FAPESP
SÃO PAULO RESEARCH FOUNDATION

ANNUAL REPORT FAPESP 2020

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2020

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YEAR 2020

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INTRODUCTION

The year 2020 was dominated by the COVID-19 pandemic, the greatest challenge to science in the last 100 years. FAPESP mobilized to deal with it, but was also affected by its impacts.

The urgency of combating the disease required changes to our research funding calendar. As early as March, only a week after the World Health Organization (WHO) recognized the pandemic, FAPESP issued calls for proposals and other measures mobilizing more than 140 researchers affiliated with universities, research institutions and companies to contribute to efforts to investigate SARS-CoV-2, a hitherto unknown virus, pursue effective treatments, and contain the spread of the disease. As part of FAPESP's Research Program on Public Policies for the National Health System (SUS), in partnership with the Ministry of Health and the National Council for Scientific and Technological Development (CNPq), eight projects were approved to strengthen the capabilities of the SUS in addressing the challenges of COVID-19.

We also launched initiatives to facilitate the sharing of information. In June, in partnership with the University of São Paulo (USP), FAPESP created Brazil's first open-access repository of anonymized data concerning patients tested for COVID-19 by four hospitals and a clinical laboratory, as a resource for research on the disease in a wide array of knowledge areas. At the end of the year, the repository held data for 485,000 patients, some 47,000 outcome records, and more than 23 million records of clinical examinations and laboratory tests, offering huge opportunities for research on the disease and patients infected by the novel coronavirus.

FAPESP supported Phase 3 trials of CoronaVac, the vaccine manufactured in Brazil by Butantan Institute, in a joint funding effort with Todos pela Saúde, an initiative led by Itaú Unibanco, and research on the immune response to the Oxford/AstraZeneca vaccine conducted by scientists at the Federal University of São Paulo's Medical School (EPM-UNIFESP). It also funded eight projects to develop vaccines against SARS-CoV-2: four at USP, two at Butantan Institute, and two at startups supported by the FAPESP Innovative Research in Small Business Program (PIPE). All eight are still at the pre-clinical stage.

FAPESP also participated actively in global efforts to combat the disease and in planning the post-pandemic social and economic recovery. For example, it issued a joint call with the European Union for proposals to identify novel therapeutic agents and systems for effective and reliable early diagnosis relating to the virus. And it took part in a group of heads of research funding agencies in 25 countries that helped produce the United Nations Research Roadmap for the COVID-19 Recovery, launched in November 2020 to advance research priorities in strategic areas toward the building of a more equitable, resilient and sustainable future aligned with the Sustainable Development Goals (SDGs).

In the midst of public health restrictions, FAPESP held 62 online seminars between March and

December 2020, with the participation of more than 11,000 researchers in Brazil and abroad, including the series of FAPESP COVID-19 Research Webinars.

Besides these initiatives, we took steps to assure the safety of our scholarship awardees abroad, extend grants and scholarships, allow more time for researchers to file expenditure reports, and overcome the obstacles imposed by social distancing to the provision of services to researchers, without endangering the health of those among our staff who were still coming in to the office. The results of these initiatives are described in the Special COVID-19 Supplement included in this report.

The emergency created by the pandemic did not stop FAPESP from funding projects in other research areas. In 2020, it disbursed a total of $ PPP 423.3 million to fund 21,233 projects, 45% in the area of Life Sciences, 37% in Natural Sciences and Engineering, 10% in Human Sciences, and 7.5% interdisciplinary. Of the total amount disbursed, 23% was invested in Training of Human Resources for Research. This investment was less than in the previous year because of the pandemic, which hampered the functioning of universities and research laboratories, practically brought international travel to a halt even for scientists, and made imports unviable for a time, among other reasons.

As of September, all applications for grants and scholarships filed with FAPESP were required to include a Data Management Plan (PDG) to ensure the transparency, accessibility and reusability of research project data. The PDG is now one of the items analyzed when proposals and scientific reports are assessed.

FAPESP reinforced initiatives aligned with its strategy of funding innovation, allowing PIPE proposals to be submitted for analysis at any time (continuous flow) and creating a supplementary form of support for innovative companies in the shape of PIPE Invest, which calls for matching contributions from private investors to funding for market-mature projects with the aim of accelerating commercialization.

Another pro-innovation initiative by FAPESP, this time in connection with the Engineering Research Center program (ERC), was a new partnership with GSK to establish the Center for Oncology New Target Discovery (CONTD), the third ERC in partnership with the company.

The Research, Innovation and Dissemination Centers (RIDCs) achieved important knowledge advancement in their respective areas of activity, as did the research groups involved in Thematic Projects. This Report also brings good news of research conducted by recipients of Young Investigator grants.

At the end of the year, FAPESP announced the results of its Science for Development call for proposals to set up 12 research centers focusing on solutions to problems in health, law enforcement, food and agriculture, and economic development, among others. This is a novel approach fostering research partnerships among researchers at universities and other public and private institutions in Brazil and abroad, including government and business, to address São Paulo State's social and economic needs.

The production of indicators was another highlight of FAPESP's activities in 2020. New indicators of investment in research and development (R&D) in São Paulo State were presented, including a matrix that associates statewide R&D funding and execution with a panel of FAPESP's research funding indicators, among other relevant data for use in monitoring the progress of research in the state.

In 2020, FAPESP commemorated 20 years of the BIOTA Program, which has awarded 293 research grants, scholarships and fellowships to more than 1,200 researchers, and resulted in over 3,000 published scientific articles. During the period, BIOTA both extended the understanding of biodiversity and provided a scientific basis for the creation of conservation guidelines and policies.

Last but not least, in a year of strong demand for news about progress in developing treatments for COVID-19, FAPESP once again fulfilled its obligation to disseminate information to society. It created a website with information on research projects and novel technologies relating to the disease, held a series of seminars for the general public as a partnership between Agência FAPESP and Butantan Institute, and published a guide to COVID-19 in the Pesquisa FAPESP magazine, with systematically updated information on the disease. The impact of its science diffusion initiatives can be inferred from the number of visits to Agência FAPESP's website, which totaled 5.2 million in 2020 – up 34% compared with 2019 for the Portuguese-language version, 12% for the English version and 51% for the Spanish version. Media coverage of the projects supported by FAPESP, including republishing of news stories by major newspapers, magazines and broadcasters, rose 33% to total 42,500 news stories and articles (37% in local media and 13% in foreign media). Coverage by social media increased by a similar amount.

The results presented in this Report demonstrate FAPESP's capacity to respond rapidly to a situation of extreme crisis without compromising its backing for other areas of research. This robustness will be a key driver of support for the scientific community in São Paulo State as part of our society's efforts to resume development and normalcy when the epidemic has been brought under control.

Professor Marco Antonio Zago
President, FAPESP

ABOUT THIS REPORT

This Annual Report on FAPESP's activities in 2020 details the results of its investment in scientific and technological research using funds transferred by constitutional mandate from the São Paulo State Treasury, and from other sources. It highlights FAPESP's contribution to the advancement of science and innovation in São Paulo, and to the solutions to many economic and social challenges.

The framework for the Report comprises two funding instruments – research scholarships/fellowships and research grants – awarded by FAPESP to further six funding strategies: (1) Training of Human Resources for S&T; (2) Research for Knowledge Advancement; 3) Research for Innovation; (4) Research on Strategic Themes; (5) Support for Research Infrastructure; and (6) Knowledge Diffusion.

These six strategies translate respectively into (1) scholarships/fellowships in Brazil and abroad to support the training of human resources for academic and technological research; (2) support for long-term research, and regular research grants; (3) research conducted in partnership with companies; (4) strategic projects in areas such as biodiversity, bioenergy, climate change, and public policy; (5) support for modernization and conservation of research facilities; and (6) dissemination of scientific and technological research findings.

The indicators of the results of funding instruments are amounts disbursed, numbers of active projects, and numbers of projects contracted for between January and December. These results are presented in the report in connection with the funding strategies.

The classification of funding instruments (scholarships/fellowships and research grants) by funding strategy provides insight into the objectives of FAPESP's investment in research by accounting for all types of funding linked to approved projects, and distinguishing among support for long- and short-term research projects, projects selected in calls for proposals and projects submitted spontaneously, support for human resource training, and support for scientific exchange and research infrastructure, among others.

HOW THE REPORT IS STRUCTURED

SÃO PAULO ST&I SYSTEM: Indicators for São Paulo State's Science, Technology & Innovation (ST&I) System, giving the reader an overview of the state's importance

to scientific and technological development in Brazil.

FAPESP HIGHLIGHTS 2020: A summary of FAPESP's key indicators for the year, as detailed in the rest of the report, and examples of scientific research projects that were conducted in the period and stand out for their quality and relevance.

CHAPTER 1 – THE INSTITUTION: A description of FAPESP's governance, how it assesses and selects research proposals, the number of projects funded since 1962, and the numbers of reviewers and expert opinions issued.

CHAPTER 2 – GENERAL INDICATORS: The composition of FAPESP's income, the annual change in total disbursement since 2014, and indicators of disbursement, active projects and projects contracted for during the year, organized by funding strategy, major knowledge area, institution, and scholarships/fellowships or research grants pertaining to each strategy. The tables include time series for the years 2014-2020 showing total disbursement for each funding strategy, total projects contracted for, and disbursement for scholarships/fellowships and research grants.

COVID-19 SPECIAL: An outline of the measures taken by FAPESP to fast-track funding for research on ways of combating the COVID-19 pandemic, distributed along a timeline highlighting some of the scientific discoveries made in the period and media coverage in Brazil and abroad; and the operational measures taken to maintain its other activities, including support for the scientific community and protection for its staff during the pandemic.

CHAPTER 3 – FUNDING STRATEGIES: Information on the programs covered by the six research strategies, detailing disbursement, active projects, projects contracted for during the year, and examples of outstanding achievements and research results.

CHAPTER 4 – CONSOLIDATED STATUS OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS: Amount disbursed and total numbers of awards contracted for in all funding lines.

CHAPTER 5 – RESEARCH COLLABORATION AND CO-FUNDING: Promotion of collaborative research in Brazil and abroad; co-funding initiatives; investment and partnerships with funding agencies, academic institutions and companies during the year.

APPENDIX: Lists of the tables and figures in the Report, and of the tables available at **www.fapesp.br/relatorio2020**.

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SÃO PAULO STATE SCIENCE, TECHNOLOGY & INNOVATION SYSTEM 2020

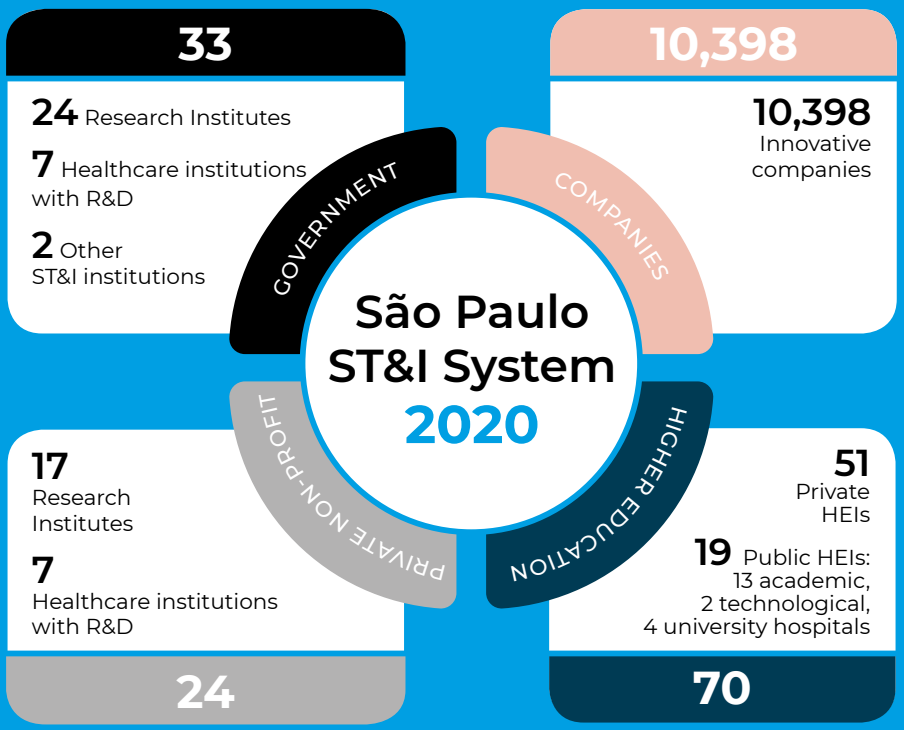
Institutions

Researchers and R&D Personnel

R&D Expenditure

Scientific Publications

Intellectual Property



RESEARCHERS AND R&D PERSONNEL, 2020 (full-time equivalent – FTE)

SECTOR OF PERFORMANCE

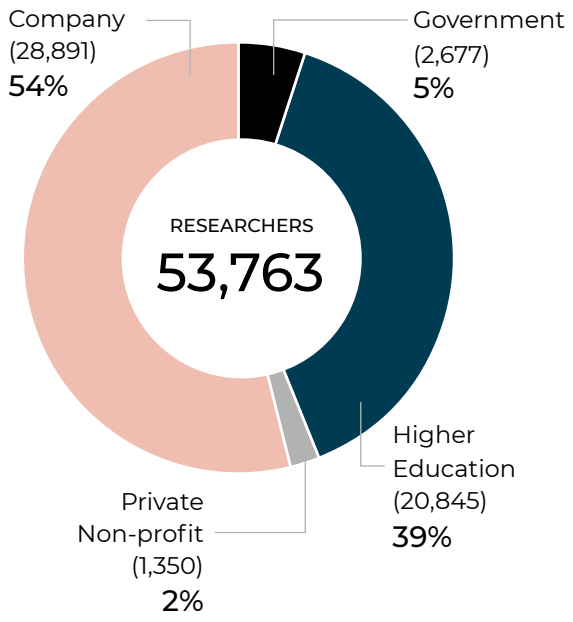
Type of Execution	Number of Researchers[1]
Research Institute (RI)	3,594
Higher Education Institution (HEI)	20,746
Healthcare institutions with R&D	515
Company	28,891

Sources: FAPESP Survey (2018); IBGE, Industrial Survey of Technological Innovation (Pintec, 2017); administrative records of FAPESP, CNPq and CAPES relating to PhD scholarships and postdoctoral fellowships.

Notes: This information comes from the primary survey conducted by FAPESP, as described in the section on investment in R&D, and from IBGE's Pintec survey. Where it diverges from the information in previous reports, this is because it now includes more institutions, and reflects more accurate counting of the number of researchers and IBGE's enhanced method for projecting data in Pintec. It counts full time equivalent (FTE) researchers employed in R&D activities, corresponding to the sum of full-time researchers and the number of part-time researchers weighted by average dedication time. Recipients of postdoc fellowships and PhD scholarships are deemed to be dedicated 100% and 50% to the activities concerned respectively.

[1] The sum of the numbers of researchers by type of executor does not match the sum of all categories because it includes recipients of scholarships or fellowships at institutions not covered by any category.

SECTOR OF PERFORMANCE



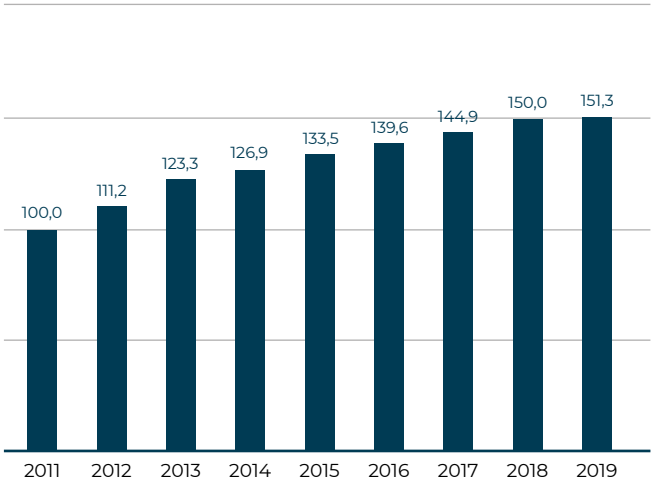
R&D EXPENDITURE IN SÃO PAULO STATE

BY TYPE OF INSTITUTION
2018-2019 (& PPP* million)

Type of institution	2018	2019
Total	**11,048**	**11,141**
HEI	3,083	3,160
Federal HEIs	0,467	0,505
State HEIs	2,324	2,340
Private HEIs	0,292	0,315
Research funding agency	1,165	1,135
CNPq	0,170	0,161
CAPES	0,344	0,316
FINEP	0,105	0,091
FAPESP	0,546	0,565
Research Institute (RI)	1,118	0,961
Federal RIs	0,832	0,679
State RIs	0,286	0,282
Companies	5,682	5,887

Source: FAPESP, Indicators (GEI).
* purchasing power parity (https://data.worldbank.org/indicator/PA.NUS.PPP?name_desc=false)

R&D EXPENDITURES INDEX
2011-2019 (current values)
Index: 2011 = 100



Source: FAPESP, Indicators (GEI).

R&D EXPENDITURE IN SÃO PAULO STATE

MATRIX OF R&D PERFORMANCE x FUNDING: a new tool for analysis and management

For the past several years, FAPESP has worked hard to refine its indicators of investment in research and development (R&D) in São Paulo State, and to construct a matrix displaying how the funding of these activities correlates with their performance.

Despite the existence of a widely accepted methodological framework and a long history of developing these indicators, their construction is complex, and for decades FAPESP has been calculating them and refining the relevant methodology. The results of these efforts can be seen in the extensive time series for its indicators of R&D expenditure, which serve as a benchmark for the rest of Brazil. The latest figures can be found on the previous page of this Report.

It is appropriate to recall that the methodology developed many years ago by FAPESP, as well as that of the Ministry of Science, Technology and Innovation (MCTI), calls for the use of administrative records, mainly of public funding for R&D, in conjunction with primary data on R&D in the corporate sector, especially from IBGE's Pintec survey. As a result, the methodology makes no distinction between R&D funding and execution expenditure, and moreover leaves out an important set of institutions that fund and/or execute R&D activities.

In order to enhance the quality of its indicators, FAPESP partnered with São Paulo State Data Analysis System (SEADE Foundation) to conduct a survey of its own, covering a large number of institutions in São Paulo State that execute R&D activities, as well as other scientific and technological activities. The survey was conducted between July 2019 and February 2020, but the data collected refers to 2018. The response from the institutions contacted was extremely collaborative. They all promptly supplied the information requested, covering items such as human resources, sources of income, and spending on these activities.

The universe of institutions investigated comprises research institutes, higher education institutions, healthcare institutions with R&D located in São Paulo State. They were classified as belonging to the governmental, higher education, corporate and nonprofit sectors. In the first two, the universe of executors comprise both state institutions and federal institutions located in São Paulo State.

This new approach to data collection enabled us to:

- extend the representativity of the sample;
- extend coverage of the sources of funding for scientific and technological activities, especially R&D;
- improve the delimitation of R&D activities in the set of scientific and technological activities performed by each institution;
- assure the uniformity and standardization of the data collected;
- measure the performance of R&D activities by type of institution and execution sector;
- construct a matrix displaying performance x funding of R&D activities.

Based on the results obtained and on the methodological guidelines of the OECD's Frascati Manual, FAPESP has constructed a new series of R&D expenditure indicators from the execution standpoint, with enhanced institutional representativity and identification of the sources of R&D funding. Its main output is a matrix displaying R&D performance x funding, now presented for the first time. The matrix provides São Paulo State with this important analytical tool, already in use in several OECD countries. While it diverges to some extent from the results of the methodology previously used by FAPESP, it is justified by gains in representativity, quality, and opportunities for analysis.

This is also the occasion for a revised approach to the counting of R&D staff and more accurate measurement of the body of researchers involved, enhancements that explain any divergences from the results of the previous methodology and are more than offset by the gain in quality.

R&D EXPENDITURE IN SÃO PAULO STATE

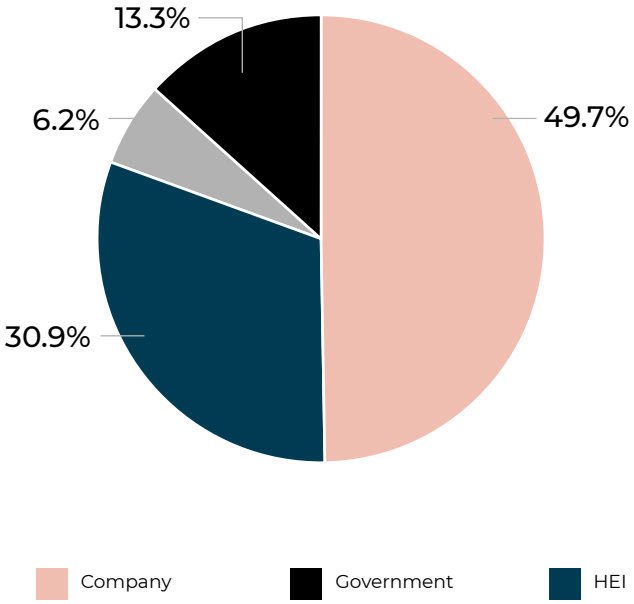
R&D PERFORMANCE X FUNDING MATRIX
SÃO PAULO STATE – 2018 ($ PPP million)

Funding Sector	Sector of Performance				Total funding by source
	Government	Company	HEI	Private Non-profit	
Government	1,442	0,425	3,007	0,194	5,068
Company	0,070	5,162	0,189	0,151	5,572
HEI	-	-	0,331	-	0,331
Private non-profit	0,010	-	0,005	0,356	0,371
Foreign	0,004	0,123	0,019	0,006	0,152
Total performed by sector	1,526	5,710	3,551	0,707	11,494

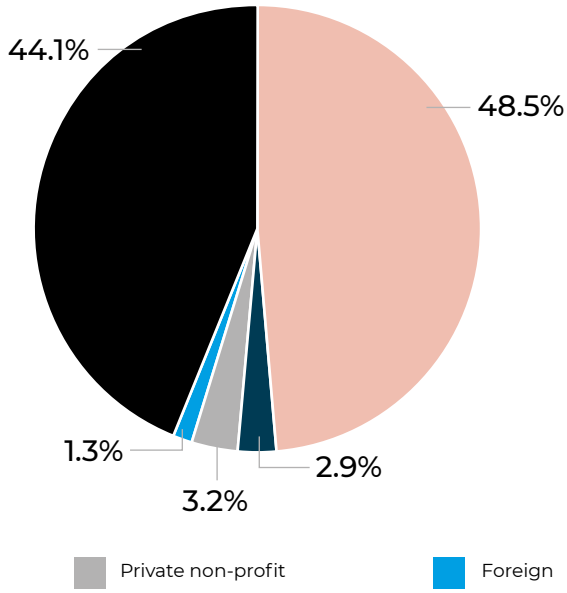
Source: FAPESP Survey; IBGE, Industrial Survey of Technological Innovation (Pintec) by sector of performance (in $ PPP).

Note: Include all institutions that carry out R&D activities located in São Paulo.

R&D EXPENDITURE BY SECTOR OF PERFORMANCE
(São Paulo: 2018)



R&D EXPENDITURE BY SOURCE OF FUNDS
(São Paulo: 2018)



Company · Government · HEI · Private non-profit · Foreign

Note: Totals in the tables and charts in this section may differ from the sum of partial amounts owing to rounding.

SCIENTIFIC PUBLICATIONS

SCIENTIFIC PUBLICATIONS BY INSTITUTIONS BASED IN SÃO PAULO STATE

(at least 100 publications in 2020)

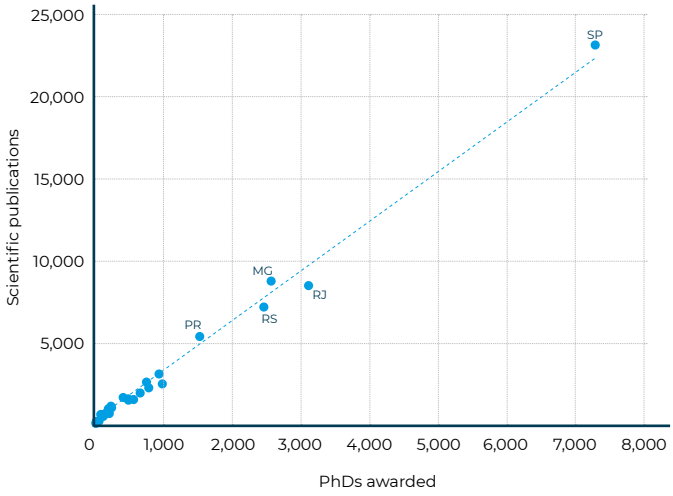
Institutions	2009	2019	Variation (%)
Brazil	**30,897**	**55,542**	**80**
São Paulo	**14,283**	**23,142**	**62**
USP	7,276	11,071	52
UNESP	2,622	4,289	64
UNICAMP	2,300	3,962	72
UNIFESP	1,323	2,057	55
UFSCAR	749	1,508	101
UFABC	223	591	165
INPE	304	351	15
CNPEM	85	324	281
I. A. Einstein Hosp.	98	302	208
Butantan Inst.	170	250	47
CTA	102	242	137
ITA	92	237	158
IPEN	168	175	4
A.C.Camargo	78	167	114
UNINOVE	35	165	371
IAC	155	147	-5
UNIP	37	142	284
Inst. Fed. SP (IFSP)	3	138	4,500
Fac. Med. ABC	55	129	135
FGV-SP	26	138	431
Sírio-Libanes Hosp.	44	123	180
Bothanic Inst.	89	120	35
UNOESTE	45	109	142
Adolfo Lutz Inst.	97	106	9
H. Câncer Barretos	11	106	864

Source: Incites/*Web of Science*/Clarivate.

Notes: Covers only scientific articles classified as Articles in Web of Science. Updated in July 2021, including data indexed by Web of Science to May 31, 2021.

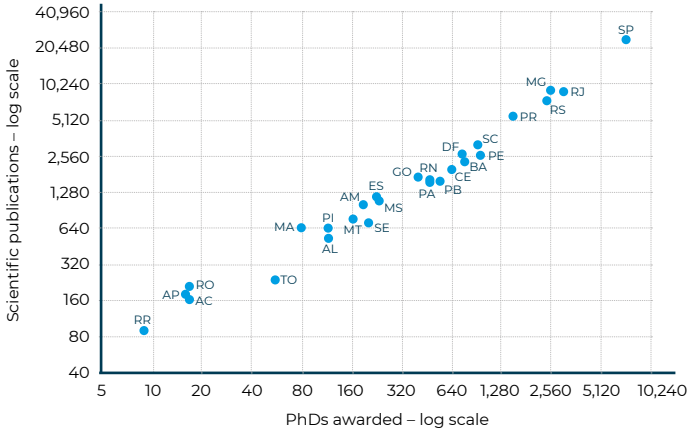
PhDs AND SCIENTIFIC PUBLICATIONS

(Federative units of Brazil, 2019)



PhDs AND SCIENTIFIC PUBLICATIONS – LOG SCALE

(Federative units of Brazil, 2019)



Sources of charts: IBGE, population; CAPES/Ministry of Education, graduate faculty and PhDs; INCITES/CLARIVATE, Articles in peer-reviewed journals. Data downloaded in June 2021. Tables and charts by FAPESP, Indicators (GEI).

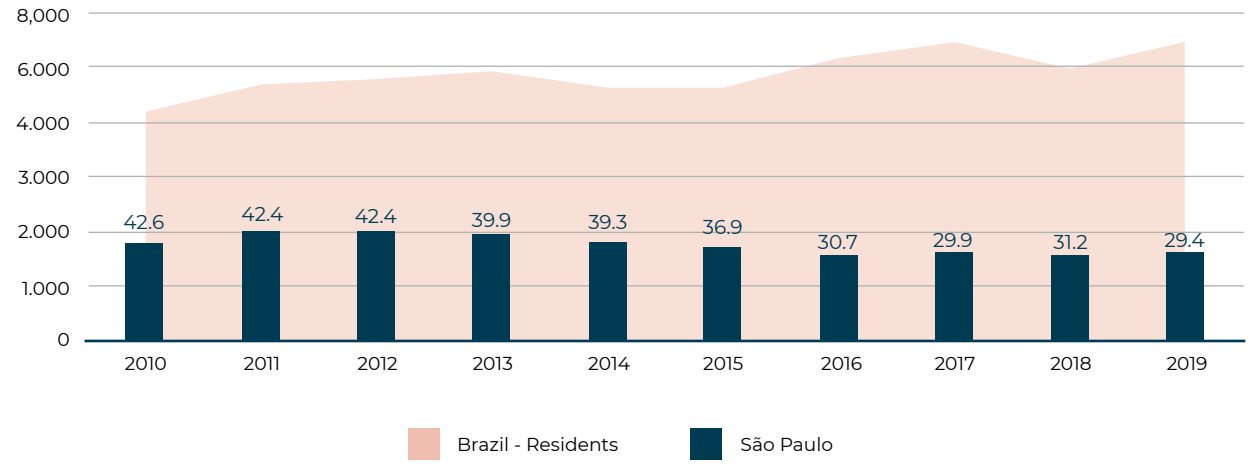
INTELLECTUAL PROPERTY

Brazil and regions	Invention patent applications filed									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Brazil	4,225	4,705	4,798	4,955	4,657	4,640	5,199	5,480	4,980	5,465
São Paulo	1,799	1,994	2,035	1,976	1,828	1,714	1,598	1,640	1,556	1,604
North	67	88	66	65	56	82	91	115	155	131
Northeast	325	420	425	489	498	568	679	835	792	882
Southeast	2,683	2,890	2,958	2,993	2,806	2,672	2,978	3,053	2,621	2,873
South	986	1,082	1,111	1,171	1,078	1,095	1,200	1,198	1,149	1,284
Center-West	164	224	238	237	219	222	251	279	263	295

Source: INPI, BADEPI v7.0.

Note: The origin of an application is defined as the first applicant's place of residence. Totals do not match the sum of the parts when there are applicants with unidentified places of residence.

INVENTION PATENT APPLICATIONS ORIGINATING IN SÃO PAULO STATE AS A SHARE OF TOTAL APPLICATIONS BY RESIDENTS OF BRAZIL – 2010-2019 (%)



FAPESP HIGHLIGHTS 2020

Research Funding Strategies

Disbursement for Research Funding Strategy and major knowledge area

Projects submitted, projects approved, proposal selection

International Cooperation

Special actions in 2020

Science diffusion

Examples of projects funded in 2020

RESEARCH FUNDING STRATEGIES

FAPESP's support for scientific and technological development in São Paulo State is oriented by six funding strategies, described below:

TRAINING OF HUMAN RESOURCES FOR RESEARCH

Regular scholarships/fellowships for undergraduate and graduate students in Brazil and abroad, not associated with other research grants. **In Brazil:** Scientific Initiation, Master's, PhD, Direct Doctorate, Postdoc.
Abroad: Research Fellowship Abroad (RFA), postdoc level; Research Internship Abroad (RIA), funding research conducted abroad while a scholarship/fellowship is in progress in Brazil.

BASIC AND APPLIED RESEARCH

Long term: Support for basic and applied research via Thematic Projects, Research, Innovation and Dissemination Centers (RIDCs), Young Investigator awards, São Paulo Excellence Chair (SPEC), Special Projects, and associated scholarships/fellowships and grants.
Short term: Support for basic and applied research via Regular Research Grants and associated scholarships/fellowships, regular grants for visiting researchers from abroad, scientific publications, and participation in and organization of scientific or technological meetings.

RESEARCH FOR INNOVATION

A set of research programs that prioritize collaboration between business organizations and universities or research institutions and stimulate technological innovation in São Paulo State.
Programs: Research Partnership for Technological Innovation (PITE); Engineering Research Centers/Applied Research Centers (ERCs/ARCs); Innovative Research in Small Business (PIPE); Support for Intellectual Property (PAPI); associated research grants and scholarships/fellowships.

RESEARCH ON STRATEGIC THEMES

A set of programs whereby FAPESP stimulates the formation of research groups to focus on topics considered strategic to the development of São Paulo State and Brazil, including support for the modernization of research institutions in the state.
Programs: BIOTA-FAPESP (biodiversity), BIOEN (bioenergy), Global Climate Change (RPGCC), eScience and Data Science, Public Policy, Public Education, Modernization of State Research Institutions, and associated grants and scholarships/fellowships.

SUPPORT FOR RESEARCH INFRASTRUCTURE

A set of programs whereby FAPESP assures the infrastructure required for the continuity of research.
Programs: Multi-User Equipment, FAP-Livros, Equipment Repair, Institutional Overhead, Access to REDNESP, Support for Infrastructure (collections, laboratories etc).

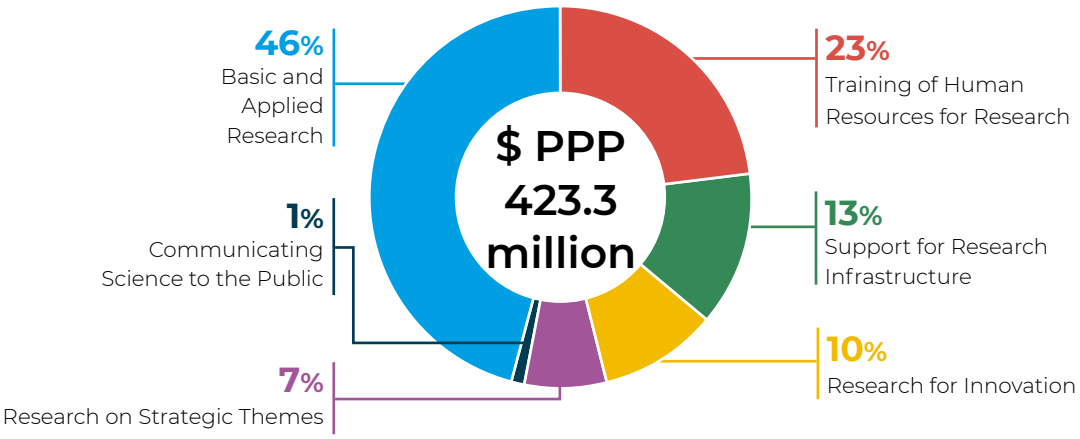
COMMUNICATING SCIENCE TO THE PUBLIC

Initiatives to inform FAPESP's stakeholders about its science policy guidelines, the results and societal and economic impact of the scientific knowledge produced in São Paulo State with FAPESP's support; and actions to measure the results of its activities, map research institutions and evaluate the overall status of research in the state.

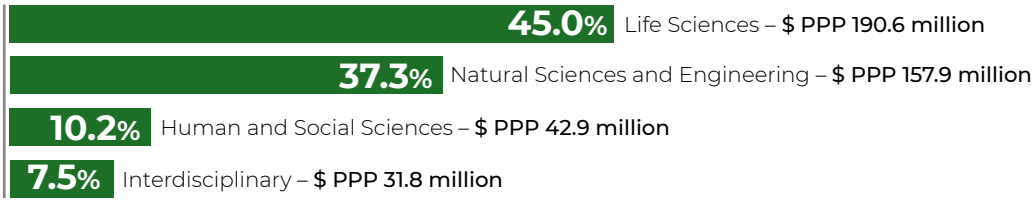
DISBURSEMENT FOR FUNDING STRATEGY AND MAJOR KNOWLEDGE AREA

FAPESP disbursed **$ PPP 423.3 million** in purchasing power parity (PPP) to fund **21,233** active research projects.

BY FUNDING STRATEGIES



BY MAJOR KNOWLEDGE AREA



PROJECTS SUBMITTED, PROJECTS APPROVED, PROPOSAL SELECTION

In 2020, the number of projects submitted to FAPESP totaled **19,880** and **7,027** were selected. The number of active projects plus new projects selected during the year amounted to **21,233**.

Advisors to the Science Directorate and **9,469** ad hoc reviewers issued **23,879** expert opinions. The average time taken to analyze each of **14,401** initial evaluation was **94** days.

INTERNATIONAL COOPERATION

In 2020, FAPESP held
13 join calls for proposals with
12 foreign organizations
(funding agencies, universities and companies).

FAPESP signed **7** new research partnership agreements with foreign organizations.

208 active partnerships with **167** foreign organizations and **41** with local organizations.

SPECIAL ACTIONS IN 2020

COVID-19: The measures taken to address the impact of the COVID-19 pandemic are described on pp. 45-82.

PIPE in continuous flow: In November 2020, FAPESP amended the timetable for submitting research projects to PIPE, which began receiving applications in a continuous flow instead of the usual four annual calls for proposals. Applicants can now submit proposals for Phase 1 proposals (proof of concept for innovative ideas), Phase 2 (development of research), and PIPE Invest, the new option.

PIPE Invest: This option was created in October 2020, offering supplementary funding for startups and small or medium enterprises that are successful in PIPE Phase 2 and want to accelerate commercialization of their innovations. In exchange for funding, the firm must prove that a private partner is committed to investing more than $ PPP 43,271. The supplementary funding provided by PIPE Invest matches the amount invested by the private partner, with a cap of $ PPP 432,713 per firm, for a period of up to 24 months.

Top 20 Ecosystems: FAPESP ranked third in the 2020 Top 20 Ecosystems, an annual contest in which *100 Open Startups* assesses the volume and intensity of open innovation by startups and other companies in Brazil.

Science for Development Centers: In December 2020, FAPESP announced its selection of 12 proposals submitted by research consortia interested in setting up Science for Development Centers. It will invest $ PPP 38.078 million in funding for research to solve problems in health, law enforcement, food security/agriculture, and economic development, among other areas selected by state governments.

BIOTA 20 years: In 2020, the program reached its 20th year, with some 293 research grants and scholarships awarded for training and the development of projects by 1,200 researchers, resulting in more than 3,000 scientific publications.

New partnership with GSK: In November 2020, FAPESP and GSK, partners in two Engineering Research Centers (ERCs) – the Center of Excellence for Research in Sustainable Chemistry and the Center of Excellence in New Target Discovery – announced a call for proposals to set up a third, the Center for New Targets in Cancer Treatment.

SCIENCE DIFFUSION

42,516 references to research projects funded by FAPESP in the media	6,246 news stories carried by 2,759 media outlets in 93 countries	36,270 news stories carried by 5,844 Brazilian media outlets	33% growth in the number of mentions of FAPESP

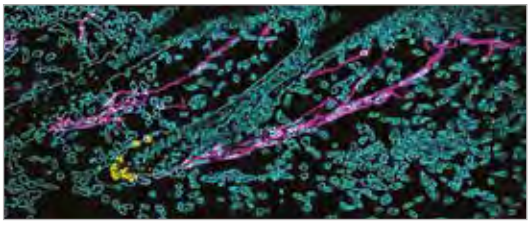
Much of this performance should be credited to the broad coverage given by Agência FAPESP to research projects relating to COVID-19 and SARS-CoV-2, and to Brazilian and foreign media coverage of their results (*see Tables 33 and 34 on p. 140*).

NEWSWORTHY RESULTS IN 2020

(Projects relating to COVID-19 and SARS-CoV-2 are highlighted on pp. 45-82)

RESEARCH GRANT – RIDC – CENTER FOR RESEARCH ON INFLAMMATORY DISEASES (CRID) – FAPESP Process 2013/08216-2
Principal investigator: Fernando de Queiroz Cunha
Institution: Ribeirão Preto Medical School, University of São Paulo (FMRP-USP)
Article author affiliated with CRID: Thiago Mattar Cunha

A study showed that intense activation of the sympathetic nervous system, which controls the "fight or flight" response to imminent danger, accelerates hair follicle bulb stem cell aging and permanently interrupts the production of melanin, the pigment primarily responsible for hair color. The study was conducted in partnership with a group at Harvard University in the US, and reported in the journal Nature in the article "Hyperactivation of sympathetic nerves drives depletion of melanocyte stem cells": www.nature.com/articles/s41586-020-1935-3.



Elaborate sympathetic innervation [magenta] around melanocyte stem cells [yellow]. (Photo: HSU Laboratory, Harvard University)

RESEARCH GRANT – REGULAR – FAPESP Process 2012/15375-7
Principal investigator: Marcelo Magalhães Fares Saba
Institution: Atmospheric Electricity Group (ELAT), National Space Research Institute (INPE)

Researchers at Brazil's National Space Research Institute (INPE), in partnership with colleagues in the United States, United Kingdom and South Africa, recorded for the first time the formation and branching of luminous structures by lightning strikes. Analyzing images captured by a super slow motion camera, they discovered why lightning strikes bifurcate and sometimes then form luminous structures interpreted by the human eye as flickers. The study was published in Scientific Reports in the article "Optical observation of needles in upward lightning flashes (DOI: 10.1038/s41598-020-74597-6): https://www.nature.com/articles/s41598-020-74597-6.

Photo: Inpe

RESEARCH GRANTS – THEMATIC PROJECT, REGULAR, YOUNG INVESTIGATOR, AND ASSOCIATED REGULAR SCHOLARSHIPS IN BRAZIL – FAPESP Processes 2017/01184-9, 2018/21635-8, 2017/07975-8, 2010/52557-0, 2012/06238-6, 2012/04079-8, 2015/03292-8, 2015/01316-7, 2017/04377-2 AND 2017/03423-0
Principal investigator: Marcelo Mori
Institutions in Brazil: Medical School, Federal University of São Paulo (EPM-UNIFESP); Institute of Biology, State University of Campinas (IB-UNICAMP)
Institutions abroad: University of Copenhagen, and Technical University of Denmark (cooperation agreement with Innovation Fund Denmark)

Experiments with mice and humans showed that aerobic exercise training increased the expression in adipose tissue of a key enzyme for the organism's metabolic health, combating the harmful effects of aging and obesity. The findings were published in *Proceedings of the National Academy of Sciences (PNAS)*, in an article entitled "Dynamic changes in DICER levels in adipose tissue control metabolic adaptations to exercise": www.pnas.org/content/117/38/23932. A commentary on the research reported in PNAS was published in *Science*: https://science.sciencemag.org/content/370/6512/71.6.full.

Photo: Danilo Ferrucci and Bruna B. Brandão

NEWSWORTHY RESULTS IN 2020

RESEARCH GRANT – YOUNG INVESTIGATOR – FAPESP Process 2019/05523-8
Principal investigator: Ricardo Martínez-García
Institution: Institute of Theoretical Physics, São Paulo State University (IFT-UNESP)

A mathematical model based on game theory predicted that, in the presence of competitors, plants produce roots to assure a supply of water and nutrients close to their stems and avoid seeking resources near neighbors. Besides advancing the theoretical understanding of plants' interactions in the subsoil, the research has important applications in crop management and climate change mitigation. The article "The exploitative segregation of plant roots" (doi:10.1126/science.aba9877) was published in the journal *Science* and featured on the cover: https://science.sciencemag.org/content/370/6521/1197.

Image: Ciro Cabal/ Princeton University

RESEARCH INTERNSHIP ABROAD (RIA), DIRECT DOCTORATE – FAPESP Process 2018/25372-1
Supervisor in Brazil: Bem-Hur Viana Borges/ Supervisor abroad: Thomas Fraser-Krauss
Grantee: Augusto Martins
Institutions: São Carlos School of Engineering, University of São Paulo (EESC-USP); University of York (UK)

A flat lens a thousand times thinner than a human hair developed by researchers at EESC-USP can be used as a camera lens in smartphones and in other devices that depend on sensors. An article about the research entitled "On meta-lenses with an arbitrarily wide field of view" was published in *ACS Photonics*: https://pubs.acs.org/doi/10.1021/acsphotonics.0c00479.

High-resolution wide-angle selfie obtained using the meta-lens (photo: Augusto Martins/USP)

RESEARCH GRANT – REGULAR – FAPESP Processes 2019/05043-6 AND 2016/18052-5
Principal investigator: Pedro Esteves Duarte Augusto
Institution: Luiz de Queiroz College of Agriculture, University of São Paulo (ESALQ-USP)

A group of researchers from Brazil and France developed gels based on modified starch that can be used as "ink" to produce food by 3D printing. The results of the project were reported in the journal *Food Research International* in an article entitled "Dry heating treatment: A potential tool to improve the wheat starch properties for 3D food printing application" (DOI: doi.org/10.1016/j.foodres.2020.109731): www.sciencedirect.com/science/article/abs/pii/S0963996920307560.

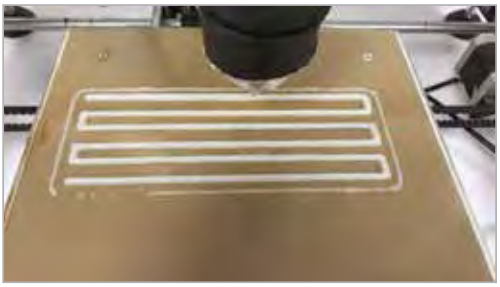


Photo: Bianca C. Maniglia/USP

NEWSWORTHY RESULTS IN 2020

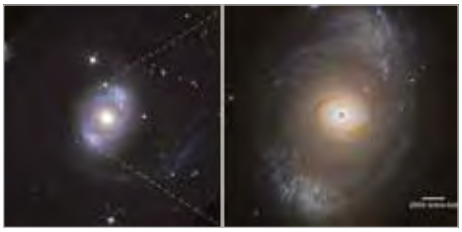
RESEARCH GRANT – ERC – GENOMICS FOR CLIMATE CHANGE RESEARCH CENTER (GCCRC) – FAPESP Process 2016/23218-0
Principal investigator: Paulo Arruda
Company: Brazilian Agricultural Research Corporation (EMBRAPA)
Host institution: State University of Campinas (UNICAMP)

Researchers affiliated with the Genomics for Climate Change Research Center (GCCRC) discovered a protein involved in corn's resistance to dry weather, high temperatures, and fungal invasion. The discovery paved the way for the development of more drought-resistant plants and products that reduce crop losses. An article on the research was published in *BMC Plant Biology*: https://bmcplantbiol.biomedcentral.com/articles/10.1186/s12870-020-2328-3.

Image: Crystal of the protein DRIK1 used in the study (credit: GCCRC)

PHD AND POSTDOCTORAL SCHOLARSHIPS IN BRAZIL – FAPESP Processes 2011/19824-8 AND 2017/18733-5
Supervisors in Brazil: João Steiner and Laerte Sodré Junior
Grantee: Daniel May
Institution: Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo (IAG-USP)

A study proposed a new approach to understanding black hole matter ejection. In the conventional model, matter accumulates in two phases in the central region of an active galactic nucleus: an outflow of high-speed ionized gas from the matter ejected by the nucleus, and slower molecules that may feed the nucleus. The researchers found that the molecular phase, which appears to have completely different dynamics from the ionized phase, is part of the outflow, and that the active nucleus plays a key role in galactic structuring. The study was reported in an article published in *Monthly Notices of the Royal Astronomical Society*: https://academic.oup.com/mnras/article-abstract/496/2/1488/5851281?redirectedFrom=fulltext#205434907.



Galaxy NGC 4151 (left) and close-up of central region (right). (Images: Adam Block/University of Arizona and Judy Schmidt)

RESEARCH GRANT – REGULAR – FAPESP Process 2014/24804-4
Principal Investigator: Paula Midori Castelo Ferrua
Institution: Institute of Environmental, Chemical and Pharmaceutical Sciences, Federal University of São Paulo (ICAQF-UNIFESP)

Researchers at UNIFESP and UNICAMP found that the level of uric acid in saliva is a good indicator of body fat. When they measured the amount of uric acid in the saliva of adolescents, they were able to use it to predict body fat percentage. The researchers were looking for biomarkers that could be used to create non-invasive rapid tests for early detection of the risk of chronic diseases. The results were reported in *Nutrition Research* no artigo *Salivary uric acid is a predictive marker of body fat percentage in adolescents* (DOI: 10.1016/j.nutres.2019.11.007): www.sciencedirect.com/science/article/pii/S0271531719307304?via%3Dihub.

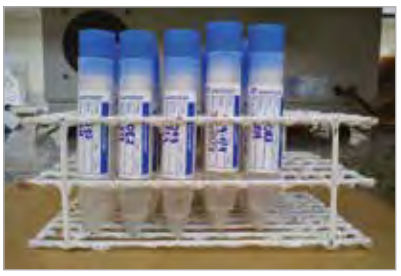


Photo: Paula Midori Castelo/Unifesp

NEWSWORTHY RESULTS IN 2020

PHD SCHOLARSHIP IN BRAZIL ASSOCIATED WITH RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2017/02314-3 AND 2014/07125-6
Principal investigator: Lucia Helena Faccioli
Grantee: Mouzarllem Barros dos Reis
Institution: Ribeirão Preto School of Pharmaceutical Sciences, University of São Paulo (FCFRP-USP)

Researchers at FCFRP-USP demonstrated for the first time that in severe cases of scorpionism a neuroimmune reaction triggered by the scorpion's venom can be the cause of death. The study published in *Nature Communications* also suggested that the inflammatory process can be blocked if a corticosteroid drug is administered as soon as possible after envenomation. The article featured as an Editors' Highlight in Therapeutics: https://www.nature.com/articles/s41467-020-19232-8.

Photo: Wikimedia Commons

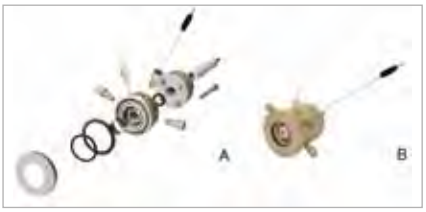
RESEARCH GRANT – MULTIUSER EQUIPMENT – FAPESP Process 2009/54011-8
Principal investigator: Victor Marcelo Deflon
Institution: São Carlos Institute of Chemistry, University of São Paulo (IQSC-USP)

PResearchers developed a compound based on palladium, a silvery-white metal belonging to the same group as platinum, to combat ovarian tumor cells without affecting healthy tissue. In vitro testing on tumor cell lines showed that the molecule was more selective and powerful than cisplatin, the drug most frequently used to treat this type of cancer. The article "Palladium (II) complexes with thiosemicarbazones derived from pyrene as topoisomerase IB inhibitors" (doi: 10.1039/C9DT02570G), signed by researchers from Brazil, the UK and Italy, featured on the cover of *Dalton Transactions*, a journal published by the Royal Society of Chemistry: https://pubs.rsc.org/en/content/articlehtml/2019/dt/c9dt02570g.

Photo: researcher Carolina Oliveira's archive

RESEARCH GRANT – ERC – CENTER FOR INNOVATION IN NEW ENERGIES (CINE) – FAPESP Process 2017/11986-5
Principal investigator: Ana Flávia Nogueira
Company: Grupo Shell
Host institution: Institute of Chemistry, State University of Campinas (IQ-UNICAMP)

A novel device designed to help scientists study in detail what happens during electrochemical reactions has been developed by researchers at the Center for Innovation in New Energies (CINE) in collaboration with colleagues at the Brazilian Synchrotron Light Laboratory (LNLS), a unit of the National Center for Research in Energy and Materials (CNPEM). CINE is an Engineering Research Center (ERC) established by FAPESP and Shell, and is hosted by the University of Campinas (UNICAMP) in São Paulo State, Brazil. Applications of the device will include improving the performance of fuel cells, electrolyzers, batteries and other appliances used to convert chemical energy into electricity or vice-versa. An article on the research featured on the cover of *ChemElectroChem* – https://chemistry-europe.onlinelibrary.wiley.com/doi/full/10.1002/celc.202001242 –, and the journal also published an interview with Pablo Sebastián Fernández, lead author of the article and a researcher at CINE.



Schematic of novel cell. (Image: researcher's archive)

I

THE INSTITUTION

About FAPESP

Governance

Proposal selection

Evaluation of FAPESP's Programs

ABOUT FAPESP

The São Paulo Research Foundation (FAPESP) is one of Brazil's leading public agencies for the funding of research. FAPESP was formally created by State Law 5918 (dated October 18, 1960), which established that its remit was to support scientific research and science dissemination in São Paulo State. It began operating in 1962 in accordance with Decree 40132 (dated May 23, 1962).

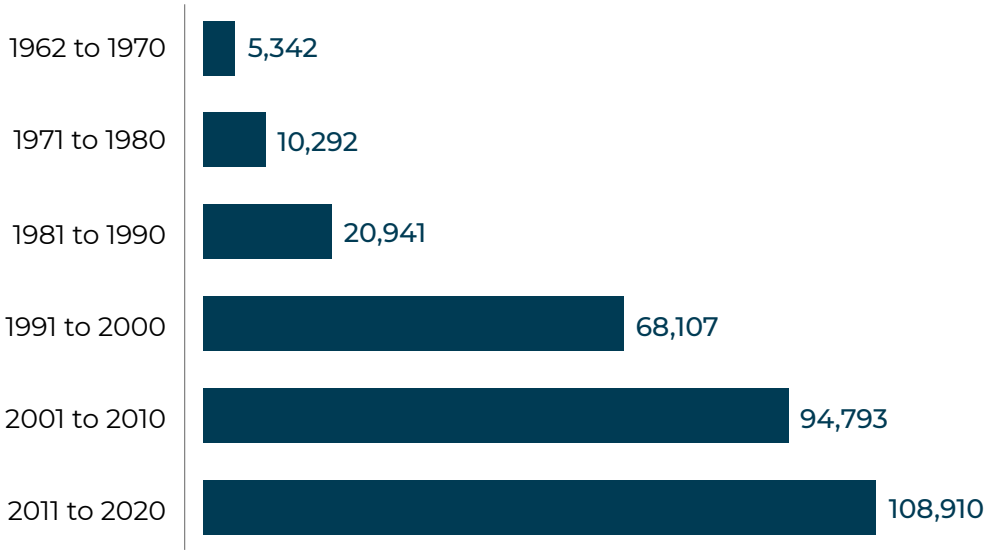
Called for by São Paulo State's 1947 Constitution and ratified by its 1989 Constitution, FAPESP receives 1% of the state's annual tax revenue to carry out its mission of investing in scientific and technological development.

This investment takes the form of scholarships, fellowships and grants to fund research projects in all knowledge areas led by researchers affiliated with public or private higher education and research institutions in São Paulo State, and by researchers employed by companies based in the state.

FAPESP's funding strategies support Research for Innovation, Research for Knowledge Advancement, Research on Strategic Themes, Training of Human Resources for Science and Technology, Support for Research Infrastructure, and Knowledge Diffusion initiatives.

CHART 1

NUMBER OF PROJECTS SUPPORTED – 1962 TO 2020



GOVERNANCE

FAPESP is governed by a Board of Trustees and an Executive Board. The São Paulo State Constitution guarantees its administrative autonomy.

The Board of Trustees sets general guidelines and makes key decisions regarding scientific policy, administrative affairs and asset management. The Board has 12 members, who each serve a six-year term renewable once. Six trustees are appointed directly by the state governor, and the others are chosen by the governor from three-name shortlists submitted by public and private higher education and research institutions in São Paulo State. FAPESP's president and vice president are appointed by the governor from a three-name shortlist drawn up by the Board of Trustees from among its own members.

The Executive Board (CTA) is responsible for the day-to-day running of FAPESP. It has three members: the Executive Director, the Scientific Director, and the Administrative Director. They are chosen by the governor from three-name shortlists drawn up by the Board of Trustees and are retained by FAPESP for up to three years, renewable for two further terms.

DECEMBER 2020

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VICE PRESIDENT
Ronaldo Aloise Pilli

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PROPOSAL SELECTION

Research proposals submitted to FAPESP for support from its various funding lines are evaluated by peer review. Committees of experts called Area Panels coordinate the proposal assessment process in major knowledge areas under the aegis of FAPESP's Scientific Directorate.

The relevant Area Panel selects ad hoc reviewers to analyze each proposal and issue a merit assessment. The proposal then returns to the Area Panel, which issues an approval or denial recommendation to the Scientific Directorate. The Scientific Directorate makes the final decision, with the assistance of a supervisory panel comprising 20 associate coordinators. Decisions must be ratified by the Executive Board, and may also have to be endorsed by the Board of Trustees.

TABLE 1

AD HOC REVIEWERS AND ASSESSMENTS

Evolution – 2015 to 2020

Nº of assessments per reviewer	Nº de assessores por ano					
	2015	2016	2017	2018	2019	2020
1 to 4	7,867	7,748	7,759	7,852	8,311	8,193
5 to 9	1,035	1,113	1,082	1,086	916	1,155
10 to 14	43	67	67	79	87	117
15 or +	5	4	7	4	10	4
Total de reviewers	8,950	8,932	8,915	9,021	9,324	9,469

CHART 2

NUMBER OF ASSESSMENTS BY REVIEWERS' REGIONS OF ORIGIN – 2015 TO 2020

NORTH

2015	2016	2017	2018	2019	2020
11	21	31	10	12	20

NORTHEAST

2015	2016	2017	2018	2019	2020
296	289	310	279	287	312

CENTER-WEST

2015	2016	2017	2018	2019	2020
225	195	229	199	224	238

SOUTHEAST

	2015	2016	2017	2018	2019	2020
São Paulo	18,487	19,429	19,304	19,476	21,112	21,419
Other states	1,061	1,164	1,163	1,043	1,146	1,162

SOUTH

2015	2016	2017	2018	2019	2020
551	598	593	577	600	616

NOT IDENTIFIED

2015	2016	2017	2018	2019	2020
1,015	1,027	971	578	108	112

THE STEPS IN THIS PROCESS ARE SUMMARIZED BELOW:

FOR MORE DETAILS OF FAPESP'S PROJECT SELECTION PROCESS, SEE https://fapesp.br/pdf/peer_review.pdf

1

Area Panels receive applications

Each application received by FAPESP goes to the Area Panel corresponding to the knowledge area for the project. The Area Panel analyzes the abstract and the principal investigator's institutional affiliation.

2

Selection of ad hoc reviewers and issuance of assessment reports

The Area Panels select specialists with specific competencies in each project's subject matter to act as ad hoc reviewers, asking them to issue expert opinions and avoiding potential conflicts of interest. The use of algorithms to suggest reviewers, tested in 2019 and implemented in 2020, is fully operational and has been integrated into the Management Support System (SAGe). The program analyzes data from FAPESP's processes (reviewer history, project research area, keywords, conflicts) and suggests a ranked list of possible reviewers for each new proposal. These lists are presented to the Area Panels, which make the final selection based on the recommendations. The Area Panels have strongly welcomed the system, which is now in production for all proposals received.

9,469 ad hoc reviewers issued **23,879** assessments in 2020

3

Analysis by Area Panel

The proposal returns to the Area Panel, which analyzes the reviewers' assessments and recommends approval or denial by the Scientific Directorate.

KNOWLEDGE AREAS OF PROPOSALS ANALYZED IN 2020:

- 51% Life Sciences
- 30% Natural Sciences and Engineering
- 17.5% Human and Social Sciences
- 1.5% Interdisciplinary

4

Analysis by Supervisory Panel

The Scientific Directorate also works with a Supervisory Panel comprising 20 researchers who are Area Panel members and recognized leaders in their respective fields. They review the recommendations made by the Area Panels to assure compatibility with the available merit assessments. They may endorse recommendations, or question them and suggest further analysis, among other measures.

5

Decision by Scientific Directorate

The Scientific Directorate's decisions are based on the recommendations of the Supervisory Panel and Area Panels.

94 days was the average time taken to analyze each of the **14,401** initial assessments

6

Approval by Executive Board

The Executive Board (CTA) **deliberates** on the applications for research funding, subject to ratification by the Board of Trustees.

7

Board of Trustees

The Board of Trustees **examines** the Executive Board's approvals, **ratifying** them if appropriate.

EVALUATION OF FAPESP'S PROGRAMS

FAPESP's programs are regularly evaluated in terms of their scientific, societal and economic impact. Executive summaries and full reports on the evaluations completed so far are available in Portuguese on its portal (**www.fapesp.br/en/evaluation**). Links to articles deriving from these initiatives and published in special-interest journals can be found on the same page.

The evaluations completed to date cover FAPESP's key activities: cross-border cooperation agreements, scientific initiation, master's and PhD scholarships, the Innovative Research in Small Business Program (PIPE), the BIOTA-FAPESP Program, the Multi-User Equipment Program, the Young Investigator Program, the Research Partnership for Technological Innovation Program (PITE), and the Public Policy Program.

FAPESP makes changes to its initiatives in response to these evaluations with the aim of increasing their effectiveness. New activities are also influenced by the evaluations. The process has been enhanced over the years, not least by an exchange of experiences with funding agencies in other countries.

The evaluations now involve detailed questionnaires for completion by the researchers and institutions awarded funding, as well as control groups with proponents whose applications for funding are turned down.

2

GENERAL INDICATORS

- Income in 2020
- Total disbursement for research funding
- Disbursement, active projects and projects contracted – 2020

By Funding Strategies

By Major Knowledge Areas

By Institution

By Scholarship/fellowship and grant per funding strategies

- Annual evolution of disbursement – 2014 to 2020

By Funding Strategies

By Types of Scholarships/Fellowships and Grants

- Annual evolution in projects contracted – 2014 to 2020

By Funding Strategies

By Types of Scholarships/Fellowships and Grants

INCOME IN 2020

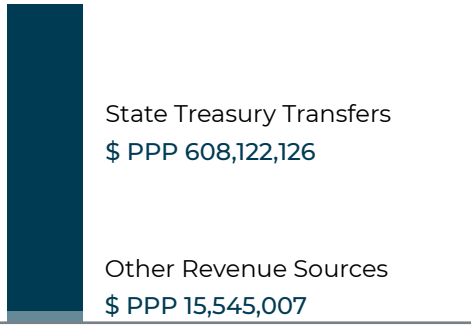
FAPESP's income totaled, in 2020,

$ PPP 623,667,134.

FAPESP's income consists of 1% of São Paulo State's annual tax revenue, transferred by the state treasury as required by the state constitution, and receipts from other sources, such as joint research funding agreements with other institutions and companies.

CHART 3

COMPOSITION OF FAPESP'S INCOME 2020



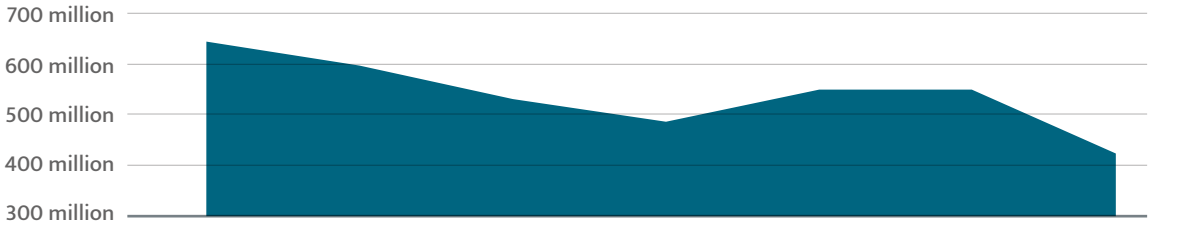
DISBURSEMENT

In 2020, FAPESP disbursed **$ PPP 423,320,342** to support **21,233** active scientific and technological research projects.

The new reality created by the COVID-19 pandemic affected FAPESP's activities significantly in 2020. On one hand, it affected income because the state's tax revenue fell, especially in April and May. Sharp local currency depreciation also forced FAPESP to delay equipment imports in order to conserve its cash position. Research activities in the state were affected most of all, as many laboratories were forced to shut down or operate partially. Restrictions on domestic and cross-border mobility also affected FAPESP, particularly because many internships abroad involving grantees were cut short or postponed. FAPESP took emergency and provisional measures to guarantee short-, medium- and long-term financial commitments relating to scholarships, fellowships and grants already awarded, and to prepare for the resumption of research activities in São Paulo.

CHART 4

ANNUAL EVOLUTION OF DISBURSEMENT FOR RESEARCH FUNDING ($ PPP) – 2014 TO 2020



2014	2015	2016	2017	2018	2019	2020
635,940,752	597,689,694	533,198,350	485,246,052	546,574,884	551,269,903	423,320,342

$ PPP = Purchasing Power Parity. Source: https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

DISBURSEMENT, NUMBER OF ACTIVE PROJECTS AND NEW PROJECTS CONTRACTED IN 2020

TABLE 2

BY FUNDING STRATEGIES

Funding Strategies	Disbursement		Active projects		New projects contracted	
	$ PPP	%	Nº	%	Nº	%
Training of Human Resources for ST&I	98,061,692	23.0	8,127	38.0	2,557	36.4
Basic and Applied Research	196,438,833	46.0	9,710	46.0	3,115	44
Research for Innovation	42,568,890	10.0	1,568	7.0	756	11.0
Research on Strategic Themes	22,992,180	7.0	1,013	4.0	360	5.0
Support for Research Infrastructure	56,474,563	13.0	809	5.0	237	3.5
Communicating Science to the public	6,784,184	1.0	6	0.0	2	0.1
Total	**423,320,342**	**100.0**	**21,233**	**100.0**	**7,027**	**100.0**

TABLE 3

BY MAJOR KNOWLEDGE AREAS

Major knowledge areas	Disbursement		Active projects		New projects contracted	
	$ PPP	%	Nº	%	Nº	%
Life Sciences	190,633,366	45.0	10,865	51.1	3,669	52.2
Natural Sciences and Engineering	157,942,614	37.3	6,542	30.8	2,091	29.8
Human and Social Sciences	42,975,522	10.2	3,309	15.6	1,091	15.5
Interdisciplinary	31,768,840	7.5	517	2.4	176	2.5
Total	**423,320,342**	**100.0**	**21,233**	**100.0**	**7,027**	**100.0**

TABLE 4

BY INSTITUTION

Institution	Disbursement		Active projects		New project contracted	
	$ PPP	%	Nº	%	Nº	%
University of São Paulo (USP)	193,520,685	45.7	7,791	36.7	2,358	33.6
University of Campinas (UNICAMP)	56,901,278	13.4	2,854	13.4	867	12.3
Federal Research Institutions	52,278,319	12.3	3,231	15.2	1,120	15.9
São Paulo State University (UNESP)	42,061,293	10.0	3,788	17.8	1,303	18.5
Companies	33,422,013	7.9	1,332	6.3	667	9.5
State Research Institutions	27,936,945	6.6	1,010	4.8	290	4.1
Private Higher Education and Research Institutions	15,107,508	3.6	1,154	5.4	388	5.5
Scientific Associations and Societies	770,692	0.2	14	0.1	10	0.1
Municipal Institutions	520,607	0.1	47	0.2	21	0.3
Others	801,002	0.2	12	0.1	3	0.0
Total	**423.320.342**	**100.0**	**21,233**	**100.0**	**7,027**	**100.0**

DISBURSEMENT, NUMBER OF ACTIVE PROJECTS AND NEW PROJECTS CONTRACTED IN 2020

TABLE 5

SCHOLARSHIPS/FELLOWSHIPS AND GRANTS BY FUNDING STRATEGIES

Funding Strategies		Disbursement $ PPP	Active projects	New projects contracted
Total		**423,320,342**	**21,233**	**7,027**
TRAINING OF HUMAN RESOURCES FOR RESEARCH		98,061,692	8,127	2,557
Scholarships and Fellowships not associated with research grants	In Brazil	72,520,155	7,250	2,310
	Abroad	25,541,537	877	247
BASIC AND APPLIED RESEARCH		196,438,833	9,710	3,115
Long-term Research	Thematic Project Grant and associated scholarships/ fellowships and grants	91,434,004	3,390	989
	Research, Innovation and Dissemination Centers (RIDC) and associated scholarships/fellowships and grants	23,513,047	666	188
	Young Investigator grants and associated scholarships, fellowships and grants	22,589,834	1,251	409
	Special Project grants and associated scholarships, fellowships and grants	12,467,672	22	4
	São Paulo Excellence Chair (SPEC) and associated scholarships, fellowships and grants	2,174,857	61	22
Subtotal		**152,179,414**	**5,390**	**1,612**
Regular Research Grants not associated with other grants	Regular Research Grants not associated to other grants and associated scholarships/fellowships	41,702,886	3,733	1,030
	Regular Grants (meetings, organization, publications, visiting researchers) not associated to other grants	2,556,532	587	473
Subtotal		**44,259,418**	**4,320**	**1,503**
RESEARCH FOR INNOVATION		42,568,890	1,568	756
	Research Partnership for Technological Innovation Program (PITE) and associated scholarships/fellowships and grants	1,631,541	67	17
	Engineering Research Centers/Applied Research Centers (ERC/ARC) and associated scholarships/fellowships and grants	7,229,707	169	74
	Innovative Research in Small Business Program (PIPE), Fellowship PE and associated scholarships/fellowships and grants	33,172,800	1,305	656
	Intellectual Property Support Program (PAPI-Nuplitec) and associated scholarships/fellowships and grants	140,156	27	9
	Innovation Distritcts	394,686		
RESEARCH ON STRATEGIC THEMES		22,992,180	1,013	360
	FAPESP Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable Use (BIOTA) and associated scholarships/fellowships and grants	4,400,047	207	67
	FAPESP Bioenergy Research Program (BIOEN) and associated scholarships/fellowships and grants	4,325,178	169	49

DISBURSEMENT, NUMBER OF ACTIVE PROJECTS AND NEW PROJECTS CONTRACTED IN 2020

Funding strategies		Disbursement $ PPP	Active projects	New projects contracted
	FAPESP Research Program on Global Climate Change (RPGCC) and associated scholarships/fellowships and grants	6,640,913	263	72
	FAPESP Research Program on eScience and DataScience and associated scholarships/fellowships and grants	320,908	24	13
	Institutional Development Plan for State Research Institutions (RIs)	5,310,977	135	50
	Research in Public Policies Program (PPP) and associated scholarships/fellowships and grants	1,559,141	93	48
	Research in Public Policies for National Health Care System (PP-SUS) and associated scholarships/fellowships and grants	2,069	1	
	Public Education Research Program (EP)	219,542	108	52
	Science Journalism (MídiaCiência) fellowships not associated to other grants	203,404	13	9
SUPPORT FOR RESEARCH INFRASTRUCTURE		**56,474,562**	**809**	**237**
	Multi-User Equipment Program	21,678,343	319	51
	Equipment Repair Program	1,567,195	224	77
	REDNESP	19,658,772	2	1
	Overhead for REDNESP Connectivity	938,443	12	9
	Overhead for Research Institution Infrastructure	12,440,946	240	95
	Overhead for Program Coordination	190,863	12	4
COMMUNICATING SCIENCE TO THE PUBLIC		**6,784,184**	**6**	**2**
	Pesquisa FAPESP magazine	3,860,996	1	
	Dissemination of scientific knowledge in São Paulo State[1]	1,502,183	1	
	Mapping of research units in São Paulo State (BV)[1]	666,266	2	1
	ST&I Indicators for São Paulo State	512,885	2	1
	Others (contracts)[2]	241,854		

(1) Grants for these projects were extended for 24 months from March 1, 2019, until February 28, 2021.
(2) Iron Mountain, for storage of physical files containing scientific reports on research projects supported by FAPESP.

ANNUAL EVOLUTION OF DISBURSEMENT ($PPP) – 2014 TO 2020

TABLE 6

BY FUNDING STRATEGIES

Funding Strategies		2020	2019	2018	2017	2016	2015	2014
Training of Human Resources for Research		98,061,692	130,559,806	131,522,911	135,402,194	156,512,055	188,670,898	215,236,304
Basic and Applied	Long-term research	152,179,415	188,499,668	190,850,872	160,832,022	158,208,236	168,868,243	165,736,186
	Regular Grants not associated to other grants	44,259,418	87,936,995	89,869,416	85,922,183	99,878,205	127,212,158	146,896,558
Research for Innovation		42,568,890	50,034,027	51,022,082	39,542,186	35,156,333	21,966,359	19,609,167
Research on Strategic Themes		22,992,180	33,066,684	24,536,592	17,606,051	18,490,279	23,170,518	25,466,695
Support for Research Infrastructure		56,474,563	53,246,198	51,216,717	39,344,201	58,610,665	60,069,799	52,874,918
Communicating Science to the Public		6,784,184	7,926,525	7,556,294	6,597,215	6,342,577	7,731,719	10,120,924
Total		423,320,342	551,269,903	546,574,884	485,246,052	533,198,350	597,689,694	635,940,752

TABLE 7

BY TYPES OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS

Types	2020	2019	2018	2017	2016	2015	2014
Scholarships/Fellowships[1]	198,924,248	236,799,075	225,612,672	212,596,872	223,406,194	250,730,801	277,181,444
Grants[2]	224,396,094	314,470,828	320,962,212	272,649,180	309,792,156	346,958,893	358,759,308
Total	423,320,342	551,269,903	546,574,884	485,246,052	533,198,350	597,689,694	635,940,752

For details of disbursement for all types of scholarship, fellowship and grant in 2020, see pages 146 and 148.

(1) **Scholarships** = Scientific Initiation (SI), Master's (MS), Doctorate (DR), Direct Doctorate (DD, applicant without MSc), Postdoc (PD). Regular scholarships and fellowships in Brazil and abroad, Technical Training, Science Journalism, Courses Attendance, Young Investigator, PIPE, Public Education, associated or not associated with other grants.

(2) **Grants** = all research grants.

ANNUAL EVOLUTION OF THE NUMBER OF PROJECTS CONTRACTED – 2014 TO 2020

TABLE 8

BY FUNDING STRATEGIES

Funding Strategies		2020	2019	2018	2017	2016	2015	2014
Training of Human Resources for Research		2,557	3,921	4,386	4,021	4,389	4,427	5,279
Basic and Applied	Long-term research	1,612	2,330	2,048	1,881	1,594	1,384	1,480
	Regular Grants not associated to other grants	1,503	2,657	2,960	2,924	3,249	3,319	3,905
Research for Innovation		756	733	836	731	650	365	295
Research on Strategic Themes		360	454	344	314	268	234	331
Support for Research Infrastructure		237	337	359	310	327	339	317
Communicating Science to the Public		2	11	13	5	3	2	2
Total		7,027	10,443	10,946	10,186	10,480	10,070	11,609

TABLE 9

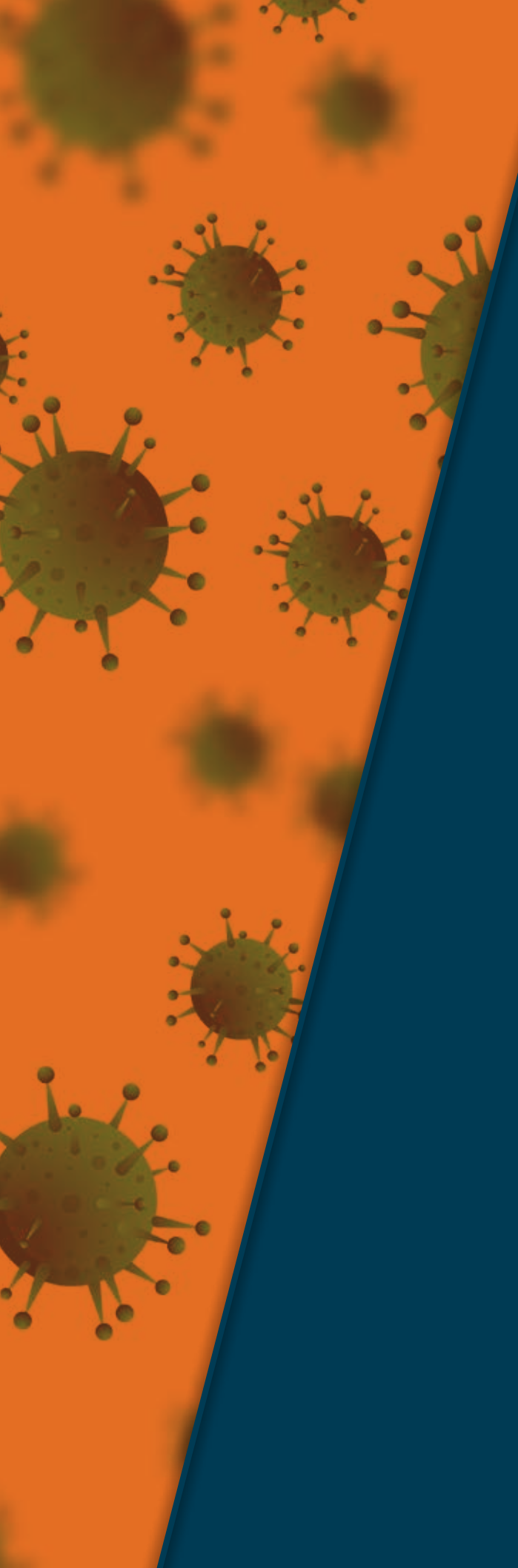
BY TYPES OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS

Types	2020	2019	2018	2017	2016	2015	2014
Scholarships/Fellowships[1]	5,035	7,107	7,276	6,584	6,653	6,247	7,234
Grants[2]	1,992	3,336	3,670	3,602	3,827	3.823	4,375
Total	7,027	10,443	10,946	10,186	10,480	10,070	11,609

For a detailed breakdown of projects contracted for by all types of grant in 2020, see pages 147 and 149.

(1) **Scholarships** = Scientific Initiation (SI), Master's (MS), Doctorate (DR), Direct Doctorate (DD, applicant without MSc), Postdoc (PD). Regular scholarships and fellowships in Brazil and abroad, Technical Training, Science Journalism, Courses Attendance, Young Investigator, PIPE, Public Education, associated or not associated with other grants.

(2) **Grants** = all research grants.



COVID-19 SPECIAL

FAPESP's main actions to deal with the pandemic caused by the novel coronavirus

FAPESP COVID-19

ANNUAL REPORT FAPESP

2020

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SUPPORT FOR RESEARCH ON COVID-19

CALL FOR FAST TRACK SUPPLEMENTS

www.fapesp.br/14082

FAPESP issued a call for research proposals entitled "Fast track supplements for projects against COVID-19", offering $PPP 8.048 million in supplemental funding for already supported researchers to redirect resources, personnel and materials from ongoing projects – Thematic and Young Investigator Projects, Research, Innovation and Dissemination Centers (RIDCs), and Engineering Research Centers (ERCs) – to research on SARS-CoV-2 and COVID-19. Sixty projects were selected, involving 143 researchers at 28 higher education and research institutions.

CALL FOR RESEARCH PROPOSALS TO DEVELOP TECHNOLOGIES FOR PRODUCTS, SERVICES AND PROCESSES TO COMBAT COVID-19

www.fapesp.br/14229

FAPESP, in partnership with FINEP, the Brazilian Innovation Agency, an arm of the Ministry of Science, Technology and Innovation, offered a special funding line of $PPP 8.654 million under the aegis of the PIPE-PAPPE Grant Program to support micro and small enterprises and startups interested in applying or scaling up innovative processes or products relating to COVID-19, such as diagnostic kits, mechanical ventilators, personal protective equipment for health workers, and digital technologies and artificial intelligence for health services or patient care. Six projects were selected in 2020.

JOINT CALL FOR RESEARCH PROPOSALS BY FAPESP, THE MINISTRY OF HEALTH AND CNPQ – RESEARCH FOR THE SUS: PPSUS-SP SHARED HEALTHCARE MANAGEMENT

www.fapesp.br/14383

This call was designed to support research projects capable of promoting scientific and technological development and innovation to strengthen the SUS, Brazil's national health service, in São Paulo State in the context of the COVID-19 pandemic. Eight projects were selected for funding via FAPESP's Research on Public Policies for the SUS Program (PPSUS), accounting for total investment of $PPP 398,312.

EUROPEAN UNION CALL FOR RESEARCH PROPOSALS TO DEVELOP THERAPIES AND DIAGNOSTIC TECHNIQUES TO COMBAT INFECTION BY THE NOVEL CORONAVIRUS

www.fapesp.br/9775

FAPESP participated in an EU emergency call to identify innovative therapies for COVID-19 and effective and reliable early diagnosis systems relating to the disease. The call was issued jointly by the Innovative Medicines Initiative, the European Federation of Pharmaceutical Industries and Associations, and the National Council of State Research Funding Agencies (CONFAP). Researchers affiliated with universities and research institutions in São Paulo and several other Brazilian states could submit proposals.

GENETIC SEQUENCING OF SARS-COV-2

http://agencia.fapesp.br/32655

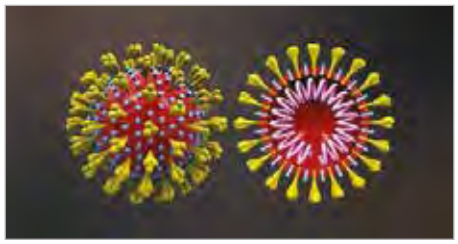


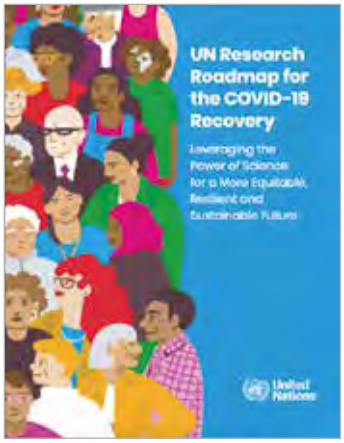
Imagem: Scientific Animations.com/Wikimedia Commons

Only two days after Latin America's first case of COVID-19 was confirmed in São Paulo City, researchers at Adolfo Lutz Institute (IAL), the University of São Paulo (USP) and Oxford University in the UK published the complete genome sequence of SARS-Cov-2. The researchers concerned are all affiliated with the Brazil-UK Center for Arbovirus Discovery, Diagnosis, Genomics and Epidemiology (CADDE), which is supported by FAPESP via a Thematic Project, the UK Medical Research Council and the Newton Fund.

PARTICIPATION IN PRODUCTION OF UN RESEARCH ROADMAP

http://agencia.fapesp.br/33872

FAPESP took part in a group of leaders of research funding agencies in 25 countries that contributed to production of the United Nations Research Roadmap for the COVID-19 Recovery, published in November 2020 with research priorities in strategic areas for building an equitable recovery, strengthening community resilience, and assuring progress toward the Sustainable Development Goals (SDGs). The Roadmap will serve as a compass for FAPESP's calls for proposals in 2021.



COVID-19 DATA SHARING/BR

https://agencia.fapesp.br/33522

On June 18, 2020, in partnership with the University of São Paulo (USP), FAPESP implemented the first open-access repository in Brazil with anonymized data from patients tested for COVID-19. Its purpose is to enable sharing of patient data to support scientific research on the disease in various knowledge areas. Initially it contained demographic, clinical, laboratory and outcome data from all over the country contributed by Fleury Group (a private laboratory chain) and two leading private hospitals in São Paulo City, Syrian-Lebanese Hospital and Albert Einstein Jewish Hospital (HIAE). Since then it has been joined by Hospital das Clínicas, the hospital complex run by USP's Medical School (HC-FMUSP), and Beneficência Portuguesa de São Paulo (BP), the largest private hospital in Latin America. By end-2020, it held anonymized data from 485,000 patients, including approximately 47,000 outcome records, and more than 23 million clinical examination and laboratory test records.

ARBOVIRUS RESEARCH LEGACY

Scientists and companies in São Paulo State were able to respond rapidly to the challenges of the COVID-19 pandemic thanks to knowledge accumulated in decades of research. For more than 20 years FAPESP has supported projects on arboviruses, such as those that cause dengue, zika, chikungunya and yellow fever.

Between 2000 and 2007, for example, FAPESP sponsored the Virus Genetic Diversity Network (VGDN) comprising dozens of researchers and 18 laboratories, including four Biosafety Level 3+ (BSL3+) facilities – at the University of São Paulo's Institute of Biosciences (ICB-USP) and Ribeirão Preto campus, at São Paulo State University (UNESP) in São José do Rio Preto, and at Adolfo Lutz Institute (IAL).

The outcome was the production of a vast amount of solid knowledge about viruses, such as the dengue transmission rate, the evolution of the mosquito Aedes aegypti, and the development by Butantan Institute of a vaccine that is already in the clinical trial stage.

Thanks to this legacy, when the outbreak of zika occurred in 2015, FAPESP was able rapidly to organize the Zika Network, allocating additional funds for researchers to redirect projects to studies of the virus and fostering international cooperation via calls for proposals issued jointly with the US National Institutes of Health and the UK Medical Research Council, among other partners.

EPICOVID-19 BR

FAPESP supported the last phase of the largest survey of the prevalence of infection by SARS-CoV-2 conducted in Brazil. Initially, EPICOVID-19 BR was coordinated by the Federal University of Pelotas (UFPEL) in Rio Grande do Sul, in four out of five phases. The first three were funded by the Health Ministry, and the fourth by Todos pela Saúde, an initiative led by private-sector bank Itaú Unibanco. The sample population for all five phases covered 133 cities (classed as hubs for administrative macroregions) and 25 census sectors, with ten households selected randomly in each sector. In the first four phases, one member of each household was tested for antibodies against SARS-CoV-2 (IgG and IgM) by a rapid serology test with 86.4% and 99.6% specificity. In the fifth phase, blood samples from all household members were submitted to immunoenyzmatic analysis to identify antibodies with an accuracy rate exceeding 99%. Participants also answered a questionnaire on sociodemographics (schooling, income, occupation etc.), as well as risk factors and exposure to the virus (comorbidities, commuting, frequency of shopping, receiving visitors etc). The results will be used to detect exposure patterns across cities, states and regions, broken down by age, gender, activity, education and income, in the first year of the pandemic in Brazil, and to define control strategies.

CLINICAL TRIALS OF CORONAVAC AND OXFORD/ASTRAZENECA VACCINES

http://agencia.fapesp.br/33936

In partnership with Todos pela Saúde, an initiative led by private-sector bank Itaú Unibanco, FAPESP supported the Phase 3 clinical trial of Coronavac, the COVID-19 vaccine developed by China's Sinovac Biotech and produced in Brazil by Butantan Institute. It allocated $PPP 14.063 million via its Public Policy Research Program (PPP) to studies of immunogenicity and safety in high-risk patients, adolescents and children. The private-sector initiative is investing $PPP 21.635 million in vaccine production facilities. FAPESP also allocated $PPP 3.678 million to support the project (FAPESP grant 2020/08943-5) "Investigation of host-induced elements in response to immunization with ChAdOx1 nCOV-19 vaccine in a Phase 3 Clinical Trial", conducted by the Federal University of São Paulo's Medical School (EPM-UNIFESP).

Photo: São Paulo State Government

SUPPORT FOR THE DEVELOPMENT OF OTHER COVID-19 VACCINES

Besides its support for the Phase 3 clinical trial of CoronaVac conducted by Butantan Institute, FAPESP funded eight research projects relating to the development of COVID-19 vaccines, four by the University of São Paulo (USP), two by Butantan Institute, and two by startups supported by the FAPESP Innovative Research in Small Business Program (PIPE).

1 A team led by Jorge Elias Kalil Filho at USP's Medical School is developing a DNA vaccine to be delivered by nasal spray, combining part of the SARS-CoV-2 spike protein with T epitopes to induce a response by neutralizing antibodies and strong cellular immunity, including cytotoxic T CD8+ lymphocytes, which kill infected cells, and T CD4+ lymphocytes, which help produce antibodies and also kill infected cells. The protein formed by the mixture of these two components will be produced in cells by means of the recombinant DNA technology and carried by nanoparticles that adhere to nasal mucosa, triggering an immune response and preventing the virus from spreading throughout the respiratory tract. The team plans to begin trials in humans in 2022.

2 Ricardo Tostes Gazzinelli, a researcher at USP's Ribeirão Preto Medical School (FMRP-USP), is developing a DNA vaccine based on influenza reverse genetics, in which a gene in the influenza virus is replaced by a gene that encodes the SARS-CoV-2 spike protein's receptor binding domain (RBD). The nonreplicating virus produced in this manner will infect nasal mucosa cells and express the SARS-CoV-2 spike protein as well as proteins proper to influenza virus. It will be unable to leave the cells and cause disease, but will nevertheless induce an immune response. The research team used reverse genetics to produce RBD-expressing influenza viruses and administered it nasally to mice. Immunogenicity testing showed that the viruses induced production of anti-RBD antibodies in bronchoalveolar lavage (BAL) and serum from the inoculated animals, as well as a strong response by specific T lymphocytes. More tests will be performed on immunized animals, and clinical trials are expected to begin in 2022.

3 A research project led by Gustavo Cabral de Miranda at the same university's Institute of Biomedical Sciences (ICB-USP) uses virus-like particles (VLPs) with similar characteristics to those of viral peptides and proteins, such as the SARS-CoV-2 spike protein. To make sure they trigger an immune response, the VLPs are inoculated together with viral antigens. The group has developed different vaccine formulations and tested them in animals. One is based on the spike protein's RDB and so far appears capable of inducing an immune response that neutralizes the virus. The next stage will be development of a cell line that can be used to produced the protein on a large scale. The group expects to begin testing in humans in 2022.

4 Also at ICB-USP, a project conducted as part of the postdoctoral research of Marianna Favaro is developing a vaccine based on self-assembling protein nanoparticles (SAPNs). The approach entails genetic modification of viral proteins so that they acquire the capacity to self-assemble in nanoparticles with a three-dimensional structure that closely resembles the morphology

http://agencia.fapesp.br/36222

of viruses and can therefore interact more effectively with the immune system. The strategy mimics characteristics of the virus that are naturally recognized by the immune system as signs of pathogens and activate an immune response. The project is currently in the preclinical trial stage.

5 Butantan Institute is working on two major vaccine projects besides CoronaVac. One is led by Soraia Attie Calil Jorge and is developing a platform to produce VLPs against SARS-CoV-2. The researchers have built the vectors, inserted structural genes for SARS-CoV-2 into the genome of a baculovirus, and begun producing VLPs in cells before embarking on preclinical trials.

6 The other project under way at Butantan Institute is led by Luciana Cezar de Cerqueira Leite and combines two technologies based on bacterial outer membrane vesicles (OMVs) – nanoparticles that mimic an infection and efficiently activate the immune system – combined with SARS-CoV-2 proteins to induce a broad immune response involving both antibodies and defense cells. The researchers are at the stage of producing the vaccine, and tests in mice will begin in the second half of 2021.

Photo: Leo Ramos Chaves / Pesquisa FAPESP magazine

7 Imunotera Soluções Terapêuticas, a University of São Paulo spinoff supported by the FAPESP Innovative Research in Small Business Program (PIPE), is developing a DNA vaccine with Luana Raposo de Melo Moraes Aps as principal investigator. The strategy focuses on designing target sequences that include the viral epitopes most easily recognized by T lymphocytes, which confer cellular immunity against SARS-CoV-2 by producing cytokines or directly killing infected cells. The researchers adapted an existing T-cell generating technology used to develop, also with the support of PIPE-FAPESP, a DNA vaccine and purified recombinant protein that activates the immune system against HPV-induced cervical cancer. The next stage will entail testing in animals.

8 The startup Invent Biotecnologia in Ribeirão Preto is using a vaccine platform based on an attenuated live bacterium, which briefly colonizes the lymphoid organs associated with the intestines, as well as secondary lymphoid organs in animals. The principal investigator is Marcel Montels Trevisani. “The platform has been used to prevent equine pneumonia caused by Rhodococcus equi, with patient applications in Brazil and elsewhere,” he explained. The timetable calls for animal testing to begin in August 2021.

FAPESP'S COMMUNIQUÉS AND REGULATIONS REGARDING COVID-19

FAPESP COMMUNIQUÉ Nº 1 TO RESEARCHERS ON COVID-19

www.fapesp.br/14070

FAPESP recommends special measures to protect the health of researchers, students, advisors and public servants.

FAPESP COMMUNIQUÉ Nº 2 ON COVID-19

www.fapesp.br/14080

In light of the restrictions put in place to contain the spread of the epidemic, FAPESP extends the time allowed for the presentation of accounts and the duration of grants and scholarships in Brazil. Imports of goods and new awards of grants and scholarships abroad are suspended.

GENERAL COMMUNIQUÉ ON CALL ANSWERING

www.fapesp.br/14095

Owing to the growing severity of the COVID-19 epidemic, FAPESP will suspend its telephone call answering service on March 24, 2020. Only messages and requests sent via the *Converse com a FAPESP* ("Talk to Us") electronic channels will be answered from then on.

COMMUNIQUÉ ON THE SERVICE PROVIDED BY THE FUNDING RELEASE SECTOR

www.fapesp.br/14083

In light of the COVID-19 epidemic and continuing implementation of FAPESP's new Financial Administration System (SIAF) to release funds for Regular Research Grants, the Funding Release Sector will provide service solely via FAPESP's website from March 19, 2020.

COMMUNIQUÉ ON RECEPTION OF GRANT CONTRACTS

www.fapesp.br/14110

Owing to the restrictive measures put in place to contain the spread of the COVID-19 pandemic, FAPESP will exceptionally accept digital signatures by grantees and executive officers of host institutions to Grant Contracts and Addenda to Grant Contracts.

EXECUTIVE BOARD ORDINANCE Nº 15

www.fapesp.br/14127

Ordinance governing exceptional temporary procedures for the awarding of research grants, scholarships and fellowships in the context of the COVID-19 pandemic, with related provisions.

FAPESP COMMUNIQUÉ Nº 3 – SUPPLEMENTARY INFORMATION ON THE PROCEDURES FOR CHANGING THE DURATION OF GRANTS FOR RESEARCH INTERNSHIPS ABROAD (RIA) AND RESEARCH FELLOWSHIPS ABROAD (RFA)

www.fapesp.br/14142

FAPESP is making best efforts to ensure that interruptions to internships abroad due to the COVID-19 pandemic do not cause unjustifiable harm to grantees, bearing in mind that its budget is funded entirely by the taxpayers of São Paulo State.

FAPESP EXECUTIVE BOARD COMMUNIQUÉ Nº 4 TO RESEARCHERS ON THE RESCHEDULING OF IMPORTS

www.fapesp.br/14204

A decision informed by the impact of the fall in collection of state sales tax (ICMS) on FAPESP's budget, as well as local currency depreciation and the need to assure maintenance of research quality.

FAPESP COMMUNIQUÉ Nº 5 ON CHANGES TO THE GRANT ANALYSIS SYSTEM

www.fapesp.br/14256

This emergency provisional measure is designed to guarantee FAPESP's capacity to discharge the financial commitments assumed hitherto.

FAPESP COMMUNIQUÉ Nº 6 ON COVID-19

www.fapesp.br/14333

In light of the continuation of restrictive measures to contain the COVID-19 epidemic, FAPESP issues guidelines to the science and technology community in São Paulo regarding submission of proposals, reconsideration of budgets, extension of grants, and extra time to meet commitments.

FAPESP COMMUNIQUÉ Nº 7 ON COVID-19 – APPLICATIONS FOR RESEARCH INTERNSHIPS ABROAD AND RESEARCH FELLOWSHIPS ABROAD (JULY 1, 2020)

www.fapesp.br/14334

On this date (July 1, 2020), FAPESP will resume its analysis of applications for Scholarships for Research Internships Abroad (RIA) and Research Fellowships Abroad (RFA) solely in cases not subject to international travel restrictions and provided in-school activities have resumed in the foreign institutions concerned.

FAPESP COMMUNIQUÉ NO. 8 ON COVID-19

www.fapesp.br/14508

In light of the COVID-19 pandemic, the postal workers' strike and questions sent to FAPESP, the Executive Board issues fresh guidelines to the science and technology community in São Paulo State.

SMALL ENTERPRISES IN THE FIGHT AGAINST COVID-19

PROJECTS SELECTED UNDER THE PIPE-PAPPE COVID-19 CALL

BRAZILIAN FIRM REFINES MECHANICAL VENTILATOR TECHNOLOGY

(29 NEWS ITEMS)
https://pesquisaparainovacao.fapesp.br/1420

Setup Automação e Controle de Processos, a firm based in Campinas (São Paulo State), developed two new portable ventilators that are more robust and easier to operate than existing models. One is designed for use in field hospitals, and the other for ICUs. They will be adaptable for use in complex surgeries on animals performed by vets. The firm is currently developing an automated test station for the calibration of ventilators of all kinds.

TECHNOLOGY OPTIMIZES USE OF MECHANICAL VENTILATORS AND INTENSIVE CARE BEDS (17 NEWS ITEMS)

https://agencia.fapesp.br/33000

Electrical impedance tomography system developed by startup based in São Paulo minimizes complications associated with mechanical ventilation and is used in the treatment of COVID-19 by hospitals in Italy, Spain and the US.

A monitoring system using electrical impedance tomography (EIT) developed by Timpel, a startup based on São Paulo, Brazil, could help increase the availability of mechanical ventilation and hence of intensive care beds for critical patients with COVID-19. The EIT technology, which was developed by the firm as part of a Thematic Project supported by FAPESP, is integrated with onboard software that enables healthcare staff to optimize the ventilation strategy for each patient, reducing the need for CT scans using X rays. The software was developed by Timpel with support from the PIPE program.

DIAGNOSIS AND MONITORING OF MUTATIONS IN SARS-COV-2

(FAPESP GRANT 2020/10241-6)

NGS Soluções Genômicas focuses on next-generation sequencing in its molecular biology strategies to develop tests to detect SARS-CoV-2, confirming RT-PCR testing. The methodology can also be used to detect other viruses, with specific strain discrimination in a single test, facilitating the monitoring of mutations.

STARTUP HELPS CUT THE COST OF MOLECULAR TESTING TO DIAGNOSE COVID-19 (24 NEWS ITEMS)

https://agencia.fapesp.br/33891

Cellco Biotec, a startup based in São Carlos (São Paulo State), is developing an RT-qPCR test kit to diagnose COVID-19 by the multiplex method, in which all reactions take place in a single tube. The method enables samples from 96 people to be analyzed simultaneously per batch. The technique used in most labs can process samples from only 24 patients per batch.

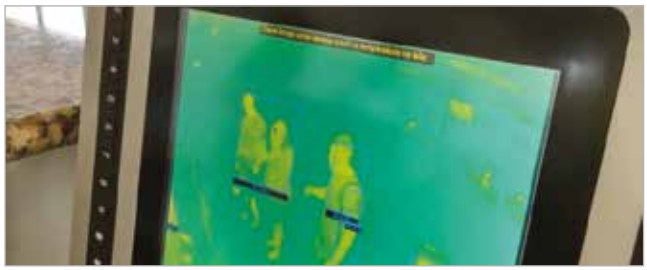
AFFORDABLE COVID-19 TEST IMPROVES ACCESS TO DIAGNOSIS (189 NEWS ITEMS)

https://agencia.fapesp.br/35101

A test that detects antibodies to the novel coronavirus in 10 minutes and costs only a fifth of the market average was developed by researchers at the University of São Paulo's São Carlos Chemistry Institute (IQSC-USP) and Brazilian startup Biolinker with FAPESP's support. The device works similarly to the rapid tests available now in pharmacies. It should sell for 30 Brazilian Reais (now about 6 US Dollars) once it has been approved by ANVISA, the national health surveillance authority.

MILITARY TECHNOLOGIES WILL HELP DETECT PEOPLE WITH SUSPECTED COVID-19 IN CROWDED PLACES (5 NEWS ITEMS)

http://pesquisaparainovacao.fapesp.br/1419



Smart visible and thermal spectrum imaging system to spot people with fever in schools, malls or offices (*photo: Opto Space & Defense*)

A monocular thermal scope developed for the Brazilian armed forces and a system that captures different wavelengths normally used by armored vehicle drivers in the army are being converted into a tool for combating COVID-19. Currently sold for military purposes by Brazilian firm Opto Space & Defense, the technologies are being integrated and upgraded for use as a fever detection system in crowded areas.

FIRMS SUPPORTED BY PIPE THAT REDIRECTED RESEARCH PROJECTS TO HELP COMBAT COVID-19

SYSTEM THAT DETECTS FEVER AT A DISTANCE (104 NEWS ITEMS)

https://agencia.fapesp.br/33041

Hoobox and Radsquare, artificial intelligence startups based in São Paulo State, developed a system called Fevver consisting of a thermal camera and facial recognition

AI-based technology developed to reduce the risk of coronavirus transmission *(image: Hoobox)*.

algorithms that automatically scans the faces of people who enter the Albert Einstein Jewish Hospital (HIAE) and measures their temperature at a distance. If it detects a fever, it sends a smartphone alert to the duty nurse, who will quickly activate the hospital's triage protocol, isolating the person if necessary to avoid transmission of SARS-CoV-2 in the hospital environment. Both startups are supported by Eretz.bio, a healthcare startup incubator operated by the Albert Einstein Jewish-Brazilian Charitable Society (SBIBAE). The face recognition technology was developed by Hoobox with the support of FAPESP's Innovative Research in Small Business Program (PIPE) for other applications and has now been adapted to meet requirements associated with the pandemic.

FABRIC THAT ELIMINATES NOVEL CORONAVIRUS BY CONTACT

(802 NEWS ITEMS)
https://agencia.fapesp.br/33568

Researchers at Nanox, a São Paulo-based company, developed a fabric with a surface layer of silver nanoparticles that inactivates SARS-CoV-2. The material eliminated 99.9% of the viral load after two minutes of contact in laboratory tests. It was developed with the collaboration of researchers at the University of São Paulo's Biomedical Sciences Institute (ICB-USP), Spain's Jaume I University, and the Center for Research and Development of Functional Materials (CDMF), one of the Research, Innovation and Dissemination Centers (RIDCs) supported by FAPESP.

MECHANICAL VENTILATORS FOR BRAZIL'S HEALTH MINISTRY

(20 NEWS ITEMS)
https://agencia.fapesp.br/32996

In April 2020, São Paulo-based Magnamed signed an agreement with Brazil's Health Ministry for the emergency supply of 6,500 mechanical ventilators by August. The portable ventilator is called OxyMag and was developed with the support of PIPE between 2006 and 2012. Forty per cent of the units produced by Magnamed are currently operating in intensive care units (ICUs). The solution was the first step in the firm's transformation from garage startup to a company that exports to more than 60 countries. It now has a plant in the US, and exports account for 40% of its sales revenue.

TECHNOLOGY FOR REMOTE MONITORING OF PATIENTS WITH SUSPECTED COVID-19 (49 NEWS ITEMS)

https://agencia.fapesp.br/33144

A sleep apnea home diagnostic and monitoring system based on the Internet of Things can be used for the remote monitoring of individuals with suspected COVID-19 or mild symptoms of the disease. Developed by Biologix, a startup located in São Paulo State, the system can also be used to recommend transfer to a hospital if the patient's clinical signs worsen. A cordless portable sensor placed on the patient's index finger captures oxygen saturation and heart rate data, which is collected in real time by a free smartphone app. The program automatically sends the data to the cloud and to a control panel operated by the medical team responsible for monitoring each patient.

MAIN DISCOVERIES RELATING TO COVID-19 SUPPORTED AND PUBLICIZED BY FAPESP – TIMELINE

2019

DEC

A novel coronavirus, later termed SARS-CoV-2, emerges in December, infecting almost 10,000 people and causing 213 deaths in China by end-January 2020.

2020

JAN 30

The World Health Organization (WHO) declares the outbreak a global public health emergency, requiring coordinated action by all countries. The virus is detected in **19 countries**. At this time Brazil has nine suspected patients in six states: São Paulo (3), Santa Catarina (2), Rio de Janeiro (1), Minas Gerais (1), Paraná (1) and Ceará (1).

FEB 26

The first case is confirmed in Brazil.

FEB 28

Technology used to sequence the virus in 48 hours can track the spread of the epidemic in real time – This kind of information helps the authorities track the spread of the diseases around the world and can be used by scientists to develop vaccines and diagnostic tests.

735 news items in the media (https://agencia.fapesp.br/32656)

MAR 3

Sequencing identifies different genomes in Brazil's two COVID-19 cases – The analysis suggests the virus is now being transmitted internally in Europe. Italian researchers request collaboration with the Brazilian team.

456 news items in the media (http://agencia.fapesp.br/32655)

MAR 4

Brazil's third case of COVID-19 is confirmed.

MAR 9

Researchers at the University of São Paulo (USP) isolate SARS-CoV-2 obtained from the first two patients diagnosed in Brazil and culture it in the laboratory – Samples of the virus cultured in cells are distributed to research groups and clinical labs for use as positive controls in validating diagnostic tests.

116 news items (https://agencia.fapesp.br/32699)

MAR 11

WHO declares COVID-19 a pandemic.

2020

MAR 12

FAPESP Communiqué nº 1 to Researchers on COVID-19.

https://fapesp.br/14070

MAR 13

Rio de Janeiro State and São Paulo State close schools.

MAR 16

The Heart Institute (InCor), part of the hospital complex run by the University of São Paulo's Medical School, announces that it is developing a COVID-19 vaccine using multiprotein structures known as virus-like particles (VLPs), which are easily recognized by the immune system.

590 news items (https://agencia.fapesp.br/32761)

MAR 17

The government announces the first death from COVID-19 in Brazil.

MAR 18

FAPESP Communiqué nº 2 on COVID-19.

https://fapesp.br/14080

MAR 18

Minimally invasive autopsies confirm deaths from COVID-19 in São Paulo – Technique developed by USP is used to confirm deaths from the disease and advance understanding of its biology.

80 news items (https://agencia.fapesp.br/32810)

MAR 20

General communiqué on call answering.

https://fapesp.br/14095

MAR 20

FAPESP announces funding for research to combat COVID-19.

165 news items (https://agencia.fapesp.br/32812)

MAR 21

FAPESP encourages researchers it supports to re-direct projects to combat COVID-19.

35 news items (https://agencia.fapesp.br/32819)

MAR 23

Communiqué about the services provided by the Funding Release Sector.

https://fapesp.br/14083

MAR 24

Communiqué on reception of Grant Contracts.

https://fapesp.br/14110

2020

MAR 26

54.8% of COVID-19 cases imported to Brazil by March 5 have come from Italy – Brazilian researchers made the discovery, in collaboration with colleagues in the UK, Canada and the US.

228 news items (https://agencia.fapesp.br/32854)

MAR 27

A study by USP could help researchers find out why COVID-19 mortality is higher among people with chronic health problems.

45 news items
(https://agencia.fapesp.br/32947)

APR 2

FAPESP Executive Board issues Ordinance 15

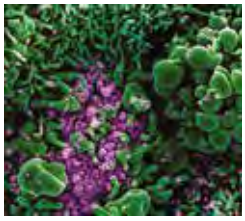
https://fapesp.br/14127

APR 11

FAPESP Communiqué nº 3
Supplementary information on the procedures for changing the duration of grants for Research Internships Abroad (RIA) and Research Fellowships Abroad (RFA).

https://fapesp.br/14142

APR 11



Apoptotic cell (green) strongly infected by SARS-COV-2 (purple). Image: NIAID/Wikimedia Commons.

Study identifies potential target for treatment of COVID-19 – Researchers at UNESP and UNICAMP found that expression of the gene TRIB3 was diminished in lung epithelial cells in men aged more than 60, such cells being preferential targets for SARS-CoV-2. Compounds capable of reversing the process could be tested against the virus.

213 news items
(https://agencia.fapesp.br/33050)

APR 15

Butantan Institute to develop antibodies for treatment of COVID-19
Researchers selected neutralizing monoclonal antibodies from B cells in patients who recovered from COVID-19 to extract proteins that could be used to block replication of the virus.

545 news items
(https://agencia.fapesp.br/33052)

APR 22

First deaths in care homes.

APR 29

Study by UNICAMP confirms that SARS-CoV-2 can infect human neurons – Infection and elevation of viral load in nerve cells were confirmed by RT-PCR testing.

440 news items
(https://agencia.fapesp.br/33146)

APR 30

FAPESP Communiqué nº 4 to Researchers on rescheduling of imports.
(https://fapesp.br/14204)

2020

MAY 4

Researchers at Butantan Institute combine biotech techniques to formulate COVID-19 vaccine – The aim is to stimulate the organism to develop different kinds of immune response to the virus.

325 news items (https://agencia.fapesp.br/33145)

MAY 6

FAPESP extends deadline for submission of proposals to PIPE COVID-19 call.

31 news items (https://agencia.fapesp.br/33095)

MAY 9

Number of deaths reaches **10,000**; **156,000** confirmed cases..

MAY 11

Study by UNIFESP shows that anticoagulant drug heparin achieves 70% reduction in infection of cells by novel coronavirus – The drug combats clotting in the lungs and also appears to stop SARS-CoV-2 invading cells.

581 news items (https://agencia.fapesp.br/33200)

MAY 12

Study by UNICAMP shows lockdown will be unavoidable São Paulo if social isolation rate does not rise.

308 news items (https://agencia.fapesp.br/33147)

MAY 13

Researchers at UFSCar develop rapid test to detect COVID-19
Device uses electrochemical sensor to detect at least three viral genome sequences in saliva.

Device detects parts of viral RNA in saliva of infected individuals (photo: UFSCar)

303 news items (https://agencia.fapesp.br/33298)

MAY 21

FAPESP holds 1st COVID-19 Webinar Reproduction number, government, response and limited testing: international experiences.

21 news items and 9,500 YouTube views (https://www.youtube.com/watch?v=_1u_yworTco&t=10s)

MAY 25

Researchers discover mechanism that makes COVID-19 more severe in diabetics
Elevated blood sugar is captured by monocytes and serves as a source of energy for replication by SARS-CoV-2.

185 news items (https://agencia.fapesp.br/33296)

MAY 26

Gene editing tool developed by USP could help block infection by novel coronavirus – Researchers create a system to simulate mutations in the gene that encodes the protein ACE2.

145 news items (https://agencia.fapesp.br/33352)

2020

MAY 26

FAPESP Communiqué nº 5 on changes to the system that analyzes applications for grants and scholarships.

https://fapesp.br/14256

JUN 1

Scientists at UNESP develop COVID-19 accelerometer – Online app monitors in real time the tendency for the disease to spread faster or slower in over 200 countries and territories.

174 news items (https://agencia.fapesp.br/33407)

JUN 4

FAPESP holds 2nd COVID-19 Webinar Focusing maths of COVID-19 on South America.

5 news items and 2,114 YouTube views (https://www.youtube.com/watch?v=yaC4x4xZk5Y)

JUN 5

Researchers at InCor start testing a potential COVID-19 vaccine in mice.

204 news items (https://agencia.fapesp.br/33405)

JUN 11

Butantan Institute and Sinovac announce partnership for Phase 3 clinical trials of **Coronavac** – a candidate COVID-19 vaccine, in Brazil.

JUN 15

Study by USP proves that COVID-19 had already begun spreading in Brazil when social distancing orders and mobility restrictions were introduced.

323 news items (https://agencia.fapesp.br/33776)

JUN 17

FAPESP creates COVID-19 Data Sharing/BR, a repository of clinical information for use in research on the disease – The open-access platform holds anonymized patient data uploaded by hospitals and clinical laboratories.

170 news items (https://agencia.fapesp.br/33522)

JUN 19

1 million confirmed cases in Brazil.

JUL 1

FAPESP Communiqué nº 6 on COVID-19.

https://fapesp.br/14333

JUL 1

FAPESP Communiqué nº 7 on COVID-19 – Applications for Research Internships Abroad (RIA) and Research Fellowships Abroad (RFA).

https://fapesp.br/14334

2020

JUL 1ST

FAPESP holds 3rd COVID-19 Webinar – Contact tracing and lockdown easing plan.

11 news items and 2,700 YouTube views (https://www.youtube.com/watch?v=GOGHwblWTjo)

JUL 13

Study by UNICAMP suggests adipose tissue can serve as reservoir for novel coronavirus – Obese people tend to have a higher viral load.

336 news items (https://agencia.fapesp.br/33729)

JUL 25

First wave of COVID-19 peaks
In the 30th epidemiological week of 2020, Brazil had the largest number of weekly deaths since the pandemic began: **7,677**

JUL 28

Researchers at USP make a live recording of blood clots forming in COVID-19 patients.

280 news items (https://agencia.fapesp.br/33909)

AGO

https://covid19.fapesp.br/en

Launch of COVID-19 Website.

AGO 3

Artificial intelligence used to diagnose COVID-19 in 20 minutes and predict risk of complications – System uses algorithms to recognize characteristic pattern of molecules in patient blood plasma.

130 news items (https://agencia.fapesp.br/34022)

AGO 5

FAPESP holds 4th COVID-19 Webinar – Open Data under the COVID-19 Pandemic.

9 news items and 1,600 YouTube views (https://www.youtube.com/watch?v=-lPVFMWQlg0&t=8s)

AGO 8

Brazil reaches **100,000** deaths and **3 million** confirmed cases.

100,000

3M

AGO 17

Study by USP shows that anti-inflammatory drug colchicine accelerates hospitalized COVID-19 patient recovery.

208 news items (https://agencia.fapesp.br/33958)

AGO 21

CoronaVac vaccine, being tested by Butantan Institute, to receive BRL 82.5 million from FAPESP and Todos pela Saúde.

66 news items (https://agencia.fapesp.br/33936)

2020

AUG 28

Researchers at USP develop test to diagnose COVID-19 in saliva – The test is based on RT-LAMP, a molecular technique used to diagnose infectious diseases such as dengue, chikungunya, hepatitis A and zika.

63 news items (https://agencia.fapesp.br/34135)

SEP 2

FAPESP holds 5th COVID-19 Webinar – COVID-19 Economic Recovery Strategies: basic income

15 news items and 809 YouTube views (https://www.youtube.com/watch?v=tuGclAhiEjU)

SEP 15

Adhesive plastic film protects surfaces by inactivating novel coronavirus – Material developed by Nanox contains silver-silica nanoparticles and disinfects by contact.

228 news items (https://pesquisaparainovacao.fapesp.br/1595)

SEP 21

Gastroesophageal reflux may increase risk of death from COVID-19, study by USP shows Stomach acid appears to increase expression in tissue of ACE2, the gene that encodes the protein to which SARS-CoV-2 binds in order to invade human cells.

113 news items (https://agencia.fapesp.br/34468)

SEP 23

With 66% of its population infected, Manaus may have reached herd immunity.

743 news items (https://agencia.fapesp.br/34291)

SEP 24

FAPESP Communiqué n° 8 on COVID-19.

https://fapesp.br/14508

SEP 24

Two anti-inflammatory compounds found capable of accelerating recovery from COVID-19 Studies by USP suggest monoclonal antibody eculizumab and experimental drug AMY-101 can combat exacerbated inflammatory response to virus.

118 news items (https://agencia.fapesp.br/34570)

OCT 1

Study by UNICAMP shows that SARS-CoV-2 uses a similar strategy to HIV to infect defense cells – Both viruses affect T CD4+ cells, which coordinate the adaptive immune response.

101 news items (https://agencia.fapesp.br/34469)

OCT 15

Study by UNICAMP, USP, IDOR and UFRJ proves that novel coronavirus affects brain and details effects on nerve cells – Research shows SARS-CoV-2 infecting and replicating in astrocytes, potentially reducing viability of neurons. .

574 news items (https://agencia.fapesp.br/34404)

NOV 4

FAPESP holds 6th COVID-19 Webinar – Values-Based Behavior under COVID-19.

13 news items and 930 YouTube views (https://www.youtube.com/watch?v=VgnF-wkPguI&t=7s)

2020

NOV 23

COVID-19 hospitalizations are 34% lower among physically active people, study by USP shows.

103 news items (https://agencia.fapesp.br/34841)

Developed at Human Genome and Stem Cell Research Center (photo: HUG-CELL)

DEC 1

Saliva-based COVID-19 test developed by USP – Method is an alternative to RT-PCR test and complies with guidelines issued by ANVISA.

186 news items (https://agencia.fapesp.br/34718)

DEC 14

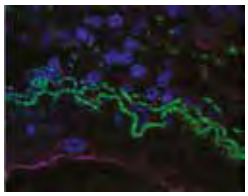
FAPESP holds 7th COVID-19 Webinar – Facing the chalenges on vaccine distribution.

28 news items and 637 YouTube views (https://www.youtube.com/watch?v=bZbo-Og3aQU&t=2s)

NOV 25

Study by USP describes immune system mechanism that triggers cytokine storm typical of COVID-19 – Inflammasome participates in activation of inflammatory process that can damage several organs and even lead to death.

43 news items (https://agencia.fapesp.br/34732)



Lung tissue from a patient who died after contracting COVID-19. Red dots: active inflammasome cells (puncta). Green: collagen fibers. Blue: lung cell nuclei. Pink: epithelial cells (image: Keyla S. G. de Sá/FMRP-USP)

DEC 31

Brazil has had **194,976** deaths and **7,675,781** confirmed cases of COVID-19 since the start of the pandemic.

194,976 **7,675,781**

SCIENTIFIC DISSEMINATION IN THE PANDEMIC

COVID-19 WEBSITE

https://covid19.fapesp.br/en

In July 2020, FAPESP launched a website with information about research and development projects in new technologies to combat the disease, news articles and videos on the results of these investigations, and access to the schedule and archive of its COVID-19 webinars, communiqués, ordinances and calls for proposals, among other initiatives relating to the disease and SARS-CoV-2. Since its creation, the website has recorded 9,781 hits and 21,225 page views.

AGÊNCIA FAPESP

BULLETIN AND NEWS WEBSITE

In 2020, Agência FAPESP published 228 news articles about research supported by FAPESP relating to SARS-CoV-2 and COVID-19. Many of these articles were published in real time on Agência FAPESP's website, even before they circulated in the daily bulletin, and distributed to the media.

The website recorded 4.5 million hits in the period March-December 2020, for an increase of 37% year over year. Its contents were reproduced in 19,477 news items published by media outlets in Brazil (16,311) and other countries (3,166).

The ten most-read news items published by Agência FAPESP during the COVID-19 pandemic

Article	Published on	Page views
Amazonas data reinforces theory that collective immunity to SARS-CoV-2 could be reached sooner than predicted	Aug 6th 2020	131,021
Study proves that novel coronavirus affects the brain and details its effects on nerve cells	Oct 15th 2020	128,217
Experts recommend ways to combat pandemic in the second half of this year	July 16th 2020	125,580
Exercise hormone can modulate genes associated with replication by novel coronavirus, study suggests	Aug 11th 2020	122,878
COVID-19 should be treated as a thrombotic disease, Brazilian physician says	May 15th 2020	121,660
São Paulo firm develops fabric that eliminates novel coronavirus by contact	June 17th 2020	121,239
Protein in blood of COVID-19 patients may indicate progression and severity of the disease	Oct 1st 2020	103,483
Anti-inflammatory drug colchicine accelerates recovery of hospitalized COVID-19 patients	Aug 17th 2020	83,919
Researchers discover mechanism that makes COVID-19 more severe in diabetics	May 25th 2020	81,901
Study suggests adipose tissue can serve as reservoir for novel coronavirus	July 13th 2020	78,893

PARTNERSHIP BETWEEN AGÊNCIA FAPESP AND BUTANTAN INSTITUTE CHANNEL

Agência FAPESP and Butantan Institute's YouTube channel held four webinars on aspects of the COVID-19 pandemic between July and September 2020. They were viewed 56,500 times. Dissemination of the research results discussed by the experts who took part led to publication of 1,071 news items by media outlets (1,009 in Brazil and 62 in other countries).

FIELD DIARY SERIES (*DIÁRIO DE CAMPO*)

Agência FAPESP produced the Field Diary series in five chapters, comprising videos, photos and texts by Marcelo Urbano Ferreira and Marly Augusto Cardoso, researchers at the University of São Paulo (USP) in Brazil, recounting their ten-day expedition to Mâncio Lima, a small town in the state of Acre near the border with Peru. The aim was to collect material and investigate the dynamics of transmission of COVID-19 in the local population. A teaser, trailer and the complete series were posted to social media in October 2020. An abridged version of the series was broadcast by TV Cultura. The videos (in Portuguese, some with English subtitles) registered 2,337 views on YouTube and 2,820 on Facebook.

VIDEO REPORTAGE

The 18 films about COVID-19 exhibited by Agência FAPESP 562,462 views on its YouTube channel and 66,445 on Facebook. The most viewed on both social media were "Coronavirus is produced in laboratory by researchers at USP" (498,594 views), "Autopsies could help treat severe cases of COVID-19" (53,610), "Researchers record formation of blood clots in COVID-19 patients" (16,157), and "COVID-19 should be treated as a thrombotic disease" (12,089).

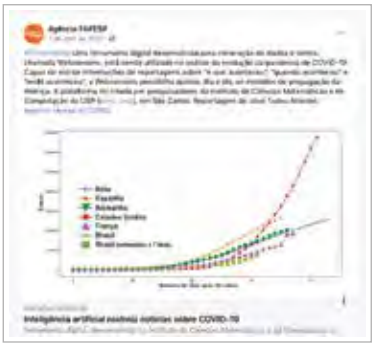
CIÊNCIA SP

This is another Agencia FAPESP channel, where 24 videos relating to COVID-19 were watched 48,923 times on YouTube and 34,800 on Facebook. The most viewed on both were "Technology for mechanical ventilators" (13,909 views), "Reusable mask against novel coronavirus" (13,850), "Keep coronavirus away from food" (9,123), and "Coronavac vaccine" (6,359).

AGÊNCIA FAPESP ON SOCIAL MEDIA

COVID-19 was the most frequent focus for Agência FAPESP's top-performing posts on Facebook, Twitter and Instagram in terms of both engagements and views in 2020.

Coverage of the pandemic also boosted the number of followers, particularly on Twitter and Instagram, and diversified the profiles mentioning Agência FAPESP on social media (see the chapter on this topic for more details).



@agfapesp

On **Facebook**, nine of the top ten posts in total engagements were about COVID-19. The standouts were: "Technology that sequenced coronavirus in 48 hours can be used to monitor epidemic in real time" (28,454 interactions); "Brazilian scientists are developing a vaccine against the novel coronavirus" (21,469); and "Sequencing identifies different genomes in the two Brazilian cases of COVID-19" (19,608). Based on readership, seven of the top-performing posts were about COVID-19, including "Artificial intelligence tracks news stories on COVID-19" (viewed by 131,739 users); "Coronavirus is produced in lab by researchers at USP" (video viewed by 103,465 people, and watched for at least 3 seconds by 47,209); and "FAPESP Communiqué to Researchers on COVID-19" (54,923).

@AgenciaFAPESP

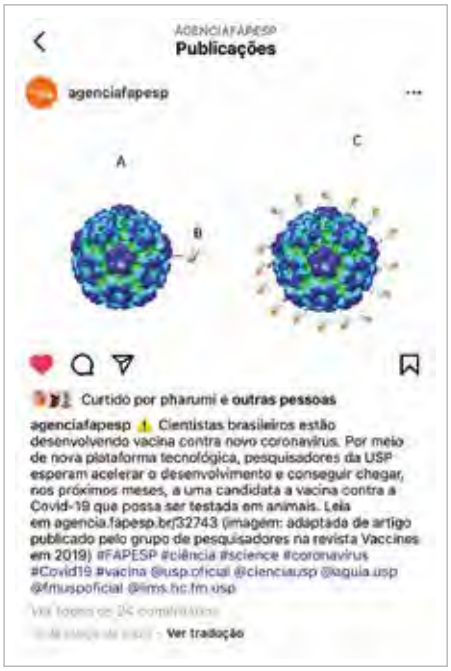
On **Twitter**, a post entitled "Two novel viruses identified in patients with suspected dengue" had the most total interactions (23,118) and views (207,292). The post went viral via a cascade of chain messages on SARS-CoV-2, giving rise to thousands of engagements, with memes and animated GIFs.

In terms of total engagements, half the top ten tweets in the year were about COVID-19, including "Technology that sequenced

coronavirus in 48 hours can be used to monitor epidemic in real time" (10,208 interactions); "Brazilian scientists are developing a vaccine against the novel coronavirus" (761); and "54.8% of COVID-19 cases imported to Brazil by March 5 came from Italy" (638). The first two were also among the ten most-viewed tweets in the year, with 175,287 and 15,339 views respectively.

@agfapesp

On **Instagram**, posts about coronavirus accounted for five of the top ten in terms of interactions and six in terms of reach. The most popular were "Saliva-based COVID-19 test developed by USP is now available" (1,750 engagements and 14,100 accounts reached) and "Brazilian scientists are developing a novel vaccine against COVID-19" (1,598 and 10,400).



PESQUISA FAPESP MAGAZINE

COVERAGE OF COVID-19 ON THE WEBSITE

https://revistapesquisa.fapesp.br/en/keywords/coronavirus-en-2

In 2020, the magazine's website published 236 articles directly about the pandemic. In April and May, for example, it published 84 (42 per month). Altogether, it published 137 news items, 9 interviews, 32 notes and 58 researcher testimonials in the section "Research during Lockdown", created specially for the pandemic.

A keyword was created to group together all the content relating to COVID-19, comprising news stories, notes, testimonials, videos, podcasts and photo galleries (458 items published in 2020, with some repetition, such as news stories with online and print versions, interviews extracted from podcasts, and complete radio programs).

GUIDE TO COVID-19

This is a regularly updated section with infographics, maps, tables, a glossary, and a Q&A about the disease. It was viewed 38,550 times in 2020, with ups and downs but fairly stable over time.

NEWS HIGHLIGHTS

Early in the pandemic, the lack of mechanical ventilators was one of the biggest problems faced by health services. Four reports were published on this topic, three in April and one in July: "Vital ventilators", "Improving healthcare management isn't enough", "In the palm of the hand", and "USP finishes developing mechanical ventilators".

Published in July 17th 2020, by Yuri Vasconcelos.

The most-viewed article in 2020, published in March, was "Similarities between Spanish flu and COVID-19", in which three historians compared the two pandemics, with almost 190,000 clicks (see table below).

In May, COVID-19 was already known to cause a range of problems in the organism, which motivated an article titled "A frightening disease", published first in the print magazine. In September, the topic was again in the spotlight with "The effects of COVID-19", featured on the cover of the print magazine that month and soon afterward posted to the website.

The magazine's coverage of the humanities and S&T policy also contributed significantly to its coverage of the pandemic in 2020. Examples include "Health beyond medication" (April), "Historic vulnerability" (April), "Delicate return" (July), "When the source (of income) dries up" (July), "The weight of inequality" (July), and "Healthy spaces" (October).

RESEARCH DURING LOCKDOWN

The section focuses on the personal and professional challenges of working during the pandemic, covering a broad academic spectrum from novices to researchers with a well-established career, and a range of knowledge areas. The testimonials are widely read as soon as they are published (with more than 5,000 views in a single day in three cases), but then are no longer viewed, possibly owing to Google's indexing algorithm. One was viewed almost 30,000 times during the year, two between 10,000 and 20,000 times, and six more than 4,000 times.

The ten most-read articles among those produced in 2020 were about COVID-19

Page views – total for website (100%): 7,758,022 | clicks on home page: 315,307 (4,06%)

News	Clicks	%
Similarities between Spanish flu and COVID-19	189,891	2.45
The second wave of coronavirus	46,591	0.60
A guide to coronavirus	38,550	0.50
("When I saw the results, I thought 'This virus is going to infect everyone'"	28,564	0.37
First cases in Italy went unnoticed for weeks	27,975	0.36
Challenges of isolation	27,582	0.35
Pregnant women and babies tend to have mild symptoms of COVID-19	27,546	0.36
The other coronaviruses	27,299	0.35
Butantan Institute develops serum against coronavirus	22,524	0.29
The damage done by coronavirus	21,980	0.28

COVERAGE OF COVID-19 IN THE PRINT MAGAZINE

Part of what was produced in the form of news stories, interviews, notes and testimonials for the website section "Research during Lockdown" was published later in the print magazine. All texts produced for the print magazine were posted to the website.

Of the 236 texts about COVID-19 published online in 2020 (137 news stories, 9 interviews, 32 notes and 58 testimonials), 74 were also carried by the print edition, albeit often abridged. In some cases, the text was first published online, while on others it appeared online as soon as the print magazine came out.

Twelve issues of the print magazine were published in 2020. COVID-19 was featured on seven covers, the last three (August, September and December) being the most significant.

APR 2020

MAY 2020

JUN 2020

JUL 2020

AUG 2020

SEP 2020

DEC 2020

A peculiarity of the covers about the pandemic in 2020 was the difficulty of using photos that represented what the magazine wanted to express. Only one of the seven covers featured a straightforward photo (April). Another displayed a stylized image of coronavirus (May), and a third used a collage of photos. Four covers displayed illustrations created by artists who had been invited by the editors to produce work for this purpose.

Several news stories used graphics by designers and the work of artists to illustrate difficult topics. The magazine's designers were also frequently called upon to help in this regard. Selected examples are reproduced below.

JUN 2020

JUL 2020

AUG 2020

MEDIA ATTENTION

In 2020, articles originally published in Pesquisa FAPESP were re-published at least 406 times in scientific journals, newsletters, magazines and newspapers, and on news sites (e.g. UOL, Nexo, Veja, MSN), besides being mentioned in doctoral theses and scientific articles.

VIDEOS: six videos relating to the pandemic were produced in 2020 – two specifically about COVID-19 and four more broadly about the pandemic:

- *Os efeitos da COVID-19 no corpo* / The effects of COVID-19 on the body (Jun. 8, 2020), 54,626 views and 164 comments on YouTube (Apr. 8, 2021); 8,642 views on Facebook.
- *O que desmatamento tem a ver com novas pandemias?* / What does deforestation have to do with future pandemics? (Aug. 7, 2020), 17,674 views and 29 comments on YouTube (Apr. 8, 2021); 27,068 views on Facebook.
- *Para além da sala de aula*, / Beyond the classroom (Sep. 3, 2020, Aug. 31, 2020), 13,154 views and 24 comments on YouTube (Apr. 8, 2021); 4,001 views on Facebook.
- *Como prever o espalhamento de uma doença* / How to predict the spread of a disease (Jul. 6, 2020), 4,693 views and 23 comments on YouTube (Apr. 8, 2021); 7,189 views on Facebook.
- *As técnicas na busca pela vacina contra a COVID-19* / The techniques being used to produce a COVID-19 vaccine (Aug. 31, 2020), 3,449 views and 11 comments on YouTube (Apr. 8, 2021); 5,553 views on Facebook.
- *Como a arquitetura pode auxiliar no combate a epidemias* / How architecture can help combat epidemics (Dec. 21, 2020), 2,229 views and 18 comments on YouTube (Apr. 8, 2021); 1,861 views on Facebook.

In November 2020, the video "Para além da sala de aula" was selected by the jury as best in the medium-length category at the show "Science and the Pandemic", organized by the Brazilian Society for the Advancement of Science (SBPC) (https://revistapesquisa.fapesp.br/mostra-destaca-video-de-pesquisa-fapesp-sobre-ensino-remoto).

Video *Os efeitos da COVID-19 no corpo* (The effects of COVID-19 on the body), published in https://www.youtube.com/watch?v=yX7JikJBzg8

PODCASTS

In 2020, 45 entirely new radio programs were produced in partnership with Radio USP. For 30 consecutive weeks (April-October), the radio program and Pesquisa Brasil podcast produced by Pesquisa FAPESP focused solely on the pandemic. Ninety interviews via Skype were recorded with researchers in several disciplines, from public health to engineering, psychology and political science, discussing the results of scientific studies and public policy relating to COVID-19 and lockdown. The decision to focus on the pandemic and disseminate knowledge on the hottest topic of the times had a positive impact on the program's audience ratings.

According to Kantar Ibope, the number of listeners per program was as follows (Radio USP FM + Radio USP web):

Período	Sep-Nov 2019	Sep-Nov 2020
1 p.m. Friday	4,067	6,200
6 p.m. Saturday (repeat)	1,647	5,098

IMAGE GALLERY

Photographic essays can portray aspects of the pandemic that are not conveyed so powerfully by the magazine's news stories. Four were published in 2020:

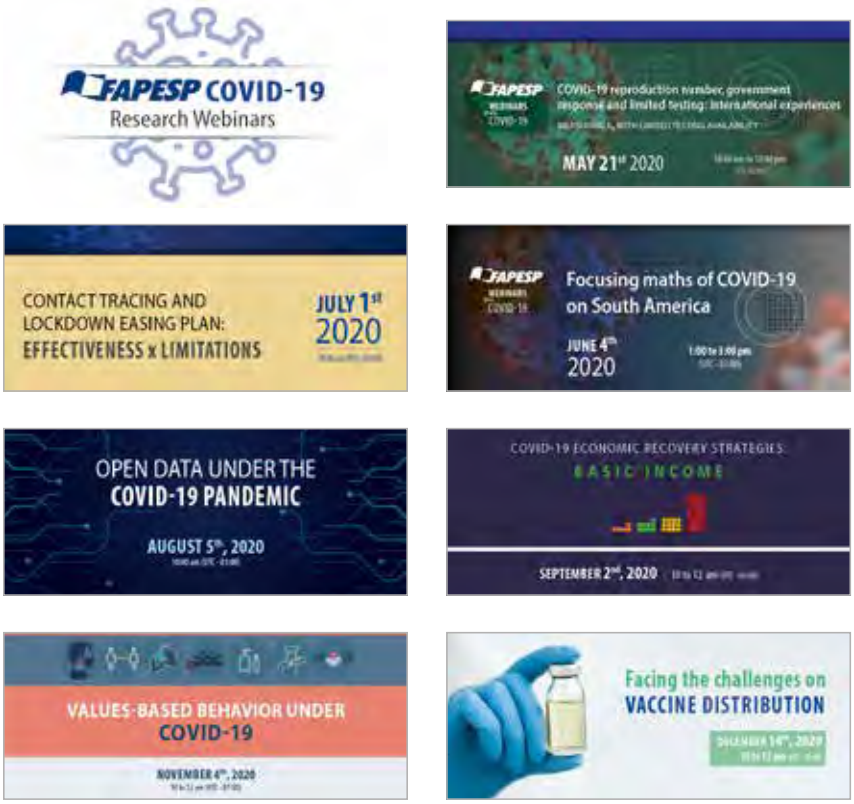
- *Megalópole adormecida* / Sleeping megalopolis (Apr. 8, 2020): empty spaces in São Paulo.
- *Lembranças de uma cidade recolhida* / Memories of a city sheltering in place (Jun. 30, 2020): black-and-white pictures with dramatic views of the empty city published just as everyday activities were returning.
- *#FiqueEmCasa* / #StayAtHome (Jul. 28, 2020): portraits of mask wearers in São Paulo's streets. People who had to go out were mainly nonwhite, justifying citation of a study by a group led by urbanist Raquel Rolnik (FAU-USP) on how bus and train routes contributed strongly to the worsening of the pandemic in the city.
- *A reconquista das ruas* / Reconquering the streets (Sep. 9, 2020): contrasts between protected and populous spaces in São Paulo and Rio de Janeiro.

EVENTS

COVID-19 RESEARCH WEBINARS

https://covid19.fapesp.br/en

FAPESP organized a series of webinars in which researchers from Brazil and other countries discussed discoveries and results of studies relating to the advancement of knowledge about COVID-19. Seven such webinars were held between May and December 2020, with 1,569 live participants; the recordings were watched by 18,276 people. The Brazilian media published 102 news items on the topics discussed in the webinars. Their titles were: COVID-19 - Reproduction number, government, response and limited testing: international experiences; Focusing maths of COVID-19 on South America; Contact tracing and lockdown easing plan; Open Data under the COVID-19 Pandemic; COVID-19 Economic Recovery Strategies: basic income; Values-Based Behavior under COVID-19; Facing the challenges of vaccine distribution.



FIRST VIRTUAL PRESS CONFERENCE

FAPESP held its first online press conference on June 17, 2020, to announce the creation of COVID-19 Data Sharing/BR. The number of participants was 188. The launch was reported by 170 media outlets.

FAPESP IN THE MEDIA DURING THE PANDEMIC

Dissemination of research and technological innovations developed with FAPESP's support and focusing on SARS CoV-2 and COVID-19 resulted in the publication of 25,195 news items in Brazilian media (21,739) and media abroad (3,456). The most widely read items are listed below.

Research on COVID-19 publicized by FAPESP and with the highest visibility in Brazilian media

Article	N° of news
Technology that sequenced coronavirus in 48 hours can be used to track the epidemic in real time	721
São Paulo-based company develops fabric that eliminates coronavirus by contact	597
Brazilian scientists are developing a vaccine against the novel coronavirus	563
Butantan Institute's labs are to develop antibodies to treat COVID-19	539
Study by UNICAMP, USP, IDOR and UFRJ proves that coronavirus affects the brain and details its effects on nerve cells	435
Study by UNICAMP confirms that coronavirus can infect human neurons	434
Sequencing identifies different genomes in two Brazilian cases of COVID-19	399
With 66% of its population infected, Manaus may have reached herd immunity	358
Webinar on candidate COVID-19 vaccines developed by Sinovac and Oxford/AstraZeneca undergoing trials in Brazil	353
Study suggests adipose tissue can serve as reservoir for coronavirus	334

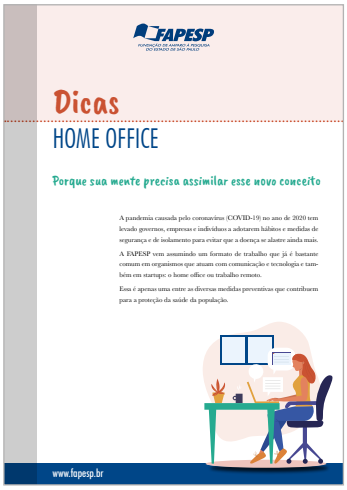
Research on COVID-19 publicized by FAPESP and with the highest visibility in international media

Article	N° of news
With SARS-CoV-2 prevalence of 66%, Amazonia's largest city may have reached herd immunity	388
Use of anticoagulant medication leads to 70% reduction in cell infection by novel coronavírus	337
São Paulo-based company develops fabric that eliminates novel coronavirus by contact	230
Plastic film used to protect foods and surfaces inactivates novel coronavirus	194
Study proves that novel coronavirus harms brain and details its effects on nerve cells	139
Brasil: tecnología que secuencia el coronavirus permite monitorear la epidemia em tempo real	69
Adipose tissue may be the source of inflammatory factors that aggravate COVID-19	65
Two complete genome sequence for coronavirus in Brazil were published	62
COVID-19 had already spread in Brazil when measures to contain it were implemented	38
Brazilian scientists are developing a vaccine against the new coronavirus	34

SERVICES PROVIDED BY FAPESP TO THE SCIENTIFIC COMMUNITY AND THE SAFETY OF STAFF AND COLLABORATORS

On June 2, 2020, FAPESP set up a staff committee to plan a return to in-office activities, even if only partial, as soon as the São Paulo State Government lifted social isolation measures and mobility restrictions. In line with the guidelines established by Executive Board Ordinance 14/2020 and the public health protocols issued by the Ministry of Health and the São Paulo State Government, the committee suggested the implementation of health measures and procedures designed to assure staff workplace safety.

Based on these suggestions, the Executive Board implemented a number of measures relating to health and safety, including social distancing, personal hygiene, interpersonal precautions, office sanitization, health guidance and monitoring, communication, and a selective return to in-office working. It produced a document detailing the measures ("Orientações para evitar a transmissão e propagação do coronavírus na FAPESP"), for distribution to all staff members. It also acquired personal protective equipment and devices to increase the protection of staff, collaborators and researchers while on FAPESP's premises, such as acrylic shields for countertops and desks, pedal waste bins, and hand sanitizer, among others.



Guide to working from home

Guidelines and protocols for a possible return from the period of quarantine: Guidelines to avoid transmission and propagation of coronavirus in FAPESP, Health protocols, Duties of line managers, Specific protocols – guidelines for each type of space, Guidelines for the Plan to Resume In-Office Working.

Signage in FAPESP's head offices: Hand sanitizer totem, shoe sanitizer mat, social distancing floor decals, maximum people capacity posters, COVID-19 prevention posters for different space, totem for body temperature scan, totem with general guidance on prevention.

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FUNDING STRATEGIES

- Training of Human Resources for Research
- Basic and Applied:
  - Long-term research and
  - Regular Grants not associated to other grants
- Research for Innovation
- Research on Strategic Themes
- Support for Research Infrastructure
- Communicating Science to the Public

FUNDING STRATEGIES

TRAINING OF HUMAN RESOURCES FOR RESEARCH

FAPESP awards several types of regular scholarships and fellowships for undergraduates and graduates who reside in São Paulo State to train in Brazil and abroad. Regular scholarships and fellowships in Brazil support academic education and training at different levels: Scientific Initiation, Master's, Doctorate, Direct Doctorate, and Postdoctorate.

FAPESP has an agreement with the Ministry of Education's Higher Research Council (CAPES) to fund Master's, Doctorate and Direct Doctorate scholarships, as well as Postdoc fellowships.

FAPESP awards two types of funding for education and training abroad: Research Fellowships Abroad (RFA) for postdoctoral research; and Research Internships Abroad (RIA) for use while scholarships in Brazil are in progress. It considers the experience of research abroad a key component of the training of new researchers.

TABLE 10 shows the amounts disbursed for training scholarships and fellowships not associated with other grants. Total investment in scholarships and fellowships, including both those associated and those not associated with other grants, can be found on page 146.

In 2020, FAPESP disbursed $ PPP 98.061 million for 8,127 human-resource training scholarships/fellowships in Brazil and abroad, and contracted for 2,557 new scholarships/fellowships.

TYPES OF TRAINING SCHOLARSHIPS AND FELLOWSHIPS

REGULARES SCHOLARSHIPS/FELLOWSHIPS NOT ASSOCIATED WITH GRANTS	
IN BRAZIL	SCHOLARSHIPS
	Scientific Initiation (IC)
	Master's (MS)
	Doctorate (DR)
	Direct Doctorate (DD)
	FELLOWSHIPS
	Postdoctorate (PD) – www.fapesp.br/en/postdoc
ABROAD	Research Internships Abroad (RIA) – www.fapesp.br/en/bpe
	Research Fellowships Abroad (RFA)

TABLE 10

TRAINING OF HUMAN RESOURCES FOR RESEARCH

Types of scholarships/fellowships, disbursement, number of actives projects and new projects contracted for in 2020

Regular Scholarships/Fellowships not associated to grants	Disbursement $ PPP	Active projects	New projects contracted
In Brazil	72,520,155	7,250	2,310
SCHOLARSHIPS – Scientific Initiation (SI)	7,222,372	3,192	1,616
Master's (MS)	8,067,302	1,133	271
Doctorate (DR)	26,650,565	1,735	234
Direct Doctorate (DD)	4,717,011	362	82
FELLOWSHIP – Postdoctorate (PD)	25,862,905	828	107
Abroad	25,541,537	877	247
Research Internships Abroad (RIA)	19,582,659	694	197
RIA - SI	198,661	51	28
RIA - MS	885,982	93	31
RIA - DR	7,872,254	339	86
RIA - DD	1,148,818	48	17
RIA - PD	9,476,944	163	35
Research Fellowships Abroad (RFA) - PD	5,958,878	183	50
Total	98,061,692	8,127	2,557

TABLE 11

TRAINING OF HUMAN RESOURCES FOR RESEARCH

Types of scholarships/fellowships, disbursement, number of actives projects and new projects contracted by knowledge areas

Scholarships/ Fellowships	Life Sciences		Natural Sciences and Engineering		Human and Sociais Sciences		Interdisciplinary	
	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted
In Brazil	38,501,669	1,283	14,948,728	530	18,805,874	494	263,884	3
Abroad	12,607,434	97	7,019,059	76	5,884,777	73	30,267	1
RIA	10,699,941	86	3,894,037	54	4,963,407	56	25,274	1
RFA	1,907,493	11	3,125,022	22	921,370	17	4,992	
Total	51,109,103	1,380	21,967,787	606	24.690.651	567	294,151	4

MEDIA COVERAGE OF RESEARCH RESULTS: SCHOLARSHIPS/FELLOWSHIPS

Study could provide guidelines on exercise training for patients with high blood pressure

A study by the University of São Paulo (USP) and published in *Clinical and Experimental Hypertension* suggested that matching the time of day when patients with high blood pressure undergo training to the class of anti-hypertensive drug used in their treatment can increase the beneficial effects of aerobic exercise. The strategy could be particularly advantageous for patients who do not respond well to treatment with medication.

News stories on the study were carried by **22** media outlets.

Physical Education

DOCTORATE SCHOLARSHIP AND POSTDOCTORAL FELLOWSHIP IN BRAZIL
FAPESP Processes 2014/21667-6 and 2018/05226-0

INSTITUTION:
School of Physical Education and Sports, University of São Paulo (USP)

PRINCIPAL INVESTIGATOR:
Cláudia Lúcia de Moraes Forjaz

GRANTEE:
Leandro Campos de Brito

https://agencia.fapesp.br/34194

Book recalls exhibition of humans in zoos and freak shows

Zoológicos Humanos: gente em exibição na era do imperialismo, published by Editora Unicamp in 2020, is based on research conducted at the State University of Campinas's Institute of Arts (IA-UNICAMP) with FAPESP's support. The book is full of photographs and videos showing the brutality of the "human zoos" and freak shows popular in the US, Europe and Brazil until the start of the twentieth century. In addition to their popularity as entertainment for a public avid for exotic novelties, they were backed by scientific authorities, who used them to support racist and economic theories.

News stories about the book were carried by **6** media outlets.

Photography

POSTDOCTORAL FELLOWSHIP IN BRAZIL – FAPESP Process 2008/56372-5

INSTITUTION:
Institute of Arts, State University of Campinas (UNICAMP)

PRINCIPAL INVESTIGATOR:
Iara Lis Franco Schiavatto

GRANTEE:
Sandra Sofia Machado Koutsoukos

https://agencia.fapesp.br/34867

MEDIA COVERAGE OF RESEARCH RESULTS: SCHOLARSHIPS/FELLOWSHIPS

Southern hemisphere could see up to 30% less rain at the end of the century if Earth's temperature rises 3 °C

Projections based on climate models for the mid-Pliocene Warm Period (about 3 million years ago) suggest countries in the tropical and subtropical southern hemisphere, including Brazil, may face longer droughts in the future. Annual rainfall may decrease as much as 30% compared with current levels. One of the main variables considered in this scenario is a rise of 3 ºC in the global average temperature, which may happen between 2050 and the end of the century unless the effects of climate change are mitigated.

The study was described in an article in *Scientific Reports* and news stories about it were carried by **28** media outlets.

Oceanography

DIRECT DOCTORATE SCHOLARSHIP IN BRAZIL – FAPESP Process 2016/23670-0

INSTITUTION:
Oceanographic Institute, University of São Paulo (USP)

PRINCIPAL INVESTIGATOR:
Ilana Elazari Klein Coaracy Wainer

GRANTEE:
Gabriel Marques Pontes

https://agencia.fapesp.br/34190

Brazilian scientists publish book presenting low-cost solutions for treatment and reuse of wastewater

Low-cost solutions for the treatment and reuse of wastewater were presented by researchers at São Paulo State University (UNESP) in a chapter of Wastewater Treatment and Reuse – Lessons Learned, volume 6 of Advances in Chemical Pollution, Environmental Management and Protection, published by Elsevier. The chapter is the first in the book and is entitled "Treatment options for the direct reuse of reclaimed water in developing countries", describing studies supported by FAPESP.

News stories about the publication were carried by **6** media outlets.

Photography

MASTER'S SCHOLARSHIP IN BRAZIL – FAPESP Process 2017/14729-3

INSTITUTION:
School of Agricultural Sciences, São Paulo State University (UNESP) in Botucatu

PRINCIPAL INVESTIGATOR:
Rodrigo Maximo Sanchez Roman

GRANTEE:
Tamires Lima da Silva

https://agencia.fapesp.br/34607

MEDIA COVERAGE OF RESEARCH RESULTS: SCHOLARSHIPS/FELLOWSHIPS

Molecules derived from omega-3 can regenerate inflamed periodontal tissue

Local inflammation is one of the most challenging aspects of the treatment of periodontal disease. A researcher at the University of São Paulo (USP) showed *in vitro* that maresin and resolvin, produced by the body from omega-3 fatty acids, stimulate periodontal ligament stem cells even in the presence of inflammation. The study found that stimulating the release of these mediators could be a way to improve the success rate of so-called regenerative therapy.

News stories about the research were carried by **5** media outlets.

Periodontics

RESEARCH INTERNSHIP ABROAD (RIA) SCHOLARSHIP – DOCTORATE – FAPESP Process 2017/25260-6

INSTITUTIONS:
Dental School, University of São Paulo (USP), and Forsyth Institute, USA

PRINCIPAL INVESTIGATOR:
Marinella Holzhausen Caldeira

SUPERVISOR ABROAD:
Alpdogan Kantarci

GRANTEE:
Emmanuel Albuquerque de Souza

https://agencia.fapesp.br/34836

Researchers develop flat lens a thousand times thinner than a human hair

A lens that is a thousand times thinner than a human hair was developed by researchers at the University of São Paulo (USP). It can serve as a camera lens in smartphones and can be used in other devices that depend on sensors.

An article on the study was published in *ACS Photonics* and news stories about it were carried by **29** media outlets.

Telecommunications

RESEARCH INTERNSHIP ABROAD (RIA) SCHOLARSHIP – MASTER'S – FAPESP Process 2018/25372-1

INSTITUTIONS:
São Carlos School of Engineering, University of São Paulo (USP), and University of York, UK

PRINCIPAL INVESTIGATOR:
Ben-Hur Viana Gomes

SUPERVISOR ABROAD:
Thomas Fraser-Krauss

GRANTEE:
Augusto Martins

https://agencia.fapesp.br/33956

MEDIA COVERAGE OF RESEARCH RESULTS: SCHOLARSHIPS/FELLOWSHIPS

Novel method identifies areas most suitable for conservation of black lion tamarin

A group of researchers at the non-governmental organization Instituto de Pesquisas Ecológicas (IPE), São Paulo State University (UNESP) and the Federal University of Mato Grosso (UFMT) cross-tabulated climate data and data on forest cover (landscape) to determine the sites most suitable as a home for the black lion tamarin (Leontopithecus chrysopygus), an endangered species endemic to São Paulo State.

The study, which contributed to initiatives involving translocation of the animals to areas from which they had disappeared, was published in the *American Journal of Primatology*, and news stories about it were carried by **8** media outlets.

Ecology

RESEARCH INTERNSHIP ABROAD (RIA) SCHOLARSHIP – POSTDOCTORATE – FAPESP Process 2020/10617-9

INSTITUTIONS:
Biosciences Institute of Universidade Estadual Paulista (IB/Unesp de Rio Claro) e Swansea University (País de Gales)

PRINCIPAL INVESTIGATOR:
Laurence Marianne Vincianne Culot

SUPERVISOR ABROAD:
Luca Borger

GRANTEE:
Gabriela Cabral Rezende

https://agencia.fapesp.br/34930

Genomic analysis of mako shark reveals genes relating to tumor suppression in humans

Genetic mapping of liver and eye tissue from the Shortfin mako shark (*Isurus oxyrinchus*) showed overexpression of nine genes known for action in tumor suppression, wound healing, and probable monochrome vision. The large pelagic species, which can be as long as 4 meters, inhabits temperate and tropical seas worldwide. It is considered globally endangered, owing mainly to non-selective longline fishing with hundreds of hooks by factory ships that capture many animals in a single pass.

An article on the study was published in *Genomics*, and news stories about it were carried by **16** media outlets..

Oceanography

RESEARCH INTERNSHIP ABROAD (RIA) SCHOLARSHIP – POSTDOCTORATE – FAPESP Process 2018/21319-9

INSTITUTIONS:
Institute of Health and Society, Federal University of São Paulo (UNIFESP) in Santos, Brazil, and Interdisciplinary Center of Marine and Environmental Research (CIIMAR) in Portugal

PRINCIPAL INVESTIGATOR:
Fernando Fernandes Mendonça

SUPERVISOR ABROAD:
Agostinho Antunes Pereira

GRANTEE:
Rodrigo Rodrigues Domingues

https://agencia.fapesp.br/34719

FUNDING STRATEGIES

BASIC AND APPLIED RESEARCH

Almost half of all the funding disbursed by FAPESP goes to ambitious research projects that set out to advance knowledge and solve problems. Research of this kind requires long-term support and is conducted under the aegis of Thematic Projects, the Young Investigator and São Paulo Excellence Chair (SPEC) programs, Special Projects, and Research, Innovation and Dissemination Centers (RDICs). It is also supported by Regular Research Grants for fast-track projects.

In 2020, FAPESP disbursed $ PPP 196.438 million to support 9,710 long- and short-term projects. It contracted for 3,115 new projects in the year.

RELATED PROGRAMS

- **Long-term research**

  Thematic Project Grant
  www.fapesp.br/thematic

  São Paulo Excellence Chair (SPEC)

  Research, Innovation and Dissemination Centers (RIDCs) – https://cepid.fapesp.br/en/home

  Young Investigators Grant (YIG) – www.fapesp.br/en/yia

  Special Projects

- **Regular Grants not associated to other grants**

  Research Grants – Regular

  Visiting Researcher Award – www.fapesp.br/en/visiting

  Publications Award

  Participation in Scientific Meeting Award

  Organization of Scientific Meeting Award

  - São Paulo School of Advanced Science (SPSAS) – https://espca.fapesp.br/home

TABLE 12

BASIC AND APPLIED RESEARCH

Disbursement and new projects contracted in 2020 by major knowledge area

Programs	Life Sciences		Natural Sciences and Engineering		Human and Social Sciences		Interdisciplinary	
	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted
Thematic and associated	51,681,214	502	34,372,843	384	4,970,158	96	409,790	7
Special projects and associated	0	0	12,467,672	4	0	0	0	0
CEPID and associated	5,234,053	101	6,761,665	74	971,680	13	10,545,649	0
SPEC and associated	1,294,446	10	849,847	9	23,374	2	3,190	1
YIG and associated	15,615,224	235	5,237,229	119	1,608,651	53	128,730	2
Regular Grants not associated to other grants	26,930,700	895	11,949,470	372	2,047,298	221	3,331,950	15
Total	100,755,637	1,743	71,638,726	962	9,625,161	385	14,419,309	25

THEMATIC PROJECTS

Goals: support for research projects with ambitious aims conducted by multidisciplinary teams for up to five years. Includes National Institutes of Science and Technology (NISTs), in partnership with the Ministry for Science, Technology, Innovation and Communications via the National Council for Scientific and Technological Development (CNPq). Important books published in 2020 resulted from Thematic Projects supported by FAPESP, such as: Crises da democracia: o papel do congresso, dos deputados e dos partidos, issued as an e-book in 2020 (https://agencia.fapesp.br/34536), *Os Objetivos do Desenvolvimento Sustentável – Desafios para o Planejamento e a Governança Ambiental na Macrometrópole Paulista* (https://agencia.fapesp.br/34792), *Educar para a sustentabilidade – visões de presente e futuro* (https://agencia.fapesp.br/34139), *Cuidar do espírito e do corpo entre o velho e os novos mundos – séculos XIII-XVIII* (https://agencia.fapesp.br/32294).

TABLE **13**

THEMATIC

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grants – Thematic Project	40,291,071	58	465
Research Grants – Regular	1,007,420	54	98
Research Grants – Participation in Scientific Meetings	40,112	6	4
Research Grants – Visiting Researcher	725,887	12	26
Research Grants – Publications	14,153	3	9
Regular Scholarships/Fellowships	47,872,155	730	2,497
Fellowships – Technical Training	1,434,821	117	279
Fellowships – Science Jornalism	24,856	3	5
Fellowships – Public Education	23,529	6	7
Total	**91,434,004**	**989**	**3,390**

SPECIAL PROJECTS

Goals: support for projects with significant scientific impact via participation in international consortia to assure access to high-cost next-generation equipment and technology for researchers in São Paulo State.

In 2020, the US National Science Foundation (NSF) awarded a grant of USD 17.5 million to the GMTO Corporation to accelerate development of the Giant Magellan Telescope (GMT) at the Las Campanas Observatory in the Atacama Desert in Chile. The GMT is set to go live in 2024, allowing astronomers to see farther into space with more detail than any other optical telescope before. FAPESP will invest USD 40 million, or 4% of the GMT's estimated cost. This support will guarantee 4% of the telescope's operating time for studies by researchers in São Paulo.

TABLE **14**

SPECIAL PROJECTS

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Special Projects Grants	12,066,855	0	2
Research Internships and Fellowships Abroad (RIA e RFA)	14,762	0	2
Regular Scholarships/Fellowships	273,894	0	8
Fellowships – Technical Training	112,161	4	10
Total	**12,467,672**	**4**	**22**

MEDIA COVERAGE OF RESEARCH RESULTS: THEMATIC PROJECTS

Physical exercise reverses muscle atrophy caused by cancer and can increase patient survival

Cancer patients tend to suffer from muscle wasting, part of a problem physicians sometimes refer to as cancer cachexia. A study involving rats conducted by researchers affiliated with institutions in Brazil, the United States and Norway showed that regular aerobic training not only improved physical capacity but also reversed loss of skeletal muscle mass, normalized muscle contractile function, and above all increased the survival of rats with tumors by 30%. The authors suggest training as ancillary treatment for cancer patients.

An article on the study was published in *Molecular Metabolism*, and news stories on it were carried by **32** media outlets.

Medicine / Physical Education

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2015/22814-5

INSTITUTION: Heart Institute (INCOR)
PRINCIPAL INVESTIGATOR: Carlos Eduardo Negrão

BOLSA ESTÁGIO DE PESQUISA NO EXTERIOR (BEPE) DE DOUTORADO – FAPESP Process 2016/01478-0

INSTITUTIONS: School of Physical Education and Sports, University of São Paulo (EEFE-USP), and Harvard University, USA
PRINCIPAL INVESTIGATOR: Patrícia Chakur Brum
SUPERVISOR ABROAD: Laurie Goodyear
GRANTEE: Christiano Robles Rodrigues Alves

https://agencia.fapesp.br/34075

Science and art restore famous Brazilian painting celebrating declaration of independence

Like the museum that houses it, the painting *Independência ou Morte* is undergoing painstaking restoration. Besides repairing the damage done by the passage of time, conservators are trying to restore the painting's original colors by removing accumulated dirt, retouching areas of loss or damage in the paint layer, and removing what remains of old restoration attempts. They use chemical and physical techniques with handheld devices that provide information on the materials used and the artist's creative process. Their methods include infrared reflectography, X-ray fluorescence spectroscopy, and Raman spectroscopy. Infrared imaging enabled them to see the first charcoal or pencil strokes drawn by Pedro Américo before he began applying paint to the canvas.

News stories on the restoration were carried by **20** media outlets.

Museology/Chemistry/Physics

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Processes 2017/07366-1 and 2017/07366-1

POSTDOCTORAL FELLOWSHIP IN BRAZIL – FAPESP Process 2018/12191-9

INSTITUTIONS: Museum of Contemporary Art (MAC), Institute of Chemistry and Institute of Physics, University of São Paulo

PRINCIPAL INVESTIGATORS: Ana Gonçalves Magalhães e Mauro Carlos Costa Ribeiro

SUPERVISOR: Márcia de Almeida Rizzutto

GRANTEE: Pedro Herzilio Ottoni Viviani de Campos

https://agencia.fapesp.br/32557

MEDIA COVERAGE OF RESEARCH RESULTS: THEMATIC PROJECT

Researchers develop bio-ink for 3D printing of nerve tissue

Researchers at the Federal University of São Paulo (UNIFESP) are developing a bio-ink capable of producing 3D neural tissue to simulate the human brain and permit more detailed investigation of neurodegenerative disorders, such as Parkinson's and Alzheimer's disease. The idea is to reproduce the functions of the central nervous system more accurately than can be done with traditional two-dimensional methods involving culture of a single cell type in the laboratory or studies performed in mice, which have a genome comparable to ours but a much less complex brain.

News stories on the research were carried by **15** media outlets.

Morphology

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2018/12605-8

POSTDOCTORAL FELLOWSHIP – FAPESP Process 2018/23039-3

INSTITUTION:
Medical School, Federal University of São Paulo (EPM-UNIFESP)

PRINCIPAL INVESTIGATORS:
Marimélia Aparecida Porcionatto

GRANTEE:
Bruna Alice Gomes de Melo

https://agencia.fapesp.br/32523

Inflammation caused by scorpion venom should be blocked immediately, study shows

Researchers at the University of São Paulo (USP) demonstrated for the first time that in severe cases of scorpionism, a neuroimmune reaction triggered by the venom is the cause of death. The Yellow scorpion *Tityus serrulatus* kills more people than any other venomous animal in Brazil. According to the Brazilian Health Ministry, more than 156,000 cases of scorpion envenomation, 169 fatal, were reported in 2019. The study suggests the inflammatory process can be blocked by a corticosteroid, which should be administered almost immediately after the patient is stung.

The study was published in *Nature Communications*, and news stories were carried by **26** media outlets.

Pharmacy/Immunology

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2014/07125-6

PHD SCHOLARSHIP IN BRAZIL – FAPESP Process 2017/02314-3

INSTITUTION: Ribeirão Preto School of Pharmaceutical Sciences, University of São Paulo (FCFRP-USP)

PRINCIPAL INVESTIGATOR:
Lucia Helena Faccioli

GRANTEE:
Mouzarllem Barros dos Reis

https://agencia.fapesp.br/35024

MEDIA COVERAGE OF RESEARCH RESULTS: THEMATIC PROJECT

Oldest South American fossil lizard discovered in Minas Gerais

Fossil remains of a novel species of lizard that lived more than 130 million years ago were found in the north of Minas Gerais, Brazil. It has been named Neokotus sanfranciscanus and is the oldest representative of the order Squamata ever found in South America. Squamates are the largest reptile group, comprising lizards, snakes and amphisbaenians (worm lizards). The discovery showed that scaled lizards were present on the continent at least 20 million years earlier than previously recorded, suggesting they were part of a much broader global distribution, in contrast with the high levels of endemism (confinement to certain geographic regions) characteristic of modern species.

An article on the research was published in Communications Biology, and news stories about it were carried by **13** media outlets.

Zoologia

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2014/03825-3

POSTDOCTORAL FELLOWSHIP IN BRAZIL – FAPESP Process 2010/08891-3

INSTITUTION:
Ribeirão Preto School of Philosophy, Science and Letters, University of São Paulo (FFCLRP-USP)

PRINCIPAL INVESTIGATOR:
Max Cardoso Langer

GRANTEE:
Jonathas de Souza Bittencourt Rodrigues

https://agencia.fapesp.br/33737

Novel rapid test for dengue, Zika, yellow fever and other viruses is validated

Flaviviruses cause several diseases in humans and animals, including dengue, Zika and yellow fever. A novel flavivirus identification test that is both fast and sensitive was validated by researchers affiliated with several institutions.

An article on the research was published in *Archives of Virology*, and news stories about it were carried by **29** media outlets.

Microbiology/Veterinary Medicine

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2013/21719-3

RESEARCH GRANT – REGULAR – FAPESP Process 2012/23645-4

INSTITUTIONS:
São José do Rio Preto Medical School (FAMERP), and School of Veterinary Medicine and Animal Science, University of São Paulo (FMVZ-USP)

PRINCIPAL INVESTIGATORS:
Maurício Lacerda Nogueira e Paulo César Maiorka

https://agencia.fapesp.br/33942

MEDIA COVERAGE OF RESEARCH RESULTS: THEMATIC PROJECT

Research details how aerobic exercise reverses the degenerative process that leads to metabolic disease

Experiments with mice and humans showed that aerobic exercise training increased the expression in adipose tissue of a key enzyme for the organism's metabolic health, combating the harmful effects of aging and obesity.

The findings were published in *Proceedings of the National Academy of Sciences (PNAS)*, with a commentary in Science, and news stories about the research were carried by **27** media outlets.

Physiology/Biochemistry/Pharmacy

RESEARCH GRANT – THEMATIC PROJECT, REGULAR, YOUNG INVESTIGATOR, AND ASSOCIATED SCHOLARSHIPS IN BRAZIL – FAPESP Processes 2017/01184-9, 2018/21635-8, 2017/07975-8, 2010/52557-0, 2012/06238-6, 2012/04079-8, 2015/03292-8, 2015/01316-7, 2017/04377-2 and 2017/03423-0

INSTITUTIONS IN BRAZIL: Medical School, Federal University of São Paulo (EPM-UNIFESP), and Institute of Biology, State University of Campinas (IB-UNICAMP)

INSTITUTIONS ABROAD: University of Copenhagen and Technical University of Denmark (cooperation agreement with Innovation Fund Denmark)

PRINCIPAL INVESTIGATOR: Marcelo Mori

GRANTEE: Gabriel Palermo Ruiz, Adriano Silva Martins, Bruna Brasil Brandão, Beatriz Alves Guerra, Silas Pinto da Silva e Thiago Leite Knittel

https://agencia.fapesp.br/34783

Method created by Brazilians facilitates discovery of disease markers

Analysis of all the proteins present in a blood plasma sample can reveal the occurrence of a number of processes in the organism and even help diagnose certain diseases. This type of study is performed using a small part of a plasma sample. Before embarking on a proteomic analysis, researchers chemically separate the more abundant proteins from those that are less plentiful in plasma. However, scientists at the University of Campinas (UNICAMP) showed that this separation is not as precise as is often thought and can leave important proteins out of the analysis. Some of these normally excluded proteins regulate important biological processes and could serve as markers of disease.

The findings were published in *Separation Science Plus*, and news stories about the research were carried by **20** media outlets.

Biochemistry

RESEARCH GRANT – THEMATIC PROJECT – FAPESP Process 2017/25588-1

INSTITUTION: Institute of Biology, State University of Campinas (IB-UNICAMP)

PRINCIPAL INVESTIGATOR: Daniel Martins-de-Souza

https://agencia.fapesp.br/33074

BASIC AND APPLIED RESEARCH

RESEARCH, INNOVATION AND DISSEMINATION CENTERS (RIDC's)

Goals: support lasting up to 11 years for centers of excellence that conduct basic or applied research focusing on specific issues; active contributions to innovation via technology transfer; production of public policy input; extension activities for primary and secondary schools and the general public.

17 RIDCs selected in 2013 were up and running in 2020, and will continue to conduct research projects until 2024:

- Center for Research and Innovation in Biodiversity and Drug Discovery (CIBFar): USP – São Carlos
- CCenter for Research on Toxins, Immune-Response and Cell Signaling (CeTICS): Butantan Institute – São Paulo
- Center for Cell-Based Therapy (CTC): USP – Ribeirão Preto
- Optics and Photonics Research Center (CEPOF): USP – São Carlos
- Center for Metropolitan Studies (CEM): USP – São Paulo
- Food Research Center (FoRC): USP – São Paulo
- Center for Research, Teaching, and Innovation in Glass (CeRTEV): UFSCar – São Carlos
- Center for Research in Mathematical Sciences Applied to Industry (CeMEAI): USP – São Paulo
- Human Genome and Stem-Cell Research Center (HUG-CELL): USP – São Paulo
- Brazilian Research Institute for Neuroscience and Neurotechnology (BRAINN): UNICAMP – Campinas
- Center for the Study of Violence (NEV): USP – São Paulo
- Obesity and Comorbidities Research Center (OCRC): UNICAMP – Campinas
- Center for Research on Inflammatory Diseases (CRID): USP – Ribeirão Preto
- Center for Research on Redox Processes in Biomedicine (Redoxome): USP – São Paulo
- Center for Computational Engineering and Sciences (CCES): UNICAMP – Campinas
- Research, Innovation and Dissemination Center for Neuromathematics (NeuroMat): USP – São Paulo
- Center for Development of Functional Materials (CDMF): UFSCar – São Carlos.

TABLE **15**

RIDC

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grants RIDC	11,143,574	0	17
Research Grants – Regular	225,662	9	17
Research Grants – Participation in Scientific Meetings in Brazil and Abroad	4,181	0	0
Research Grants – Visiting Researcher from Brazil and Abroad	5,557	1	1
Research Grants – Publications	0	0	1
Regular Scholarships/Fellowships	8,669,157	131	507
Research Internships and Fellowships Abroad	2,856,721	22	67
Fellowships – Technical Training	553,771	22	49
Fellowships – Public Education	54,424	3	7
Total	23,513,047	188	666

DISSEMINATION ACTIVITIES – 2020

Science by girls

The Ribeirão Preto hub of the Institute for Advanced Studies (IEA-RP), in partnership with the Center for Cell-Based Therapy (CTC), held the third edition of the online event "Ciência por Elas", designed to encourage girls in the sixth to ninth grades of primary school to take an interest in a scientific career. Researchers gave talks about selected topics, such as oilfield produced water, astrobiology, science diffusion, migratory birds, health for Black people and women, changes in diet due to COVID-19, and reefs in the Amazon.

Monica and Friends handbook offers guidance on diet in the coronavirus era

Monica and Friends, the media franchise owned by Mauricio de Sousa Produções (MSP), under the supervision of researchers at the Food Researcher Center (FoRC), has issued a handbook with guidance on healthy food during the COVID-19 pandemic. It offers answers to frequent questions such as how to sanitize vegetables and fruit, and the care required with home-delivered purchases, among others. It is available from Turma da Mônica on Instagram and Facebook, and from FoRC's website

Center for Metropolitan Studies joins platform on public policy in Brazil

The Center for Metropolitan Studies (CEM) joined the platform Nexo Políticas Públicas, created by the digital newspaper Nexo. The website offers academic essays and news on topics of structural importance that interface with public policymaking. The aim of the partnership for CEM is to increase the visibility of its research for non-specialists and show how scientific knowledge can serve as a public policy input. To view free content, visit https://pp.nexojornal.com.br.

Podcast on frequently asked questions about epidemiology and other aspects of COVID-19

The Open Interactivity Laboratory for the Dissemination of Scientific and Technological Knowledge (LAbI) at the Federal University of São Carlos (UFSCar) launched a new scientific diffusion service in 2020: the podcast "Quarentena", with summaries of COVID-19 news, commentaries, data, and fact checking, available from LAbI on social media including Facebook, and the ClickCiência channel on YouTube. LAbI is supported by the Center for Development of Functional Materials (CDMF) and the Center for Innovation in New Energies (CINE). LAbI also offers workshops for high school teachers and other members of the public to find out about its technology and methodologies, so they can act as multipliers and stay abreast of its research and development activities.

NeuroMat spark

The RIDC on Neuromathematics created a series of videos called Faísca NeuroMat, featuring physicist Fernando da Paixão in talks on scientific concepts as they relate to events in the news headlines. New episodes are posted every two weeks on Facebook and YouTube.

MEDIA COVERAGE OF RESEARCH RESULTS: RIDCs

Researchers discover how acute stress can make hair go white

A study showed that intense activation of the sympathetic nervous system, which controls the "fight or flight" response to imminent danger, accelerates hair follicle bulb stem cell aging and permanently interrupts the production of melanin, the pigment primarily responsible for hair color. The study was conducted in partnership with a group at Harvard University in the US.

An article reporting the study was published in *Nature*, and news stories about it were carried by **548** media outlets.

Farmacology

RESEARCH GRANT – RIDC – CENTER FOR RESEARCH ON INFLAMMATORY DISEASES (CRID) – FAPESP Process 2013/08216-2

INSTITUTION:
Ribeirão Preto Medical School, University of São Paulo (FMRP-USP)

PRINCIPAL INVESTIGATOR:
Fernando de Queiroz Cunha

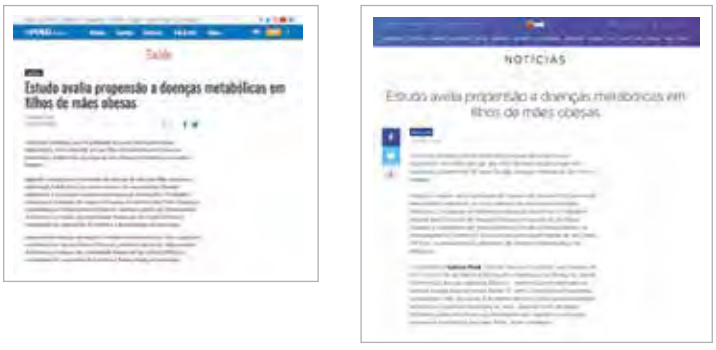
ARTICLE AUTHOR AFFILIATED WITH CRID:
Thiago Mattar Cunha

https://agencia.fapesp.br/32355

Study shows why children of obese mothers tend to be more susceptible to metabolic disease

A study provided fresh insight into the mechanisms whereby obese mothers tend to have children with a propensity to develop metabolic disease during their lifetime, as suggested by previous research. The phenomenon may be associated with a deficiency of the protein mitofusin-2 in the mother's eggs, which affects the shape and functioning of mitochondria. The finding was based on experiments with mice conducted at the Federal University of São Carlos (UFSCar).

An article on the study was published in *Molecular Human Reproduction* and news stories about it were carried by **166** media outlets.



Biochemistry and Medicine

RESEARCH GRANTS – RIDC – CENTER FOR RESEARCH ON REDOX PROCESSES IN BIOMEDICINE (REDOXOME) AND OBESITY AND COMORBIDITIES RESEARCH CENTER (OCRC) – FAPESP Processes 2013/07937-8 and 2013/07607-8

INSTITUTIONS:
Institute of Chemistry, University of São Paulo (IQ-USP), and Medical School, State University of Campinas (FCM-UNICAMP)

PRINCIPAL INVESTIGATORS:
Ohara Augusto and Licio Augusto Velloso

https://agencia.fapesp.br/35056

MEDIA COVERAGE OF RESEARCH RESULTS: RIDCs

Brazilian researchers complete Latin America's largest whole-genome sequencing of elderly people

Researchers affiliated with the Human Genome and Stem-Cell Research Center (HUG-CELL) completed the whole-genome sequencing of 1,171 elderly inhabitants of São Paulo, Brazil's largest city. By analyzing the data, now housed in an open-access repository, scientists will be able to identify genetic mutations responsible for diseases, estimate their incidence in the Brazilian population, and find variants that can help assure healthy aging, among other applications. The Online Archive of Brazilian Mutations is Latin America's largest database of DNA for elderly people and for a population as ethnically mixed as Brazil's, resulting from research begun over ten years ago.

News stories on the research were carried by **140** media outlets.

Genetics

RESEARCH GRANT – RIDC – HUMAN GENOME AND STEM-CELL RESEARCH CENTER (HUG-CELL) – FAPESP Process 2013/08028-1

INSTITUTION:
Institute of Biosciences, University of São Paulo (IB-USP)

PRINCIPAL INVESTIGATOR:
Mayana Zatz

https://agencia.fapesp.br/34628

Research maps artisan cheese production in São Paulo

Many craft cheeses are produced in São Paulo State. According to the state association of cheesemakers, APQA, established only four years ago, some 200 different cheeses are made by its 80 members. Many are based on recipes brought over from abroad. Apart from the association's database and a few other sources, little is known about the industry, making it hard to improve the applicable laws and formulate a favorable public policy. To address this issue, the Food Research Center (FoRC) is mapping the state's artisanal cheese industry via a national research network set up for this purpose (Repequab).

News stories about the research were carried by **18** media outlets.

Food Science

RESEARCH GRANT – RIDC – FOOD RESEARCH CENTER (FORC) – FAPESP Process 2013/07914-8

INSTITUTION:
School of Pharmaceutical Sciences, University of São Paulo (FCF-USP)

PRINCIPAL INVESTIGATOR:
Bernadette Dora Gombossy de Melo Franco

https://agencia.fapesp.br/33937

MEDIA COVERAGE OF RESEARCH RESULTS: RIDCs

Virtual reality applied to rehabilitation for stroke and neurodegenerative disease patients

Virtual reality-based rehabilitation programs are becoming an important complement to conventional motor therapy for stroke patients and individuals with neurodegenerative diseases. A study by the Brazilian Research Institute for Neuroscience and Neurotechnology (BRAINN) resulted in the development of a wearable device called Biomechanics Sensor Node (BSN) and software enabling patients in motor rehabilitation to interact with VR environments while the therapist views data for the movements performed during the session.

News stories about the study were carried by **25** media outlets.

Medicine and Interdisciplinary

RESEARCH GRANT – RIDC – BRAZILIAN RESEARCH INSTITUTE FOR NEUROSCIENCE AND NEUROTECHNOLOGY (BRAINN)– FAPESP Process 2013/07559-3

INSTITUTION: Medical School, State University of Campinas (FCM-UNICAMP)

PRINCIPAL INVESTIGATOR: Fernando Cendes

POSTDOCTORAL SCHOLARSHIP IN BRAZIL – FAPESP Process 2015/03695-5

INSTITUTION: Gleb Wataghin Institute of Physics, State University of Campinas (IFGW-UNICAMP)

PRINCIPAL INVESTIGATOR: Gabriela Castellano

GRANTEE: Alexandre Fonseca Brandão

https://agencia.fapesp.br/34835

Industrial waste is reused to produce alternatives to plastic

Researchers at the Center for Development of Functional Materials (CDMF) developed a film that can replace plastic in food packaging. The film is made from hydroxypropyl methylcellulose (HPMC) and bacterial cellulose scraps left over from industrial processing. Both raw materials are sustainable. They are combined to produce a biodegradable film of bacterial cellulose nanocrystals and HPMC. The product outperforms film made of HPMC alone.

An article on the innovation was published on *Applied Material & Interfaces* and news stories about it were carried by **23** media outlets.

Materials Engineering and Metallurgy

RESEARCH GRANT – RIDC – CENTER FOR DEVELOPMENT OF FUNCTIONAL MATERIALS (CDMF) – FAPESP Process 2013/07296-2

INSTITUTION: Center for Exact Sciences and Technology, Federal University of São Carlos (CCET-UFSCar)

PRINCIPAL INVESTIGATOR: Elson Longo da Silva

RESEARCH GRANT – REGULAR – FAPESP Process 2019/06170-1

INSTITUTION: School of Engineering, São Paulo State University (FEIS-UNESP), Ilha Solteira

PRINCIPAL INVESTIGATOR: Márcia Regina de Moura Aouada

https://agencia.fapesp.br/34834

BASIC AND APPLIED RESEARCH

YOUNG INVESTIGATOR GRANT (YIG)

Goals: attracting young PhDs from Brazil and other countries to create new research groups, and training new science leaders with the aim of building a scientific community of excellence in São Paulo State. Phase 2 of the program aims to consolidate research lines initiated by researchers who previously received support from the program and achieved excellence in their performance during the development of their projects.

Under the auspices of the YI program, researchers at the Federal University of São Carlos (UFSCar) in Sorocaba developed a technique for early diagnosis of multiple sclerosis and to distinguish it from neuromyelitis optica. Both are central nervous system diseases and have similar symptoms, but require different treatment.

TABLE **16**

YOUNG INVESTIGATORS

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Young Investigators Grant – Phase 1[(1)]	7,837,156	27	251
Young Investigators Grant – Phase 2[(1)]	2,076,222	0	33
Young Investigators Fellowships[(1)]	3,232,765	22	88
Research Grants – Regular	498,935	21	38
Research Grants – Visiting Researcher from Brazil and Abroad	93,225	4	3
Research Grants – Publications	6,485	2	3
Regular Scholarships/Fellowships	7,361,140	285	713
Regular Scholarships/Fellowships Abroad	1,208,860	10	45
Fellowships – Technical Training	275,046	38	77
Total	22,589,834	409	1,251

SÃO PAULO EXCELLENCE CHAIR (SPEC)

Goals: support for high-level researchers based abroad to come to Brazil to set up research centers at universities in São Paulo State. They remain affiliated with their home institutions but undertake to stay in Brazil for 12 weeks per year for the duration of the project, which must last at least five years. They each coordinate a group of FAPESP grantees comprising postdoctoral researchers, PhDs, and scientific initiation students.

Workshops were organized by the project "Innovation in systems: organizational strategy and governance for research and innovation policies" (InSySPo), developed at UNICAMP's Department of S&T Policy under the auspices of the SPEC Program. Entitled "Technology Upgrading and Economic Catch-Up", the series of events featured discussion of new paradigms in technological advancement.

TABLE **17**

SPEC

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grant SPEC	1,036,257	4	14
Research Grants – Regular	0	1	1
Research Grants – Participation in Scientific Meetings	9,353	1	1
Research Grants – Visiting Researcher from Brazil and Abroad	27,910	1	1
Research Internships and Fellowships Abroad	504,264	2	10
Regular Scholarships/Fellowships	590,150	12	32
Fellowships – Science Jornalism	5,211	1	1
Fellowships – Technical Training	1,712	0	1
Total	2,174,857	22	61

MEDIA COVERAGE OF RESEARCH RESULTS: YOUNG INVESTIGATORS GRANT

New theory advances understanding of below-ground plant interaction

A mathematical model based on game theory predicts that in the presence of competitors plants avoid conflict and produce roots to assure a supply of water and nutrients near the stem rather than pursuing resources near their neighbors. Besides advancing the theoretical understanding of below-ground plant interaction, which cannot be directly observed, the study has important applications in agricultural and climate change management.

An article on the study by researchers affiliated with UNESP's South American Institute for Fundamental Research (ICTP-SAIFR), Princeton University (USA), and the National Museum of Natural Sciences and King Juan Carlos University (Spain), was published in Science and featured on the cover of the journal. News stories about the study were carried by **19** media outlets.

Physics

RESEARCH GRANT – YOUNG INVESTIGATOR – FAPESP Process 2019/05523-8

INSTITUTION:
Instituto de Física Teórica da Universidade Estadual Paulista (IFT-Unesp)

PRINCIPAL INVESTIGATOR:
Ricardo Martínez-García

https://agencia.fapesp.br/34782

Solar System acquired current configuration not long after its formation

Until recently the Solar System was thought to have acquired its present features as a result of a period of turbulence that occurred some 700 million years after its formation. However, recent research, in which three scientists at Sao Paulo State University (UNESP) in Guaratinguetá participated, suggests it took shape in the more remote past, at some stage during the first 100 million years and very probably between 10 million and 60 million years ago.

An article on the research was published in Icarus, and news stories about it were carried by **9** media outlets.

Astronomy and Space Engineering

RESEARCH GRANT – YOUNG INVESTIGATOR AND YI SCHOLARSHIP – FAPESP Processes 2016/12686-2 and 2016/19556-7

PRINCIPAL INVESTIGATOR: André Izidoro F. da Costa

RESEARCH GRANT – THEMATIC PROJECTFAPESP Process 2016/24561-0

PRINCIPAL INVESTIGATOR: Othon Cabo Winter

PHD SCHOLARSHIP IN BRAZIL AND RESEARCH INTERNSHIP ABROAD (RIA) SCHOLARSHIP – DOCTORATE – FAPESP Processes 15/15588-9 and 17/09919-8

PRINCIPAL INVESTIGATOR: Ernesto Vieira Neto

SUPERVISOR ABROAD: Alessandro Morbidelli

GRANTEE: Rafael Ribeiro de Sousa

INSTITUTIONS: School of Engineering, Sao Paulo State University (FEG-UNESP), and Côte d'Azur Observatory (OCA), France

https://agencia.fapesp.br/32794

MEDIA COVERAGE OF RESEARCH RESULTS: YOUNG INVESTIGATORS GRANT

Studies point to novel uses of ultrasound in cancer treatment

Two studies conducted at the University of São Paulo in Ribeirão Preto pointed to novel uses of ultrasound beyond examining organs and tissue deep inside the human body. When combined with fiber optics and iron oxide nanoparticles, ultrasound devices can identify and even destroy cancer tumors by magnetic hyperthermia. Another possible application described in the studies entails the use of an ultrasound appliance coupled to a fiber optic system to determine the degree of oxygen saturation in tumors or other tissues, as well as joints.

News stories about the studies were carried by **7** media outlets.

Biomedical Engineering

RESEARCH GRANT – YOUNG INVESTIGATOR – FAPESP Process 2013/18854-6

INSTITUTION:
Ribeirão Preto School of Philosophy, Sciences and Letters, University of São Paulo (FFCLRP-USP)

PRINCIPAL INVESTIGATOR:
Theo Zeferino Pavan

https://agencia.fapesp.br/34335

High temperatures and dry weather change tree longevity in tropical forests

High temperatures and dry weather have been more frequent in recent years in many countries, and are affecting the dynamics of tropical forests such as the Amazon and Atlantic Rainforest. Trees die sooner in these conditions, according to a study led by Brazilian researchers, which investigated the impact on the characteristics of the biomes concerned and the carbon storage role played by trees.

The study was published in *Proceedings of the National Academy of Sciences (PNAS)*, and news stories about it were carried by **21** media outlets.

Botany

RESEARCH GRANT – YOUNG INVESTIGATOR – FAPESP Process 2019/08783-0

INSTITUTION:
Institute of Botany, São Paulo State Department of Infrastructure and Environment

PRINCIPAL INVESTIGATOR:
Giuliano Maselli Locosselli

https://agencia.fapesp.br/34838

MEDIA COVERAGE OF RESEARCH RESULTS: YOUNG INVESTIGATORS GRANT

Study of dune dynamics will help scientists understand the topography of Mars

Barchans are crescent-shaped sand dunes whose two horns face in the direction of the fluid flow. They appear in different environments, such as inside water pipes, on river beds, in deserts, and on Mars. A model developed by researchers at UNICAMP in more than 120 experiments with dunes of up to 10 cm is also valid for dunes on the surface of Mars that are many miles long and take more than a thousand years to interact. Studying aquatic barchans in the laboratory can be the basis for predictions about the evolution of the dunes in Lençóis Maranhenses, a coastal ecosystem in Northeast Brazil, or to investigate the origins of the topography in the Hellespontus region on Mars, for example.

The study was published in *Geophysical Research Letters*, and news stories about it were carried by **5** media outlets.

Mechanical Engineering

RESEARCH GRANT – YOUNG INVESTIGATOR PHASE 2 – FAPESP Process 2018/14981-7

DIRECT DOCTORATE SCHOLARSHIP IN BRAZIL – FAPESP Process 2019/10239-7

INSTITUTION:
School of Mechanical Engineering, State University of Campinas (FEM-UNICAMP)

PRINCIPAL INVESTIGATOR:
Erick de Moraes Franklin

GRANTEE:
Willian Righi Assis

https://agencia.fapesp.br/34849

MEDIA COVERAGE OF RESEARCH RESULTS: SPEC

Study confirms contribution of biofuels to climate change mitigation

A cross-border study refuted arguments that carbon debt, opportunity cost and indirect land-use change prevent greenhouse gas mitigation by biofuels. The study showed that the greenhouse gas emission mitigation potential of switchgrass growing for cellulosic ethanol production in the US was comparable on a per-hectare basis to that of reforestation and several times greater than that of grassland restoration. More advanced technology and integration of carbon capture and storage could further increase the per-hectare mitigation potential of bioenergy systems by a factor of six, according to the study.

The study was published in *Proceedings of the National Academy of Sciences (PNAS)*, and news stories about it were carried by **27** media outlets.

Interdisciplinary and Chemical Engineering

RESEARCH GRANTS – SPEC – FAPESP Processes 2014/26767-9 and 2018/25682-0

HOST INSTITUTIONS:
School of Agricultural Engineering (FEAGRI-UNICAMP), and Center for Molecular Biology and Genetic Engineering, State University of Campinas (CBMEG-UNICAMP)

PRINCIPAL INVESTIGATORS:
John Joseph Sheehan e Lee Rybeck Lynd

https://agencia.fapesp.br/34623

BASIC AND APPLIED RESEARCH

REGULAR GRANTS NOT ASSOCIATED TO OTHER GRANTS

Regular grants are awarded in response to applications submitted spontaneously by researchers with a PhD. The following types are awarded: Research Grants – Regular (support for individual research projects); Grants for Participation in Scientific Meetings, Organization of Scientific Meetings, Publications (books, articles and other publications in scientific journals reporting original research results), and Visiting Researchers.

São Paulo School of Advanced Science (SPSAS)

SPSAS awards are a type of Regular Grant for Organization of Scientific Meetings to support short courses for graduate students and postdocs from Brazil and elsewhere delivered by leading Brazilian and foreign scientists.
No SPSAS courses were held in 2020 owing to the mobility restrictions imposed to combat the COVID-19 pandemic.

TABLE **18**

REGULAR GRANTS

Disbursement, number of active projects and new projects contracted in 2020

Regular Grants[1] not associated to other grants and fellowships associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grants – Regular	38,536,522	758	3,131
Research Grants – Participation in Scientific Meetings in Brazil	2,735	5	1
Research Grants – Participation in Scientific Meetings Abroad	175,827	37	24
Research Grants – Organization	591,007	80	57
Research Grants – Publications	1,196,706	337	473
Research Grants – Visiting Researcher from Brazil	218,338	1	8
Research Grants – Visiting Researcher Abroad	371,918	13	24
Fellowships – Technical Training	1,611,065	257	554
Regular Scholarships/Fellowships in Brazil and Abroad	1,555,300	15	48
Total	**44,259,418**	**1,503**	**4,320**

(1) Not included Regular Grants associated with other programs. For a complete overview of FAPESP's Investment in all types of grant, see pages 148 and 149.

MEDIA COVERAGE OF RESEARCH RESULTS: GRANTS

Researchers create ingredients to produce food by 3D printing

In the near future it will be possible to use 3D printing to produce food considered attractive and healthy, and with personalized shapes, textures, flavors and colors. A group of researchers in Brazil and France developed gels based on modified starch for use as "ink" to make foods and novel materials by additive manufacturing.

An article on the project was published in *Food Research International*, and news stories about it were carried by **148** media outlets.

Food Technology

RESEARCH GRANT – REGULAR – FAPESP Processes 2019/05043-6 and 2016/18052-5

INSTITUTION:
Luiz de Queiroz College of Agriculture, University of São Paulo (ESALQ-USP)

PRINCIPAL INVESTIGATOR:
Pedro Esteves Duarte Augusto

https://agencia.fapesp.br/34729

Researchers at Brazil's space institute discover why lightning branches and flickers

Researchers at Brazil's National Space Research Institute (INPE), in partnership with colleagues in the United States, United Kingdom and South Africa, recorded for the first time the formation and branching of luminous structures by lightning strikes. Analyzing images captured by a super slow motion camera, they discovered why lightning strikes bifurcate and sometimes then form luminous structures interpreted by the human eye as flickers.

The study was published in *Scientific Reports*, and news stories about it were carried by **83** media outlets.

Geosciences

RESEARCH GRANT – REGULAR – FAPESP Process 2012/15375-7

INSTITUTION:
Atmospheric Electricity Group, National Space Research Institute (ELAT-INPE)

PRINCIPAL INVESTIGATOR:
Marcelo Magalhaes Fares Saba

https://agencia.fapesp.br/34974

MEDIA COVERAGE OF RESEARCH RESULTS: GRANTS

Saliva can be used to predict excess body fat in teenagers

Researchers at UNIFESP and the State University of Campinas (UNICAMP) found that the level of uric acid in saliva is a good indicator of body fat in teenagers. They were able to identify those with surplus fat even if they had no symptoms of chronic obesity-related disease. The study was designed to identify reliable biomarkers that can be used to develop quick non-invasive tests for early detection of chronic diseases.

An article reporting the study was published in *Nutrition Research*, and news stories about it were carried by **365** media outlets.

Dentistry

RESEARCH GRANT – REGULAR – FAPESP Process 2014/24804-4

INSTITUTION:
Institute of Environmental, Chemical and Pharmaceutical Science, Federal University of São Paulo (ICAQF-UNIFESP)

PRINCIPAL INVESTIGATOR:
Paula Midori Castelo Ferrua

https://agencia.fapesp.br/32568

Study could lead to diagnostic test for schizophrenia and bipolarity

A methodology developed by Brazilian researchers could permit the creation of a blood test capable of diagnosing two psychiatric diseases with similar symptoms – schizophrenia and bipolar disorder. The study was the first to distinguish between the two disorders by analyzing biochemical and molecular alterations. Diagnosis of these diseases is currently based on clinical analysis, and is highly subjective as it depends on the psychiatrist's judgment and the patient's ability to describe symptoms.

The innovation has been patented and described in the *Journal of Psychiatric Research*
News stories about the research were carried by **340** media outlets.

Chemistry and Farmacology

RESEARCH GRANT – REGULAR – FAPESP Process 2014/18938-8

INSTITUTION:
Institute of Chemistry, State University of Campinas (IQ-UNICAMP)

PRINCIPAL INVESTIGATOR:
Ljubica Tasic

PHD SCHOLARSHIP IN BRAZIL – FAPESP Process 2019/09207-3

INSTITUTION:
National Institute of Pharmacology (INFAR), Federal University of São Paulo (UNIFESP)

PRINCIPAL INVESTIGATOR:
João Victor Silva Nani

GRANTEE:
Akemi Furuie Hayashi

https://agencia.fapesp.br/34356

MEDIA COVERAGE OF RESEARCH RESULTS: GRANTS

Tube-dwelling anemone toxins have pharmacological potential, mapping study shows

Researchers based in Brazil and the United States completed the first-ever mapping exercise to profile the toxins produced by tube-dwelling anemones, a family of marine animals belonging to the same phylum as sea anemones, jellyfish and corals. The analysis revealed that the toxins can act on the nervous system, cardiovascular system and cell walls, among other functions, paving the way to the discovery of novel medications. One of the molecules proved effective against cancer cells in preliminary test results.

An article reporting the results was published in Marine Drugs, and news stories about it were carried by **31** media outlets.

Oceanography and Zoology

RESEARCH GRANT – REGULAR – FAPESP Processes 2015/24408-4, 2019/03552-0 and 2017/50028-0

INSTITUTION:
School of Sciences and Letters, Sao Paulo State University (FCL-UNESP Assis), and University of North Carolina at Charlotte (UNCC), USA

PRINCIPAL INVESTIGATOR:
Sérgio Nascimento Stampar

https://agencia.fapesp.br/34466

Venoms from Amazon snake and spider have pharmaceutical potential

Researchers at UNIFESP, USP and Butantan Institute found the venom from a snake and spider endemic to the North of Brazil to contain a number of peptides – small fragments of proteins – with the pharmaceutical potential to combat heart problems, bacteria, fungi, viruses and cancer, among other things. The snake is Bothrops atrox, a pit viper, and the spider is *Acanthoscurria rondoniae*, a tarantula. Both are native to the North of Brazil.

Articles reporting the results were published in the *Journal of Venomous Animals* and *Toxins including Tropical Diseases and Frontiers in Pharmacology*, and news stories about the research were carried by **258** media outlets.

Biochemistry

RESEARCH GRANT– REGULAR – FAPESP Process 2017/20106-9

INSTITUTION:
Medical School, Federal University of São Paulo (EPM-UNIFESP)

PRINCIPAL INVESTIGATOR:
Alexandre Keiji Tashima

https://agencia.fapesp.br/35106

FUNDING STRATEGIES

RESEARCH FOR INNOVATION

FAPESP runs a number of research programs that promote collaboration between companies and universities or research institutions to stimulate the development of technological innovation in São Paulo State. In addition, FAPESP is supporting a study to establish conceptual and operational parameters for the creation of Innovation & Creativity Districts in São Paulo and Campinas.

In 2020, FAPESP disbursed **$ PPP 42.568 million** for **1,568** collaborative research projects involving universities and companies, and to support innovation by small businesses. It contracted for **756** new projects in the year.

RELATED PROGRAMS

Engineering Research Centers (ERCs)/Applied Research Centers (ARCs) – www.fapesp.br/cpe/home
Research Partnership for Technological Innovation Program (PITE) – www.fapesp.br/en/12050
Innovative Research in Small Business Program (PIPE)
Intellectual Property Support Program (PAPI-Nuplitec)
Innovation Districts

TABLE **19**

RESEARCH FOR INNOVATION
Disbursement (in $ PPP) and number of new projects contracted for as research in partnership with companies in 2020, by major knowledge area

Programs	Life Sciences		Natural Sciences and Engineering		Interdisciplinary		Human and Social Sciences	
	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted
ERCs/ARCs and associated	3,842,742	16	2,628,230	47	645,260	5	113,475	6
PITE and associated	1,019,431	5	534,007	12	78,103	0	0	0
PIPE and associated	10,143,575	239	19,683,437	314	2,106,232	38	1,239,556	65
PAPI-Nuplitec and associated	0	0	9,738	0	85,033	3	45,385	6
Innovation Districts	0	0	0	0	394,686	0	0	0
Total	15,005,748	260	22,855,412	373	3,309,314	46	1,398,416	77

RESEARCH FOR INNOVATION

ENGINEERING RESEARCH CENTERS/APPLIED RESEARCH CENTERS (ERCs/ARCs)

ERCs and ARCs operate in accordance with an innovative collaborative research model: they enable companies' research teams to conduct effective collaboration for a long period (five to ten years) with a university or research institution, creating shared knowledge in areas of common interest with significant potential for application of results. Research projects are co-funded by FAPESP, partner companies, and host institutions responsible for operating costs and salaries.

In 2020, two new ERCs began operating: the Center for Artificial Intelligence (C4AI), established in 2019 in partnership with IBM and hosted by the University of São Paulo's Innovation Center (Inova); and the Brazilian Water Research Center (BWRC), a partnership with the Campinas Water and Sanitation Corporation (SANASA) hosted by the State University of Campinas's Institute of Chemistry (IQ-UNICAMP). The same period saw the establishment of the Brazilian Center for Early Childhood Development in partnership with Maria Cecília Souto Vidigal Foundation. The center is hosted by INSPER and will begin operating in 2021.

In November 2020, FAPESP and GSK, already partners in two ERCs, announced a call for proposals to establish a third, the Center for Oncology New Target Discovery (CONTD). Selection of proposals submitted in a call issued in 2019 also began during the year, for the establishment of six ARCs in Artificial Intelligence in partnership with the Ministry of Science, Technology and Innovation (MCTI) and the Brazilian Internet Steering Committee (CGI.br).

In 2020, FAPESP disbursed $ PPP 7.230 million for 169 research projects under the auspices of ERCs/ARCs established in partnership with ten companies and academic institutions. It contracted for 74 new projects in the year.

TABLE **20**

ERCs/ARCs

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement FAPESP ($ PPP)	New projects contracted	Active projects
Grants – ERC/ARC	4,683,898	3	16
Research Grants – Regular	51,252	6	6
Research Grants – Participation in Scientifc Meetings Abroad	0	1	1
Regular Scholarships/Fellowships in Brazil	2,028,267	53	117
Regular Scholarships/Fellowships Abroad	224,270	1	6
Fellowships – Technical Training	242,020	10	23
Total	7,229,707	74	169

12 ENGINEERING RESEARCH CENTERS AND APPLIED RESEARCH CENTERS IN OPERATION IN 2020

1. Engineering Research Center on combustion engines powered by biofuels, in partnership with Peugeot-Citroën, hosted by the University of Campinas (UNICAMP).
2. Applied Research Center on Wellbeing and Human Behavior, in partnership with Natura, hosted by the Institute of Psychology, University of São Paulo (USP).
3. Engineering Research Center on Green Chemistry, in partnership with GSK, hosted by the Federal University of São Carlos (UFSCar).
4. Center of Excellence in New Target Discovery (CENTD), in partnership with GSK, hosted by Butantan Institute.
5. Research Center for Gas Innovation, in partnership with Shell, hosted by the University of São Paulo's Engineering School (POLI-USP).
6. Engineering Research Center in Energy Production and Innovation, in partnership with Equinor (formerly Statoil), hosted by UNICAMP's School of Mechanical Engineering.
7. Genomics for Climate Change Research Center, in partnership with EMBRAPA, hosted by UNICAMP.
8. Center for Innovation in New Energies, in partnership with Shell, with four research divisions, hosted by UNICAMP (Advanced Energy Storage and Dense Energy Carriers), USP (Materials Science and Computational Chemistry) and IPEN (Sustainable Route for Conversion of Methane with Advanced Chemical Technologies).
9. São Paulo Advanced Research Center for Biological Control, in partnership with Koppert, hosted by the University of São Paulo's Luiz de Queiroz College of Agriculture (ESALQ-USP).
10. Center for Plant Health in Sugarcane, in partnership with São Martinho, hosted by UNESP's Jaboticabal School of Agrarian and Veterinarian Sciences.
11. Engineering Research Center in Artificial Intelligence, in partnership with IBM, hosted by USP.
12. Brazilian Water Research Center (BWRC), in partnership with the Campinas Water and Sanitation Corporation (SANASA), hosted by UNICAMP.

ERC/ARC INITIATIVES IN 2020

Supercapacitor and battery factory installed at CINE

The Center for Innovation in New Energies (CINE), an ERC established by FAPESP and Shell, began operating the first factory to make supercapacitor and battery prototypes on the scale of pouch cells (rectangular batteries measuring 5x7cm sealed in flexible foil) in the southern hemisphere. The move means exiting the coin cell stage, in which solid results had been achieved. Pouch cell production can easily by scaled up for industrial use. Supercapacitors are backup systems for use during power outages by hospitals and other facilities that cannot operate without an electricity supply. They also have applications in electric vehicles.

https://agencia.fapesp.br/34125

Center for Gas Innovation partners with universities abroad

The Research Center for Gas Innovation (RCGI) established by FAPESP and Shell at the University of São Paulo's School of Engineering (POLI-USP) signed collaboration agreements in the area of energy transition with Princeton University in the US and the University of Queensland in Australia.

https://agencia.fapesp.br/32848

MEDIA COVERAGE OF RESEARCH RESULTS: ERCs/ARCs

Protein involved in corn's water stress response discovered

Researchers affiliated with the Genomics for Climate Change Research Center (GCCRC) discovered a protein involved in corn's resistance to dry weather, high temperatures, and fungal invasion. The finding paved the way for the development of more drought-resistant plants and products that reduce losses in production at a time when global climate change threatens crop yields around the world.

An article on the study was published in *BMC Plant Biology*, and news stories about it were carried by **16** media outlets.

Genetics

ERC – GENOMICS FOR CLIMATE CHANGE RESEARCH CENTER (GCCRC) – FAPESP Process 2016/23218-0

HOST INSTITUTION:
State University of Campinas (UNICAMP)

COMPANY:
Brazilian Agricultural Research Corporation (EMBRAPA)

PRINCIPAL INVESTIGATOR:
Paulo Arruda

https://agencia.fapesp.br/33571

Device refines analysis of materials for fuel cells and batteries

A novel device designed to help scientists study in detail what happens during electrochemical reactions was developed by researchers at the Center for Innovation in New Energies (CINE) in collaboration with researchers at the National Synchrotron Light Laboratory (LNLS) run by the Brazilian Center for Research in Energy and Materials (CNPEM). Its purpose is to improve the performance of fuel cells, electrolyzers, batteries and other appliances used to convert chemical energy into electricity or vice-versa.

The technology featured on the cover of the journal *ChemElectroChem* and news stories about it were carried by **6** media outlets.

Chemistry

ERC – CENTER FOR INNOVATION IN NEW ENERGIES (CINE) – DENSE ENERGY CARRIER DIVISION – FAPESP Process 2017/11986-5

HOST INSTITUTION:
Institute of Chemistry, State University of Campinas (UNICAMP)

COMPANY:
Grupo Shell

PRINCIPAL INVESTIGATOR:
Ana Flávia Nogueira

https://agencia.fapesp.br/34888

MEDIA COVERAGE OF RESEARCH RESULTS: ERCs/ARCs

Protein derived from tick saliva proves effective in the treatment of equine skin cancer

A protein derived from the saliva of the tick *Amblyomma sculptum* was successfully used to treat skin cancer (melanoma) in horses by researchers at the Center of Excellence in New Target Discovery, hosted by Butantan Institute.

The research was reported in *Scientific Reports*, and news stories about it were carried in **13** media outlets.

Biochemistry

ERC – CENTER OF EXCELLENCE IN NEW TARGET DISCOVERY (CENTD) – FAPESP Process 2015/50040-4

HOST INSTITUTION:
Butantan Institute

COMPANY:
GlaxoSmithKline

PRINCIPAL INVESTIGATOR:
Ana Marisa Chudzinski-Tavassi

https://agencia.fapesp.br/33501

Acoustic database can help detect sea bed gas leaks

To monitor the sea bed for possible gas leaks tens of thousands of meters below the surface, researchers at the Research Center for Gas Innovation (RCGI) are establishing a unique database at the University of São Paulo's Engineering School (POLI- USP) with a collection of sounds in the form of acoustic data. In conjunction with hardware and software being developed to collect and analyze sounds, the archive can help monitor caverns in the subsalt rock layer where CO_2 from natural gas extraction will be stored.

News stories about the research were carried by **6** media outlets.

Mechanical Engineering

ERC – RESEARCH CENTER FOR GAS INNOVATION (RCGI) – FAPESP Process 2014/50279-4

HOST INSTITUTION:
School of Engineering, University of São Paulo (POLI-USP)

COMPANY:
Grupo Shell

PRINCIPAL INVESTIGATOR:
Julio Romano Meneghini

https://agencia.fapesp.br/32570

RESEARCH FOR INNOVATION

RESEARCH PARTNERSHIP FOR TECHNOLOGICAL INNOVATION PROGRAM (PITE)

PITE supports scientific and technological research projects conducted at universities or research institutions in São Paulo State in cooperation with researchers at companies of any size and based in Brazil or abroad. Research proposals can be submitted at any time (PITE Spontaneous Demand) or in response to calls issued under the aegis of cooperation agreements between FAPESP and partner companies interested in solutions to challenges facing the companies, an industry or an economic sector (PITE Agreements).

Two calls for PITE proposals were issued in 2020. The first, in partnership with SABESP, will support projects for modernization of the sanitation sector. Project selection has not yet been completed. The second, in partnership with the Amazonas State Research Foundation (FAPEAM), selected 21 projects relating to the environment, economic development, and public policies.

In 2020, FAPESP disbursed $ PPP 1.631 million to support 67 research projects involving collaboration between companies and universities or research institutions, and contracted for 17 new projects.

IN 2020

- **PITE Agreements: Eight companies with 50 active projects:**

  Agilent, Embraer (under a cooperation agreement with the European Union – Horizon 2020), IBM Brazil, Intel, Microsoft, SABESP, Ananse Química Ltda., and Vale (the last two via an agreement with EMBRAPII). Eleven other companies with active agreements did not have projects in progress in 2020: Andaraguá, AstraZeneca/MedImmune, BP Biocombustíveis, Braskem, BioZeus, Citrosuco, Copag, Fundação Biominas, Fundação O Boticário, Informática de Municípios Associados, and Solvay.

- **PITE Spontaneous Demand: Nine companies with 17 active projects:**

  bioMérieux Brasil S.A., Companhia Brasileira de Metalurgia e Mineração, EMS S.A., Infibra S.A., Laboratório BioVet S.A., Maiz Indústria e Comércio de Produtos Agropecuários Ltda., Medicines for Malaria Venture, Proteca Biotecnologia Florestal Ltda., and Structural Genomics Consortium.

TABLE **21**

PITE
Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grants – PITE	1,438,642	4	33
Fellowships – Technical Training	61,300	5	12
Regular Scholarships/Fellowships in Brazil	131,599	8	22
Total	**1,631,541**	**17**	**67**

RESEARCH FOR INNOVATION

INNOVATIVE RESEARCH IN SMALL BUSINESS PROGRAM (PIPE)

PIPE supports entrepreneurs who want to convert knowledge into novel products or services. In November 2020, FAPESP changed the calendar for submitting projects to PIPE so that applications could be made at any time instead of four times a year. Proof-of-concept testing is Phase 1, project development proper is Phase 2, and PIPE Invest is a new part of the program.

The industrial and commercial development of innovative products (Phase 3) is supported by FAPESP under an agreement with FINEP, the Brazilian government's innovation agency, called PIPE-PAPPE Grants.

In 2020, PIPE invested $ PPP 33.173 million in 1,305 research projects by innovative small enterprises. During the year, 213 companies in 48 cities in São Paulo State had 237 new projects approved, in addition to associated scholarships. Since the program's inception in 1997, FAPESP has awarded 2,695 PIPE grants to 1,633 companies in 153 cities in São Paulo State.

TABLE **22**

PIPE
Disbursement, number of active projects and new projects contracted in 2020

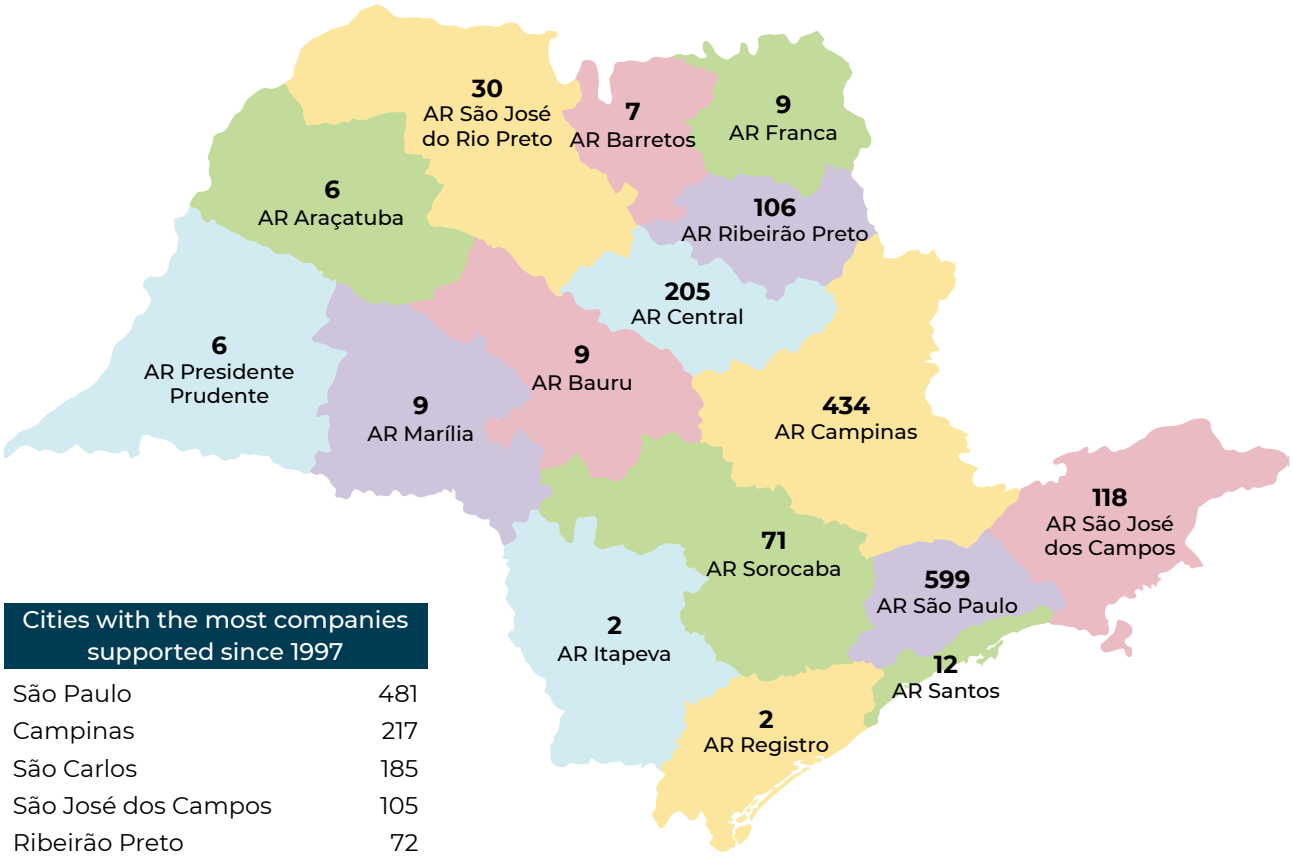
Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grants – PIPE	24,239,282	237	566
Fellowship – Research in Small Business	5,135,642	135	257
Fellowships – Technical Training	3,797,855	284	482
PAPI-Nuplitec	21	0	0
Total	**33,172,800**	**656**	**1,305**

RESEARCH FOR INNOVATION: PIPE

CHART 5

GEOGRAPHY OF INNOVATION IN SÃO PAULO STATE – 2020

Companies supported by PIPE in Administrative Regions (AR) of São Paulo – since 1997*



Cities with the most companies supported since 1997	
São Paulo	481
Campinas	217
São Carlos	185
São José dos Campos	105
Ribeirão Preto	72
Piracicaba	55
Botucatu	25
Sorocaba	24
Araraquara	19
São José do Rio Preto	17
Santana de Parnaíba	15
Jaboticabal	14
Limeira	13
Indaiatuba	13
Cotia	12
Valinhos	11
São Bernardo do Campo	11

* Not city identified for eight companies.

PIPE INITIATIVES

PIPE Invest

FAPESP launched PIPE Invest, a new line of funding for innovative firms that will allocate supplementary funds to startups and small and medium enterprises that were successful in PIPE Phase 2. The aim is to accelerate commercialization of innovations. Firms that receive support will have to prove that a private partner has invested more than BRL 100,000 in the project. The supplementary funding awarded by PIPE Invest will match the amount injected by the private partner, capped at BRL 1 million for firm, for a period of 24 months.

https://agencia.fapesp.br/34435

Top 20 Ecosystems

FAPESP ranked third in the 2020 edition of Top 20 Ecosystems, in which the organization *100 Open Startups* measured the volume and intensity of open innovation relationships established between startups and large corporations in Brazil.

https://agencia.fapesp.br/34606

PIPE High Tech Entrepreneurship Training Program

FAPESP offers this training program to entrepreneurs selected in Phase 1 of the PIPE program as an opportunity to increase their chances of success by aligning their products with market demand and enhancing their domestic and foreign competitiveness. Two editions were held in 2020, with 42 firms participating (21 in the 16th edition and 21 in the 17th). They updated their research projects and business plans after nine weeks of training in high tech entrepreneurship.

MVisia e PPI-Multitask são alvo de aquisições

The startup MVisia, based in São Paulo City, Brazil, specializes in artificial intelligence (AI) systems applied to industrial computer vision. PPI-Multitask, also based in São Paulo, develops manufacturing execution system (MES) platforms to control production on the factory floor. Both firms received investments from PIPE to develop their technological solutions, and a controlling stake in both has recently been bought by Brazilian multinational Weg, one of the world's leading manufacturers of industrial electric motors and power generators. Weg's decision to acquire PPI-Multitask and MVisia in less than a year was motivated by a desire to speed up the development of its digital business division.

https://pesquisaparainovacao.fapesp.br/1698

Startup supported by PIPE wins innovation challenge

nChemi Engenharia de Materiais, a spinoff from the Center for Development of Functional Materials (CDMF), one of the RIDCs supported by FAPESP, won the Paint the Future innovation challenge for startups in the New Functionality category. The contest was organized by AkzoNobel, which produces paints and coatings, is headquartered in the Netherlands, and operates in more than 150 countries. Supported by PIPE, nChemi presented a solution based on the use of functionalized nanoparticles to endow the multinational's products with new properties.

https://agencia.fapesp.br/34750

MEDIA COVERAGE OF RESEARCH RESULTS: PIPE

3D skin created in the laboratory can be used to assess efficacy of cosmetics

A platform based on a three-dimensional skin model developed by Eleve Science, a startup incubated at the Supera Innovation and Technology Park in Ribeirão Preto, could help the cosmetics industry eliminate animal testing by enabling it to perform efficacy and safety trials on sunscreens and anti-aging products under conditions closely resembling real life. The platform comprises a structure with a diameter of approximately 2 cm on which cells derived from human tissue grow layer by layer to form a 3D skin model.

News stories about the technology were carried by **33** media outlets.

Pharmacy

PIPE GRANT – FAPESP Process 2016/08453-2

COMPANY:
Eleve Pesquisa e Desenvolvimento Ltda.

PRINCIPAL INVESTIGATOR:
Ana Luiza Scarano Aguillera Forte

https://pesquisaparainovacao.fapesp.br/1625

Company develops ultra-fast method to test tenderness of beef cuts

A project conducted by researchers at the Brazilian company Fine Instrument Technology (FIT) has the potential to counteract the insecurity felt by consumers who pay more for a joint of beef because they expect it to be genuinely tender but are frequently disappointed. The proposal is to bring a portable version of a surface nuclear magnetic resonance machine to market by July 2021. The device will be able to measure the tenderness of commercially packaged beef cuts non-destructively.

News stories about the project were carried by **13** media outlets.

Animal Sciences

PIPE GRANT – FAPESP Process 2017/15336-5

COMPANY:
Fine Instrument Technology (FIT)

PRINCIPAL INVESTIGATOR:
Fabiane de Souza Costa

https://pesquisaparainovacao.fapesp.br/1576

MEDIA COVERAGE OF RESEARCH RESULTS: PIPE

Wearable sensors printed on natural materials analyze substances present in sweat

A wearable sensor detects substances in sweat and can be used to monitor diabetes, for example, or for hormone control. No bigger than a postage stamp and worn on the skin like a sticking plaster, it was developed by researchers at USP in São Carlos, in collaboration with colleagues at UNESP, UNICAMP, UNIARA and the Brazilian Center for Research in Energy and Materials (CNPEM). It can detect a range of biomarkers, such as sodium, potassium, uric acid, lactic acid and glucose, among others. In partnership with Biosmart Nanotechnology, which is supported by PIPE, the researchers are studying the use of the sensor to administer drugs, and are working on ways of making it commercially feasible.

News stories about the innovation were carried by **45** media outlets.

Interdisciplinary

PIPE GRANT – FAPESP Process 2018/15039-3

COMPANY:
Biosmart Nanotechnology Ltda.

PRINCIPAL INVESTIGATOR:
Deivy Wilson Masso

https://agencia.fapesp.br/33899

Software helps minimize impact of rainstorms on urban mass transit

Rio de Janeiro City tested a system developed by Scipopulis to monitor the functioning of bus lines and detect operational problems in real time so that actions can be taken to minimize the impact of storms on commuters. A pilot version was implemented in December. The system was also tested in Belo Horizonte, one of the cities most affected by heavy rain in 2020. Its on-screen dashboards and maps pinpoint locations where stormwater has backed up, highlighting bus routes blocked by flooding, and helping management predict the lines most affected and make decisions faster.

News stories about the system were carried by **7** media outlets.

Computer Science

PIPE GRANT – FAPESP Process 2013/50812-1

COMPANY:
Scipopulis Desenvolvimento e Análise de Dados Ltda.

PRINCIPAL INVESTIGATOR:
Roberto Speicys Cardoso

https://pesquisaparainovacao.fapesp.br/1311

MEDIA COVERAGE OF RESEARCH RESULTS: PIPE

Sensor for rapid detection of microorganisms in hospitals

A sensor system developed by the startup NanoChemTech Solutions, in partnership with researchers at UFSCar's Physics Department, identifies bacterial diseases near hospital patients in 30 minutes. The device senses altered electromagnetic properties using RFID tags and has been patented.

News stories about the innovation were carried by **3** media outlets.

Interdisciplinary

PIPE GRANT – FAPESP Process 2019/07589-6

COMPANY:
NanoChemTech Ltda.

PRINCIPAL INVESTIGATOR:
Gabriela Byzynski Soares

https://agencia.fapesp.br/33780

Nanometric ceramic coating reduces surgical drill and mill cutter friction by 50%

nChemi Engenharia de Materiais developed a nanometric ceramic coating technology that increases the surface hardness of surgical drills and mill cutters by 90% and reduces friction by 50%. The key is a nanometric zirconium film deposited on the stainless steel surface of the tools. Tissue or bone necrosis is reduced and post-operative recovery made faster and less unpleasant as a result. The firm is a spinoff from the Center for Development of Functional Materials (CDMF), one of the RIDCs supported by FAPESP.

News stories about the technology were carried by **5** media outlets.

Materials Engineering and Metallurgy

PIPE GRANT – FAPESP Process 2016/17630-5

COMPANY:
nChemi Engenharia de Materiais Ltda.

PRINCIPAL INVESTIGATOR:
Bruno Henrique Ramos de Lima

https://agencia.fapesp.br/33177

RESEARCH FOR INNOVATION

INTELLECTUAL PROPERTY SUPPORT PROGRAM (PAPI/NUPLITEC)

The Intellectual Property Support Program (PAPI) was created in 2000 under the aegis of the Center for Technology Patenting and Licensing (Nuplitec) with the aim of fostering an IP rights protection culture among researchers in São Paulo State.

Between 1982 and 2020, 1,579 patent applications of interest to FAPESP were filed with the National Industrial Property Institute (INPI), Brazil's patent office. In 2020, 362 of these applications had resulted in patents, 1,011 were still being processed, and 206 had been denied.

In 2020, FAPESP disbursed **$ PPP 140,156** for the PAPI/Nuplitec program, which supports protection and licensing of IP rights to the results of research funded by FAPESP.

TABLE **23**

NUMBER OF PATENT APPLICATIONS FILED – 1982-2020
By knowledge area

Knowledge area	Number of filings
Life Sciences	793
Natural Sciences and Engineering	764
Human and Social Sciences	5
Interdisciplinary	8
Not identified	9
Total	**1,579**

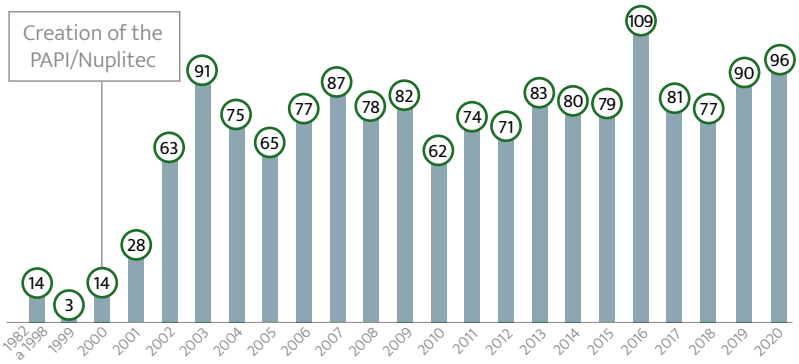
TABLE **24**

TOP 10 INSTITUTIONS BY Nº OF PATENT APPLICATIONS – 1982-2020

Institution	Number of fillings
UNICAMP	550
USP	477
UNESP	171
Butantan Institute	93
UFSCAR	92
UNIFESP	43
UFABC	28
IPT	16
UNIAN	15
UNIFRAN	15

CHART **6**

PATENT APPLICATIONS FILED – 1982 TO 2020
PAPI/NUPLITEC PROGRAM ESTABLISHED



FUNDING STRATEGIES

RESEARCH ON STRATEGIC THEMES

This funding line covers a group of programs through which FAPESP seeks to encourage research projects on topics considered strategic to the development of São Paulo State and Brazil, and includes support for the institutional development plan for research institutions in the state.

FAPESP invested $ PPP 22.922 million in 1,013 active projects under its nine programs for Research on Strategic Themes in 2020. This total included associated scholarships, fellowships and grants of various types. The number of new strategic projects contracted for in the year was 360.

RELATED PROGRAMS

FAPESP Research Program on Biodiversity (BIOTA-FAPESP) – www.fapesp.br/en/biota
FAPESP Research Program on Global Climate Change (RPGCC) – www.fapesp.br/en/rpgcc
FAPESP Bioenergy Research Program (BIOEN) – www.fapesp.br/en/bioen
Institutional Development Plan for Research Institutions in São Paulo State – https://agencia.fapesp.br/27445
Science Journalism (MídiaCiência) – www.fapesp.br/jornalismocientifico
FAPESP Research Program on eScience & Data Science – www.fapesp.br/en/escience
Research on Public Policies Program (PPP) – www.fapesp.br/políticaspublicas
Research on Public Policies for the National Health System Program (PP-SUS) – www.fapesp.br/ppsus
Public Education Research Program –www.fapesp.br/46
Problem-Oriented Research Center (NPOP)

TABLE **25**

RESEARCH ON STRATEGIC THEMES
Disbursement and new projects contracted for in 2019, by major knowledge area

Programs	Life Sciences		Natural Sciences and Engineering		Human and Social Sciences		Interdisciplinary	
	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted	Disbursement $ PPP	New projects contracted
BIOTA and associated	3,440,423	53	614,945	6	139,674	7	205,005	1
Global Climate Change and associated	2,823,441	36	3,162,192	25	361,382	9	293,898	2
BIOEN and associated	2,606,054	29	1,535,738	16	43,649	0	139,737	4
Institutional Development Plan for RI and associated	3,128,936	31	2,170,995	19	0	0	11,046	0
eScience & Data Science and associated	204,432	7	82,975	6	0	0	43,501	0
Research in Public Policies and associated	1,231,248	29	143,909	2	352,655	61	52,941	8
MídiaCiência not associated	53,919	2	35,095	1	88,713	4	25,677	2
Total	**13,488,453**	**187**	**7,745,849**	**75**	**986,073**	**81**	**771,805**	**17**

BIOTA-FAPESP

Goals: mapping, cataloguing and characterizing biodiversity in São Paulo State; defining mechanisms of conservation, restoration and assessment.
BIOTA-FAPESP completed its 20th year in 2020, with 293 research grants and scholarships awarded to more than 1,200 researchers resulting in more than 3,000 scientific publications. Two news stories outlined its achievements in the period, especially contributing to a more profound understanding of biodiversity and providing a scientific basis for biodiversity conservation and restoration guidelines and policies: **https://agencia.fapesp.br/33964** and **https://revistapesquisa.fapesp.br/en/more-than-biodiversity**.

TABLE **26**

BIOTA

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Desembolso $ PPP	New projects contracted	Active projects
Research Grant - BIOTA	639,862	23	39
Research Grant - BIOTA Thematic	1,432,713	0	23
Research Grant - BIOTA JP	27,997	0	2
Research Grant - Regular	0	1	3
Regular Grants – Publication	17,309	1	1
Regular Grants – Participation in Scientific Meetings in Brazil	0	1	0
Regular Scholarships/Fellowships	1,674,531	23	93
Regular Scholarships/Fellowships Abroad	405,551	1	13
Fellowships – Technical Training	202,084	17	33
Total	4,400,047	67	207

FAPESP RESEARCH PROGRAM ON GLOBAL CLIMATE CHANGE (PFPMCG)

Goals: support for research projects that contribute to decision making on the societal and economic impacts of global warming for Brazil.
A cooperation agreement entered into by the University of São Paulo (USP), the Federal University of São Paulo (UNIFESP), the National Space Research Institute (INPE) and Oak Ridge National Laboratory (ORNL), an agency of the United States Department of Energy, will facilitate the development of a computational system and services to enable Brazilian institutions to manage and curate atmospheric data collected as part of projects supported by FAPESP, such as the Green Ocean Amazon scientific campaign (GOAmazon) and the project "Aerosol and cloud life cycles in Amazonia", linked to the Research Program on Global Climate Change (**https://agencia.fapesp.br/32890**).

TABLE **27**

PFPMCG

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grant - PFPMCG	286,756	5	16
Research Grant - PFPMCG - JP	75,464	1	4
Research Grant - PFPMCG - JP2	206,689	0	1
Research Grant - PFPMCG - Thematic	2,304,778	0	16
Research Grant - Regular	13,849	4	9
Regular Grants – Visiting Researcher	76,681	0	1
Regular Grants – Visiting Researcher Abroad	2,659	0	0
Regular Grants – Publication	4,878	2	3
Regular Scholarships/Fellowships	2,291,700	34	137
Regular Scholarships/Fellowships Abroad	1,091,066	8	26
Fellowships PFPMCG - JP	54,376	1	2
Fellowships – Technical Training	226,713	16	47
Fellowships – Scientific Journalism	5,304	1	1
Total	6,640,913	72	263

MEDIA COVERAGE OF RESEARCH RESULTS: BIOTA

Inventory assembles information on more than 200 viruses that infect plants in Brazil

Data on 219 pathogens that infect plants in Brazil, including many agriculturally important species, was assembled in the largest compilation of information on plant viruses ever produced here. The inventory contains descriptions of the microorganisms, data on the diseases they cause, and information on their occurrence in native, cultivated and ornamental plants as well as weeds. It is the outcome of projects conducted under the aegis of BIOTA-FAPESP and serves as a tool for researchers, growers and policymakers.

News stories about the inventory were carried by **27** media outlets.

Agronomy

BIOTA-FAPESP GRANT – FAPESP Process 2017/18910-4

INSTITUTION:
Luiz de Queiroz College of Agriculture, University of São Paulo (ESALQ/USP)

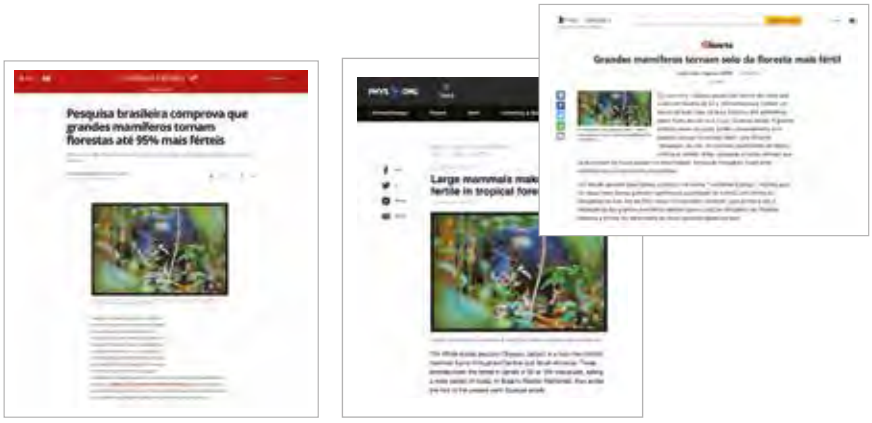
PRINCIPAL INVESTIGATOR:
Elliot Watanabe Kitajima

https://agencia.fapesp.br/33788

Large mammals make soil more fertile in tropical forests

A study conducted at UNESP showed that the vast amounts of dung and urine left on the ground by peccaries, tapirs and other fruit-eating animals release forms of nitrogen, a key element in plant growth. The findings evidenced for the first time the importance of these animals to the nitrogen cycle, serving as yet another warning of the ecosystem losses caused when large mammals disappear from tropical forests.

An article reporting the results of the study was published in *Functional Ecology*, and news stories on it were carried by **20** media outlets.



Ecology

THEMATIC PROJECT GRANT AND POSTDOCTORAL RESEARCH INTERNSHIP ABROAD (RIA) SCHOLARSHIP – BIOTA-FAPESP Processes– FAPESP 2014/01986-0 and 2018/20599-8

INSTITUTIONS:
Institute of Biosciences, Sao Paulo State University (IB-UNESP) in Rio Claro, and Royal Netherlands Academy of Arts and Sciences (KNAW)

PRINCIPAL INVESTIGATOR:
Mauro Galetti Rodrigues

GRANTEE:
Jose Ignacio Fernandez de La Pradilla Villar

https://agencia.fapesp.br/34975

MEDIA COVERAGE OF RESEARCH RESULTS: BIOTA

Substances with anti-cancer action are identified in Brazilian red propolis

Researchers at USP and UNICAMP isolated eight novel polyphenols – natural substances such as flavonoids and tannins found in plants, cereals and wine – from the rarest type of propolis, present only in beehives in an area of mangroves in Alagoas. Two of them were found in laboratory assays to be capable of inhibiting tumor cell proliferation in ovarian, breast and brain cancer. The other six had structures previously unknown to science.

An article on the study was published in the *Journal of Natural Products*, and news stories about it were carried by **60** media outlets.

Chemistry

THEMATIC PROJECT GRANT – BIOTA-FAPESP, AND THEMATIC PROJECT RESEARCH GRANT – FAPESP Processes 2013/50228-8 and 2009/51602-5

INSTITUTIONS: São Carlos Institute of Chemistry, University of São Paulo (IQSC-USP), and Institute of Chemistry, State University of Campinas (IQ-UNICAMP)

PRINCIPAL INVESTIGATOR: Roberto Gomes de Souza Berlinck and Ronaldo Aloise Pilli

https://agencia.fapesp.br/34072

MEDIA COVERAGE OF RESEARCH RESULTS: CLIMATE CHANGE

Destruction of Atlantic Rainforest fragment raises local temperature

A study conducted by researchers at USP and UNICAMP showed that if 25% of an Atlantic Rainforest fragment that is approximately 1 hectare is deforested, then the local temperature will increase by 1°C. Clear-cutting the entire fragment would increase the local temperature by as much as 4°C.

An article reporting the study was published in PLOS ONE, and news stories about it were carried by **31** media outlets.

Geosciences

FELLOWSHIPS – TECHNICAL TRAINING AND THEMATIC PROJECT GRANT – RPGCC – FAPESP Processes 2018/22120-1 and 2015/50682-6

INSTITUTION: Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo (IAG-USP)
PRINCIPAL INVESTIGATOR: Humberto Ribeiro da Rocha
GRANTEE: Raianny Leite do Nascimento Wanderley

THEMATIC PROJECT GRANT – BIOTA-FAPESP – FAPESP Process 2012/51872-5

INSTITUTION: Institute of Biology, State University of Campinas (IB-UNICAMP)
PRINCIPAL INVESTIGATOR: Carlos Alfredo Joly

https://agencia.fapesp.br/32611

RESEARCH ON STRATEGIC THEMES

BIOEN

Goals: investigation of novel technological strategies to increase sugarcane yield, mitigate the environmental and socioeconomic impact of bioenergy production, and create knowledge of bioenergy production and application processes. As part of the 2020 Brazilian Bioenergy Science and Technology Conference (BBEST), BIOEN held a webinar on Biofuture Principles for Post-COVID Recovery: an Agenda for Brazil, discussing the strategic importance of bioenergy to a sustainable economic recovery in the context of climate change (https://agencia.fapesp.br/34073).

TABLE **28**

BIOEN

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grant - BIOEN	512,460	5	33
Young Investigator Grant	164,763	0	6
Research Grant - Thematic	1,464,843	0	9
Research Grant - PIPE	31,422	2	5
Young Investigator - Phase 2	131,489	0	2
Regular Research Grant	8,867	3	4
Regular Grants – Publication	3,070	1	1
Regular Fellowships/Scholarships	1,138,342	21	74
Regular Fellowships/Scholarships Abroad	664,066	2	8
Fellowship BIOEN - PE	32,626	2	2
Fellowship BIOEN - JP	43,501	0	1
Fellowship - Technical Trainning	129,729	13	24
Total	4,325,178	49	169

PUBLIC POLICY RESEARCH PROGRAMS

Goals: support for research projects that aim to meet societal demand and result in public policy implementation:

- **FAPESP Public Policy Research Program (PPP)**
- **Research on Public Policy for the National Health System (PP-SUS)**

  In 2020, a call for proposals on shared healthcare management and research for the SUS was issued by FAPESP, the Ministry of Health, and the National Council for Scientific and Technological Development (CNPq). The eight selected projects aim to strengthen the health system's capacity to deal with the challenges presented by the COVID-19 pandemic. The projects will be awarded Regular Research Grants for up to 24 months.

- **Ensino Público**

TABLE **29**

PPP, PP-SUS AND PUBLIC EDUCATION

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
PPP	**1,559,140**	**48**	**93**
PPP Grants	1,288,238	3	31
Regular Fellowships in Brazil	20,046	1	2
Fellowships - Technical Trainning	250,856	44	60
PP-SUS	**2,069**	**0**	**1**
PP-SUS Grants	2,069	0	1
Public Education	**219,543**	**52**	**108**
EP Grants	55,418	3	12
EP Fellowships	144,016	38	85
Fellowships - Technical Trainning	20,109	11	11
Total	1,780,752	100	202

MEDIA COVERAGE OF RESEARCH RESULTS: BIOEN

Technology converts agricultural waste into high-value chemicals

A group of researchers developed a novel simplified biotechnological route to obtain fine chemicals from sugarcane bagasse and wheat straw. The compounds have applications in the food, cosmetics and pharmaceutical industries, among others. The researchers are now looking for partners to commercialize the technology. The group comprised scientists affiliated with the University of Sorocaba (UNISO) and the State University of Campinas (UNICAMP) on the Brazilian side, and Manchester and Warwick Universities in the UK.

An article on the research was published in *Green Chemistry* and news stories about it were carried by **32** media outlets.

Genetics

THEMATIC PROJECT GRANT – BIOEN – FAPESP Process 2015/50590-4

INSTITUTIONS:
University of Sorocaba (UNISO), and University of Warwick, UK

PRINCIPAL INVESTIGATOR:
Fábio Márcio Squina

https://pesquisaparainovacao.fapesp.br/1297

MEDIA COVERAGE OF RESEARCH RESULTS: PUBLIC POLICY

UNESCO launches ocean literacy toolkit in Brazilian Portuguese

UNESCO, the United Nations Educational, Scientific and Cultural Organization, launched "Ocean Literacy for All" in Brazilian Portuguese, a free online handbook offered as a teaching guide and toolkit for people of all ages and walks of life to understand the complex processes and functions of the ocean. It had already been published in English, French and Spanish. The Portuguese version was an initiative of researchers at UNIFESP in Santos in partnership with the city government. The project gave rise to *Maré de Ciência* ("Science Tide"), a science diffusion program that resulted in the creation of tools to support school classes on ocean sciences in which students are protagonists of knowledge production and the construction of learning processes.

News stories about the initiative were carried by **16** media outlets.

Interdisciplinary

RESEARCH ON PUBLIC POLICIES – FAPESP Process 2017/50220-8

HOST INSTITUTION:
Institute of Health and Society, Federal University of São Paulo (ISS-UNIFESP), Santos

PARTNER INSTITUTION:
City of Santos

PRINCIPAL INVESTIGATOR:
Ronaldo Adriano Christofoletti

https://agencia.fapesp.br/33251

RESEARCH ON STRATEGIC THEMES

SCIENCE FOR DEVELOPMENT CENTERS

In December 2020, FAPESP announced the results of its 2019 Science for Development call to support research oriented to solving problems in health, law enforcement, food, agriculture and economic development, among others defined by state government departments. A total of BRL 88 million will be invested in the 12 selected projects, which were submitted by research consortia comprising researchers in agencies of the state government, and at universities and other public and private institutions in Brazil and abroad, as well as companies. The projects will be conducted by Science for Development Centers set up for this purpose.

Projects selected in the call

https://agencia.fapesp.br/34906

Center for Cell Therapy (NuTeC)
Principal investigator: Dimas Tadeu Covas
Institution responsible: Ribeirão Preto Blood Center (FUNDHERP, São Paulo State Department of Health, SSSP)

Multi-center program using PSMA radioligands for prostate cancer diagnosis and treatment
Principal investigator: Wilson Aparecido Parejo Calvo
Institution responsible: Nuclear and Energy Research Institute (IPEN, Department of Economic Development, SDE)

Center for Research and Development in Immunobiologics
Principal investigator: Ana Maria Moro
Institution responsible: Butantan Institute (IB/SSSP)

Fisheries for health – improving the nutritional quality of fish farmed for human consumption
Principal investigator: Daniel Eduardo Lavanholi de Lemos
Institution responsible: Oceanographic Institute, University of São Paulo (IO-USP)

Center for Research and Development in Living Knowledge
Principal investigator: João Eduardo Ferreira
Institution responsible: Institute of Mathematics and Statistics (IME-USP)

BIOTA Synthesis – Center for Analysis and Synthesis of Nature-Based Solutions
Principal investigator: Jean Paul Walter Metzger
Institution responsible: Institute of Advanced Studies (IEA-USP)

Innovation for Health Surveillance (IViS)
Principal investigator: Paulo Rossi Menezes
Center for Disease Control (CCD, SSSP)

Development of the additive manufacturing metal component production chain
Principal investigator: Mário Boccalini Júnior
Institution responsible: São Paulo State Technological Research Institute (IPT, SDE)

Integrated Biotech Platform for Healthy Ingredients (PBIS)
Principal investigator: Maria Teresa Bertoldo Pacheco
Institution responsible: Food Technology Institute (ITAL, Department of Agriculture and Supply, SAASP)

Biotech and genomic strategies for quality, productivity and sustainable management of citrus, coffee and sugarcane in São Paulo State
Principal investigator: Mariângela Cristofani-Yaly
Institution responsible: Agronomic Institute (IAC, SAASP)

Center for Data Intelligence in Management of Cities and Security (NInDA)
Principal investigator: Luis Gustavo Nonato
Institution responsible: Institute of Mathematics and Computer Science (ICMC-USP)

Center for Science Applied to Security (CCAS)
Principal investigator: João Luiz Becker
Institution responsible: São Paulo Business School (EAESP-FGV)

MEDIA COVERAGE OF RESEARCH RESULTS: CENTER FOR PROBLEM-ORIENTED RESEARCH IN SÃO PAULO (NPOP)

Biotech Platform for Healthy Ingredients

The Integrated Biotechnological Platform for Healthy Ingredients (PBIS), established to develop new technology for the food industry, was one of the 12 projects selected in 2020 in the Science for Development Centers call. Researchers will focus on sustainable biotech processes to develop food products using indigenous raw materials and byproducts of agroindustry, while also establishing guidelines for integration of production systems. PBIS will be developed by a consortium of public universities and research institutions, private-sector companies, and the São Paulo State Government. The Food Technology Institute (ITAL), an arm of the São Paulo State Department of Agriculture, is the lead player.

News stories about the project were carried by **21** media outlets.


Fapesp aprova R$ 6,7 milhões para pesquisas sobre ingredientes saudáveis para alimentos


Plataforma Biotecnológica de Ingredientes Saudáveis é aprovada pela Fapesp

Food Science and Technology

SCIENCE FOR DEVELOPMENT CENTERS – FAPESP Process 2020/07015-7

INSTITUTION:
Food Technology Institute (ITAL), São Paulo State Department of Agriculture

PRINCIPAL INVESTIGATOR:
Maria Teresa Bertoldo Pacheco

Agronomic Institute to receive BRL 34.8 million for research on citrus, coffee and sugarcane

The Agronomic Institute (IAC) will receive BRL 34.8 million for research to expand the scientific and technological foundation for problem solving in citrus, coffee and sugarcane. These three crops were chosen because of their importance in São Paulo and Brazil, and because of IAC's leading role in developing varieties. Part of the total (BRL 4.54 million) will be invested by FAPESP in NPOP-IAC under its Science for Development call. Private enterprise will contribute BRL 4.47 million. The state will provide infrastructure and human resources worth BRL 25.79 million.

News stories on the institute's selection in the call were carried by **26** media outlets.


IAC TERÁ R$ 34,8 MILHÕES PARA PESQUISAS EM CITROS, CAFÉ E CANA-DE-AÇÚCAR


Dinheiro Rural

IAC terá R$ 34,8 milhões para pesquisas em citros, café e cana-de-açúcar

Agronomy

SCIENCE FOR DEVELOPMENT CENTER - FAPESP Process 2020/07045-3

INSTITUTION:
Agronomic Institute (IAC)

PRINCIPAL INVESTIGATOR:
Mariângela Cristofani-Yaly

RESEARCH ON STRATEGIC THEMES

INSTITUTIONAL DEVELOPMENT PLAN FOR STATE RESEARCH INSTITUTIONS (RIs)

FAPESP supports modernization projects at 12 research institutions in São Paulo State with research proposals selected in a 2018 call, disbursing funds for capital and running costs (fixed assets, consumables and contractors, among others), and for scholarships and research grants.

TABLE 30

INSTITUTIONAL DEVELOPMENT PLAN FOR RIs

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grant - Institutional Development Plan for RIs	2,915,140	0	12
Young Investigator Grant (YI)	168,945	3	4
Research Grant - PPP	28,121	2	3
Regular Research Grant	0	1	1
Regular Grants – Visiting Research	34,855	0	1
Regular Grants – Visiting Research Abroad	0	1	2
Regular Scholaships/Fellowships	1,740,216	24	89
Regular Scholaships/Fellowships Abroad	232,148	5	6
Fellowship - Technical Trainning	42,925	12	13
Fellowship - YI	148,627	2	4
Total	5,310,977	50	135

eSCIENCE E DATA SCIENCE

Goals: supporting integration between research groups involved with the investigation of algorithms, computational modeling and data infrastructure, and groups of scientists involved with other knowledge areas, from biology to social science.
Since September 1, 2020, applications for grants and scholarships must be accompanied by a Data Management Plan, which is one of the items analyzed when proposals and scientific reports are assessed. The eScience and Data Science program's steering committee explained how to draft this plan in a webinar available at www.youtube.com/watch?v=iLwcLVpXjuU.

TABLE 31

eSCIENCE E DATA SCIENCE

Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Research Grant - eScience	17,987	3	6
Research Grant - Thematic	85,479	1	2
Research Grant - PIPE	70,476	2	3
Fellowships - PE	76,126	2	3
Regular Scholaships/Fellowships	35,891	3	4
Fellowships - Technical Trainning	44,949	2	6
Total	330,908	13	24

SCIENCE JOURNALISM (MÍDIACIÊNCIA)

Goals: supporting the education and training of science disseminators by awarding undergraduate and graduate fellowships under the aegis of the José Reis Program. FAPESP disbursed $ PPP 203,404 for 13 active projects and contracted for nine new fellowships in 2020.

MEDIA COVERAGE OF RESEARCH RESULTS: RESEARCH GRANT – INSTITUTIONAL DEVELOPMENT PLAN FOR RIs

Botanical Institute creates models to predict impacts of climate and urbanization in São Paulo's Green Belt

Researchers at the Botanical Institute are to study the effects of climate change, pollution and land use on the native vegetation that still exists in São Paulo City and 70 neighboring municipalities. They will develop models to project scenarios for the next 30 years using historical data, field surveys and laboratory simulations. The aim of the multidisciplinary study is to assess the level of biodiversity conservation in São Paulo's Green Belt Biosphere Reserve, as well as the status of ecosystem services such as water quality and flow, climate regulation and carbon storage. Based on the results, the São Paulo State Department of Infrastructure and Environment will develop public policy and regulation for the area.

News stories on the study were carried by **20** media outlets.

Botany

RESEARCH GRANT – INSTITUTIONAL DEVELOPMENT PLAN FOR RIs – FAPESP Process 2017/50341-0

INSTITUTION:
Botanical Institute

PRINCIPAL INVESTIGATOR:
Luiz Mauro Barbosa

https://agencia.fapesp.br/34517


Instituto da Botânica irá estudar impacto do clima na vegetação


CORREIO
Impacto no cinturão verde de SP

Production of nanoradiopharmaceuticals in São Paulo takes first steps

The Nuclear and Energy Research Institute (IPEN) is assembling a world-class laboratory that associates nanotechnology with radiopharmacy. The aim is to develop new products, mainly for cancer treatment. As a result of a call for proposals under FAPESP's research institute modernization program, IPEN will receive BRL 16 million for investment in infrastructure and acquisition of multi-user equipment, as well as research grants and scholarships.

News stories on the subject were carried by **11** media outlets.

Chemistry

RESEARCH GRANT – INSTITUTIONAL DEVELOPMENT PLAN FOR RIs – FAPESP Process 2017/50332-0

INSTITUTION:
Nuclear and Energy Research Institute (IPEN)

PRINCIPAL INVESTIGATOR:
Marcelo Linardi

https://agencia.fapesp.br/34679

FUNDING STRATEGIES

SUPPORT FOR RESEARCH INFRASTRUCTURE

FAPESP maintains eight programs that aim to assure provision of the infrastructure needed for the continuity of research in São Paulo State.

RELATED PROGRAMS

Multi-user Equipment – Acquisition of equipment for shared use by the scientific community.

FAP-Livros – Acquisition of books for libraries open to the public.

Equipment Repair – Repair and preventive maintenance of equipment.

Support for Infrastructure – Maintenance of museums, information repositories, documents and biological collections.

Technical Overheads – Additional funding for institutions to cover unforeseen research project expenses.

Access to Research and Education Network at São Paulo (**REDNESP**).

In 2020, to facilitate researchers' access to the multi-user equipment located at universities and research institutions around the state, FAPESP's Virtual Library (Biblioteca Virtual, BV) created a web page (https://bv.fapesp.br/pt/equipamento_multiusuarios/) offering a search engine for use in finding equipment sites in accordance with a three-level taxonomy focusing on the type of use. If a particular type of equipment that meets the needs of a research project is available at more than one location, the user can see this remotely, for example.

TABLE **32**

SUPPORT FOR RESEARCH INFRASTRUCTURE
Disbursement, number of active projects and new projects contracted in 2020

Fellowships and Grants associated	Disbursement $ PPP	New projects contracted	Active projects
Multi-user Equipment	21,678,343	51	319
Equipment Repair	1,567,195	77	224
REDNESP	19,658,772	1	2
Overhead – Institutional Research Infrastructure	12,440,946	95	240
Overhead – Program Coordination	190,863	4	12
Overhead – REDNESP	938,443	9	12
Total	**56,474,562**	**237**	**809**

MEDIA COVERAGE OF RESEARCH RESULTS: INFRASTRUCTURE

Novel molecule displays potent and selective action against ovarian tumor cells

Researchers developed a compound based on palladium, a silvery white metal belonging to the same group as platinum, that acted against ovarian tumor cells without affecting healthy tissue. The molecule acted more selectively and powerfully in vitro than cisplatin, a platinum-based chemotherapy medication widely used against this type of cancer. The novel compound proved effective even against cisplatin-resistant tumor cell lines. The researchers used a single-crystal X-ray diffractometer for structural analysis of small molecules and proteins acquired with the support of FAPESP's Multi-User Equipment Program.

An article describing the study featured on the cover of *Dalton Transactions*, a journal published by the UK's Royal Society of Chemistry, and news stories about it were carried by **573** media outlets.

Chemistry

RESEARCH GRANT – MULTI-USER EQUIPMENT – FAPESP Process 2009/54011-8

INSTITUTION:
São Carlos Institute of Chemistry, University of São Paulo (IQSC-USP)

PRINCIPAL INVESTIGATOR:
Victor Marcelo Deflon

https://agencia.fapesp.br/32396

Multiuser equipment facilitates the selection of sterile insects used to combat fruit crop pests

VideoMeterLab, a multispectral imaging instrument acquired with the support of the Multi-User Equipment Program, was used by a team at USP's Center for Nuclear Energy in Agriculture (CENA) in an experiment to enhance the effectiveness of biological control of the South American fruit fly *Anastrepha fraterculus* via sterilization of males by X-ray or gamma-ray radiation. The aim of the procedure is to bring about a decrease in the wild population of these insects, a major crop pest in Brazil's South region, mainly affecting apple and peach orchards.

News stories on the experiment were carried by **22** media outlets.

Agronomy

RESEARCH GRANT – MULTI-USER EQUIPMENT AND YOUNG INVESTIGATOR – FAPESP Processes 2018/03793-5 and 2017/15220-7

INSTITUTION:
Center for Nuclear Energy in Agriculture, University of São Paulo (CENA-USP)

PRINCIPAL INVESTIGATOR:
Clíssia Barboza da Silva

https://agencia.fapesp.br/32612

FUNDING STRATEGIES

COMMUNICATING SCIENCE TO THE PUBLIC

This funding strategy encompasses initiatives to inform FAPESP's stakeholders and the general public about its science policy guidelines and the societal and economic impacts of the scientific knowledge produced in São Paulo State with its support, as well as initiatives to map and evaluate the general status of research in the state, as required by the law that created FAPESP.

$ PPP 6.784 million for research diffusion, mapping and evaluation projects in 2020.

PESQUISA FAPESP MAGAZINE (monthly)

revistapesquisa.fapesp.br/en

PAPER EDITION

- Average monthly print run: **29,100**.
- **5,937** paying subscribers* (+15% on December 2019).
- Average monthly sale via newsvendors: **832** (-20%).
- **3,674** copies distributed per month to state high schools in São Paulo State.

* Verified by Instituto de Verificação de Comunicação (IVC), Brazil's audit bureau of circulation, in December 2020

SITE

- **5.5 million** visits (sessions) (+47% on 2019) – monthly average: **458,700**.
- **4.2 million** user visited the site (+46%).
- **7.8 million** page views (+57%) – monthly average **646,600**.
- Traffic increased most in April-May, rising from 784,000 to **1.4 million** visits.

TRAFFIC TO THE SITE (how digital content is accessed)

- Organic search (Google): **3.4 million** sessions, or **61%** of the total (+31.6%).
- Direct search (via the URL): **777,000** sessions or **14%** of the total (+48.3%).
- Social media: **670,000** sessions or **12%** of the total (+46.1%).
- The newsletters accounted for few sessions (**2,440**), but were the fastest-growing route to the site (+50.7% on 2019).

TRAFFIC TO THE SITE VIA SOCIAL MEDIA (% sessions originating from each platform out of total sessions originating from social media)

- **65.8%** via Facebook (in absolute numbers +97.4% on 2019).
- **29.8%** via Twitter (in absolute numbers +48.6%).
- **1.62%** via Instagram (in absolute numbers +197.3%).
- **1,39%** pelo YouTube (in absolute numbers +95.1%).

SOCIAL MEDIA *Pesquisa FAPESP*

Facebook
185,500 followers (+2.0%)
336,000 reactions, comments and shares (+36.6%)

Twitter
91,100 followers (+9.6%)
34,000 retweets and likes (-3.3%)

Instagram
83,200 followers (+56.0%)
135,000 likes and comments (+20.0%)

YouTube
67,000 (+99.8%)
1.8 million vies (+91.2%)

OTHER DATA

- **102** content items (news stories, infographics, photos and videos) licensed to publishers of teaching material (+91.2% on 2019).
- **1,089** reproductions or citations of the magazine's content in media outlets (+68.0% on 2019), **105** major newspapers, radio or TV stations in Brazil.
- **151** citations in journals, books and theses, among others.
- **45** unique radio programs (*Pesquisa Brasil* program, a partnership with Rádio USP).

COMMUNICATING SCIENCE TO THE PUBLIC

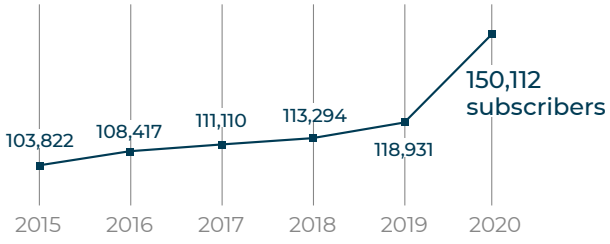
AGÊNCIA FAPESP DE NOTÍCIAS (FAPESP NEWS AGENCY –NEWSLETTER)

agencia.fapesp.br/home

- **150,112** subscribers
  - Portuguese (daily updates): 138,243 (+25%)
  - English (weekly updates): 7,135 (+2%)
  - Spanish (weekly updates): 4,734 (+200%)

CHART 7

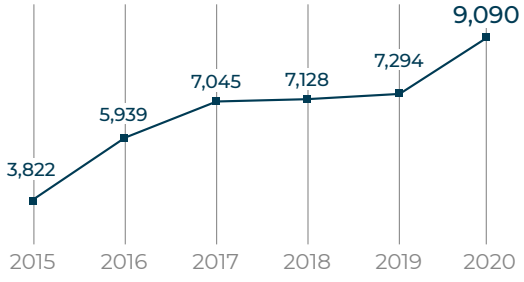
TOTAL NUMBER OF SUBSCRIBERS – ANNUAL CHANGE



- **9,090** reproductions* of *Agência FAPESP's* original content (+25% on 2019): 8,479 news stories in Brazilian media outlets – 399 in major broadsheet newspapers – and 611 news stories in foreign media outlets.

CHART 8

REPRODUCTIONS OF *AGÊNCIA FAPESP*'S ORIGINAL CONTENT* BY BRAZILIAN AND FOREIGN MEDIA OUTLETS

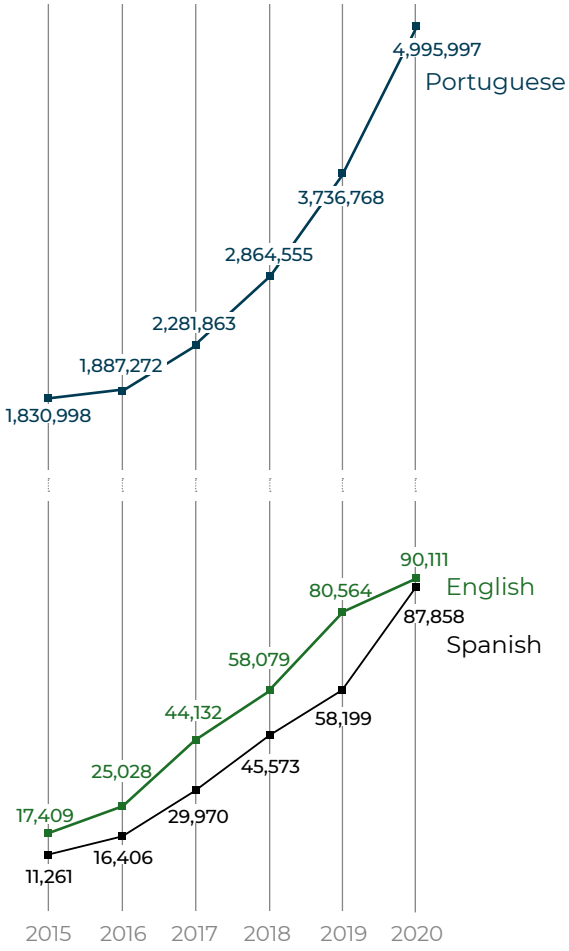


*includes total or partial reproduction of news stories published by *Agência FAPESP*, and/or citation of *Agência FAPESP* as the information source.

- **5.2 million** visits to Agência FAPESP's website in all three languages:
  - Portuguese (daily updates): 4.9 million (+34%)
  - English (weekly updates): 90,100 (+12%)
  - Spanish (weekly updates): 87,900 (+51%)

CHART 9

TOTAL WEBSITE (*AGÊNCIA FAPESP*) PAGE VIEWS – ANNUAL CHANGE



SOCIAL MEDIA Agência FAPESP

Facebook – @agfapesp

- **47,474 followers**: 3,668 new in 2020

  43,983 Brazil, 391 EUA, 310 Portugal, 213 Peru, 155 Germany, among others.
- **1,343 posts**.
- MOST POPULAR POST IN 2020: news story "Technology that sequenced SARS-Cov-2 in 48 hours can be used for real-time monitoring of the epidemic", with **28,454** engagements.

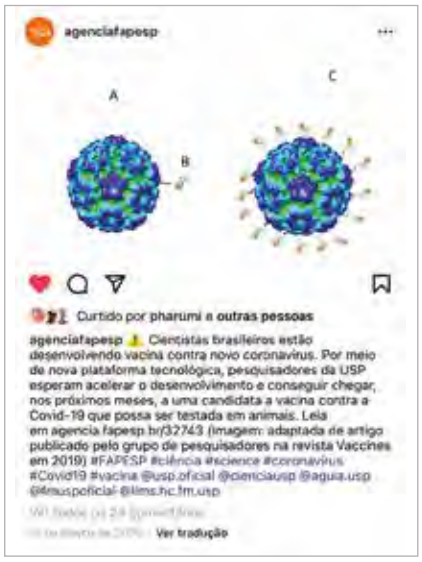
The news story that reached the most people (**131,739**) foi was "Artificial intelligence tracks news about COVID-19".

Twitter – @AgenciaFAPESP

- **78,242 followers**: 11,021 news in 2020.
- **1,641 posts**.
- MOST POPULAR POST IN 2020: news story "Two novel viruses are identified in patients with suspected dengue" led in engagements (**23,118**), and reach **207,292**.

Instagram – @agenciafapesp

- **19.030 followers**: 14,256 news in 2020.
- **929 posts**: 281 in feeds and 648 in stories.
- **348 stories**.
- MOST POPULAR FEED POST IN 2020: "Researchers discover how acute stress can make hair go white", with **2,183** engagement; **nine** other posts had more than **1,000** reations.



YouTube – /fapespagencia

- **34,000 subscribers** – more than 18,000 news in 2020 – up **114%**.
- **134** vídeos posted in the year.
- **763,831** views and **23,618** likes.
- MOST POPULAR VIDEO IN 2020: news story "Coronavirus is produced in a laboratory by researchers at USP", with **449,700** 700 views, or 59% of total views for Agência FAPESP's YouTube channel.

COMMUNICATING SCIENCE TO THE PUBLIC

NEWSLETTER *PESQUISA PARA INOVAÇÃO* (INNOVATIVE R&D)

pesquisaparainovacao.fapesp.br/english

- 50 newsletters produced in 2020.
- 57,399 visits to the site (+17%).
- 390 content reproductions in Brazilian media (373) and foreign media (17).
- 15,000 subscribers (FAPESP mailing). The newsletter is also distributed to CIESP/FIESP, SIMPI, EMBRAPII, ANPROTEC, CNPEN, EMBRAPA, CTA, ABFIN, Supera Parque (RP) and CIETEC, among other partners.

VISUAL MEDIA

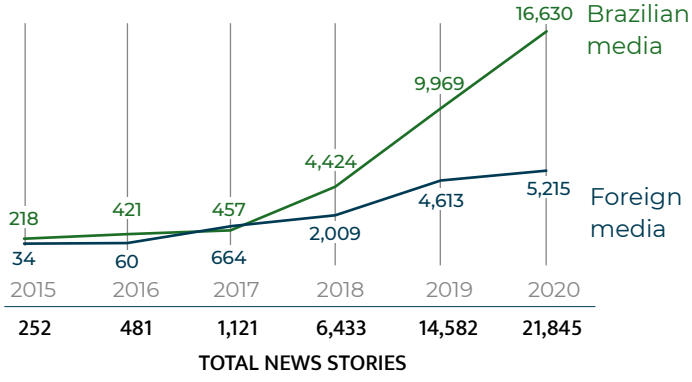
- **Ciência Aberta ("Open Science"):** A webcast produced in partnership with Folha de S. Paulo. Recordings stopped in 2020 owing to the coronavirus pandemic. 17 programs were produced between the launch in 2018 and December 2019.
- 46 episodes of the series **Ciência SP** ("São Paulo Science"): one-minute videos on applications of science, research and development in different areas of society.
- 5 episodes of the series **Diário de Campo:** ("Field Diary"): featuring videos, photos and stories by Marcelo Urbano Ferreira and Marly Augusto Cardoso, both scientists affiliated with the University of São Paulo (USP), narrating their expedition to Juruá Valley, Acre State, to collect material with which to study COVID-19 transmission in the region (*see also p. 45 – COVID-19 Special*).
- 38 news stories and 42 videos covering online events in 2020.
- A total of 134 videos were produced in the year, with 1,013,376 views on *Agência FAPESP*'s social media:
  - YouTube: 763,831 views and 23,618 likes
  - Facebook: 149,187 views and 18,485 interactions
  - Twitter: 4,758 views
  - Instagram: 53,497 views

MEDIA RELATIONS

- Content from Agência FAPESP used by media outlets for 21,845 news stories in 2020.
- Foreign media: content used for 5,215 news stories (+13%) – 2,170 via news agencies, 2,581 via EurekAlert, 464 via Dicyt.
- Brazilian media: 16,630 news stories carried (+67%).
- 131news releases posted to EurekAlert: more than 539,000 pageviews.

CHART 10

NEWS STORIES BASED ON EDITORIAL SUGGESTIONS BY PRESS OFFICE

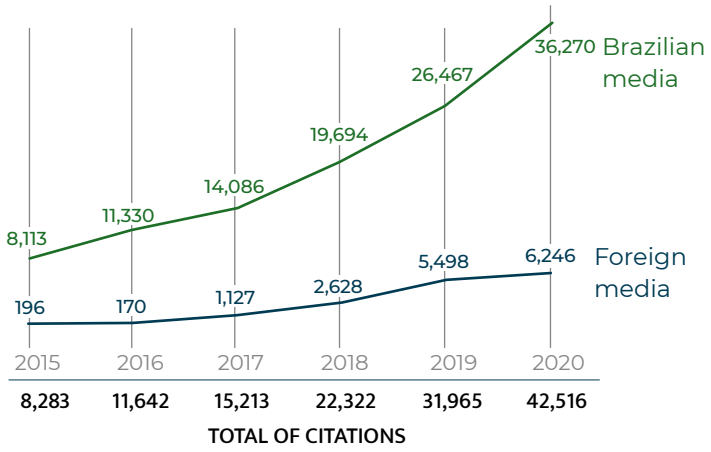


FAPESP'S VISIBILITY IN THE MEDIA

In 2020, Brazilian and foreign media outlets published 42,500 news stories relating to research or researchers supported by FAPESP and other subjects associated with it, for an increase of 33% compared with 2019. 75% of the stories mentioned FAPESP, while 8% did not.

CHART 11

ANNUAL CHANGE IN MEDIA CITATIONS OF FAPESP



- 42,516 news stories about FAPESP:
  - 6,246 carried by 2,759 media outlets in 93 countries.
  - 36,270 carried by 5,844 media outlets in Brazil.
  - 3,744 in major media outlets in terms of circulation or audience share, such as UOL (457), Folha.com and FSP (424), Estadao.com and OESP (375), G1 (148), TV Globo (54), Globo News (10).

  Increase in media coverage compared with 2019, especially regarding research relating to COVID-19 and technological innovations: +174% in Latin America and the Caribbean, +39% in Asia, +28% in Oceania, +7% in Europe.

MEDIA COVERAGE OF FAPESP ("FAPESP NA MÍDIA" website)

Brazilian and foreign media coverage of FAPESP's activities can be seen on the website "FAPESP na Mídia", which contains a searchable catalogue of over 221,000 news stories published since 1999. The site recorded 101,600 unique visitors in 2020. This database serves as the raw material for FAPESP's media coverage statistics and analysis, as well as a daily electronic clipping service for internal use. The cataloguing procedure includes the FAPESP grant numbers corresponding to the research projects mentioned, so that links to the news stories can also be included on the Virtual Library (BV) pages presenting projects and researchers.

COMMUNICATING SCIENCE TO THE PUBLIC

MOST WIDELY CITED OR REPRODUCED NEWS STORIES IN 2020

TABLE 33

BRAZILIAN MEDIA

Top 10 news stories in terms of media coverage

Repercussão/ Nº	Título
721	Technology used to sequence coronavirus in Brazil will enable scientists to monitor epidemic in real time (https://agencia.fapesp.br/32656)
597	São Paulo-based company develops fabric that eliminates novel coronavirus by contact (https://agencia.fapesp.br/33568)
569	Novel molecules display potent and selective action against ovarian tumor cells (https://agencia.fapesp.br/32396)
563	Brazilian scientists are developing a vaccine against the new coronavirus (https://agencia.fapesp.br/32761)
539	Antibodies to treat COVID-19 will be developed in laboratory (https://agencia.fapesp.br/33052)
435	Study proves that novel coronavirus harms brain and details its effects on nerve cells (https://agencia.fapesp.br/34404)
435	Less expensive, more effective pneumonia vaccines are tested in humans (https://agencia.fapesp.br/32835)
434	Novel coronavirus can infect human neurons (https://agencia.fapesp.br/33146)
399	Sequencing identifies different genomes in two Brazilian coronavirus cases (https://agencia.fapesp.br/32655)
358	With SARS-CoV2 prevalence of 66%, Amazonia's largest city may have reached herd immunity (https://agencia.fapesp.br/34291)

TABLE 34

FOREIGN MEDIA

Top 10 news stories in terms of media coverage

Repercussão/ Nº	Título
409	With SARS-CoV-2 prevalence of 66%, Amazonia's largest city may have reached herd immunity (https://agencia.fapesp.br/34291)
337	Use of anticoagulant medication leads to 70% reduction in cell infection by novel coronavírus (https://agencia.fapesp.br/33200)
288	How stress make your hair turn grey (https://www.eurekalert.org/pub_releases/2020-01/fda-sef012120.php)
239	São Paulo-based company develops fabric that eliminates novel coronavirus by contact (https://agencia.fapesp.br/33568)
194	Plastic film used to protect foods and surfaces inactivates novel coronavírus (https://pesquisaparainovacao.fapesp.br/1639)
143	Study proves that novel coronavirus harms brain and details its effects on nerve cells (https://agencia.fapesp.br/34404)
143	Researchers develop flat lens a thousand times thinner than a human hair (https://www.eurekalert.org/pub_releases/2020-08/fda-rdf082420.php)
100	Saliva Helps Predict Excess Body Fat in Youth (https://www.eurekalert.org/pub_releases/2020-02/fda-scb021720.php)
97	Nuovo gel a base di amido di manioca permette stampa 3D di alimenti (https://www.eurekalert.org/pub_releases/2020-12/fda-rci120320.php)
75	Hybrid fungus involved in lung infections discovered (https://www.eurekalert.org/pub_releases/2020-07/fda-rdh071720.php)

EVENTS

www.fapesp.br/eventos

- Between January 1 and March 25, 2020, FAPESP held **10** events attended in person by **446** people. From then on, a total of **62** events were held entirely on line owing to the COVID-19 pandemic.
- **11,602** people watched the events while they were streamed live, and **33,249** watched the recordings, for a total of **44,851** viewings.
- The 1st FAPESP COVID-19 Research Webinar had the largest audience. The title of this event was "Reproduction number, government response and limited testing: international experiences", and it was held on May 21, 2020, with **9,2 mil** views (*see also p. 45 – COVID-19 Special*).

FAPESP PORTAL

www.fapesp.br/en

A new version of the FAPESP Portal was launched in September 2020. The portal is the main interface between FAPESP and the general public, offering information on rules and regulations, funding lines, scholarship opportunities, agreements, and pages on many programs, events and institutional publications, among other items. It also provides access to other FAPESP sites, such as Agência FAPESP, Pesquisa FAPESP, Pesquisa para Inovação, and FAPESP na Mídia.

In 2020, FAPESP launched its COVID-19 site (https://covid19.fapesp.br/en) – with information on research projects and new technologies to combat COVID-19, news, videos on research results, and the FAPESP COVID-19 Research Webinar calendar and archive, among other science and technology initiatives relating to the disease and SARS-CoV-2.

- **18.1 million** visits to FAPESP Portal (home page and all hosted sites) in 2020.

COMMUNICATING SCIENCE TO THE PUBLIC

PUBLICATIONS

www.fapesp.br/publications

Editorial production (writing, editing, revising, graphic design and art editing) of books, reports, booklets on the research programs funded by FAPESP with abstracts of research projects, folders, leaflets, advertisements, invitations and banners, among others.

- 11 publications (books, reports, booklets and research program folders produced in 2020).
- 301 communication pieces (invitations, social media posts, screens for YouTube and platform relating to 72 events, banners, certificates, templates and logos, among others).

VIRTUAL LIBRARY (BV)

www.bv.fapesp.br/en

bv-cdi fapesp

- 4.7 million unique visits in the year.
- 256,089 records on grants, scholarships and fellowships funded by FAPESP between 1992 and 2020.
- 39,500 records on research projects available in the retrospective database (1962-91).
- More than 160,000 scientific and academic publications associated with research projects funded by FAPESP.
- 514 projects funded by FAPESP indexed by the International Alzheimer's and Related Dementias Research Portfolio (IADRP), created by the US National Institutes of Health (NIH) to index research projects supported by public and private funders worldwide.
- Launch of BV's page on COVID-19 with information referring to approximately 245 scholarships and research grants offered by FAPESP and links to scientific publications on the subject issued globally by several publishers.
- Start of the process of production of a page indexing projects funded by FAPESP to the **17 Sustainable Development Goals (SDGs).**

INDICATORS OF SCIENCE, TECHNOLOGY AND INNOVATION IN SÃO PAULO

www.fapesp.br/indicadores

In 2020, the Studies and Indicators Unit presented new indicators of R&D expenditure, including a matrix that associates funding and execution of research and development in São Paulo State.

- Calculation of new indicators of R&D expenditure and dedicated R&D personnel in São Paulo State referring to 2018, from a primary survey conducted in 2019;
- Survey of patents in São Paulo (applications, applicants and partnerships) conducted under a technical cooperation agreement with INPI;
- Survey on indicators of highly qualified human resources conducted under a technical cooperation agreement with Fundação SEADE;
- Collection of information for the "Data" section published monthly in Pesquisa FAPESP magazine;
- Monitoring of the results of Program 1044 – Development of Science and Technology, and its six deliverables, in accordance with the state's 2020-23 Multiyear Plan and Budget Laws;
- CONFAP-CRIS Program: FAPESP represented on ST&I indicator working group responsible for technical studies in compliance with requirements of current research information system (CRIS) for national council of state research funding agencies (CONFAP);
- Updating of ST&I indicators on FAPESP's indicator site (under construction).
- Thematic studies in bibliometrics, including academia-business collaborations;
- Production of a dashboard displaying FAPESP's funding indicators;
- Projects for internal clients in FAPESP.

4

OVERVIEW OF SCHOLARSHIPS, FELLOWSHIPS AND GRANTS

The preceding chapters present indicators according to a segmentation based on funding strategies.

This chapter presents the same data in a manner that provides an overview of total disbursement, new scholarships, fellowships and grants of all types contracted for in 2020, and a breakdown by funding strategy.

OVERVIEW OF SCHOLARSHIPS/FELLOWSHIPS

TABLE 35

SCHOLARSHIPS/FELLOWSHIPS – DISBURSEMENT IN 2020 ($ PPP*)

By types or program and funding strategies

Types \ Funding strategies	Trainning of Human for Research	Basic and Applied Research	Research for Innovation	Research on Strategic Themes	Support for Research Infrastructure	Communicating Science to the public	Total
Regular Scholarships/ Fellowships in Brazil	72,520,156	58,121,602	2,159,865	6,900,727			139,702,350
Scientific Initiation (SI)	7,222,372	1,867,676	94,055	179,634			9,363,737
Master's (MS)	8,067,303	3,731,935	172,629	505,001			12,476,868
Doctorate (DR)	26,650,565	9,879,825	283,708	1,086,211			37,900,309
Direct Doctorate (DD)	4,717,011	4,668,258	58,778	294,205			9,738,252
Postdoctorate (PD)	25,862,905	37,973,908	1,550,695	4,835,676			70,223,184
Regular Scholarships/ Fellowships Abroad	25,541,537	12,784,801	224,270	2,392,832			40,943,440
Research Fellowships Abroad (RFE) - PD	5,958,877	959,460		60,441			6,978,778
Research Internships Abroad (RIA)	19,582,660	11,825,341	224,270	2,332,391			33,964,662
RIA - SI	198,662	40,140		19,394			258,196
RIA - MS	885,982	355,974		39,186			1,281,142
RIA - DR	7,872,254	2,693,969		173,521			10,739,744
RIA - DD	1,148,818	757,523	9,738	43,682			1,959,761
RIA - PD	9,476,944	7,977,735	214,532	2,056,608			19,725,819
Subtotal	**98,061,693**	**70,906,403**	**2,384,135**	**9,293,559**			**180,645,790**
Fellowships – Trainning		4,073,068	4,146,803	1,126,072	31,904	9,404	9,387,251
Fellowships – Technical Trainning		3,988,576	4,146,803	917,364		9,404	9,062,147
Fellowships – Scientific Journalism		84,492		208,708	31,904		325,104
Research Fellowships (Programs)		3,256,294	5,135,642	499,271			8,891,207
PE Fellowships			5,135,642	-			5,135,642
Public Education Fellowships		23,529		144,016			167,545
Young Investigators Fellowships		3,232,765		148,627			3,381,392
BIOEN Fellowships				76,126			76,126
Global Climate Change Fellowships				54,376			54,376
eScience Fellowships				76,126			76,126
Total	**98,061,693**	**78,235,765**	**11,666,580**	**10,918,902**			**198,924,248**

Small diferences in subtotals may be occur due to rounding. * Source: https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

TABLE 36

SCHOLARSHIPS/FELLOWSHIPS – NUMBER OF PROJECTS CONTRACTED FOR IN 2020

By types or program and funding strategies

Types \ Funding strategies	Trainning of Human for Research	Basic and Applied Research	Research for Innovation	Research on Strategic Themes	Support for Research Infrastructure	Communicating Science to the public	Total
Regular Scholarships/ Fellowships in Brazil	2,310	1,082	61	106	1		3,560
Scientific Initiation (SI)	1,616	352	27	25			2,020
Master's (MS)	271	138	9	15			433
Doctorate (DR)	234	115	8	13			370
Direct Doctorate (DD)	82	112	2	9			205
Postdoctorate (PD)	107	365	15	44	1		532
Regular Scholarships/ Fellowships Abroad	247	125	1	16			389
Research Fellowships Abroad (RFE) - PD	50	5		2			57
Research Internships Abroad (RIA)	197	120	1	14			332
RIA - SI	28	5		1			34
RIA - MS	31	7		3			41
RIA - DR	86	27		5			118
RIA - DD	17	17		1			35
RIA - PD	35	64	1	4			104
Subtotal	**2,557**	**1,207**	**62**	**122**	**1**		**3,949**
Fellowships – Trainning		445	306	125	1	1	878
Fellowships – Technical Trainning		438	306	115		1	860
Fellowships – Scientific Journalism		7		10	1		18
Research Fellowships (Programs)		28	135	45			208
PE Fellowships			135				135
Public Education Fellowships		6		38			44
Young Investigators Fellowships		22		2			24
BIOEN Fellowships				2			2
Global Climate Change Fellowships				1			1
eScience Fellowships				**2**			**2**
Total	2,557	1,680	503	292	2	1	5,035

OVERVIEW OF GRANTS

TABLE 37

GRANTS – DISBURSEMENT IN 2020 ($ PPP*)

By types or program and funding strategies

Types \ Funding Strategies	Basic and Applied Research		Research for Innovation	Research on Strategic Themes	Support for Research Infrastructure	Communicating Science to the Public	Total
	Long-term research	Regular Grants not associated to other grants					
Regular Research Grants[1]	2,658,880	41,093,053	51,252	162,169		5,936,499	49,901,853
Research Grants	74,451,135		30,456,372	11,911,109	56,442,658	596,427	173,857,70
Thematic	40,291,071						40,291,071
Special Projects	12,066,855					596,427	12,663,282
SPEC	1,036,257						1,036,257
Young Investigators - Phase 1	7,837,156			168,944			8,006,100
Young Investigators - Phase 2	2,076,222			131,489			2,207,711
RIDC's	11,143,574						11,143,574
PITE			1,438,642				1,438,642
PIPE			24,239,282				24,239,282
ERC/ARC			4,683,899				4,683,899
Intellectual Property (PAPI-Nuplitec)			94,549				94,549
BIOTA				2,100,572			2,100,572
BIOEN				2,173,488			2,173,488
Global Climate Change				2,873,686			2,873,686
eScience & Data Science				173,942			173,942
Institutional Development Plan for State Research Institutions (RIs)				2,915,140			2,915,140
Public Policies (PPP)				1,316,361			1,316,361
PP-SUS				2,069			2,069
Public Education				55,418			55,418
Multi-user Equipment					21,678,343		21,678,343
Equipment Repair					1,567,195		1,567,195
REDNESP					19,658,772		19,658,772
Technical Reserves Institutional Research Infrastructure					12,440,946		12,440,946
TR Program Coordinator					158,959		158,959
TR Connectivity of REDNESP					938,443		938,443
Research Grants Subtotal	**77,110,015**	**41,093,053**	**30,507,624**	**12,073,278**	**56,442,658**	**6,532,926**	**223,759,554**
Innovation District (FIPE)			394,686				394,686
Others (Contracts)[2]						241,854	241,854
Total	77,110,015	41,093,053	30,902,310	12,073,278	56,442,658	6,774,780	224,396,094

[1] Regular research grants comprise Research Grants – Regular, Grants for Meeting Organization, Grants for Participation in Meetings, Publication Grants, and Visiting Researcher Awards. [2] Scientific reports on research supported by FAPESP archived in physical form by Iron Mountain. Small differences in subtotals may occur due to rounding.

* Source: https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm

TABLE 38

GRANTS – NUMBER OF PROJECTS CONTRACTED FOR IN 2020

By types or program and funding strategies

Types \ Funding Strategies	Basic and Applied Research		Research for Innovation	Research on Strategic Themes	Support for Research Infrastructure	Communicating Science to the Public	Total
	Long-term research	Regular Grants not associated to other grants					
Regular Research Grants[1]	115	1,231	7	15			1,368
Research Grants	89	0	246	53	235	1	624
Thematic	58						58
Special Projects						1	1
SPEC	4						4
Young Investigators - Phase 1	27			3			30
PITE			4				4
PIPE			237				237
ERC/ARC			3				3
Intellectual Property (PAPI-Nuplitec)			2				2
BIOTA				23			23
BIOEN				7			7
Global Climate Change				6			6
eScience & Data Science				6			6
Public Policies (PPP)				5			5
Public Education				3			3
Multi-user Equipment					51		51
Equipment Repair					77		77
REDNESP					1		1
Technical Reserves Institutional Research Infrastructure					95		95
TR Program Coordinator					2		2
TR Connectivity of REDNESP					9		9
Total	204	1,231	253	68	235	1	1,992

[1] Regular research grants comprise Research Grants – Regular, Grants for Meeting Organization, Grants for Participation in Meetings, Publication Grants, and Visiting Researcher Awards.

5

PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

- Institutional funding instruments
- Partnerships with higher education and research institutions
- Research funding agencies and bodies
- Companies
- Most frequent destinations and origins of scholarship/ fellowship awardees in 2020
- FAPESP Week
- Map of cooperation with funding agencies and academic organizations
- Map of research collaboration with companies

PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

FAPESP promotes research collaboration in Brazil and abroad to strengthen and broaden the domestic and global impact of the science produced in São Paulo State. As well as fostering collaboration by means of institutional instruments in a continuous flow, FAPESP enters into co-funding agreements with higher education and research institutions, funders, and companies. Some agreements require the partner organization to transfer its share of the funding to FAPESP in order for disbursement to happen. Others call for the partner to transfer its share of funding directly to the institution that will host the research project supported.

The amounts transferred in 2020 are detailed in Tables 52 and 52a at **www.fapesp.br/relatorio2020**. Tables 53 and 54 show the change in disbursements and new cross-border collaborations in the last five years.

In 2020, FAPESP supported 3,840 collaborative research projects: 2,392 projects were co-funded, for a total of $ PPP 47.901 million, and 1,448 projects were funded solely by FAPESP, for a total of $ PPP 42.963 million.

TABLE 39

DOMESTIC AND INTERNATIONAL PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

Disbursement, number of active projects and new projects contracted for in 2020, including scholarships/fellowships and grants associated

Collaborative research/ type partner organization	Disbursement from FAPESP ($ PPP)	Active projects	New project contracted
Institutional funding instruments[1]	42,963,395	1,448	541
Higher education and research institutions[2]	843,063	247	82
Research funding agencies[3]	38,196,317	1,909	517
Companies[4]	8,861,248	236	91
Total	90,864,023	3,840	1,231

1 Disbursement by FAPESP for projects funded via continuous flow institutional instruments, in Brazil and abroad.
2 Disbursement by FAPESP for projects co-funded by higher education institutions and scientific and technological research institutions.
3 Disbursement by FAPESP for projects co-funded by international and multilateral funding agencies and by domestic partners: CAPES, CNPq, FINEP, MCTIC, FAPs, APAE, FMCSV, São Paulo State Department of Government, EMBRAPII and SEADE.
4 Disbursement by FAPESP for projects co-funded by Brazilian and foreign companies.

INSTITUTIONAL FUNDING INSTRUMENTS

In 2020, FAPESP disbursed $ PPP 42.963 million to fund 1,448 projects supported by means of its institutional funding instruments. Out of this total, $ PPP 41.547 million went to Research Internships Abroad (RIA) ranging from scientific initiation to postdoctoral, and Research Fellowships Abroad (RFA) at the postdoctoral level; Grants to fund visits by researchers from abroad to São Paulo to deliver courses or contribute to research groups; and Grants to fund participation by researchers from São Paulo in scientific meetings held abroad. Funding for visits by researchers from other parts of Brazil and participation in or organization of scientific meetings in Brazil accounted for a further $ PPP 1.416 million. Investment in scientific exchanges fell 43.5% compared with 2019 because of the mobility restrictions imposed to combat the COVID-19 pandemic.

TABLE 40

CONTINUOUS FLOW INSTITUTIONAL INSTRUMENTS (FUNDING SOLELY BY FAPESP)

Disbursement, number of active projects and new projects contracted for in 2020, including scholarships/fellowships and grants associated

Funding Strategies	Disbursement ($ PPP)	Active projects	New project contracted
Domestic scientific exchange	**1,416,456**	**76**	**82**
Basic and Applied Research	1,304,920	74	82
Research on Strategic Themes	111,536	2	0
Cross-border scientific exchange	**41,546,939**	**1,372**	**459**
Training of Human Resources for Research	25,393,210	873	245
Basic and Applied Research	13,533,969	437	194
Research for Innovation	224,270	7	2
Research on Strategic Themes	2,395,490	55	18
Total	42,963,395	1,448	541

PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

PARTNERSHIPS WITH HIGHER EDUCATION AND RESEARCH INSTITUTIONS

FAPESP has stepped up research collaboration by issuing joint calls for proposals with higher education and research institutions in Brazil and abroad. Research funding is shared between the parties in these cases.

In 2020, 92 cooperation agreements were active with 107 foreign institutions and two domestic institutions – 4 were signed during the year – and 247 projects with 52 foreign institutions were in progress under these agreements. Most were associated with Regular Research Grants, and 82 were contracted for during the year. FAPESP's contribution to the funding for these projects amounted to $ PPP 843,062, with partner institutions contributing matching amounts.

The list of partners and a map showing their locations on all continents can be found on pp. 160-163.

TABLE 41

PARTNERSHIPS WITH HIGHER EDUCATION AND RESEARCH INSTITUTIONS, BY FUNDING STRATEGY

Disbursement, number of active projects and new projects contracted for in 2020, including scholarships/fellowships and grants associated

Funding strategies	Disbursement from FAPESP ($ PPP)	Active projects	New projects contracted
Cross-border partnerships			
Basic and Applied Research	692,772	222	68
Research for Innovation	0	4	4
Research on Strategic Themes	95,653	19	8
Training of Human Resources for Research	54,637	2	2
Total	843,062	247	82

RESEARCH FUNDING AGENCIES

In 2020, 100 research co-funding agreements were active. Three were signed during the year. 75 of the agreements were with foreign funders and 21 with Brazilian funders. In addition, 18 agreements were with multilateral agencies, and seven with domestic research funding associations.

Among the 100 co-funding agreements, 63 (43 cross-border and 20 local) resulted in support for 1,823 projects, mainly via Research Grants – Regular (344), Thematic Projects (80), Scholarships and Fellowships in Brazil (992), and Technical Training Fellowships (223), most of which were aligned with the strategies Training of Human Resources for S&T and Research for Knowledge Advancement.

In Brazil, the following organizations were FAPESP's main partners: CAPES, the Ministry of Education's Higher Research Council, which supplied funding for FAPESP to award master's to postdoctoral scholarships and fellowships; FINEP, the Brazilian Innovation Agency, for joint maintenance of the PIPE/PAPPE Grant program; and the National Council for Scientific and Technological Development (CNPq), in federal initiatives in São Paulo State such as National Institutes of Science and Technology (NISTs), Research for the SUS (PPSUS), the Long Term Ecological Research Program (LTER), and the Training in Taxonomy Program (Protax), among others.

In the same period, the agreement with the Ministry of Science, Technology, Innovation and Communications (MCTIC) and the Brazilian Internet Steering Committee (CGI.br) to support research projects that contribute to the development of the internet in Brazil remained in effect.

FAPESP also supported research projects in partnership with several state research foundations (FAPs), Fundação SEADE, APAE, the São Paulo State Government (via the PitchGov program to help startups develop solutions for the public sector), the Brazilian Industrial Research and Innovation Corporation (EMBRAPII), and the São Paulo State Department of Infrastructure and Environment (SIMA).

PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

FAPESP's share of total investment under co-funding agreements with foreign partners amounted to $ PPP 9.318 million, and under agreements with domestic agencies it contributed $ PPP 28.878 million. To effect disbursement the partners transferred $ PPP 12.505 million to FAPESP. Under the agreements calling for direct transfer of funds to the institutions hosting the projects supported, FAPESP and its partners disbursed similar amounts.

The list of partners and a map showing where the organizations are located on all continents can be seen on pp. 160-163.

TABLE 42

PARTNERSHIPS WITH FUNDING AGENCIES, BY FUNDING STRATEGY

Disbursement, number of active projects and new projects contracted for in 2020, including scholarships/fellowships and grants associated

Funding strategies	Disbursement R$	Active project	
Domestic partnerships	**28,878,347**	**1,385**	
Training of Human Resources for Research	5,711,705	578	
Basic and Applied Research	9,518,482	510	
Research for Innovation	12,607,106	192	
Research on Strategic Themes	1,041,054	91	
Support for Research Infrastructure	0	14	
Cross-border partnerships	**9,317,970**	**524**	
Training of Human Resources for Research	148,327	4	
Basic and Applied Research	7,396,689	416	
Research for Innovation	142,793	15	
Research on Strategic Themes	1,630,161	89	
Total	38,196,317	1,909	

COMPANIES

In 2020, 38 companies funded scientific and technological research under the aegis of FAPESP's programs. 10 companies set up 12 Engineering Research Centers (ERCs) or Applied Research Centers (ARCs) in partnership with FAPESP and higher education and research institutions, where 169 projects were in progress, including 74 new projects contracted for during the year.

FAPESP disbursed $ PPP 4.814 million for ERCs/ARCs with local partners and $ PPP 2.416 million for those with foreign partners.

The ERC/ARC Program requires partner companies to match FAPESP's investment in funding during the life of the agreement, while host institutions match both in the form of laboratory and other infrastructure, salaries for researchers and support personnel etc.

28 other companies are co-funding research via the PITE program. In 2020, 67 projects were ongoing and 17 newly contracted for in the two modalities of the program, PITE Agreements and PITE Spontaneous Demand (see p. 114). FAPESP disbursed $ PPP 1.632 million, of which $ PPP 1.438 million for local partnerships and $ PPP 193,752 for cross-border agreements. FAPESP's percentage share of PITE co-funding depends on the degree of innovation in the proposals and the associated technological risks, ranging from 20% to 70% of the budget.

A list of co-funding companies can be found on pp. 164-165.

TABLE 43

PARTNERSHIPS WITH DOMESTIC AND FOREIGN COMPANIES, BY FUNDING STRATEGY

Disbursement, number of active projects and new projects contracted for in 2020, including scholarships/fellowships and grants associated

Funding strategies	Disbursement from FAPESP ($ PPP)	Active projects	New projects contracted
Research for Innovation			
ERC/ARC	7,229,707	169	74
PITE Agreements	531,082	50	13
PITE Spontaneous Demand	1,100,459	17	4
Total	8,861,248	236	91

PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

DISBURSEMENT BY FAPESP AND PARTNER COMPANIES FOR ERC/ARC AND PITE PROGRAMS – 2020

In 2020, two new ERCs began operating, in partnership with the following institutions:

ERC	Partner company	Partner HE/research institution
Center for Artificial Intelligence (C4AI)	IBM	Center for Innovation (Inova), USP
Brazilian Water Research Center (BWRC)	SANASA/PMC	Institute of Chemistry, UNICAMP

Over the next ten years, investment in the two new centers is projected to reach $ PPP 72.947 million, of which $ PPP 16.092 million will be disbursed by FAPESP and $ PPP 17.591 million by the partner companies, with the host higher education and research institutions contributing $ PPP 39.264 million in researchers' and technicians' salaries, facilities, equipment and infrastructure.

In 2020, 12 ERCs were up and running under agreements with 10 companies: Peugeot-Citroën, Natura, GSK (2, with a third in the selection stage), Shell (2, with four research divisions), EMBRAPA, Equinor (formerly Statoil), Koppert, Grupo São Martinho, IBM, and SANASA.

FAPESP's disbursement for ERCs and ARCs totaled $ PPP 7.230 million in 2020, while the companies concerned invested $ PPP 7.230 million and the host institutions contributed $ PPP 14.460 million, taking estimated total investment to $ PPP 28.920 million.

Under the aegis of the PITE program, 4 companies transferred to FAPESP a total of $ PPP 277,421 as their share in disbursement for projects: Agilent, IBM Brazil, Microsoft and SABESP (see Tables 52 and 52a at **www.fapesp.br/relatório2020**). The rest transferred funds directly to the host institutions.

MOST FREQUENT DESTINATIONS AND ORIGINS

DESTINATIONS OF 330 RIA AWARDEES	
Europe	216
North America	101
Oceania	5
Latin America & Caribe	4
Asia	3
Africa	1

DESTINATIONS OF 57 RFA AWARDEES	
Europe	26
North America	27
Latin America & Caribe	2
Oceania	2

PARTICIPATION IN 46 SCIENTIFIC MEETINGS	
Europe	20
North America	17
Latin America & Caribe	5
Asia	2
Africa	2

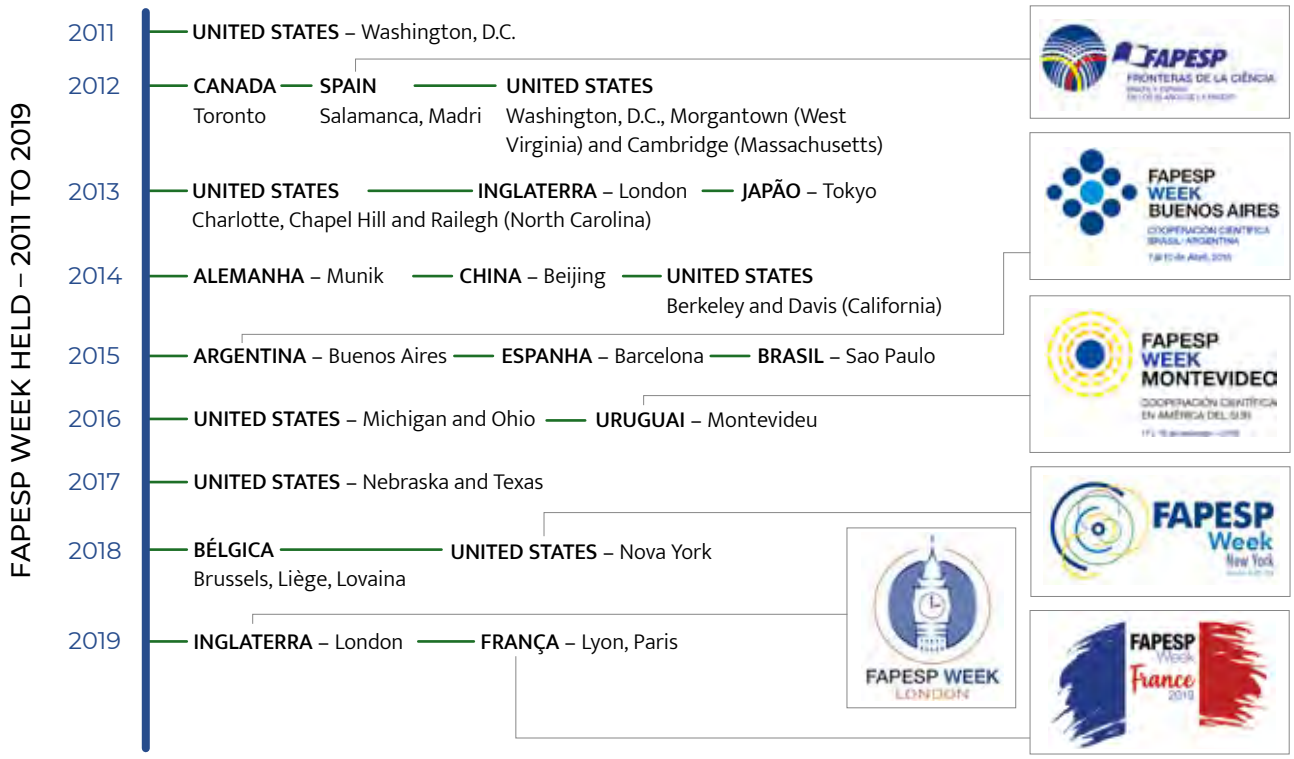
ORIGINS OF 26 VISITING RESEARCHERS	
Europe	13
North America	6
Oceania	2
Latin America & Carib	1
Asia	3
Africa	1

ORGANIZATION OF INTERNATIONAL SCIENTIFIC MEETINGS
1 reunião realizada com organização da África

SCHOLARSHIPS AND FELLOWSHIPS AWARDED UNDER COOPERATION AGREEMENTS WITH
2 organizações da Itália

FAPESP WEEK

FAPESP Week would have reached its 20th edition in 2020 but did not take place because of the COVID-19 pandemic. Since 2011, FAPESP Week scientific symposia have helped create an environment for scientific collaboration between Brazilian and foreign researchers with shared or complementary interests.



PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

FUNDING AGENCIES AND ACADEMIC ORGANIZATIONS

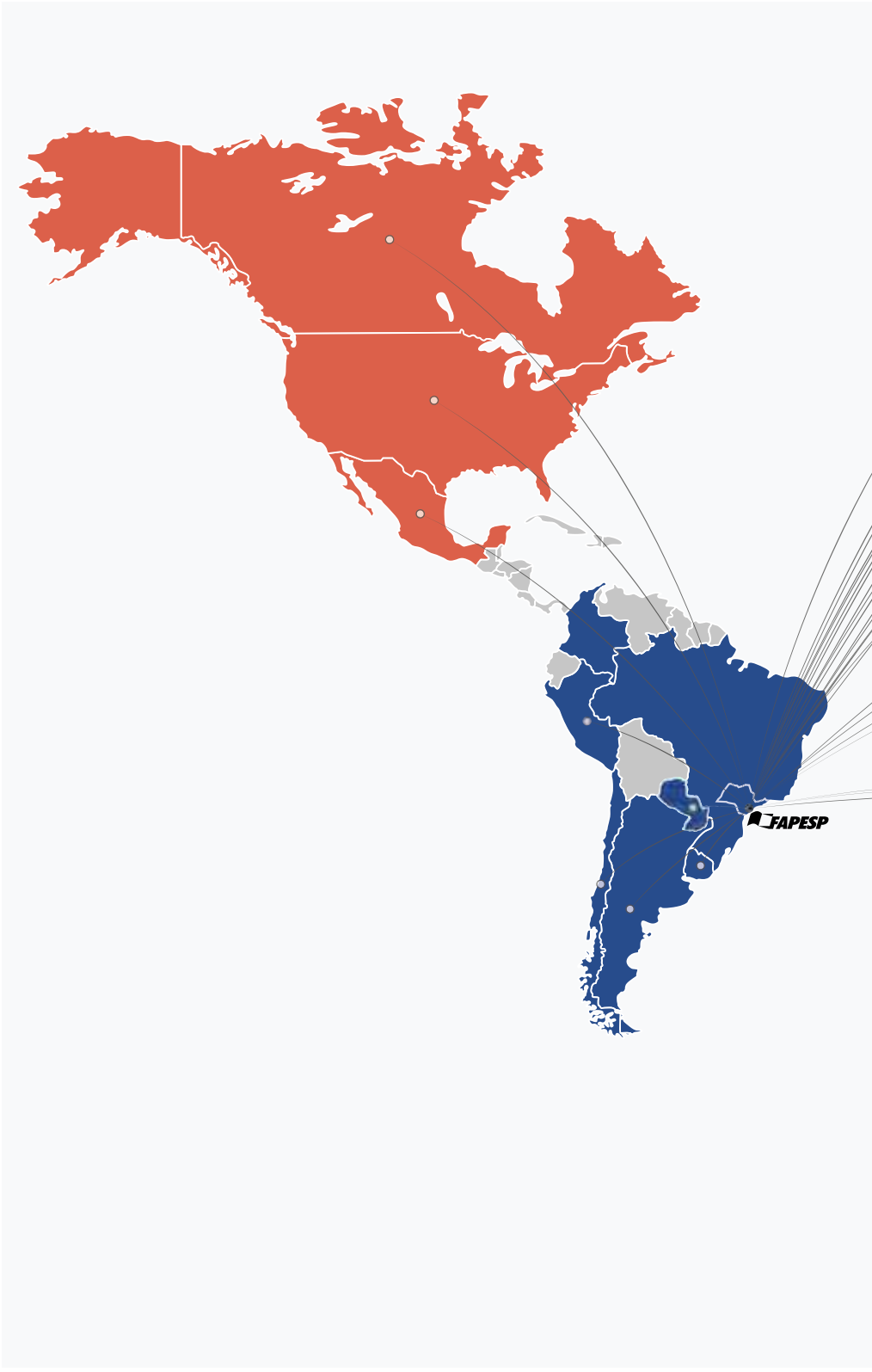
ACADEMIC ORGANIZATIONS:

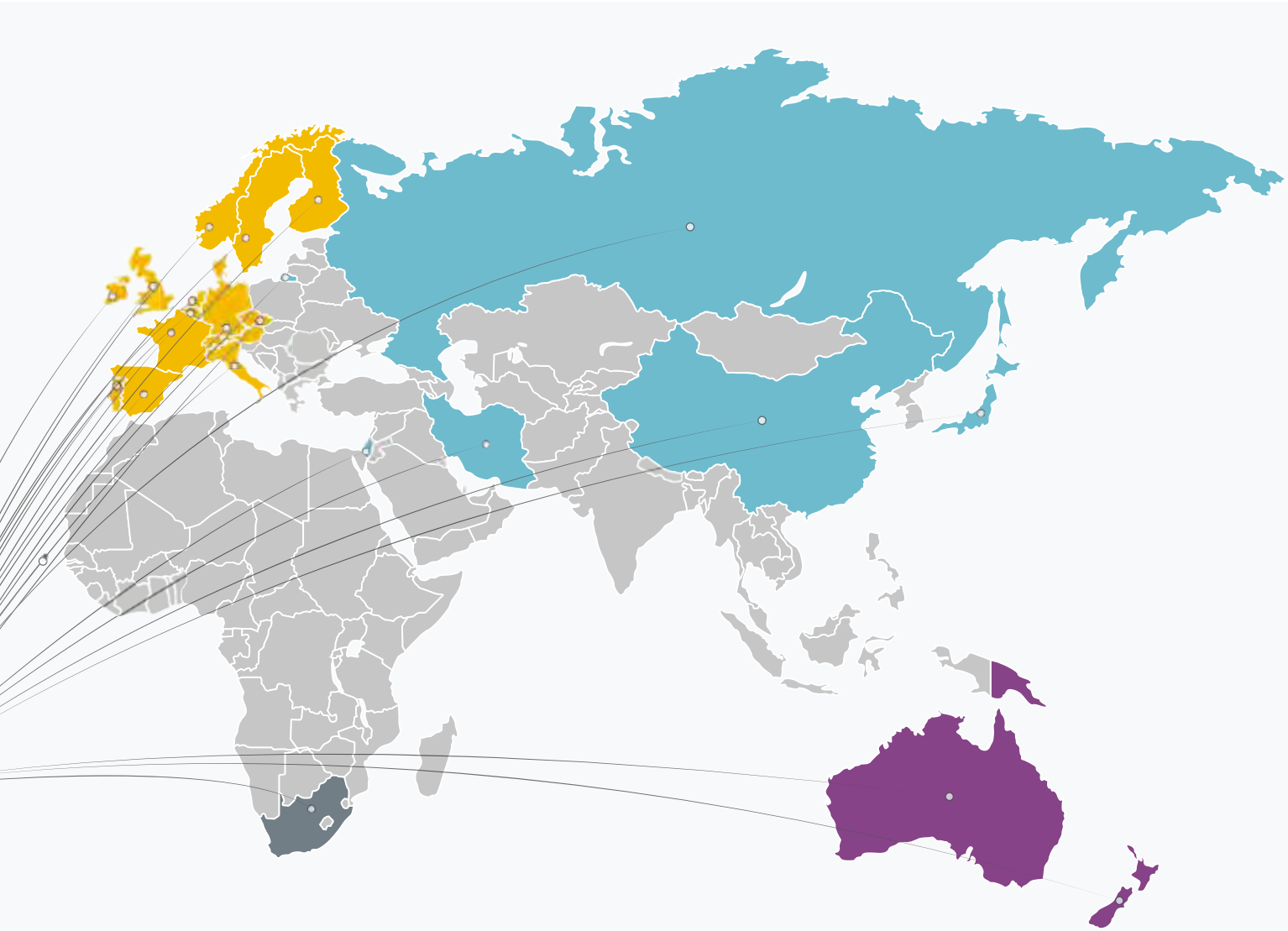
- 92 active agreements with:
  - 90 foreign institutions and 2 local institutions

FUNDING AGENCIES:

- 100 active agreements with:
  - 75 agencies (54 foreign and 21 local);
  - 18 multilateral organizations;
  - 7 local associations.

The organizations and companies with which FAPESP had agreements in 2020 are listed on pp. 162-163 and pp. 164-165 respectively.





AFRICA
3 organizations in 3 countries

NORTH AMERICA
31 organizations in 3 countries

SOUTH AMERICA
39 organizations in 6 countries

ASIA
13 organizations in 6 countries

EUROPE
80 organizations in 17 countries

OCEANIA
8 organizations in 2 countries

AGENCIES AND ACADEMIC INSTITUTIONS IN 2020

AFRICA

SOUTH AFRICA
- ❖ National Research Foundation (NRF)

CABO VERDE
- ❖ Ministério da Educação Superior, Ciência e Inovação (MESCI)

MOZAMBIQUE
- ❖ Fundo Nacional de Investigação (FNI)

NORTH AMERICA

CANADA
- ❖ Canada's International Development Research Centre (IDRC)
- ● Carleton University
- ● Consortium Alberta, Laval, Dalhousie and Ottawa (CALDO)
- ❖ Natural Sciences and Engineering Research Council of Canada (NSERC)
- ❖ National Research Council of Canada (NRC)
- ❖ Fonds de Recherche du Quebec (FRQ)
- ● University of Victoria

UNITED STATES
- ● Case Western Reserve University
- ● Columbia Global Centers
- ● Duke University
- ● Emory University
- ● Fermi Research Alliance (Fermilab) 2020
- ❖ Gates Foundation
- ❖ National Institutes of Health (NIH)
- ❖ National Science Foundation (NSF)
- ❖ Programa Dra. Ruth Cardoso (Capes/Fulbright/ Universidade Columbia)
- ● Purdue University
- ● Texas Tech University (TTU)
- ● Texas A&M University (TAMU)
- ● The Scripps Research Institute
- ● University of California San Diego (UCSD)
- ● University of Central Florida
- ● University of Georgia
- ● University of Illinois
- ● University of Maryland
- ● University of Missouri
- ● University of Nebraska – Lincoln
- ● University of North Carolina – Charlotte
- ● University of Virginia
- ● West Virginia University (WVU)

MEXICO
- ❖ Conselho Nacional de Ciência e Tecnologia dos Estados Unidos do México (CONACYT)

SOUTH AMERICA

ARGENTINA
- ❖ Consejo Nacional de Investigaciones Científicas y Técnicas (Conicet)

BRAZIL
- △ Apae de São Paulo
- △ Associação Brasileira da Indústria de Alta Tecnologia de Produtos para a Saúde (Abimed)
- ❖ Associação Brasileira de Pesquisa e Inovação Industrial (Embrapii)
- ❖ Banco Nacional de Desenvolvimento Econômico e Social (BNDES)
- ❖ Centro Alemão de Ciência e Inovação de São Paulo (DWIH)
- ❖ Conselho Nacional das Fundações Estaduais de Amparo à Pesquisa (Confap)
- ❖ Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)
- ❖ Coord. de Aperfeiçoamento de Pessoal de Nível Superior (Capes)
- ❖ Embaixada do Reino Unido da Grã-Bretanha e da Irlanda do Norte
- ❖ Financiadora de Estudos e Projetos (Finep)
- ❖ Fundação de Amparo à Pesquisa do Estado do Amazonas (Fapeam)
- ❖ Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão (Fapema)
- ❖ Fundação de Amparo à Pesquisa e Inovação do Espírito Santo (Fapes)
- ❖ Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (Fapesc)
- ❖ Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco (Facepe)
- ❖ Fundação de Apoio à Pesquisa do Estado da Paraíba (Fapesq)
- ● Fundação Getúlio Vargas (FGV)
- ❖ Fundação Maria Cecília Souto Vidigal
- △ Instituto de Estudos de Saúde Suplementar (IESS)
- △ Fundação Sistema Estadual de Análise de Dados (Seade)
- △ Instituto Euvaldo Lodi (IEL/SP)
- ● Instituto Nacional de Pesquisas Espaciais (Inpe)
- ❖ Ministério da Ciência, Tecnologia e Inovações
- ❖ Prefeitura Municipal de Jundiaí
- ❖ Secretaria de Governo do Estado de São Paulo
- ❖ Secretaria do Meio Ambiente do Estado de São Paulo
- ❖ Secretaria Municipal de Inovação e Tecnologia de São Paulo
- ❖ Secretaria Municipal de Saúde de São Paulo
- △ Sindicato das Empresas de Compra, Venda, Locação e Administração de Imóveis Residenciais e Comerciais de São Paulo (Secovi-SP)
- △ União dos Produtores de Bioenergia (Udop)

CHILE
- ❖ Comisión Nacional de Investigación Científica y Tecnológica (Conycit)
- ● Universidad de la Frontera
- ● Universidad de Magallanes (UMAG)

COLOMBIA
- ● Universidad de Antioquia
- ❖ Ministério da Ciência, Tecnologia e Inovação (Minciencias)

PARAGUAY
- ❖ Consejo Nacional de Ciencia y Tecnología (Conacyt)

URUGUAY
- ❖ Agencia Nacional de Investigación e Innovación de Uruguay (ANII)
- ● Asociación de Universidades Grupo Montevideo (AUGM)

ASIA

CHINA
- ❖ National Natural Science Foundation of China (NSFC)
- ● Tianjin University (TJU)
- ● Zhejiang University (ZIU)

SOUTH KOREA
- ❖ National Research Foundation of Korea (NRF)

IRAN
- ❖ Iran National Science Foundation (INSF)
- ❖ Cognitive Science and Technology Council of Iran (CSTC)

ISRAEL
- ❖ Matimop
- ● Technion - Instituto de Tecnologia de Israel
- ● The Hebrew University of Jerusalem
- ● Weizmann Institute of Science

JAPAN
- ❖ Japan Science and Technology Agency (JST)
- ● University of Tsukuba

SINGAPORE
- ● National University of Singapure

EUROPE

GERMANY
- ❖ Cornet
- ❖ Deutsche Forschungsgemeinschaft (DFG)
- ❖ DWIH – German House of Science and Innovation
- ● Fraunhofer-Gesellschaft
- ● Friedrich-Alexander-Universität Erlangen-Nürnberg

❖ Research funding agencies ● Higher education and research institutions △ Research fudning associations

- ❖ Bavarian State Ministry of Science and the Arts of the Free State of Bavaria (StMWK)
- ❖ Federal Ministry of Education and Research (BMBF)
- ❖ German Academic Exchange Service (DAAD)
- ● Max Planck Society for the Advancement of Science
- ● Technishe Universität München
- ● Technische Universität Berlin (TU Berlin)
- ● Universität Hamburg

AUSTRIA
- ● Universit of Natural Resources and Life Science
- ● International Institute for Aplied Systems Analysis

BELGIUM
- ❖ Eureka Network
- ❖ Fonds de la Recherche Scientifique (F.R.S.- FNRS)
- ❖ Research Foundation - Flanders (FWO)

DENMARK
- ❖ Danish Agency for Science and Higher Education (DAFSHE)
- ❖ Innovation Fund Denmark (ex-DCSR)
- ● University of Copenhagen

SPAIN
- ❖ Centro para el Desarrollo Tecnologico Industrial (CDTI)
- ❖ Secretaría de Estado de Investigación, Desarrollo e Innovación (SEIDI)
- ● Universidad Miguel Hernandéz de Elche
- ● Universidad de Salamanca

FINLAND
- ❖ Academy of Finland (AKA)

FRANCE
- ❖ Agence Nationale de la Recherche (ANR)
- ❖ Centre National de la Recherche Scientifique (CNRS)
- ● École des Hautes Études en Sciences Sociales
- ● Institut National de la Santé et de la Recherche Médicale (Inserm)
- ● Institut National de Recherche en Informatique et en Automatique (INRIA)
- ● Sorbonne Universités
- ● Université de Lyon
- ● Université Grenoble Alpes

NETHERLAND
- ● BE-BASIC
- ● Delft University of Tecnhnology
- ● Erasmus Universiteit Rotterdam
- ● Leiden University
- ❖ Netherlands Organization for Scientific Research (NWO)
- ● Technische Universiteit Eindhoven (TU/e)

IRELAND
- ❖ Irish Research Council (IRC)

ITALY
- ❖ Consiglio Nazionale delle Richerche (CNR)
- ● Network of Italian Universities
- ● Scuola Normale Superiore
- ● Università di Bologna

NORWAY
- ❖ Research Council of Norway (RCN)

PORTUGAL
- ❖ Fundação para a Ciência e a Tecnologia de Portugal (FCT)

UNITED KINGDOM
- ● Brunel University London
- ❖ British Council/Newton Fund
- ● Cardiff University
- ● Coventry University
- ● Durham University
- ● Imperial College
- ● Keele University
- ● King's College London
- ● Queen Mary University of London
- ● Queen's University of Belfast
- ❖ UK Research and Innovation (UKRI) – BBSRC, NERC, MRC, ESRC
- ❖ UK Academies
- ❖ Royal Academy of Engineering
- ● University of Bath
- ● University of Birmingham
- ● University of Leeds
- ● University of Manchester
- ● University of Nottingham
- ● University of Oxford
- ● University of Southampton
- ● University of Surrey
- ● University of Warwick
- ● University of York

CEZCH REPUBLIC
- ❖ Czech Science Foundation (GACR)
- ❖ Technology Agency of the Czech Republic

RUSSIAN
- ❖ Russian Federation for Basic Research

SWEDEN
- ● Halmstad University
- ● Karolinska Institutet
- ● Linköping University
- ● Lund University
- ❖ Swedish Research Council
- ❖ Swedish Governmental Agency for Innovation Systems (Vinnova)
- ● Uppsala University

SWITZERLAND
- ❖ Swiss National Science Foundation (SNSF)

OCEANIA

AUSTRALIA
- ● Australian National University (ANU)
- ● Australian Technology Network of Universities (ATN)
- ● Deakin University
- ● Macquarie University
- ● Swinburne University of Technology
- ● University of Queensland
- ● University of Wollongong (UOW)

NEW ZELAND
- ● Universities New Zealand, Te Pokai Tara (UNZ)

MULTINATIONAL AGENCIES

- ■ Belmont Forum (IGFA)
- ■ Biodiversa
- ■ EU-CELAC IG - Cooperação Birregional em Ciência, Tecnologia e Inovação
- ■ EU-LIFE
- ■ Earth Biogenome Project (EBP)
- ■ European Research Council (ERC)
- ■ Foundation for Food and Agriculture (FFAR)
- ■ Fundo Global para o Meio Ambiente (GEF)
- ■ Global Alliance for Chronic Diseases (GACD)
- ■ Global Research Collaboration for Infectious Disease Preparedness (GloPID-R)
- ■ GMTO Corporation
- ■ Incobra
- ■ Inter-American Institute for Global Change Research (IAI)
- ■ Inter-American Network of Academies of Science (IANAS)
- ■ M-ERA.NET
- ■ Parceria G3
- ■ Trans-Atlantic Platform for the Social Sciences and Humanities
- ■ União Europeia (Horizon 2020)

PARTNERSHIPS FOR RESEARCH COLLABORATION AND CO-FUNDING

RESEARCH COLLABORATION WITH COMPANIES

PARTNER COMPANIES

- 10 co-funders of Engineering Research Centers (ERCs):

  5 foreign and 5 local

  169 active projects and 74 newly contracted for in the year

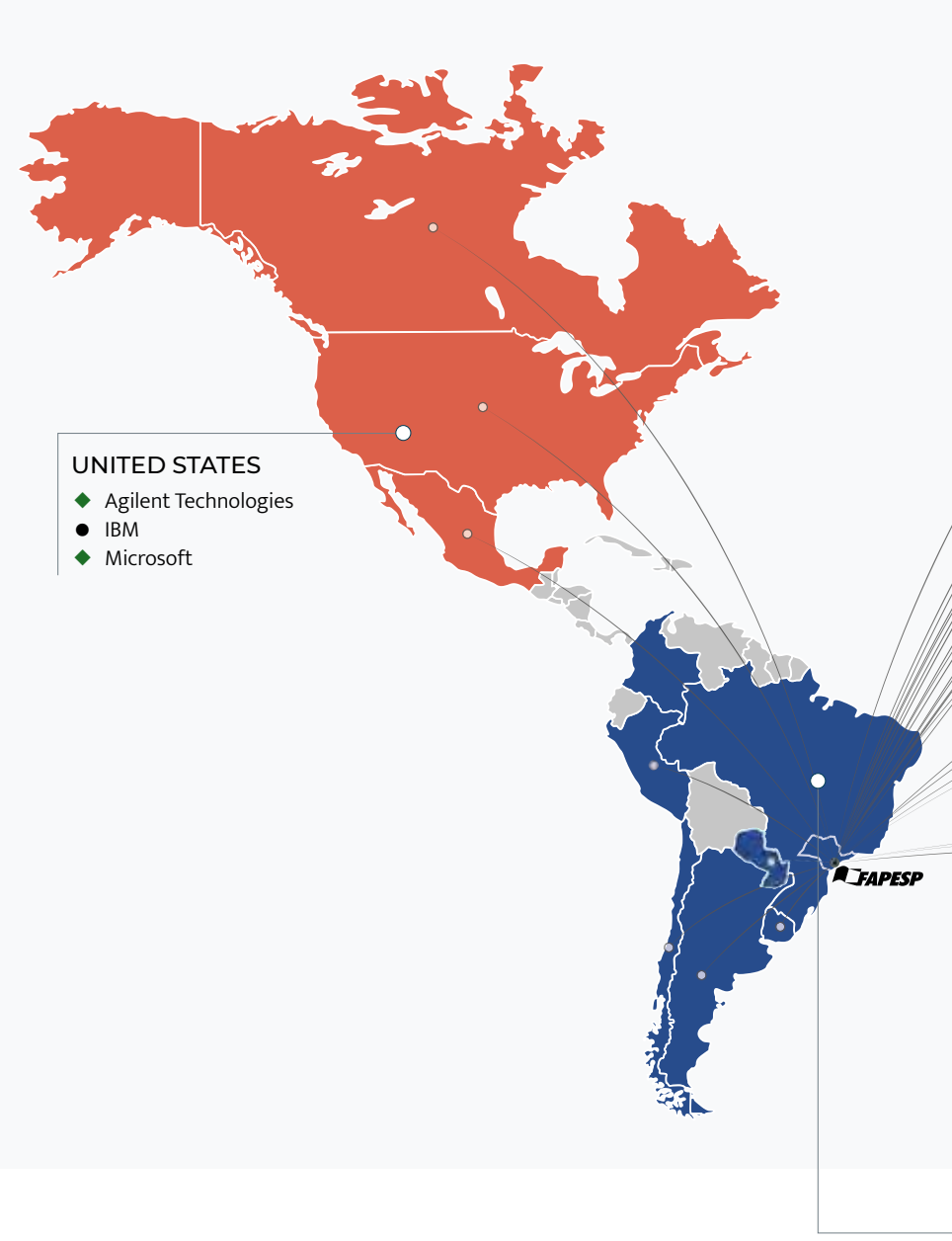
- 19 co-funders under the PITE Agreement program:

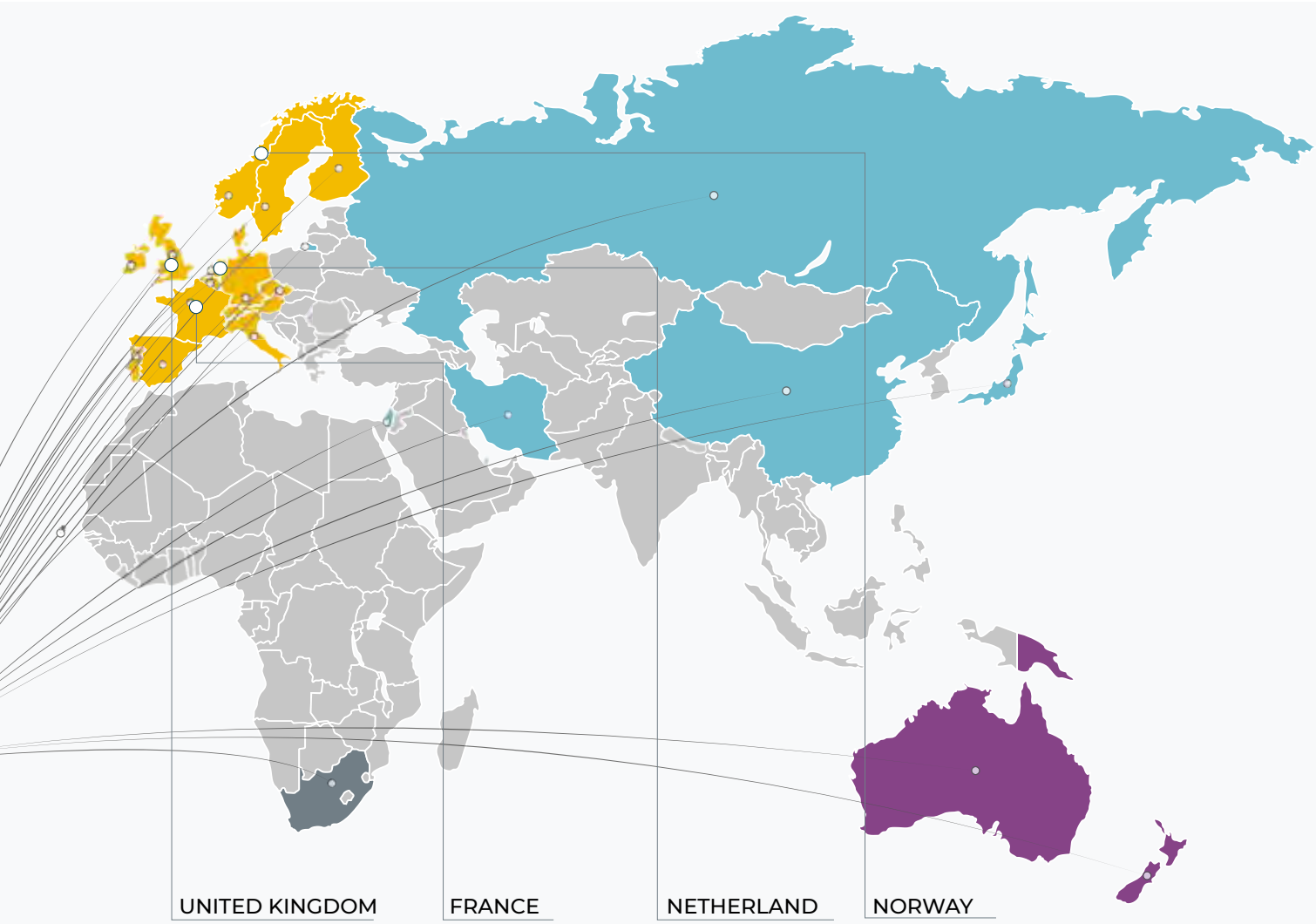
  16 local and 3 foreign

  50 active projects and 13 newly contracted for

- 9 partner companies under the PITE Spontaneous Demand program

  17 active projects and 4 newly contracted for





UNITED KINGDOM

- ◆ AstraZeneca
- ● Shell
- ● GlaxoSmithKline (GSK)

FRANCE

- ● PSA Groupe – Peugeot Citroën

NETHERLAND

- ● Koppert

NORWAY

- ● Equinor

BRAZIL

- ◆ Ananse Química Ltda.
- ◆ Andaraguá S.A.
- ■ bioMérieux Brasil S.A.
- ◆ BioZeus
- ◆ BP Biocombustíveis
- ◆ Braskem
- ■ Companhia Brasileira de Metalurgia e Mineração
- ◆ Citrosuco
- ◆ Copag
- ◆ Embraer
- ● Embrapa
- ■ EMS S.A.
- ◆ Fundação Biominas
- ◆ Fundação Grupo Boticário
- ● Grupo São Martinho
- ◆ IBM Brasil
- ■ Infibra S.A.
- ◆ Inform. de Municípios Associados (IMA)
- ◆ Intel Semicondutores do Brasil
- ■ Maiz Indústria e Comércio de Produtos Agropecuários Ltda.
- ■ Medicines for Malaria Venture
- ● Natura
- ■ Proteca Biotecnologia Florestal Ltda.
- ◆ Sabesp
- ● Sanasa
- ◆ Solvay
- ■ Structural Genomics Consortium
- ◆ Vale

FAPESP'S TOTAL INCOME AND EXPENDITURE IN 2020

FAPESP's budget execution in 2020 is summarized below. The funding activities described in the Report, as well as the other main items of income and expenditure, are shown on a cash flow basis. FAPESP's complete financial statements on an accrual basis, as required by law, can be found on its website at(https://fapesp.br/balancos).

INCOME	in $ PPP
Transfers from the São Paulo State Treasury	608,122,126
Federal funds	1,721,894
Own income (net)	13,823,113
TOTAL INCOME	**623,667,133**

DISBURSEMENT	
Grants	224,396,095
Scholarships and fellowships	198,924,247
Other expenses associated with grants	13,423,582
Refunds relating to cooperation agreements	60,419
Running costs*	33,620,667
Institutional investment	3,976,880
SUBTOTAL DISBURSEMENT	**474,401,890**
Grants approved but not yet paid at year-end	131,748,357
TOTAL DISBURSEMENT	**606,150,247**
Cash and cash equivalents at year-end	17,516,886

FAPESP's commitments as at December 31, 2020, in terms of grants, scholarships and fellowships already approved and to be disbursed in the years ahead, are shown below.

COMMITMENTS	in $ PPP
Grants	608,467,127
Scholarships and fellowships	179,539,649
TOTAL COMMITMENTS	**788,006,776**

* FAPESP is required by law to limit running costs to 5% of its annual budget, which in 2020 was $ PPP 729,570,914 resulting in a cap of $ PPP 36,478,545.

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