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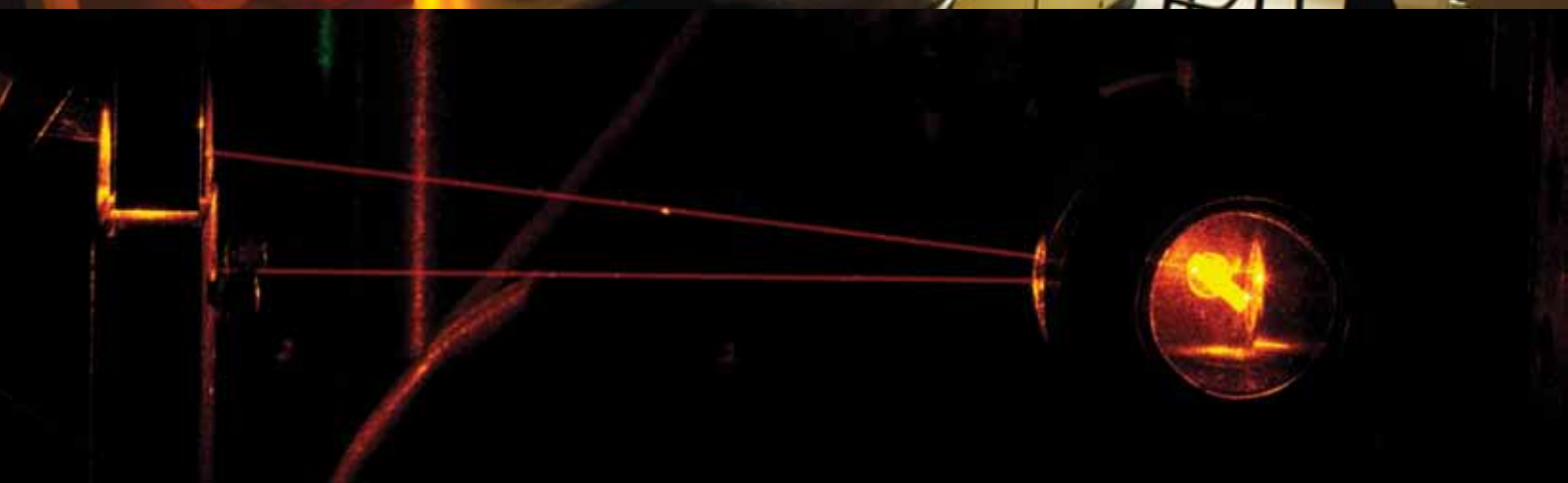

The expansion of knowledge

FAPESP's new Research, Innovation, and Dissemination Centers embolden Brazil's science and enhance its impact

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In one of the biggest investments ever made in a research program in Brazil, FAPESP announced the creation of 17 new Research, Innovation, and Dissemination Centers (RIDCs) that will bring together 535 scientists from the state of São Paulo, Brazil, and from 69 other countries to work in fields on the frontier of knowledge. During an 11-year period, US$680 million will be invested, of which US$370 million will come from FAPESP, and US$310 million will be provided in the form of salaries paid by the host institutions to researchers and technical personnel. "Large-scale long-term financing enables us to be bolder in setting research objectives; ensures stabilization of the teams; and, at the same time, increases the scale of science and technology research in the state of São Paulo," says Carlos Henrique de Brito Cruz, scientific director of FAPESP.

The selection process lasted 20 months, from the submission of 90 pre-projects to the selection of the 17 centers. The effort involved 250 Brazilian and foreign reviewers and an international committee composed of 11 invited scientists, in addition to the internal committees at FAPESP. The submitted proposals were evaluated based on scientific merit, boldness, originality, international competitiveness, and the qualifications of the teams and their leaders. Each RIDC will have an international advisory committee. Each will be evaluated by FAPESP in the 2nd, 4th, and 7th years to determine whether the center should continue its work.

From October 2000 to December 2012, FAPESP financed an initial group of 11 RIDCs (known in Brazil by their Portuguese acronym, *Cepid*), investing a total of R$260 million. "The Foundation intends to commission an evaluation of that period, but we can already say that the contributions by several of those centers were remarkable," says Hernan Chaimovich, Coordinator of the RIDC program. "Some leaders received significant international recognition; for example, Professor Marco Antonio Zago has been applauded for his research on cellular therapy in diabetes, and physicist Vanderlei Bagnato was recently selected by the National Academy of Sciences." Eight centers represent the continuation of initiatives contemplated in the first round. Several retain the same name and purpose: for example, the Center for Metropolitan Studies, the Center for the Study of Violence, and the Center for Cell-Based Therapy (CTC). Others have updated their mission but have retained their leaders. Nine centers are new and address topics such as foods, obesity, inflammatory diseases, neuroscience, biomedicine, applied mathematics, computer science, and vitreous materials.

For the centers that were selected during the first round, the possibility of continuing in the program for another 11 years has advantages but also poses challenges. "While in 2000, we had a vague idea of what these centers could be like, today, we understand their potential enough to have more audacious and speculative ambitions—and here, I'm talking about all of the approved centers, not just the one I head," says Marco

Targets for the RIDCs include research projects on inequality in metropolitan areas, the human genome, the therapeutic potential of toxins, and optics

PHOTOS: LÉO RAMOS

Antonio Zago, a professor at the Ribeirão Preto School of Medicine and Coordinator of the CTC. "One important result of the first round of the RIDC program was its ability to align the work of a series of researchers who had been doing high-level research independently." The center will now adopt a more practical approach. "Our RIDC was successful in conducting clinical tests of a diabetes therapy, but now, we are looking to perfect that treatment method so it can also be used for leukemia by using stem cells," says Zago, who is Dean of Research at USP. The center's team has been rejuvenated. "We have attracted researchers who were trained in an environment in which cell-based therapy was already a reality," he says. One of the goals is to generate Brazilian lines of stem cells for use in preclinical studies focusing on diseases such as dyskeratosis congenita (which causes premature aging), hemophilia A, and Parkinson's disease.

"While in the first round, we took some time to get off the ground, this time we'll start at full speed," agrees Vanderlei Bagnato, a professor at USP's São Carlos Institute of Physics and Coordinator of the São Carlos Optics and Photonics Research Center (CePOF). "We are faced with the challenge of coming up with original problems and assuming international leadership," he says. Bagnato's group is recognized for its contributions, one of which was in the field of quantum turbulence, a phenomenon first demonstrated by the São Carlos group in 2009 (see *Pesquisa FAPESP* Issue Nº 177). That line of research is related to the so-called Bose-Einstein condensate, the name given to a group of atoms (or molecules) that begin to behave as a single entity when cooled to extremely low temperatures. The center will conduct research on three fronts: cold atoms (such as those of the Bose-Einstein condensate), plasmonics (work that could result in optical computer processors when applied), and biophotonics (the use of light as a tool for research in the life sciences). One of the emphases in the new phase of the CePOF is innovation. "The objective is not only to obtain patents but also to generate projects with companies," says Bagnato, whose center collaborated on the introduction of 25 products.

Inspired by the Science and Technology Centers established in 1987 by the National Science Foundation (NSF) in the United States, the RIDCs encourage the establishment of multidisciplinary, topic-based teams whose characteristics are well defined. "What we want is multidisciplinary research that meets international standards and works on the frontiers of knowledge, an effort that identifies new directions for that research, rather than simply accompanying the state of the art," says Chaimovich. The centers should also produce innovation and transfer knowledge to the productive sector or provide support for the formulation of public policies. "There's an important third component, which is skills building. The centers need to have an instructional arm that disseminates the knowledge that was produced," says the coordinator, referring to courses offered to students and the development of educational resources.

1 e 2 Mass spectrometer (1) and preformulation laboratory (2) at the Butantan Institute

3 Laboratory at the Human Genome and Stem-Cell Research Center at USP

THE FRONTIER OF KNOWLEDGE

The updates to the goals to be followed by certain RIDCs, which have technically turned the RIDCs into different centers, were driven by the emergence of new topics at the frontier of knowledge. A center devoted to research on genetic diseases, for example, now includes the study of stem cells in its name and scope. "That had already happened in the trajectory followed by the first RIDC, in 2005, when we introduced the study of stem cells as a tool for understanding genetic expression and the differences among genetic diseases and evaluating the cells' therapeutic potential," says Mayana Zatz, a professor at the USP Biosciences Institute and Coordinator of the Human Genome and Stem-Cell Research Center. "That is one of the advantages of an RIDC. It can update its course of action in order to keep itself always on the frontier," she says. Another new element is the inclusion of the study of aging, degenerative diseases, and factors that may contribute to those processes. The center has developed a project in which it will compare genomic variation and brain function between healthy Brazilians over the age of 80 and a group of people over the age of 60 who have been followed for more than 10 years.

The Center for Innovation in Biodiversity and Drug Discovery grew out of the Center for Structural Molecular Biotechnology. Its purposes are more directed toward applied science.

$680 million will be invested in the 17 centers during an 11-year period

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"What we want is research that meets international standards and identifies new directions for science," says Hernan Chaimovich

Whereas the RIDC approved in 2000 studied the structure and function of molecules of biotechnological interest, the current center aims to develop drugs based on compounds found in the diverse Brazilian ecosystem, as well as synthetic substances. Led by Glaucius Oliva of the São Carlos Institute of Physics, who is the current president of the National Council for Scientific and Technological Development (CNPq), the center has joined forces with the Center for Natural Products Bioassays, Biosynthesis, and Eco-physiology (NuBBE) of the Universidade Estadual Paulista (Unesp) in Araraquara, led by researcher Vanderlan Bolzani and the Chemical Synthesis Group at the University of Campinas (Unicamp). The NuBBE has assembled a collection of compounds isolated from plants, fungi, microorganisms, and other sources (see *Pesquisa FAPESP* Issue Nº 200). "We learned a lot by doing high-quality research in structural biology, and now, it's time to use that knowledge to develop new drugs," Oliva says. The center brings together researchers from the Federal University of São Carlos and USP's Ribeirão Preto School of Pharmaceutical Sciences.

VIOLENCE IN METROPOLITAN AREAS

In the case of the Center for Metropolitan Studies (CEM), the new phase will focus more on the role of the State and public policy in the reduction of inequalities. "We know that there has been a consistent reduction in income inequality in Brazil. However, people's well-being does not depend on income alone but also—and critically so—on access to services," says Marta Arretche, a professor at USP and Coordinator of the center, which is housed at the Brazilian Center for Analysis and Planning (Cebrap). "Our goal is to systematically examine what has been happening with regard to inequality in access to public services, such as water and sewer service, employment, education, and health, and to what extent public policies affect people's quality of life," she says. Another central area of interest to the center is the functioning of institutions that are beyond the reach of the State, situated on the peripheries of urban areas: notably, safety and the real estate market. Many families have unreliable access to housing. "Brazil is noted for having areas where the government does not govern. This makes it important to study the activities of organized crime and the real estate business in the urban peripheries. There is then another dimension that interests us, which is the flourishing on the peripheries of association membership, civic life, and cultural expressions," she states. The new phase of the CEM will seek to deepen the internationalization of its research agenda. "We will make an effort to promote co-authorships with foreign authors and to expand our connections with researchers who are on the cutting edge," Arretche says. One of the projects that the CEM started to develop in 2000 was the production of georeferenced data (see *Pesquisa FAPESP* Issue Nº 193). The current plan is to offer a distance-learning course on georeferencing that would be tailored to policymakers and researchers.

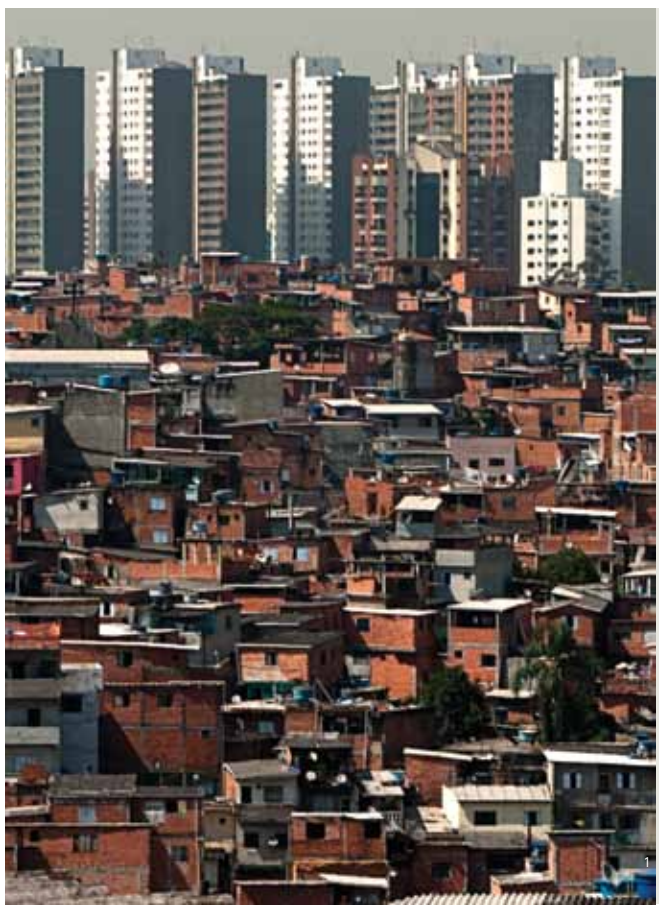
The Center for the Study of Violence will con-

PHOTOS LÉO RAMOS

duct a major study in the city of São Paulo, hoping to make progress in answering questions raised during the earlier project. In this project, scenarios of violence in Brazil were mapped, and issues such as the causes of persistent violence and the nature of the political culture that supports human rights were investigated for the first time. "We observed that the public has a hard time believing that laws and institutions have the power to promote social justice and reduce conflicts that otherwise tend to be resolved with violence," says Sérgio Adorno, a professor at the USP School of Philosophy, Language and Literature, and the Humanities and the principal researcher at the center. "We want to understand how an individual's relationships and ties work with regard to obeying laws, respecting authority, recognizing the institutions responsible for enforcing laws and preserving rights," he says.

The starting point, Adorno says, is the observation that the relationship between the citizens of neighborhoods and the public services charged with ensuring their rights—such as schools, local police stations, and health centers—is conflicted. In that regard, the research project will examine the fundamental legitimacy of the democratic order. One population group will be followed over time at successive moments. "We plan to observe the changes that occur between the governors and the governed, between citizens and public services, and to understand the possibilities for strengthening policies of respect for the laws and institutions," Sérgio Adorno says. The professor also says that methodology will have to be developed for observing the city. "Violence is not evenly distributed. In order to do longitudinal research, we have to have a representation of that territorial and social diversity," he says. The study is integrated into an international network. Researchers from countries such as Colombia, Mexico, the United States, South Africa, and India will perform studies along the same lines, several of which will do so by select a series of snapshots. All the while, these studies will produce results comparable with those obtained in Brazil.

"The impact on the ability to produce quality science is significant and does not result only from the volume of funds," says Fernando Cendes



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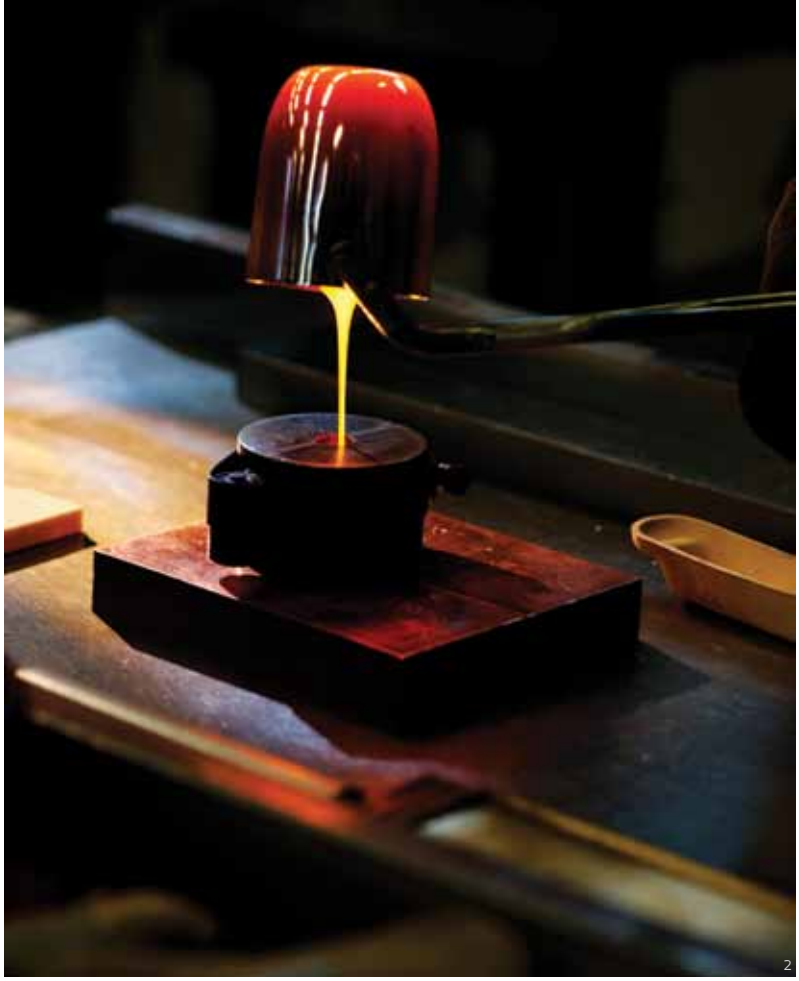
HEALTH

To researchers and program participants, the impact on their ability to produce quality science is remarkable—and not just quality in terms of the volume of funds. "By being assured of long-term funding, we can work calmly, without having to spend time trying to raise new funds," says Fernando Cendes, a professor at the School of Medical Sciences at Unicamp and Coordinator of the Brazilian Institute of Neuroscience and Neurotechnology (English acronym: BRAINN). "Collaboration flows when all researchers know that they will be able to conduct a bold project. It may take four years to gather data so that they can then perform complex analyses," he says. A virtuous circle is formed. "The group guarantees a level of prestige that makes it possible to recruit the best students and to obtain additional investments and a good infrastructure."

The RIDC led by Fernando Cendes is the fruit of another investment by FAPESP and is known as the Inter-Institutional Cooperation to Support Brain Research (CInAPCe). Between 2007 and 2012, this network brought together 30 research groups who studied the mechanisms of epilepsy, as manifested among Brazilians (see *Pesquisa FAPESP* Issue Nº 124). The new center will focus on technological research and development related to epilepsy,

PHOTOS LÉO RAMOS



1 Inequality in access to public services in cities will be investigated by the Center for Metropolitan Studies

2 Development of vitroceramics at UFSCar, which is home to a new center for vitreous materials

a condition that affects three million Brazilians, and cerebral vascular accidents (CVAs), which are responsible for one in every nine deaths in Brazil. The cooperation involves researchers in health and biology, computational graphic design professionals, engineers, physicists, and medical physicists. The objectives are to interfere with the development of epilepsy and to improve the rehabilitation of stroke victims by developing new methods for diagnosis and intervention, including products that feature electrodes with microcircuits, robotic interfaces, and warning systems coupled to cellphones.

As with BRAINN, the search for an understanding of diseases that afflict a large percentage of people and for new therapies to address these diseases is a common denominator among several RIDCs. In the case of the Obesity and Co-Morbidities Research Center, a collaboration between nine researchers from Unicamp, four researchers from USP, and nine researchers from other countries, the plan is to make progress in identifying and describing the mechanisms at the cellular and molecular levels that contribute to the development of obesity. "Only by understanding the origin of the problem from a molecular standpoint can we find therapeutic solutions," says Licio Velloso, a professor at the School of Medical Sciences, Unicamp, and the principal researcher at the center. The prevalence of obesity, which affected approximately 5% of the world's population in the 1970s, is rising and may well exceed 25% of the population in this decade. The incidence of associated diseases, such as hypertension, diabetes, CVA, and heart attack, are rising and killing increasing numbers of people, not to mention the impact on health care costs. "There is no efficient treatment for obesity," Velloso says. Each researcher at the center will work on a disease or a specific research topic. "By joining forces, we want to advance in knowledge and therapeutics. We have one researcher in the field of chemistry who will work on developing drugs from the potential targets that we hope to find," he says.

The Center for Research on Toxins, Immune Response, and Cell Signaling will concentrate on studies on the biochemical, molecular, and cellular mechanisms of toxins that have therapeutic potential. Headquartered at the Butantan Institute, the center grew out of the Center for Applied Toxinology, which operated between 2000 and 2012. "During the center's first phase, the objective was to discover new toxins in the venoms and secretions of various animals, such as snakes and arachnids, by isolating them, characterizing them in chemical terms, and promoting the synthesis of peptides and biological tests to verify the activity of the toxins," observes Hugo Armelin, a professor at USP's Chemistry Institute, a researcher at the Butantan Institute, and Coordinator of the center. "Now the goal is to work with the mechanisms of the molecular actions of selected toxins," he explains. Ten researchers from Butantan, in fields such as immunology, biochemistry, cellular biology, systemic biology, and computer science and all affiliated with the institution's laboratories, will work on topics including protein structure, DNA sequencing, and protein production in bacteria. The Pain and Signaling Laboratory will work on developing analgesics and perform biological testing with rodents. Studies on zebrafish, a fish that serves as a model in research associated with the immunological response to toxins, are being conducted in a laboratory that was recently established for this purpose. "Using toxins means working in a cell signaling network. The toxins are chemical substances with extremely high specificity and serve as tools for studying signaling pathways within the cells," says Armelin.

The twenty years of experience in basic and clinical studies of a group of researchers at USP's Ribeirão Preto School of Medicine lend support to the Center for Research on Inflammatory Diseases, which will investigate the mechanisms involved in the genesis of inflammatory diseases of autoimmune origin and infectious and metabolic diseases, such as rheumatoid arthritis, multiple sclerosis,

sepsis, leishmaniasis, and atherosclerosis. The studies are looking for new targets with which to develop therapies for these diseases. Under the leadership of Professor Fernando Queiroz Cunha, the group has already made important contributions to the study of arthritis. For example, the researchers studied the mechanisms that keep certain patients from responding to an important medication used to treat arthritis and have examined the reasons that smokers suffer from more serious arthritis. The group has also contributed to the study of inflammatory pain and sepsis. Sepsis is characterized by a systemic inflammatory response that results from an infection, formerly known as septicemia, and is fatal for more than 30% of its victims. One concern of the group is to understand why certain patients who survive the acute crisis of sepsis die a short while later from other infections or from apparently unrelated diseases, such as cancer and cardiovascular problems. "We are going to use our experience and to bring in other groups from the basic and clinical areas in order to increase the variety of diseases being studied," the professor says. "When we find a biological target that has potential in treatment development, we will examine it to see whether it is relevant to the other diseases being investigated." The research will also involve a search for new natural molecules in plants and in the saliva of insect vectors of diseases. Meanwhile, the Center for Research on Redox Processes in Biomedicine is looking for effective antioxidant strategies and biomarkers of oxidative stress that have potential technological applications. Under the leadership of Professor Ohara Augusto, from USP's Chemistry Institute, the center will have a central laboratory that will supply the researchers with analytical tools.

A new element in the results of the second RIDC request for proposals was the selection of two centers headed by mathematicians. The need for mathematical models capable of analyzing the complex mass of data generated by experimental neuroscience sparked the creation of the Research, Innovation, and Dissemination Center for Neuromathematics (NeuroMat). "The center's mission is to conduct pure research in mathematics and statistics, starting with fundamental questions raised by basic and clinical neurobiology. Neuroscience is experiencing a situation of disequilibrium between a high capacity for producing experimental data and an insufficient capability for theoretical comprehension," says Antonio Galves, a professor at the USP Institute of Mathematics and Statistics and Coordinator of NeuroMat. "Overcoming that imbalance means developing a new domain of mathematics at the interface between the theory of probabilities, combinatorics, statistics, and computer science. The objective is to construct a conceptual framework suited to rigorous formulation of the problems of neurobiology," he says. Mathematicians from several specialized fields will work together with computer scientists, neuroscientists, and clinicians. The principal technological transfer activity will be the development of open-code computational tools for basic and clinical research and an open access neurobiological database.

1 Obesity and overweight status, which now afflict 25% of the population, are the targets of an RIDC based at Unicamp

2 Magnetic resonance of the brain: equipment based in Campinas will be used to study epilepsy and CVAs

3 Study of nanoparticles seeks to develop materials with new functions at the Unesp center in Araraquara

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The search for an understanding of diseases and for new treatments is a common denominator among several teams of researchers

Another initiative is in the field of mathematics applied to industry. "Brazil does not have a tradition of using mathematics as a tool for industrial development, but that is a common practice in other countries," says José Alberto Cuminato, a professor at the Institute of Mathematical Sciences and Computation (ICMC) at USP in São Carlos and Coordinator of the Center for Research in Mathematical Sciences Applied to Industry. The center's ambitions include but are not limited to transferring knowledge to industry. "We need to imagine that the problems of industry can lead to new research approaches for mathematics," says Cuminato. "When a mathematician considers an academic problem, he formulates a conjecture and tries to prove it. If he does not succeed, he reformulates his hypotheses, simplifying them. However, if I have to simulate the flow through a 15-cm diameter pipe, I cannot reduce the size of the pipe to 10 cm. The problem is a real one," he says. The RIDC will look for solutions for areas such as fluid mechanics, aeronautical engineering, computational intelligence, optimization, operational research, and risk analysis for banks. "We want to work primarily on problems for small companies," he notes.

INTERDISCIPLINARITY

One ambition that is shared by all 17 RIDCs is to bring together researchers from different disciplines to multiply the impact of their scientific production. The Center for Computational Science and Engineering is gathering specialists in chemistry, physics, biology, mechanical engineering, and computational and applied mathematics to develop advanced computational modeling techniques. "We are bringing together scientists who have different backgrounds in multidisciplinary topics but whose focal point is the application and development of computationally intensive methods," says Munir Skaf, a professor at the Unicamp Chemistry Institute and Coordinator of the center. Skaf cites the example of computational geophysics, which needs to analyze gigantic quantities of cyclical data, such as series of seismographic signals, to obtain information about the geophysics of a site. "A new approach is needed for treating large volumes of data in the emerging field known as eScience. We're going to use that approach to deal with problems in materials engineering, bioinformatics and biotechnology, the molecular sciences, agriculture, and—who knows—perhaps ultimately in climate sciences and social sciences that involve large volumes of data," he says.

Multidisciplinarity also shapes the Food Research Center (FoRC), an initiative undertaken by a group of researchers from fields such as food science, food engineering, nutrition, medicine, and veterinary medicine. "Our objectives are to intervene throughout the chain of production of foods and to produce basic and applied science that is relevant to agribusiness, consumers, and regulatory agencies," says Bernadette Dora Gombossy de Melo Franco, a professor at the USP School of Pharmaceutical Sciences and Coordinator of the RIDC. The center will focus on four specific areas. In the first, foods will be characterized by their biodiversity and their composition in terms of macro- and micronutrients and other compounds that are beneficial to health using 'omic' tools. In the second, the center will study the impacts of food components on the nutritional status of the population and on the reduction in the risks of acquiring diseases. In the third, food safety will be evaluated in relation to the risks resulting from biological and chemical pollution. The fourth and final focus will be directed toward technologies for improving the quality, safety, and nutritional value of foods and to the study of the environmental impacts of food processing. The FoRC began to mature three years ago, when USP encouraged the formation of Research Support Units (NAPs) that gather specialists around a multidisciplinary topic. "After the inauguration of the Support Unit for Research in Foods and Nutrition, when the RIDC request for proposals went out, we were ready to set up the project," Gombossy de Melo Franco says.

Three cities in the interior of São Paulo State—Araraquara, São Carlos, and Ribeirão Preto, situated at a distance of 100 km from the state capital—are home to seven of the 17 RIDCs, a sign of the vigor of research institutions in that re-

PHOTOS 1 ITACI BATISTA / AE 2 PHILIPPE PSAILA/SCIENCE PHOTO LIBRARY/SPL DC/LATINSTOCK 3 LÉO RAMOS

The new RIDCs

The 17 FAPESP Research, Innovation, and Dissemination Centers

Successors to the first-round RIDCs of 2000-2012 (new centers)

RIDC	COORDINATOR	PREVIOUS EXPERIENCE	INSTITUTIONS INVOLVED
Center for Research and Innovation in Biodiversity and Drug Discovery	Glaucius Oliva – IFSC/USP	Center for Structural Molecular Biotechnology (2000-2012)	USP (HQ), Unesp, Unicamp, UFSCar
Center for Research on Toxins, Immune Response, and Cell Signaling	Hugo Armelin – Butantan Institute	Center for Applied Toxinology (2000-2012)	Butantan Institute (HQ), USP, Albert Einstein Research Institute, Unesp, UFMG, National Academy of Medicine in the United States, and universities of Glasgow, Cardiff, Stanford, Virginia, Toyama, Montpellier, Berlin, and Lausanne
Center for Cell-Based Therapy	Marco Antonio Zago – FMRP/USP	Center for Cell-Based Therapy (2000-2012)	USP (HQ), Hemotherapy Center of Ribeirão Preto, Unesp, UFSCar, and universities of Montreal, Guelph, Oxford, King's College, California, Southern California, Northwestern, Feinberg, Munich, Paris, and Leiden
Optics and Photonics Research Center	Vanderlei Salvador Bagnato – IFSC/USP	Optics and Photonics Research Center (2000-2012)	USP (HQ), Unicamp, UFSCar, UFPE, Embrapa, Barretos Cancer Hospital
Center for Metropolitan Studies	Marta Arretche – Cebrap	Center for Metropolitan Studies (2000-2012)	Cebrap (HQ), USP, Unicamp, Inpe, Insper, UFSCar, King's College
Center for the Study of Violence	Sérgio Adorno – FFLCH/USP	Center for the Study of Violence (2000-2012)	USP (HQ), Seade, El Colegio Del Mexico, Latin American Social Sciences Institute, Indian Institute for Human Settlements, Center for the Study of Violence and Reconciliation-Johannesburg, and universities of Columbia, California, and Cape Town
Center for Research and Development of Functional Materials	Elson Longo – IQ Araraquara / Unesp	Multidisciplinary Center for the Development of Ceramic Materials (2000-2012)	Unesp (HQ), USP, Unifesp, UFSCar, UFABC, IPEN, CNPEM, FacTI
Human Genome and Stem-Cell Research Center	Mayana Zatz – USP	Human Genome Research Center (2000-2012)	USP (HQ), Unifesp, Albert Einstein Hospital, Fleury S.A., Zerbini Foundation, InCor, University of Utrecht
Food Research Center	Bernadette Dora Gombossy de Melo Franco – FCF/USP	Support Unit for Research in Foods and Nutrition – USP	USP (HQ), Unicamp, Unesp, Ital, IMT
Obesity and Co-Morbidities Research Center	Licio Velloso – FCM/Unicamp	National Institute of Science and Technology on Obesity and Diabetes (2009-2013)	Unicamp (HQ), Unesp, InCor
Center for Research, Teaching, and Innovation in Glass	Edgar Dutra Zanotto – UFSCar		UFSCar (HQ), USP
Center for Research in Mathematical Sciences Applied to Industry	José Alberto Cuminato – ICMC/USP		USP (HQ), Unicamp, Unesp, DCTA, UFSCar, PUC-RJ
Center for Research on Inflammatory Diseases	Fernando Queiroz Cunha – FMRP/USP		USP (HQ)
Center for Research on Redox Processes in Biomedicine	Ohara Augusto – IQ/USP		USP (HQ), Unesp, Unifesp, Butantan Institute, A.C. Camargo Cancer Center, InCor, CNRS, National Institute of Aging, Atomic Energy and Alternative Energies Commission, and universities of Harvard, Milwaukee, Boston, Rochester, de Madrid, Emory, Liverpool John Moores, Koç, Aarhus, and University of the Republic (Uruguay)
Center for Computational Science and Engineering	Munir Skaf – IQ/Unicamp		Unicamp (HQ), Biocelere Agroindustrial, and universities of Texas, Yale, Buenos Aires, and Graz
Brazilian Research Institute for Neuroscience and Neurotechnology	Fernando Cendes – FCM/Unicamp	CInAPCe Program (2007-2012)	Unicamp (HQ), Unifesp, CTI, Unesp, UFABC, CNRS, and universities of Montreal, Erlangen, Phillips, and College of London
Research, Innovation, and Dissemination Center for Neuromathematics	Antonio Galves – IME/USP	Support Unit for Research in Stochastic Modeling and Complexity – USP	USP (HQ), Unicamp, UFABC, Impa, Regional Council of Statistics-SP, UFRJ, UFRN, Harvard Medical School, Watson Research Center, CNRS, and universities of, Memphis, Rockefeller, San Andrés, Buenos Aires, and University of the Republic (Uruguay)

Researcher at the Neuromathematics Center at USP: seeking equilibrium between high volumes of data and the ability to understand them

JUAN OJEA

gion. Research on the nucleation and crystallization of glass in São Carlos, which is some of the most productive in the world, gave rise to the Center for Research, Teaching, and Innovation in Vitreous Materials (English acronym: CeRTEV). Under the leadership of Edgar Zanotto, a professor at the Federal University of São Carlos (UFSCar) and a supervisor of the Vitreous Materials Laboratory (LaMaV), the RIDC will unite 14 researchers in materials engineering, physics, and chemistry from UFSCar and the USP campus in São Carlos, plus 20 collaborators abroad and 10 in Brazil. "Our group has won international recognition, but there are aspects that need to be strengthened, and the experts in physics and chemistry will be able to contribute significantly," Zanotto says. Among the topics on which the RIDC is hoping to make progress, Zanotto emphasizes the development of vitroceramics for use in orthopedic and dental prostheses and as substitutes for marble and granite, of materials for ballistic protection of automobiles and aircraft, and of supports for catalyzers in the production of ethanol.

The Center for Research and Development of Functional Materials, based in Araraquara, evolved from the Multidisciplinary Center for the Development of Ceramic Materials, an RIDC that focused on research on materials synthesis. The new center intends to develop nanostructured materials, fashioned to solve problems related to renewable energy, health, and the environment. "We will continue with what we were doing, but take it in a different direction," explains Elson Longo, Coordinator of the RIDC and a professor at Unesp's Araraquara Chemistry Institute. "We want to create multifunctional materials. We have studied the entire range of properties of a material and have analyzed how they can be used as elements of a new material. The reserves of certain compounds have been depleted. We need to optimize the use of raw materials and to improve their performance." Energy and health are two important focal points for the center. "We are developing bactericidal and fungicidal materials, both to reduce hospital infections and to clear pollution from lakes and rivers," he says. The center wants to encourage the rise of new technological companies. "At the international level, we will increase our interaction with universities and high-technology complexes in order to forge partnerships with companies from our own industrial centers."

"A good idea would be to coordinate the RIDCs to create one big program for the dissemination of science," Zago says

The RIDCs are also responsible for promoting extension activities aimed at students and the general public. The CePOF at São Carlos has a TV channel that broadcasts distance courses for high school students. "Now, we are going to set up courses on the Internet for students all over Brazil," says Vanderlei Bagnato. "We offered educational games for students on an Internet portal and obtained got more than 4 million hits," says Elson Longo, whose center also posted videos with mini-lectures by scientists on YouTube. An initiative that several centers have joined develops science experiment kits that encourage adolescents to enjoy research. "We distributed kits among schools in São Paulo, and the impact on the students was enormous," recalls Mayana Zatz. Other centers will offer courses, develop software and videogames, and organize the collections of science museums. "A good idea would be to coordinate the distribution activities of all of the RIDCs, while maintaining each group's autonomy, in order to create one big program for the dissemination of science in the State of São Paulo," suggests Marco Antonio Zago, whose RIDC launched the House of Science program in 2001, featuring activities aimed at students and teachers in schools in the Ribeirão Preto region.

"In the previous round, there was an obvious increase in the intellectual, social, and economic impact of the RIDCs. That is why our expectations are so high with respect to the 17 selected for this new round," says the scientific director of FAPESP, Carlos Henrique de Brito Cruz. ■

Fabrício Marques