

# The art of taking shortcuts

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Since 2009, microbiologist Maria José Soares Mendes Giannini has coordinated a series of endeavors with the aim of enhancing research quality at the young Universidade Estadual Paulista (Unesp). As head of the university's Office of the Dean of Research for the past four years, she has organized initiatives that have boosted the number of thematic projects at Unesp by 130%, taken fundraising to unprecedented heights, and increased the scientific article output by 42%. She has relied on an assortment of strategies to address the natural imbalances in an institution with campuses spread across 24 cities. One of her goals has been to coordinate the efforts of different researchers in order to generate research that is more robust. Another has been to increase the international visibility of the university's scientific studies by encouraging faculty members to publish in high-impact journals and by bringing in scientists from abroad. She has also established support offices for researchers at each of Unesp's academic units, thereby relieving faculty members of the bureaucratic tasks associated with progress and project outcome reports. These successes earned her the right to continue leading the Office of the Dean for the next four years, under the administration of the new president, Julio Cezar Durigan.

Born in Portugal, Giannini has lived in Brazil since she was three. She completed all of her studies in microbiology and immunology at the University of São Paulo (USP), in the city of São Paulo, complemented by short-term internships abroad. In 1983, she moved to the interior of the state, accepting an invitation to work at Unesp's Araraquara campus with the School of Pharmaceutical Sciences, an institution that recently celebrated its 90<sup>th</sup> anniversary. She was one of the forces behind the introduction of the graduate program in clinical analysis in the late 1990s. "In less than 10 years, we managed to go from a course that was not recognized to a course that the Coordinating

Agency for the Improvement of Higher Education Personnel (Capes) has given a rating of 6 [out of a potential top score of 7]. This was a huge effort," she recalls. Married and the mother of an adult son and a teenage boy, Giannini divides her time between her office in São Paulo, where she spends Mondays through Thursdays, and Araraquara, where she has her laboratory and lives with her family on Fridays through Sundays. She visits every Unesp academic unit once a year – "It's important so that researchers feel supported and we can listen to them" – and she maintains frequent contact with researchers via a videoconferencing device located next to her desk. Since 2010, she has been a member of FAPESP's Board of Trustees.

## ***How do you coordinate research efforts at a university that has campuses spread across 24 cities?***

The Office of the Dean of Research is new at Unesp. It began under the administration of Prof. Marcos Macari [president from 2005 to 2008]. Prof. José Arana Varela was the first Dean of Research, and then I took over. We're heading into our third administration. Unesp is a research university, although it is also strong in teaching and extension work. However, it has a special feature: it's a university that covers the entire state of São Paulo. We are the largest multi-campus university in the country, perhaps in the world. If you draw a sixty-mile circle around each of these 24 cities, you'll fill in the map of São Paulo state. Today, quality science is being produced in the farthest corners of the state; it's essential that the state derives benefits from this research. Of course, we have our imbalances, and the Unesp Dean of Research must try to overcome them.

## ***Research at Unesp got off to a stronger start in the more traditional academic units, such as the Araraquara campus. How do you extend one standard to all units?***

### **SPECIALTY**

Mycology

### **EDUCATION**

University of São Paulo (USP)

### **INSTITUTE**

Araraquara School of Pharmaceutical Sciences, Universidade Estadual Paulista (Unesp)

### **SCIENTIFIC PRODUCTION**

117 scientific articles, 10 book chapters. Served as an advisor to 27 Masters and 15 doctoral candidates and 26 undergraduate students. Supervised 7 post-doctoral internships



Our schools of Pharmacy and Dentistry will turn 90 this year, and they have been involved in research for some time. This is likewise true of the former Araraquara School of Philosophy, Science, and Language and Literature (FFCLA), now called the Chemistry Institute and the School of Science and Language and Literature. However, it was not only there that we started out strong. In Jaboticabal, the agrarian areas started out strong as well. If you look at the percentage of all published research studies in the field of agrarian sciences that are conducted at our university, you'll see that the number is quite substantial, with research coming from other units as well. Our institutes of Chemistry and of Theoretical Physics, along with the Bioscience Institute in Botucatu and the one in Rio Claro, are among the units whose research is the most international. In the beginning, back in 1976, 14 campuses were incorporated, 10 fewer than today. The university is now 36 years old, and as time has gone by, new academic units have been added. Even the newest ones are conducting quality research and offer graduate programs. We have foreign professors working at Ilha Solteira, São José do Rio Preto, and various other units. If we didn't have a quality public university, how would we be able to attract foreigners to perform top-level research? This history has sustained a process of steady growth, and in 2005 we reached a watershed

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moment. We charted out research groups and the types of publications and periodicals where we'd been publishing, and we identified many imbalances. Not today. Our research work has been strengthened, and it is growing and improving in quality, making an extraordinary contribution to the development of science and technology in Brazil. Over the past four years, we've hired nearly 1,000 faculty members, over 60 researchers, and over 30 higher-level

staff who maintain major pieces of equipment, and this contingent of highly qualified personnel will entrench research efforts at Unesp. Today, our focus is to increasingly internationalize our research so that it becomes more relevant in today's world and has an impact in Brazil and abroad. We are playing our part as active agents in the promotion of the scientific and technological development of our state and Brazil and in transferring such developments to society.

### **Could you cite some figures to illustrate this growth?**

I'll compare 2007 and 2011 because the numbers for 2012 haven't been fully processed. If we compare these two periods, our scientific production climbed 42% in the Thomson Reuters database. This is a substantial increase. When I assumed my post, one of the goals of the Office of the Dean was to add and merge expertise so that we could achieve quality science by strengthening our institutional capabilities through a focus on innovative proposals. And so we held a

series of seminars and of thematic workshops. These were attended by invitees from several universities in Brazil and abroad. Discussions were aimed at fostering progress in topics related to the frontiers of knowledge, in alignment with our national agenda. Research groups from a variety of areas took part in the discussions at these events. This has given us science with a more cross-sectional nature that is more inter-, multi-, and trans-disciplinary. These diverse perspectives generate quality, as well as an advantage that groups with a single discipline focus fail to develop. This is what we're trying to do here at Unesp. The major challenge presented by the distance between our campuses is how to transform isolated groups into groups that have a more active presence both inside and outside Unesp. We have very strong groups that do magnificent international work and that serve the university as well – such as ceramic materials and nanotechnology, natural products, and the computational science group, which is responsible for Unesp's grid. We have groups that coordinate Research, Innovation and Dissemination Centers (RIDC) of the São Paulo Research Foundation (FAPESP); the National Science and Technology Institutes (such as the one connected with international relations); one on nanotechnology; and another on comparative physiology. We have the Confucius Institute, considered the finest in the world. We have consolidated groups, and the Unesp Dean of Research must ensure that more groups distinguish themselves in their fields of knowledge.

### **One of your concerns has been increasing production in the engineering sciences and the humanities to bring them in line with the life sciences. How is this endeavor coming along?**

Our participation in the life sciences is strong, accounting for nearly 70% of what Unesp produces. Two areas where we had noted significant imbalances were the engineering fields and the humanities, so we established Project Renew – Renewing Engineering and Renewing the Humanities. Our focus was not only to provide financing through a funding opportunity announcement but also to facilitate projects that required a merger of expertise in these areas. I feel we've already achieved some positive results. We also launched our human sciences forums, and now we have them in the engineering sciences as well; these are meant to form cooperative ties and now innovative ties as well. We have established 11 engineering degree courses at our university. Three have already opened their doors – environmental engineering at São José dos Campos and bioprocesses and chemical engineering at Araraquara's School of Pharmacy and its Chemistry Institute, respectively.

### **Have researchers responded well to these initiatives?**

Yes, they have. Attendance was very high at the forums, which were held precisely to pinpoint and recognize the academic talents already here at our university, especially in key fields of knowledge. As part of the Contemporary Challenges series, these initiatives led to the introduction of incentives and sponsorships for publishing e-books in the fields of the human sciences and those on the cutting edge and in areas of knowledge that are of national interest, such

as nanotechnology, bioenergy, natural products, biotechnology, food and food security, and others, which provides a more effective way of disseminating the findings of large research groups. However, we observed that other initiatives were needed, and so we expanded the Renew program to encompass more university groups that had been shut out of the research process. There is a contingent of faculty members who went into administrative roles early on and never developed a career in research, so we decided to launch the General Renewal program, which is for all areas and seeks to attract staff who currently don't have access to funding mechanisms. We evaluate their processes and, in addition to funds, we include a research grant. All of this is done so that they'll return to researching and publishing and engage with a line of research and graduate programs.

***The approval of thematic projects has risen. At what rate?***

The number of thematic projects has climbed nearly 130%, and in monetary terms, we've enjoyed growth of almost 340%. We know that research requires skilled human resources and a good research infrastructure. We've received very substantial funds for these purposes from FAPESP, under its Multi-User Equipment Program; from the Brazilian Innovation Agency (Finep), under an infrastructure funding opportunity (up 340%); and from both Capes and the National Council for Scientific and Technological Development (CNPq). Our research infrastructure has seen great improvements, and today we have many facilities, many new buildings, and new laboratories. In order for research to grow, we had to open up new spaces and merge expertise; to this end, special institutes have been formally established, bringing together researchers from different campuses. Four such institutes have been approved by collegiate bodies. One is the Bioenergy Institute, headquartered in Rio Claro but with eight associate laboratories; it was created in conjunction with the other São Paulo state universities and is linked to the São Paulo Bioenergy Research Center. A joint graduate program was designed among the three universities. A Marine Institute was inaugurated in São Vicente, merging expertise from various campuses. There's a strong group in Rio Claro that works with geology; we have the Center for Geosciences Applied to Petroleum (Unespetro) there, which has close ties to Petrobras. And we have the Biotechnology Institute in Botucatu, which is also home to our central vivarium; many other groups that address different topics and come from a variety of campuses also participate there. The Institute of Public Policy and International Relations was also established. It currently operates on the university grounds in downtown São Paulo and offers graduate courses. Our outlook for the future is to have a space that can meet the needs of current agendas and of new trends and eventually serve as a center of dissemination for the university, broadening discussions. The funds for setting up these institutes – which were quite substantial – came from project grants approved by the Ministry of Science, Technology and Innovation; the São Paulo State Secretariat of Economic Development, Science and Technology; Banco Santander; Finep; and the university itself, which has invested heavily in tailoring its facilities to the new demands of a contemporary teaching and research university.

***The number of doctorates awarded is an important factor.***

We rank second among universities worldwide in the number of doctorates awarded – almost 1,000 a year. First comes the University of São Paulo and then us, followed by the University of Campinas (Unicamp) and universities in the United States.

***Graduate programs usually have strong ties to research. What is the status of this interaction at Unesp?***

The number of courses has grown. We offer more than 90 doctoral programs and over 100 masters programs, totaling 122 graduate programs. Unesp ranks second in the number of courses offered in Brazil. The number of programs receiving Capes ratings of 5, 6, and 7 has been rising steadily. We want more, and that will occur naturally as research by different groups advances.

***What impact does Unesp research have on the development of rural São Paulo?***

Years ago, a group in the field of economics did a survey that showed that Unesp contributes enormously to the local economy in cities where we have academic units. However, I believe we can contribute much more, and the Dean of Extension, the vice-president, and I will be working to see that Unesp becomes more integrated with these cities and forges partnerships with local governments involving the extension programs we already have in place; this may also have the added advantage of fostering truly innovative research. Our academic units are located in places ranging from extremely wealthy cities, such as Araraquara, to places where we know that the Human Development Index is very low, such as Vale do Ribeira, where we are introducing a course in aquacultural engineering in partnership with the city. In other cities as well, local governments do important work alongside Unesp to deliver science to these locations.

***How does Unesp place in international rankings?***

We've been focusing on our ranking, which has been an important topic of discussion since the implementation of the Institutional Development Plan under President Herman Voorwald in 2009. In its strategic plan, the university announced the goal of ranking among the top 200 universities in the world. This gave us a target, and our initiatives provide support towards this end.

***What's the value of having a goal like this?***

Without a doubt, it helps a great deal. In my talks, I jokingly say that we've already made it there in some rankings. For example, we're 174 on SCImago, and we're the

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third university in Brazil and the fifth in Ibero-America. In terms of some other classifications, we need to make further improvements. One ranking that says a lot about Unesp in its youth – we’re only 36 years old – is the *Times Higher Education’s* list of the best universities under 50 years of age; there are over 2,000, and we’re among the top 100 in the world. On the QS University Ranking, we hold quite an attractive position: 17th in Latin America; and, if you break down the research, 7th place. We’ve grown a lot and taken shortcuts; that isn’t easy in science.

***How do you take shortcuts? By bringing in people from abroad?***

Yes. This is what we had in mind by creating special research institutes. We’re in the phase of hiring researchers because we have career tracks for professors and for researchers. Our research institutes will basically have researchers working alongside professors and students. The researchers’ responsibilities encompass research and training students at the graduate level. The idea is to invite foreigners to these spots. We’ve worked at the Marine Institute, the Biotechnology Institute, and the Bioenergy Institute; we have collaboration agreements in place with international groups. The Marine Institute, for instance, has close ties with Germany

– universities such as Heidelberg and Kiel – and also with the Universidade do Porto, as well as a partnership with South Africa. We have a cooperation agreement with KU Leuven University in Belgium, under which we co-fund the arrival and return of researchers. We have highly internationalized groups. The Institute for Theoretical Physics (IFT) is the only one in Latin America that houses a unit of UNESCO’s International Centre for Theoretical

Physics (ICTP). Last year, they brought in more than 80 highly eminent foreigners. In the physical sciences, and the biological sciences as well, Unesp is becoming increasingly internationalized. Even an area that hadn’t appeared in international publications, that is, the humanities, is now beginning to do so. This is a sign that we’re turning Unesp into what is called a world-class university.

***Unesp has created offices at all of its academic units to help researchers deal with the bureaucratic administration of their projects. What was this process like?***

It was a lengthy discussion; it wasn’t easy. The original idea was to put an office on every campus, but we saw that the results wouldn’t be consistent because each unit on each campus has a different way of functioning. Therefore, we established a research office within each unit, and now we’ve hired a staff member for each unit to relieve researchers of tasks related to progress and project outcome reports. In

some units, we’ve hired a second person, based on a number of considerations – mainly related to internationalization – and this person serves researchers involved in international cooperation, thematic projects, and international workshops. We’ll have a third staff member, as well, who will be hired to work with innovation. The idea is to forge a link between researchers and businesses right inside the office itself.

***How will that work?***

There will be a place where we will be able to invite business to come in and become involved. That way, we’ll be doing all that I think we should be doing to achieve what I consider to be the responsibilities of an office of the dean of research by serving the areas of research, internationalization, and innovation; helping researchers; and working to secure funds.

***You’re beginning a new four-year term now. What are your goals and the new demands of the role?***

We’re already working on a number of points, but we’ll be expanding initiatives to foster greater inclusion of newly hired professors, who are the university’s future. We’re working hard so that they’ll find a support system here, integrate themselves into strong research groups, and devise innovative lines of research. We have a special funding opportunity for first-time projects, and now we intend to expand it. We’re going to work with areas that are not very internationalized even though their output is high. Therefore, we’ll be providing incentives for them to make this a major focal point. Another issue is innovation: that is, university-business interactions. Because we already have this type of link in a number of cities in the state of São Paulo, where there are high-tech hubs, we’re going to move toward increasing the involvement of city governments so that more such technological hubs are set up and consolidated.

***With regard to your own career, all of your training was at USP.***

Yes. I specialized in pharmacy and biochemistry and started working when I was in my first year of undergraduate studies. My first job was at a City of São Paulo laboratory; then I went to Fleury laboratory – I learned a lot there, but I didn’t want to do routine types of work. Starting in my fourth year as an undergraduate, I went to USP’s School of Medicine and worked there for 10 years in medical mycology, which involves the study of fungi of medical interest, a subject that hadn’t been included in my coursework. I worked with Carlos da Silva Lacaz, a leading scholar on fungi and a great teacher and humanist. I discovered that I liked research and teaching, as well as having a new challenge every day. I think that’s what research is all about: seeing a new path within each finding. There were a number of people who were very important to me, great teachers of mycology and immunology, such as Prof. Antônio Walter Ferreira, my masters and doctoral advisor; Mario Camargo, with the Institute of Tropical Medicine; and Vera Calich, with the Institute of Biomedical Sciences (ICB), who gave me enormous encouragement. When it came time to choose a topic for my work, I realized I didn’t want to do classic mycol-

The goal is to be among the top 200 universities in the world. Of the newer ones, we’re already among the top 100

ogy; I was already starting to fall in love with immunology. I began conducting research on the serological diagnosis of paracoccidiodomycosis, which is an immensely important disease in Latin America. I developed markers, reagents, and methods that hadn't been applied to this disease, such as carrying out research into antigen circulation in patients. This made it possible to make a diagnosis and initiate treatment earlier. My co-advisor was Prof. Aoi Massuda and, together with Prof. Maria Aparecida Shikanai Yasuda, we published two articles as a product of my doctorate that were extremely important at that time. When I finished my doctorate, I was invited to join the School of Pharmacy in Araraquara, and that proved to be a great challenge. That's because when I was in São Paulo, I moved quite freely between the School of Medicine and the Institute of Tropical Medicine; I did part of my dissertation at the Institute of Biomedical Sciences, where Prof. Erney Camargo had just arrived. I had access to a number of laboratories that had fantastic equipment for that epoch. The School of Pharmacy in Araraquara already offered a class in clinical mycology, but there was no established research area. I had been following the development of research work at Unesp since 1983. Prof. Deise Falcão, from microbiology, knew about my specialization and, although she was a bacteriologist, she invited me to work on a broad-scope project funded by Finep. This experience with bacteriology showed me that I didn't want to continue doing research on diagnostics. I did some short-term internships abroad and in Brazil and began studying models of host-fungus interactions. I began implementing *in vitro* models, which I still use today, and I made my way to the discovery of the molecules that mediate interactions between the fungus and the host. I started working with adhesins, which are the molecules involved in that interaction, and now we are studying invasins.

#### ***You had a FAPESP project about this model...***

I had a number of them. I coordinated a thematic project that is already finished, together with Prof. Gil Benard – it was an effort to combine knowledge from the *in vitro* model with the human one – and another project with Prof. Célia Maria Soares of the University of Goiás. I later joined her in a funding opportunity from Finep's Genoprot Network [which provides funding for genomic and proteomic research]; more recently, with financing through a Finep infrastructure funding opportunity, we are implementing 'omic' platforms in our laboratory. Along the way, I had a remarkable professor who unfortunately passed away last year: Henrique Lenzi, from the Oswaldo Cruz Institute's pathology sector. He was a wonderful person, as a human being, and a great humanist and specialist in science. He was of tremendous help in discussing and implementing these new technologies. Today, because of a shift in the teaching project in the pharmacy course, another line of research has been implemented, with a more technological foundation. We're creating a platform for developing antifungal agents and bioreagents. This platform was only feasible through the support of FAPESP programs, such as Biota-FAPESP's subprogram BIOprospecTA (São Paulo State Bioprospecting Network),

in conjunction with groups from chemistry and with Prof. Vanderlan Bolzani, Maysa Furlan, and Prof. Ana Marisa Fusco Almeida, who is my assistant – along with other researchers. It was arduous work to make the advances that I did but because I endeavored to work in collaboration with others, I didn't find it so hard. I'd like to stress that it was only one year prior to my coming to the Office of the Dean that I was assigned an assistant, Prof. Almeida. Without her help, this antifungal platform would not have been developed. We're working on a prototype.

#### ***What's the prototype?***

Some of the substances we've been working with showed potential during *in vitro* assays, and now we're progressing to *in vivo* assays and also using new formulations to ascertain their potential applicability as antifungal agents. I hope this joint work will yield an innovative product. We're also looking at microbial antibiofilm and antifungal agents because these microorganisms are more resistant in this form. Biofilm formation is a classic model in some diseases, especially in the case of pathologies where some fungi and bacteria are associated with a complex multicellular structure, which leads to points of ongoing contamination. A matrix is formed, and the antifungal and antibacterial agents cannot reach the sites of action. We're studying biofilm formation in endemic diseases, and we've already described this both in histoplasmosis, in a study by an advisee of Prof. Almeida's, and also in paracoccidiodomycosis, the disease I've worked with the most since starting my studies at the School of Medicine. It's a neglected disease among the fungal diseases and resembles tuberculosis.

#### ***Research by pharmaceutical companies doesn't come into play?***

Diseases caused by fungi generally fall into the neglected disease category. Mycology is considered microbiology's poor cousin. You've got bacteriology, virology, and then mycology. However, it's grown because of a higher prevalence of fungal diseases among some groups of patients because of people's increased longevity and because of immunosuppressive diseases. You improve living conditions, but this opens the door to so-called opportunistic agents. Today we have a rising number of diseases caused by fungi that hadn't even been described as pathogens – unlike *Paracoccidioides*, which was always considered a primary pathogen. It was described by Adolfo Lutz in 1908 and is one of the fungal diseases of greatest concern in Brazil. At first, I contributed to its diagnosis, and now I'm working mainly with adhesins, using them as targets in the search for new drugs. ■

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