Brazil, a pioneer in the explanation of the sedimentation of the immense Brazilian coast and of sea-level variation during the Quaternary.

The observation of nature was indeed a constant activity for Bigarella, who untiringly portrayed it by means of photographs "taken of any scene of a sunset or daybreak," as he said on a certain occasion. An excellent photographer, he collected thousands of photographs, storing them carefully in a special studio in the space that he kept especially for the results of his research. The photographs, most of them in the form of slides, enabled him to experience the happiness of doing what he most enjoyed: teaching by means of talks and lectures, of which he gave hundreds, presented in all the corners of the globe, so much so that he called himself a "roving teacher!"

Some of the landscapes that he saw and that enchanted him are to be found in his impressive book *In the Tracks of a Geologist*, one of his works that provided him with the experience of the pleasure of writing. There were more than 2 dozen of them and it is no chance that Bigarella received tribute

from the Academy of Letters of the Paraná State, which invited him to occupy chair number 22 of that house of indispensable writings and notable authors.

Bigarella established his vocation as a researcher when he joined the teaching body of the Federal University of Paraná (UFPR) in 1949, as professor of mineralogy and petrology. The university was his intellectual home until 1980 and the place where he consolidated his career as one of the great Brazilian geoscientists of considerable international status. The professor always had a perceptive vision of his role in this house of science. He used to say that a “university should be a center that seeks knowledge to benefit the country as a whole.” Having been one of the founders of the geology department of the UFPR, where generations of geologists were trained in the shadow of his glory and his teaching, he was its first leader. Bigarella said that he “taught as he would like to have been taught” and this was decisive for, in the 1990s, his being awarded the title of Emeritus Professor of the UFPR, a position reserved exclusively for teachers and scientists of recognized breadth of knowledge.

Apart from the Federal University of Paraná, he was also lecturer and researcher in various other universities. Until the end of his fruitful life he produced science and taught as visiting lecturer at the Federal University of Santa Catarina. His knowledge and his wisdom are engraved indelibly in the spirit that characterizes the professors of the various houses of knowledge that he visited.

This notable and influential researcher never ceased to recall enthusiastically his years as a student in the early 1950s, especially his first training at the Guggenheim Foundation, the British Council, and the Deutscher Akademischer Austauschdienst. He used to say that it was in those atmospheres that his scientific spirit was stimulated by his association with great teachers who gave him the certainty of the path he was following. It was with this baggage that he made his scientific pilgrimages on all the continents; that he discovered not only the geology of each of the places he visited but also the courageous folk, hospitable and resilient, that inhabited them. Tuaregs and other peoples were the inspiration of this young researcher and enabled him to understand that people throughout the world are basically the same and the reason for ethics being a universal concept.

He was devoted to the study of regional geology when he found in Riad Salamuni, newly arrived from Northwestern University, a partner for the development of his research and for the progress of the geological knowledge of southern Brazil. Their mutual influence enlarged geological science, dedicated to the study of the ancient sedimentation of the Paraná River basin, to the palaeoclimate of present-day deserts and modern-day beach dynamics.

It was in these moments of rich apprenticeship that Bigarella descried, already in the 1960s, the certainty that Alfred Wegener had had decades previously: the continents were moving away from a common ancestral land mass. For the persevering researcher the perception of this reality was possible by virtue of his research into the palaeo-environment of the ancient deserts of Pangeia. He enthused over the discovery that the direction of the winds on Gondwana came to be seen as one of the strong arguments, at that time, for the

demonstration of the proof of continental drift. He compared data from Brazil and from Africa and soon the articles that he wrote, with Riad Salamuni and Pedro Lago Marques Filho, produced an international repercussion, seeing that they presented important advances for the consolidation of the hypothesis of continental drift and, consequently, of the very theory of the tectonic plates of South America, at a time when this paradigm was still not fully accepted.

In the field of Quaternary coastal sedimentation the researcher influenced world literature on the subject. Two local events that greatly instigated him relate, respectively, to the catastrophe provoked by the erosion of Guaratuba Bay in 1968, and the coastal erosion of the shore of the states of Paraná and Santa Catarina. His serious, competent treatment of these notable natural events brought his name to the attention of the lay public, earning him great respect beyond the academic world.

Bigarella planned and carried out work of international importance, which brought him recognition in many Western centers of geoscientific research. His brilliance is shown by the thousands of quotations and references in his collection of works, composed of more than 200 published scientific articles, that addressed both geology and geomorphology generally. The impact of his work was so great that he was able to gather, in Curitiba for the International Symposium on the Quaternary in 1975, geoscientists from 23 countries who, at that point in history, represented the cream of the international geological community on the study of the Quaternary, the field of work to which he most devoted his attention.

Motivated by his research, which modified concepts and offered the world important advances in knowledge in that field, the great researcher devoted his profound attention to the studies of coastal wind sedimentation, marine sedimentation, and to the formation of dunes and palaeoclimate to the point of creating equipment to measure the inclination of dunes and palaeodunes.

If Bigarella's work affected world science in regard to stratigraphy and sedimentology, geological cartography was another of his passions. In the 1960s and early 1970s he coordinated a group of young geologists installed in the former Institute of Geology (Instituto de Geologia) of the UFPR that was included in the project called the “Commission of the Geological Chart of Paraná.” Considered, in Brazilian territory, the first great systematic study of regional geological cartography, the geological maps produced within the scope of this Project have always been admired for their excellence and precision and to this day serve as a reference for whoever studies the east of Paraná. For this outstanding work for national science the Paraná nucleus of the Brazilian Society of Geology awarded him the title in 2006 of the Sower of Geological Knowledge.

His action as a citizen was, on the other hand, expressed in his unconditional love of nature, which materialized in the Association for Environmental Defense and Education (ADEA), founded by him in 1974. There then arose a vanguard environmental nongovernmental organization inspired in the pioneer Environmental Education Movement. Directed by Bigarella until 1994, with two fundamental objectives – “the defense of Nature for the improvement of the quality of life of

the human being and the education of the people for the responsible use of natural resources” – ADEA was the ecological organization of Paraná that, between the 1970s and the 2000s, inspired generations of professionals to become involved in the defense of the environment. Thus it was that the struggle over the questions of nature flourished as a vigorous social movement that certainly left Paraná less vulnerable to the profit mania of ecological destruction. Among ADEA’s many victories are the successful outcome of the creation of the legislation that came to protect the Serra do Mar, including the creation of the Marumbi Peak State Park (o Parque Estadual Pico do Marumbi). The immediate effect was the almost total stoppage of the deforestation of that beautiful escarpment and, as a result, the physical preservation of the bays of Paranaguá and Antonina, important ecosystems of the south of the country. For this cause he made use of his technical and scientific knowledge of the dynamic of the sedimentation occurring in both of those bays.

Bigarella was a man ahead of his time and he knew that without the world’s forests the human race would succumb through lack of water. He explained to everyone how the rainfall regime of the southeast and south of Brazil depended on the preservation of the Amazonian forest. There were occasions when he lost his battles, but on many others he not only won them but succeeded in dismounting the destructive spirit that permeates irresponsible policies. With his lucid spirit he confronted unimaginable obstacles to achieve the preservation of the National Iguazu Park and with his example taught the path of respect that the human-being should have for nature.

An impassioned researcher who took great pleasure and showed great genius in his work, he became well known in Brazil and abroad. The awards he gained may be compared with the many tributes he received while still alive. As recognition for the excellence of his scientific contributions he was twice decorated by the Presidency of the Federative Republic of Brazil. In 1995, he was awarded the title of Commander of the National Order of Scientific Merit (Comendador da Ordem Nacional do Mérito Científico) and, in 2000, that of Commander of the Great-Cross of the National Order of Scientific Merit (Grã-Cruz da Ordem Nacional do Mérito Científico).

Bigarella, who had received, from the Brazilian Society of Geology in 1966, the José Bonifácio de Andrade e Silva gold medal, the major decoration of the entity, also received prizes from the Institute of Engineering of Paraná (1969), from the National Research Council CNPq (1992), and from the Heleno Frago Center for Human Rights. He was also honored with the titles of Honorary Citizen of the State of Paraná (1997), of Emeritus Outstanding Figure of the municipality of Curitiba (1998), and Honorary Citizen of the municipality of Matinhos (1999).

Tireless in his role of disseminating knowledge, he was one of the chief promoters, as consultant and adviser, of the Geological Sites of Paraná Program developed by the Geological Service of Paraná – Mineropar – between 2003 and 2011. Bigarella saw in this Program the opportunity to expand the outreach of geological knowledge to involve society in general. Important results were achieved as a result of this effort, which also involved the State University of Ponta Grossa, and placed him in the vanguard of activity in the fields of geoconservation and geotourism.

Bigarella used to tell his tales and, while observing a beautiful scene or a rocky outcrop, amused himself as if he were a youngster of 15, unfolding the history of that landscape as if it were the history of his own home. He was of that class of men who never negotiate principles, nor even diminish them when confronting political difficulties. He worked, researched, and laid bare a solid, chronological world – the geological world. He addressed the ecological and climatic themes incisively and responsibly; he desired to teach until his last days; he never demanded special treatment on the part of anyone who addressed him; to everyone he was simply Professor Bigarella.

Bigarella, a virtuoso with words and of science, left this earthly plane on 5 May 2016 serenely, leaving behind him such a fantastic legacy that science will always owe him recognition as “Great Master.” This is the spirit of this tribute to João José Bigarella, a guiding star for the sciences of Earth!

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