

## PROFILE

# Professor Angelo Machado: The remarkable deeds of a polyvalent mind

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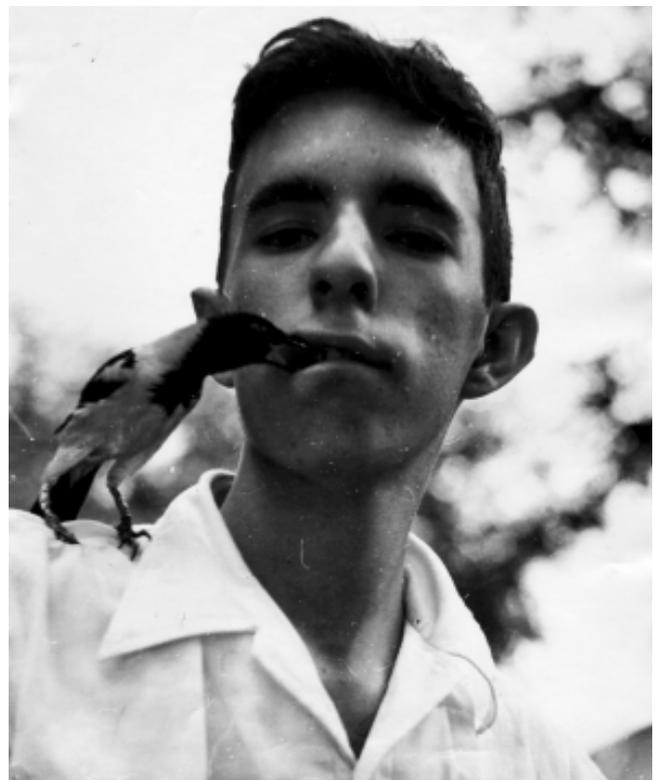
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Come by the Zoology Department at the Federal University of Minas Gerais (UFMG) in the afternoon and chances are you will catch a beam of wonder popping up from the face of a 71 year old man as he diligently observes a new kind of dragonfly lying on his office desk. Although the study of odonates is probably one of Professor Angelo Machado's greatest passion – as can be sensed by the fact that he has hitherto described forty-six new species and four genera of these insects – his interests cover a wide range of academic and public activities.

Born in the city of Belo Horizonte, capital of the state of Minas Gerais, Brazil, in 1934, Professor Angelo Machado defies all standard stereotypes about scientists. Cutting across conventional boundaries, he has accomplished an impressive record as a university professor, researcher in the fields of Zoology and Biomedical Sciences, environmentalist, advisor for policy-making in the field of sciences, and writer. Not only is Machado a man of multiple talents, as most people like to describe him, but also one who leaves a mark of excellence on everything he puts his talents to work for.

Angelo Machado's interest in Biology awoke at an early age. Encouraged by his elementary school teacher, Henrique Marques Lisboa, he first engaged in the observation and collection of plants and animals that populated the school's fish tank. Such activities, a fleeing pastime for most children, were the seeds which later developed into a serious quest for scientific knowledge about living creatures – be it simple microorganisms, such as the protozoans in termites' digestive system, or the most complex of animals, namely, man.

A glimpse at Professor Machado's office and laboratory in the Instituto de Ciências Biológicas (Institute of Biological Sciences, or ICB/UFMG), with its insect boxes, magnifying glasses, microscopes, and pictures of animals and plants lying everywhere, does not tell us about one crucial dimension of his academic background – in fact, the young Angelo, notwithstanding his early interest in odonates, chose to pursue a degree in medicine with the purpose of obtaining a more comprehensive framework for the study of living creatures, and a solid basis for scientific research. In any case, it was a choice of long-lasting personal and professional consequences, since it was at the laboratory of the School of Medicine that he met the person that came to be his greatest research partner, wife, and mother of his four children, Professor Conceição Machado. Indeed, he reveals in his memoir that meeting her was the most important fact of his scientific career and of his life as a whole.



**Figure 1** - Angelo Machado as a teenager – his love for animals and curiosity about nature developed early.

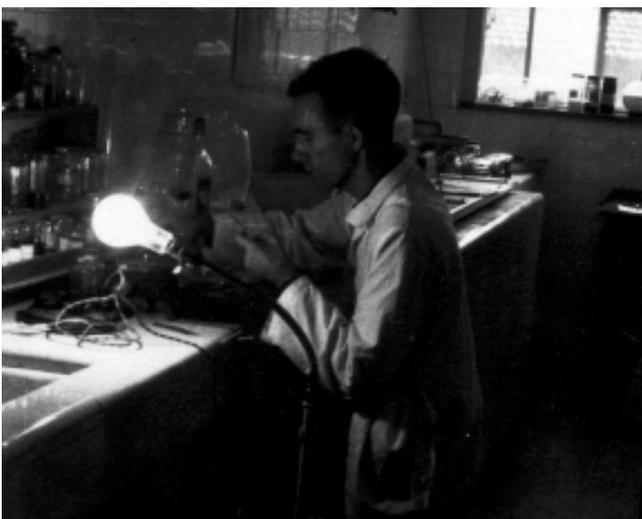
Angelo Machado's trajectory in the School of Medicine took a straight course once he decided that his contribution to society would be not as a physician, but rather as a professor, researcher, and scientist. Thus, as soon as he graduated, in 1958, he became instructor of Anatomy and, in 1966, three years after the completion of his PhD, took the position of Assistant Professor. Notwithstanding the fact that he has written one of the most important books in Functional Neuroanatomy ever published in Brazil, Machado has never concealed his predilection for histology, a field wherefrom he borrowed important methodological tools for his research projects.



**Figure 2** - Angelo Machado at the freshmen's parade, in 1953, when he entered the School of Medicine, dressed up as the "microbe hunter."



**Figure 3** - Angelo Machado with his wife and children in the mid 1970's.



**Figure 4** - Angelo Machado, during his undergrad studies, working as a trainee in the anatomy department of the School of Medicine in 1957.



**Figure 5** - Angelo Machado gives a ride to a visiting professor, in the beginning of his career as a faculty member of the School of Medicine.

During his career in the School of Medicine, Machado dedicated himself almost exclusively to the field of Neuroanatomy. Following the suggestion of Professor Liberato Di Dio, he chose to focus in the study of the pineal gland, responsible for, among other things, photoperiodic regulation of reproduction, immunoregulation and antioxidation. In a laboratory equipped with the support of the Brazilian National Research Council (CNPq), and the Rockefeller Foundation, he and Professor Conceição Machado began to investigate the influence of this gland in determining the amounts of sodium excreted by rats. It was also through the auspices of the Rockefeller Foundation that Professor Machado went to Northwestern University, in Chicago, as a postdoctoral fellow. There, he received comprehensive training in the techniques of electronic microscopy, and was able to study in detail the ultrastructure of the pineal gland in rats during their growth, with emphasis in the sympathetic innervation.

After publishing several works on the ontogenesis of the sympathetic innervation of the pineal gland with his wife and with Professor L. Wragg, of Northwestern University, Professor Angelo Machado returned to Brazil. Then, with the support of Professor José Pellegrino, he began a comparative study of the histology and histochemistry of *Schistosoma mansoni*, a trematode responsible for causing schistosomiasis, a rather common disease in South America. In this endeavor, he brought to bear the techniques learned during his Post-doctoral program.

Later, with the creation of the Morphology Department at the ICB/ UFMG, he and Conceição engaged in the study of the damages caused by Chagas disease in the autonomous nervous system. The results of their research were made known in a number of academic publications.

*Recovering an interest that was never lost*

In 1987, Angelo Machado retired as Full Professor of the Morphology Department and it was then that he took the unexpected decision to start a new academic career; this time in the Zoology Department at the Instituto de Ciências Biológicas (ICB/UFMG). According to Conceição Machado, her husband had never really abandoned his interest in insects; “thus, to become a member of the Zoology Department meant, in effect, turning his lifelong passion into his main professional activity”. As a matter of fact, Machado was still a teenager when he published his first scientific work on odonates, in 1953, under the guidance of Professor Newton Santos. And, by that time, he had already met two of the men who would most greatly influence and encourage his studies in Zoology.

“I still remember this skinny school boy who once entered into my lab asking if I could help him with the study of the protozoans in the digestive system of termites”, recalls Professor Wladimir Lobato Paraense. From that day on, Machado and Lobato began a long lasting scientific partnership, first at the



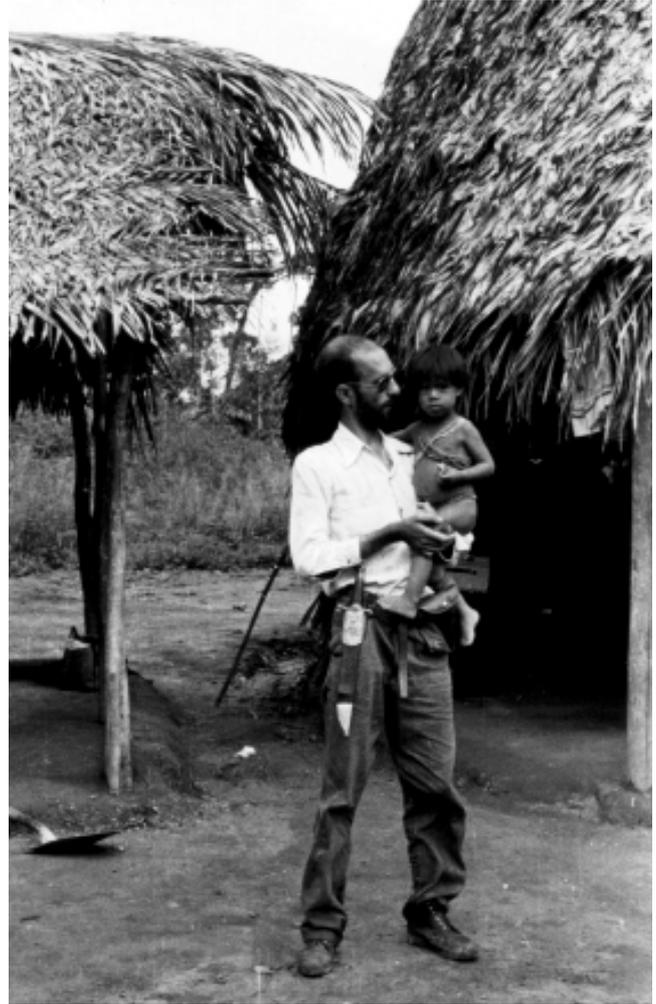
**Figure 6** - Angelo Machado in a confraternization with his department colleagues of the School of Medicine. He is the fifth at the left side of the table. The first person at the left is professor Dangelo, a close friend of Angelo since they were undergrad students.



**Figure 7** - Angelo Machado e and his former professor, Dr. Lobato, in a picture taken recently, in Belo Horizonte.



**Figure 8** - Angelo Machado hunting dragonflies in the 1960's. He participated in many scientific expeditions, starting as a teenager with Father Pereira and continuing through his life until very recently.



**Figure 9** - Angelo Machado with a Tirió child, in 1964. Contact with the indians during his scientific expeditions gave him a new perspective on life.

Oswaldo Cruz Institute in Minas Gerais (1951-1953), and later at the Public Health Service (SESP), where Angelo was admitted as an intern (1954-1956). According to Professor Lobato, Angelo Machado was a very diligent student, and quickly got hold of all the basic expertise a researcher should master – from tissue fixation and procedures for histological and histochemical staining, to the proper use of the microscope. Another thing he cannot forget about the young Angelo was his passion for dragonflies: “He even asked me, some time after we’ve known each other, if he could keep part of his collection of odonates in my lab”, recalls Lobato jokingly. Later in his life, Angelo Machado came to consider the years worked with Lobato as the most important of his scientific education.

Father Francisco Silvério Pereira was also an early and crucial influence in Machado’s career in the Natural Sciences. Father Pereira was already a renowned entomologist when, in 1951, the young Angelo, who used to attend his masses, started

to accompany him in the field expeditions that were carried-out weekly for the purpose of collecting insects. Such excursions, which continued throughout the years, took them to different and sometimes remote destinations. “Father Pereira and Angelo went to the Amazon region several times”, recalls Professor Conceição Machado. “They used to travel in airplanes of the Brazilian Air Force to the most isolated places and with no idea of their date of return”. In one occasion, Machado remained during two months in northern Brazil, living among the Tirió Indians, and from that experience he brought back home not only two new species of dragonflies, but also a new perspective on life.

Professor Machado’s work, as scientist and researcher, has been widely acknowledged by prestigious institutions, such as the Brazilian Society of Zoology, the National Research Council (CNPq), the Ford Foundation, and Conservation International. Moreover, since 1981, he is a member of the Brazilian Academy of Sciences – a distinction reserved for intellectuals that have

made an important contribution to the progress of knowledge. Equally important to him, however, have been the demonstrations of recognition and affection on the part of his students, who have, year after year, honored him in their commencement ceremonies. Machado returns such displays of admiration and friendship with his talent for teaching. “Although retired since 2004 from the ICB/UFMG, he keeps teaching undergraduates, specially freshmen, as a volunteer”, reveals Professor Fernando Silveira, head of the Zoology Department. Apart from voluntary teaching, Professor Machado currently presides Conservation International in Brazil, is member of the Biodiversitas Foundation’s council, and is still engaged in describing new species of dragonflies.

*Protecting the environment and popularizing science*

Professor Angelo Machado has been concerned not only with the study of nature, but also with its preservation. Thus, in a time when the environment was not yet a public issue, he closed ranks with the few that were already engaged in alerting Brazilian society to the need of preserving natural resources, ecosystems, plants, and animals. Dr. Hugo Werneck, president of the Centre for the Conservation of Nature of Minas Gerais, recalls the day when he first talked to Machado. “It was back in 1973. We were having a meeting at the Centre when, suddenly, Machado and other five people entered the room to ask if they could join us in defending our cause. It was a moment of pure joy.” And since that time, Professor Machado’s role in the Center has only grown, especially due to his ability to reach influential people so as to get their active support – a crucial step, no doubt, considering what Dr. Werneck has to say: “Many people at that time thought we were communists, or that we wanted to stop the progress of the World. To that extent, having in our side someone like Angelo, so well-spoken, and with good sense, was fundamental”.

Machado’s capacity to communicate with the public at large took a giant leap when, in 1982, he participated, as member of the Brazilian Society for the Progress of Science (SBPC), in the creation of *Ciência Hoje* (Science Today) – a pioneer monthly magazine whose aim is to divulge the findings and workings of Brazilian scientists in an interesting and accessible manner. In 1984, Machado began to coordinate *Ciência Hoje*’s branch-office in Minas Gerais. In fact, part of his own workplace was used as the magazine’s local headquarter. According to Roberto Carvalho, who worked for many years as the Minas Gerais’ editor of *Ciência Hoje*, the success of this branch-office was due to a large extent to Machado’s effort. “We used to sit together for a long time to discuss the scientific activities that were taking place in universities and research centers in Minas Gerais, in order to select which of those could render interesting articles. He taught me a lot about scientific journalism”.

The great reception that *Ciência Hoje* had among the general public motivated Angelo Machado and other members of the SBPC to create, in 1986, a version of the same magazine for children. “Not many people at that time believed that scientists would be willing to write for children. Angelo, however, had faith in this project, and put his heart in it”, says Roberto Carvalho. The enterprise continues to enjoy a huge acceptance among teachers and students, and has become the only Latin America magazine of this kind to reach such a popular status.



**Figure 10** - Angelo Machado in search of information on local folklore and habits. He frequently incorporates in his books the stories he recorded on tape during his vacation trips with his family.



**Figure 11** - Angelo Machado talking to school children. Speeches such as this are rather common among Angelo’s current activities.



**Figure 12** - Angelo Machado receiving the prestigious “Jabuti Literature Award,” in 1993.

Machado's interest in introducing youngsters to the fascinating universe of science and the preservation of the environment encouraged him to make an incursion into literature. "He likes to say that when the study of odonates became his main professional activity, at the time he entered the Zoology Department, he needed to find a new hobby to replace the old one – and that hobby was literature", confides Conceição Machado. In 1989, he wrote his first fiction for young readers: the story of a boy who, accompanied by a marmoset, travels in search of a clean river. Since then, he has published thirty-three books: most of them stories that combine fiction and science in an original manner. "The young reader", states Roberto Carvalho, "learns about science without even noticing it, as he/she is involved in an atmosphere of adventure; and yet, the pleasant way of introducing scientific themes is never used by Angelo at the expense of intellectual rigor". In the same vein, Dr. Hugo Werneck refers to Machado's literary gifts as being capable of "engaging children in the field of sciences, while educating them on the importance of preserving the environment".

Angelo Machado's penchant for literature is by no means amateurish, as can be assessed by the several important distinctions he received for his works. In 1993, for instance, he won the prestigious "Jabuti Literature Award" of Brazil, in the

category of children and adolescent's literature. Two years later, he was honored with the José Reis Award, offered by the Brazilian National Research Council in recognition of his efforts in teaching science to children through plays, lectures, articles, and books.

The profile portrayed throughout these pages give only a sketchy idea of the intellectual, moral and human stature of Professor Angelo Machado, whose restless dedication to science and public service will always be a source of inspiration for those who labor for the improvement of our society. These are the reasons which make the recent granting of the title of Professor Emeritus to Angelo Machado by the Instituto de Ciências Biológicas of the UFMG not only an expression of gratitude, but also an act of justice.

### **Acknowledgements**

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