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ANNUAL REPORT
FAPESP

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ANNUAL
REPORT
FAPESP

2018



YEAR 2018

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Márcio França (*April 6th to December 31th*)

SECRETARY OF ECONOMIC DEVELOPMENT, SCIENCE AND TECHNOLOGY

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Marcos Monteiro (*April 18th to 28th*)

Jânio Francisco Benith (*since April 28th*)

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(*August 15th to October 24th*)

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ANNUAL REPORT

SÃO PAULO RESEARCH FOUNDATION (FAPESP)

2018





INTRODUCTION

The São Paulo Research Foundation is pleased to present this Report, which summarizes the activities of FAPESP in 2018 in continuing pursuit of its mission to promote the scientific and technological development of São Paulo State.

2018 was a year of significant political changes in Brazil, accompanied by changing expectations regarding the future of higher education, science and technology. In this setting, FAPESP maintained its strong presence characterized by stability, increased activity in the São Paulo State Science, Technology & Innovation (ST&I) System, and increasing visibility at home and abroad.

In 2018, FAPESP disbursed \$ PPP 599.4 million (in purchasing power parity exchange rate) to support 24,720 research projects, including grants and scholarships/fellowships, in all knowledge areas. It is important to note that ever since FAPESP's inception, scientific advisors to FAPESP's Scientific Directorate, comprising over 9,000 ad hoc reviewers, have subjected all awards to a rigorous merit assessment. These actions lead to the implementation of strategies approved by the Board of Trustees with respect to the Foundation's mission: Training of Human Resources for Research, Basic and Applied Research, Research for Innovation, Strategic Research, Research Infrastructure and Communicating Science to the Public.

These lines of action cover the entire knowledge chain relating to scientific and technological development, including basic research, applied research, and innovation, as well as the training of highly qualified human resources and the empowerment of companies established in São Paulo for research and development.

FAPESP supports the human resources training for research through regular scholarships in Brazil and abroad range from scientific initiation to master's, PhD, and postdoctoral research fellowships, as well as technical training fellowships. More ambitious long-term projects such as Thematic Projects and RIDCs, together with more short-term projects such as regular grants, promote knowledge advancement.

The range of actions is completed by programs focusing on strategic issues and programs designed to support innovation. Programs focusing on strategic issues are proposed by the Foundation to the scientific community and include the FAPESP Bioenergy Research Program (BIOEN), the FAPESP Research Program on Global Climate Change (RPGCC) and the FAPESP Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable



Use (BIOTA-FAPESP), among others. Regarding innovation, FAPESP organizes cooperative research projects with major corporations and directly supports innovative small business.

The highlights of 2018 include the Phase 2 Young Investigator Grant call for proposals, whose remit was to consolidate research lines initiated by FAPESP Young Investigators grantees who had achieved excellence during the development of their projects. The year also saw the renewal, after an assessment conducted by an international committee, of the 17 Research, Innovation and Dissemination Centers (RIDCs) currently funded by the Foundation. In innovation and academia-business relations, the highlights were five new Engineering Research Centers (ERCs), four with Shell and one with EMBRAPA, as well as 270 projects approved under the Inovative Research in Small Business Program (PIPE).

In 2018, the Foundation again worked to improve the quality of research conducted in São Paulo State, strongly encouraging international cooperation and hosting FAPESP Week meetings in Brussels, Liège and Louvain , Belgium, and in New York. Joint calls for proposals were also held with dozens of universities and funding agencies abroad. The latter included Germany's Max Planck Society for the Advancement of Science (MPG) to support highly qualified young researchers interested in establishing research groups associated with universities or institutions in São Paulo State; this is an innovative model that promotes strong collaboration with researchers at MPG.

The results achieved by FAPESP undoubtedly contributed to the growing visibility of science and technology produced in São Paulo, involving 871 media outlets in 60 different countries, as well as 13 million page-views using the Foundation's online platforms. Pesquisa FAPESP magazine has become one of the most important instruments of science dissemination in Brazil.

These accomplishments demonstrate FAPESP's leading role in the international research funding arena and make it one of the most important agencies of its kind in Brazil.

Professor Marco Antonio Zago
President, FAPESP

ABOUT THIS REPORT

This annual report on FAPESP's activities in 2018 details the results of the Foundation's investment in scientific and technological research using funds transferred by a constitutional mandate from the São Paulo State Treasury, and from other sources. This report highlights the Foundation's contributions to the advancement of science and innovation in São Paulo and its impact on solutions to economic and social challenges.

Similar to previous editions, the 2018 report covers all the main funding lines, especially research scholarships/fellowships and grants, and the respective indicators of results, including amounts disbursed, the number of projects in progress, and the number of projects contracted in the period January-December 2018.

Unlike previous editions, the results for 2018 are presented by funding strategy. Each funding strategy includes scholarships/fellowships and grants.

FAPESP has the following six funding strategies:

- Training of Human Resources for Research;
- Basic and Applied Research;
- Research for Innovation;
- Strategic Research;
- Research Infrastructure; and
- Communicating Science to the Public.

These strategies translate into scholarships/fellowships in Brazil and abroad for support for long-term research, regular research grants, research in partnership with companies, strategic projects in areas such as biodiversity, bioenergy, climate change, data science, and public policies, support for modernization and conservation of research installations, and dissemination of the results of scientific and technological research.

The reorganization provides insights that are closer to the objectives of FAPESP's investment in research because it accounts for all types of funding lines and distinguishes among support for long- and short-term research projects, support for projects selected in calls for proposals and for projects submitted spontaneously, and support for human resource training, among other projects.

HOW THE REPORT IS STRUCTURED

SÃO PAULO ST&I SYSTEM IN 2018: the report begins by presenting indicators for São Paulo State's Science, Technology & Innovation (ST&I) System to give readers context on the state's importance to scientific development in Brazil.

FAPESP HIGHLIGHTS 2018: an overview of FAPESP's key indicators for the year, as detailed in the rest of the report.

CHAPTER 1 – THE INSTITUTION: a short introduction to FAPESP and its governance and how it assesses and selects research proposals.

CHAPTER 2 – GENERAL INDICATORS: tables offering an overview of FAPESP's income, time series on funding strategies, data on disbursement, projects in progress and projects contracted for during the year, organized by funding strategies, major knowledge area and institution.

- **Indicators by Funding Strategies** – the strategies that orient FAPESP's investments have been revised and expanded, as follows:

- 1) Training of Human Resources for Research;
- 2) Basic and Applied Research;
- 3) Research for Innovation;
- 4) Strategic Research;
- 5) Research Infrastructure;
- 6) Communicating Science to the Public.

- **Indicators by major knowledge areas** – data groupings:

- 1) **Life Sciences** (Health, Biology, Agronomy, Veterinary Medicine);
- 2) **Natural and Earth Sciences and Engineering** (Astronomy and Space Sciences, Physics, Engineering, Geoscience, Chemistry, Mathematics and Statistics, Computer Science);
- 3) **Human and Social Sciences** (Human and Social Sciences, Economics and Management, Architecture and Urbanism) and
- 4) **Interdisciplinary**.

- **Indicators by Institution** – data presented in accordance with the principal investigator's institutional affiliation, including USP, UNICAMP, UNESP, other state institutions, federal institutions, private institutions, companies, scientific associations and societies, among others.

ABOUT THIS REPORT

CHAPTER 3 – FUNDING STRATEGIES: Information on the programs covered by the six research strategies, with tables showing disbursement, projects in progress, projects contracted during the year, and examples of outstanding achievements and research results.

1) Training of Human Resources for Research: Regular scholarships/fellowships in Brazil and abroad not associated to grants, as described in the tables.

2) Basic and Applied Research: Long-term research – Thematic Projects Grant, Research, Innovation and Dissemination Centers (RIDCs), Young Investigators Grant, São Paulo Excellence Chair Grant (SPEC), Special Projects (with the respective funding lines described in the tables) – and Regular Grants not associated to other projects or programs, supporting short-term research, participation in or organization of scientific meetings, visiting researchers, publication of books and articles, among others.

3) Research for Innovation: projects for collaborative research between universities/ research institutions & companies funded under PITE and ERC/ARC programs, small business innovation projects (PIPE program) and funding lines described in the tables.

4) Strategic Research: Several programs with different focuses: biodiversity (BIOTA), bioenergy (BIOEN), global climate change (RPGCC), eScience & Data Science, public policies (PPP), health public policies (PP-SUS), public education (EP), modernization of São Paulo's research institutes, and associated funding lines, as described in the tables.

5) Research Infrastructure: Multi-user Equipment, Equipment Repair, ANSP Network, Books (FAP-Livros), Research Overhead for Program Coordination, Research Overhead for Institutional Research Infrastructure, Research Overhead for ANSP Network Connectivity.

6) Communicating Science to the Public: Mapping of research institutions and studies of the overall status of research in São Paulo – information on science dissemination activities, impact of support for ST&I, mapping of research institutions and assessment of research in São Paulo.

CHAPTER 4 – OVERVIEW OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS: All types of scholarships/ fellowships and grants – financial amounts and quantities.

CHAPTER 5 – RESEARCH COLLABORATIONS AND CO-FUNDING: how FAPESP promotes collaborative research and seeks co-funding for research; investments made during the year; partnerships with funding agencies, academic institutions and companies in progress during the period.

CHAPTER 6 – APPENDIX: List of tables, charts and figures in the report.

GLOSSARY



Disbursement/Expenditure: amount of funding invested in projects in progress during the period.

Grants Contracted: research projects for which grant term were signed during the period.

Active projects: research projects that began and/or ended in the year.

Process: a proposal becomes a process after its effective submission to FAPESP and generation of a control number consisting of the year of submission, a five-digit serial number and a verification digit.

Associated file: applications for scholarships and grants associated with a research grant already awarded by FAPESP can cite the number of the relevant process in order to establish the link.

Funding lines: regular scholarships/fellowships and grants through which FAPESP funds research projects with different profiles, goals and durations.

Scholarships/Fellowships and Regular Grants: permanent funding lines for projects proposed spontaneously by researchers.

Research grant: a funding instrument to support the development of a research project in a higher education institution, research institution or small business located in São Paulo State.

Scholarship (SI, MS, DD, DR) or Fellowship (other types of scholarship): a funding instrument to support the development of a research project associated to academic activities, or technical training in Brazil or abroad, in accordance with the purpose of each type of support.

Programs: grants and fellowships awarded to research designed to address specific challenges.

Ad hoc reviewers: researchers in the knowledge areas relating to the proposals assessed. FAPESP asks them to analyze and issue expert opinions on the merits of proposals. Ad hoc reviewers have no formal ties to FAPESP.

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SÃO PAULO
Science, Technology
& Innovation
SYSTEM 2018

R&D Expenditures

Researchers

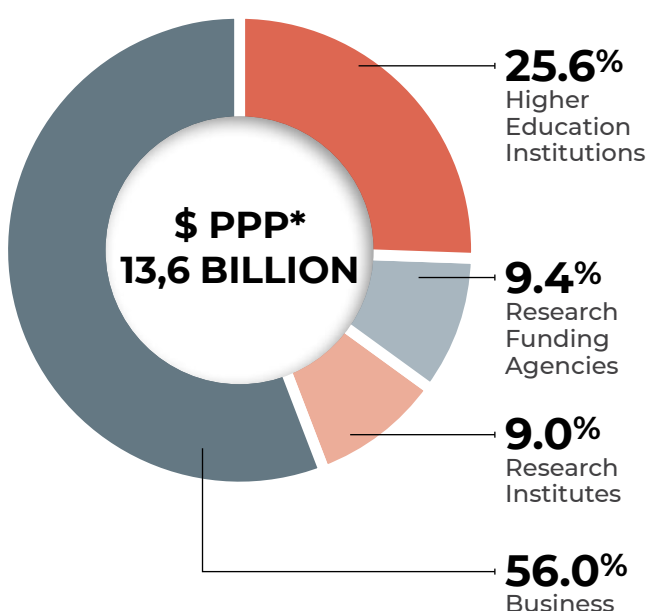
Intellectual Property

Scientific Publications

SÃO PAULO ST&I 2018 SYSTEM



EXPENDITURES IN R&D IN SÃO PAULO STATE



* Purchasing power parity
(<http://data.worldbank.org/indicator/pa.nus.ppp>)

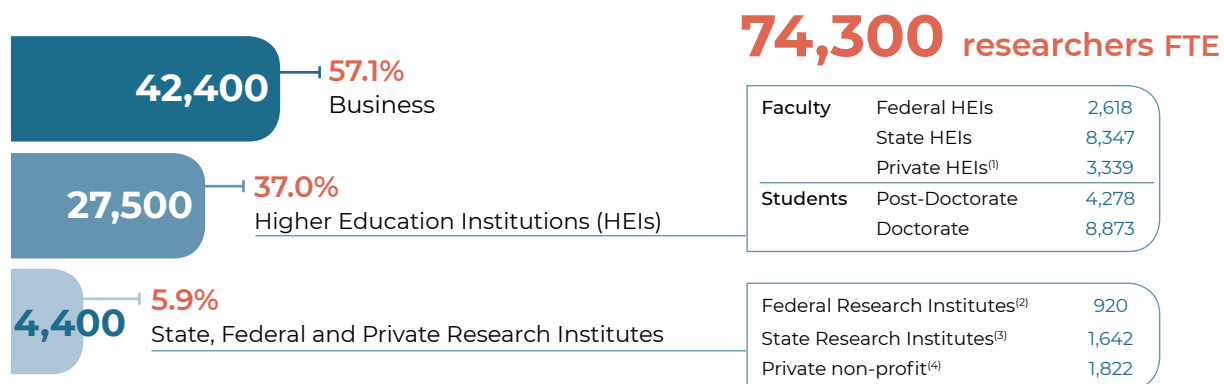
	in \$ PPP million		
	2016	2017	2018
Higher Education Institutions (HEIs)	3,470.1	3,380.9	3,476.9
Federal HEIs	476.7	507.6	607.7
State HEIs	2,697.0	2,561.6	2,548.8
Private HEIs	296.4	311.7	320.5
Research Funding Agencies	1,308.3	1,229.9	1,277.6
Federal Agencies	748.0	708.4	678.3
FAPESP	560.3	521.5	599.4
Research Institutes	965.1	1,218.2	1,216.1
Federal Research Institutes	660.5	904.6	912.6
State Research Institutes	304.6	313.6	303.5
Business⁽¹⁾	6,945.1	6,927.2	7,613.1
R&D in São Paulo State	12,688.6	12,755.7	13,583.7

⁽¹⁾ Exclude R&D services, including Embrapa and IPT.

NOTE: Data from 2016 and 2017 were recalculated after database updates and changes by the original sources.

2018 SÃO PAULO ST&I SYSTEM

RESEARCHERS IN THE STATE OF SÃO PAULO (full-time equivalent – FTE)



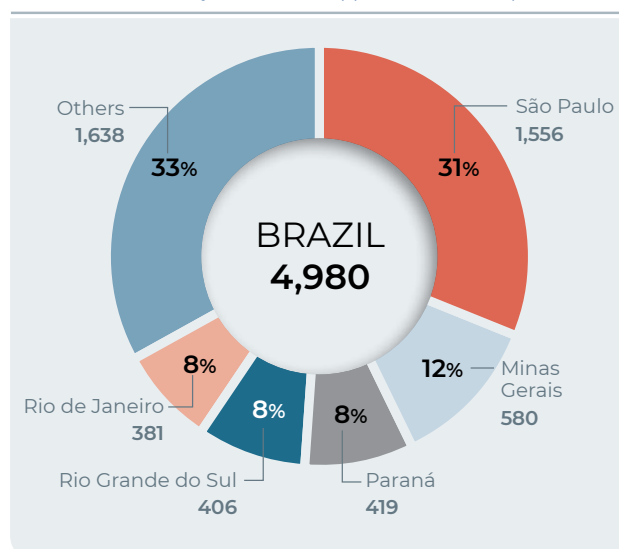
⁽¹⁾ Includes municipal higher education institutions. ⁽²⁾ Includes Embrapa and CNPEM. ⁽³⁾ Includes IPT. ⁽⁴⁾ Data for 2018 taken from a survey excluding CNPEM which is booked under federal research institutions.

INTELLECTUAL PROPERTY

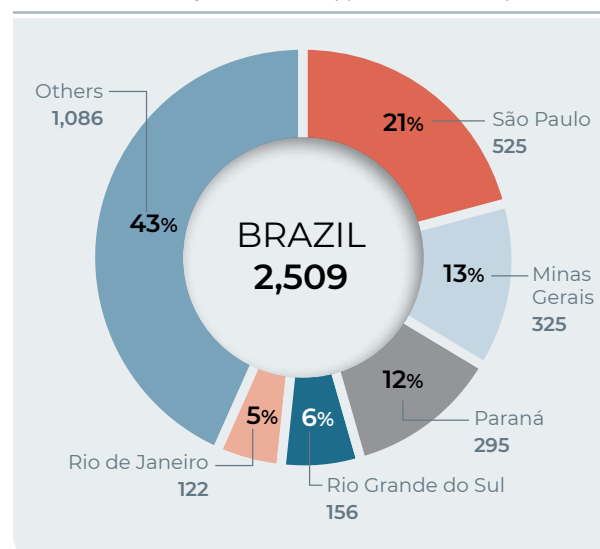
Brazilian residents filed **4,980** invention patent applications with INPI in 2018. Of these, **1,556** (31%) originated in São Paulo State. In the same year, INPI received **2,509** applications to register computer programs filed by Brazilian residents, with **525** (21%) originating in São Paulo State.



INVENTION PATENT APPLICATIONS
(filed with INPI by Brazilian residents, by state, ranked by numbers of applications in 2018)



COMPUTER PROGRAM REGISTRATION APPLICATIONS
(filed with INPI by Brazilian residents, by state, ranked by numbers of applications in 2018)



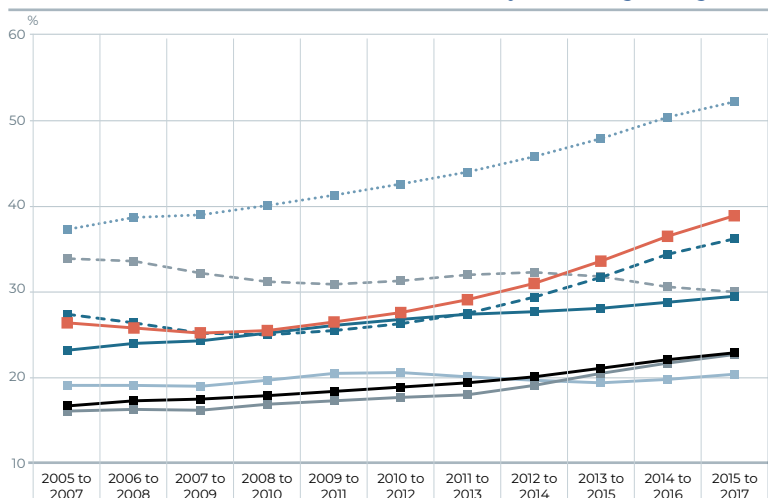
2018 SÃO PAULO ST&I SYSTEM

SCIENTIFIC PUBLICATIONS

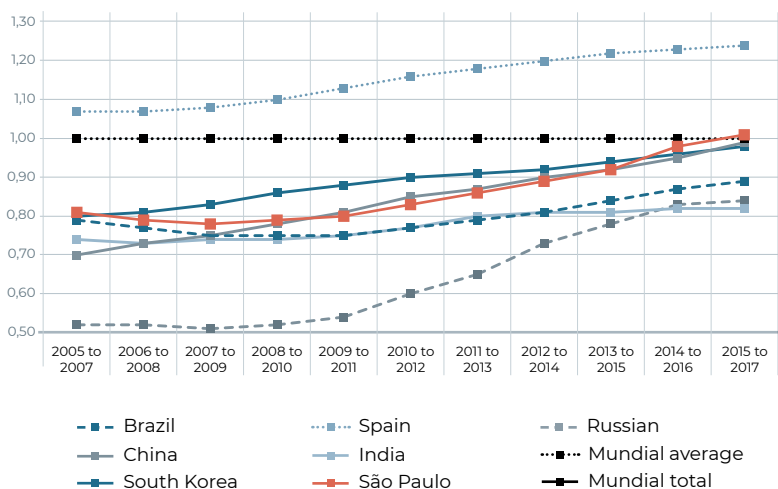
Of the **56,385** scientific publications with at least one author based in Brazil, **42%** originated in São Paulo State, for an increase of **1.8%** compared with 2016 and **77%** compared with 2007.



PERCENTAGE OF PUBLICATIONS RESULTING FROM INTERNATIONAL COLLABORATION – Three-year moving average



RELATIVE IMPACT (CITATIONS), NORMALIZED BY CATEGORY – Three-year moving average



METHODOLOGY: number of citations per publication normalized by knowledge area, year and world average

TYPE OF PUBLICATION: Articles, Proceedings Papers, Reviews.

SCIENTIFIC PUBLICATIONS BY ORGANIZATIONS LOCATED IN SÃO PAULO (at least 100 publications in 2017)

Institution	2007	2017
USP	6,803	11,137
UNESP	2,112	4,238
UNICAMP	2,344	3,893
UNIFESP	1,160	1,980
UFSCAR	625	1,400
UFABC	65	474
INPE	312	409
CNPEN	9	296
Albert Einstein Hospital	63	280
CTA	197	279
ITA	168	275
Butantan Institute	165	264
IPEN	188	170
UNINOVE	9	158
IAC	153	146
A. C. Camargo	72	133
Botanical Institute	59	130
IFSP	0	125
FGV-SP	7	120
Sírio-Libanês Hospital	29	113
Mackenzie	70	113
Adolfo Lutz Institute	97	101
FEI	22	100

PUBLICATIONS COAUTHORED BY RESEARCHERS FROM SÃO PAULO AND OTHER COUNTRIES – 2007 AND 2017

Country	2007	2017	Var (%)
USA	1,390	3,984	187
United Kingdom	411	1,683	309
Spain	245	1,356	453
Germany	371	1,318	255
France	418	1,247	198
Italy	262	1,111	324
Canada	259	1,022	295
Australia	118	807	584
Portugal	111	799	620
Switzerland	105	659	528
China	91	656	621
Netherlands	145	638	340
Argentina	230	548	138
Colombia	86	547	536
India	120	501	31
TOTAL*	3,376	9,516	182

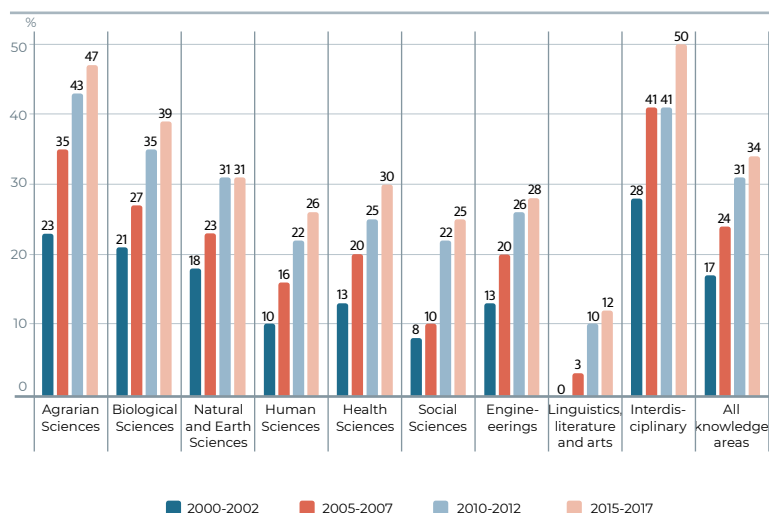
*Total number of articles with coauthors from other countries, excluding repetitions

2018 SÃO PAULO ST&I SYSTEM

SCIENTIFIC PUBLICATIONS



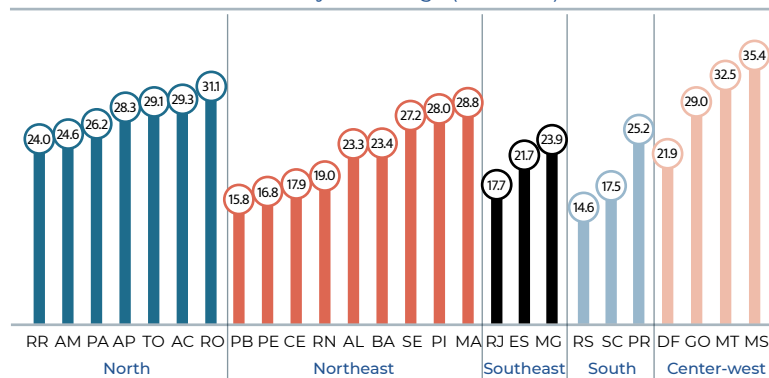
PROPORTION (%) OF PUBLICATIONS BY RESEARCHERS FROM SÃO PAULO IN COLLABORATION WITH RESEARCHERS FROM OTHER STATES OF BRAZIL, BY KNOWLEDGE AREA – Three-year average



METHODOLOGY: Percentage of publications with authors in São Paulo State and coauthors in other states, by knowledge area.

TYPE OF PUBLICATION: Articles, Proceedings Papers, Reviews.

PROPORTION (%) OF PUBLICATIONS BY RESEARCHERS FROM OTHER STATES OF BRAZIL IN COLLABORATION WITH RESEARCHERS FROM SÃO PAULO STATE – Three-year average (2015-2017)



METHODOLOGY: Percentage of publications with authors in other states and coauthors in São Paulo.

TYPE OF PUBLICATION: Articles, Proceedings Papers, Reviews.

SOURCES

2018 SÃO PAULO ST&I SYSTEM

GEI/FAPESP.

EXPENDITURE ON R&D IN SÃO PAULO

Federal HEI: Senado Federal – Siga Brasil; INEP – Censo da Educação Superior (microdata), GEI/FAPESP – survey.

State HEI: Secretaria da Fazenda e Planejamento do Estado de São Paulo; Portal da Transparência do Governo do Estado de São Paulo; INEP – Censo da Educação Superior (microdata).

Private HEI: CAPES - Geocapes.

Research Funding Agencies: CNPq: CNPq/ Dados Abertos Investimentos. CAPES: CAPES/ Geocapes. Finep: Senado Federal – Siga Brasil. FAPESP: site – Estatísticas e Balanços/ Pagamentos.

Federal Research Institutes: Senado Federal – Siga Brasil; GEI/FAPESP.

State Research Institutes: Secretaria da Fazenda e Planejamento do Estado de São Paulo.

Business: Pintec/IBGE.

By: GEI/FAPESP, according to the methodology described at FAPESP. *Indicators of Science, Technology & Innovation in São Paulo* - 2010. São Paulo: FAPESP, 2011.

RESEARCHERS

Federal and State HEIs: INEP – Censo da Educação Superior (microdata).

Publics, Municipal and Private Education Institutions: CAPES/Geocapes.

Grants: CAPES/Geocapes; CNPq/Open data/ Investimentos; FAPESP.

Public and Private Research Institutes: survey GEI/FAPESP.

Business: Pintec/IBGE.

INTELLECTUAL PROPERTY

INPI – Estatísticas preliminares (vários anos).

SCIENTIFIC PUBLICATION

Web of Science/Incites/Clarivate (consulted in July, 17th 2019).

By: GEI/FAPESP.



FAPESP HIGHLIGHTS 2018

Research Funding Strategies

Disbursement for Research Funding

Projects submitted, projects approved, proposal selection

Internacional cooperation

Special actions in 2018

Media coverage of FAPESP

Examples of projects funded in 2018

FAPESP HIGHLIGHTS IN 2018

RESEARCH FUNDING STRATEGIES

In 2018, FAPESP adopted a new system to classify its activities supporting scientific and technological development in São Paulo State.

These activities are now classified into the **six** groups below:

TRAINING OF HUMAN RESOURCES FOR RESEARCH

Regular scholarships/fellowships for undergraduate and graduate students in Brazil and abroad, not associated with other research projects.

In Brazil: Scientific Initiation, Master's, PhD, Direct Doctorate, Postdoctoral research.

Abroad: Research Fellowship Abroad (RFA), postdoc level; Research Internship Abroad (RIA), funding research conducted abroad while a scholarships/fellowships is in progress in Brazil.

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 Program (PIPE); Intellectual Property Support Program (PAPI); and associated research grants and scholarships/fellowships.

Also involves studies by FAPESP to define conceptual and operational parameters for the establishment of innovation districts in São Paulo and Campinas.

RESEARCH INFRASTRUCTURE

A set of actions whereby FAPESP supports the establishment of the infrastructure required for the continuity of research.

Programs: Multi-user Equipments (EMU), Book Program (FAP-Livros), Equipment Repair, Research Infrastructure Support and Research Overheads.

BASIC AND APPLIED RESEARCH

Long- and short-term support for academic research.

Long term: Basic and applied research via Thematic Project Grant, Research, Innovation and Dissemination Centers (RIDCs), Young Investigators Grant, São Paulo Excellence Chair Grant (SPEC), Special Projects, and associated fellowships and grants.

Short term: Basic and applied research projects of short duration via Regular Research Grants, Regular Grants - visiting researchers from abroad, scientific publications, participation in and organization of scientific or technological meetings, and associated scholarships/fellowships.

STRATEGIC RESEARCH

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 and to the modernization of research institutions in the state.

Programs: FAPESP Research Program on Biodiversity (BIOTA-FAPESP), FAPESP Bioenergy Research Program (BIOEN), FAPESP Research Program on Global Climate Change (RPGCC), FAPESP Research Program on eScience and Data Science, Research in Public Policies Program, Public Education Research Program, Modernization of Research Institutions, and associated scholarships/fellowships and grants.

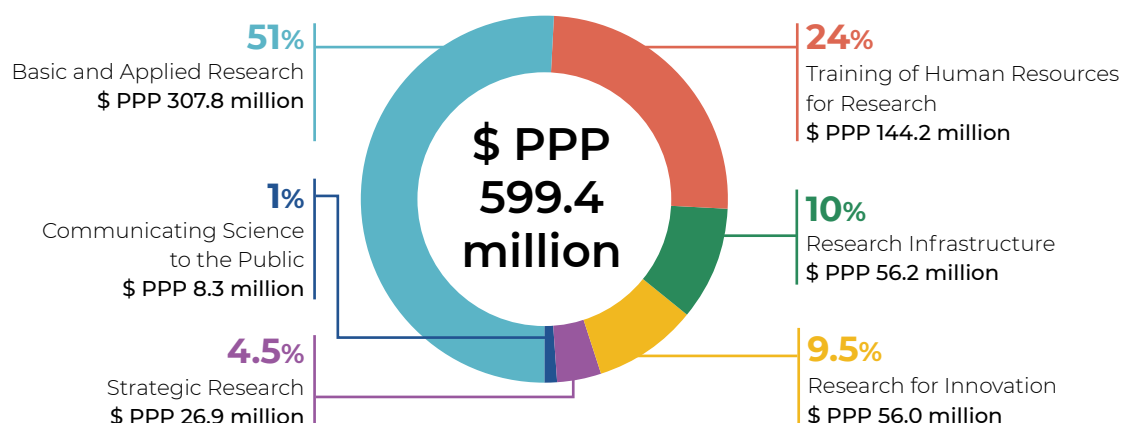
COMMUNICATING SCIENCE TO THE PUBLIC

Science dissemination and diffusion initiatives whereby FAPESP informs the general public and stakeholders about the results and societal and economic impact of public investment in scientific and technological research; publicizes its science policy guidelines; measures and evaluates the results of its actions to support scientific and technological development; maps research institutions in the state; and evaluates the overall status of research in the state.

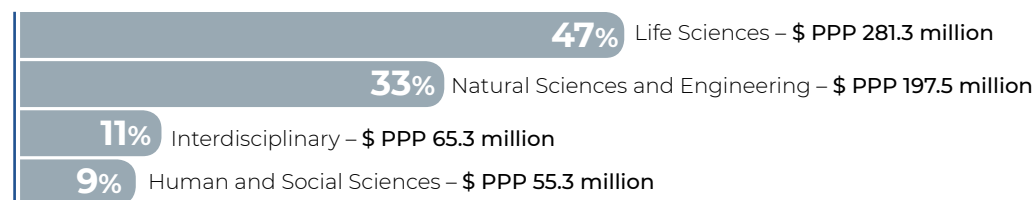
DISBURSEMENT FOR RESEARCH FUNDING

FAPESP disbursed **\$ 599.4 million** in purchasing power parity (PPP)
to fund 24,720 active research projects

BY FUNDING STRATEGIES



BY MAJOR KNOWLEDGE AREA



Projects submitted, projects approved, proposal selection

In 2018, the number of projects submitted to FAPESP totaled **19,724** and **10,946** were selected. The number of active projects plus new projects selected during the year amounted to **24,720**.

Advisors to the Science Directorate and **9,021** ad hoc reviewers issued **22,162** expert opinions. The average time taken to analyze each of **19,648** initial evaluation was **70** days.

FAPESP HIGHLIGHTS IN 2018

INTERNACIONAL COOPERATION



OCTOBER 2018

In partnership with Belgium's Department of Economy, Science & Innovation of the Flemish Government (EWI), National Fund for Scientific Research (F.R.S.-FNRS), Research Foundation Flanders (FWO) and Wallonie-Brussels International (WBI), FAPESP held the **16th edition of FAPESP Week**, in Brussels, Liège and Louvain (Leuven).



NOVEMBER 2018

In partnership with the City University of New York (CUNY), FAPESP held the **17th edition of FAPESP Week** in New York, USA.

These symposia are part of FAPESP's strategy to create an environment of scientific collaboration between Brazilian and foreign scientists with common research interests.



In 2018, FAPESP held **37 joint calls** for proposals

with **27 foreign organizations**

(funding agencies and universities)



FAPESP signed **42 new research partnership agreements**,
28 with foreign organizations and
14 with Brazilian organizations



217 active partnerships –
176 with foreign organizations,
41 with Brazilian organizations

SPECIAL ACTIONS IN 2018

Call for Proposals, Young Investigators – Phase 2, to consolidate research lines begun by researchers who received support in the first phase of the Young Investigator Grants program and achieved excellent performance during the development of their projects.

Renewal of agreements for all 17 RIDCs until 2024, following evaluation by an international committee.

Establishment of five new **Engineering Research Centers (ERCs)**: four in partnership with **Shell** and one with **EMBRAPA**.

270 projects approved for funding from FAPESP's Innovative Research in Small Business Program (**PIPE**).

MEDIA COVERAGE OF FAPESP

20,244 references
to FAPESP in
Brazilian and foreign
media about the
results of research
funded by FAPESP

52% growth
in the number
of mentions
of FAPESP in
Brazilian and
foreign media

871 media
outlets in **60**
different
countries

13 million page
views using
FAPESP's online
platforms

2,600 REFERENCES TO FAPESP IN FOREIGN MEDIA

TOP 10 NEWS STORIES IN TERMS OF MEDIA COVERAGE	Nº of publications
Scientists identify 4 extremely young asteroid families www.agencia.fapesp.br/28785	65
Music intensifies effects of anti-hypertensive medication www.agencia.fapesp.br/27588	51
Key gene to accelerate sugarcane growth is identified www.agencia.fapesp.br/28350	32
Scientists calculate radiation dose in bone from victim of Hiroshima bombing www.agencia.fapesp.br/27697	28
Colored filter improves dyslexic children's reading speed www.agencia.fapesp.br/28849	26
The new face of Luzia and the Lagoa Santa people www.agencia.fapesp.br/29168	23
Bioluminescent substance discovered in Brazilian cave worm larva www.agencia.fapesp.br/29066	22
Artificial magnetic field produces exotic behavior in graphene sheets www.agencia.fapesp.br/29227	22
Cappuccino made with jackfruit seed flour has chocolate aroma www.agencia.fapesp.br/29005	19
New laboratory-synthesized molecule appears to fight malaria effectively www.agencia.fapesp.br/28400	17

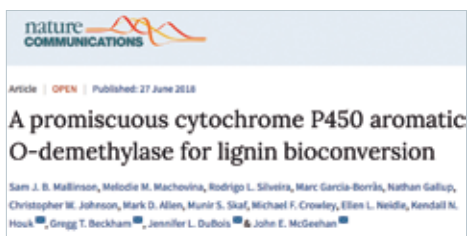
17,600 REFERENCES TO FAPESP IN BRAZILIAN MEDIA

TOP 10 NEWS STORIES IN TERMS OF MEDIA COVERAGE	Nº of publications
Overweight and obesity make up for more than 15,000 cancer cases per year in Brazil www.agencia.fapesp.br/27852	337
Jaboticaba peel extract promotes beneficial effects on health www.agencia.fapesp.br/29400	315
A biomarker that detects dengue hemorrhagic fever is discovered www.agencia.fapesp.br/29114	288
Study identifies a key cellular mechanism that triggers pneumonia in humans www.agencia.fapesp.br/29398	284
Discovery of Zika virus in monkeys suggests disease may also have wild cycle www.agencia.fapesp.br/29081	274
Music intensifies effects of anti-hypertensive medication www.agencia.fapesp.br/27588	230
New molecule considered promising antimalarial candidate www.agencia.fapesp.br/28400	182
Salmonella found to be resistant to different classes of antibiotics www.agencia.fapesp.br/29128	179
Expeditions to Amazonia reveal new species of toads, lizards, birds and plants www.agencia.fapesp.br/28237	166
Zika virus eliminates advanced human tumor in central nervous system of rodents www.agencia.fapesp.br/27677	138

FAPESP HIGHLIGHTS IN 2018

Newsworthy results in 2018

Many research projects funded by FAPESP were featured in the news in 2018. Below are some examples that illustrate the outstanding quality of the projects supported.



An international research group including scientists at the Center for Computing in Engineering & Science (CCES), one of the Research, Innovation & Dissemination Centers (RIDCs) funded by FAPESP, identified and elucidated the action mechanism of a new enzyme that converts lignocellulosic biomass from renewable sources such as sugarcane and corn into high value-added products, including biomaterials, biofuels and bioplastics. The study was published in the journal *Nature Communications*. CCES is hosted by the University of Campinas (UNICAMP) in São Paulo State.

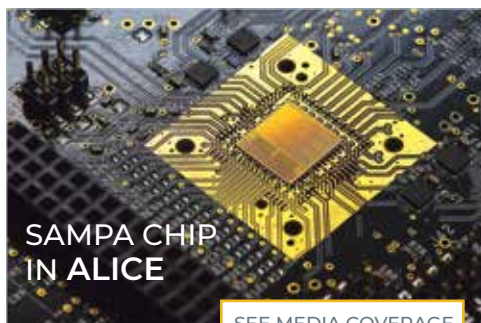
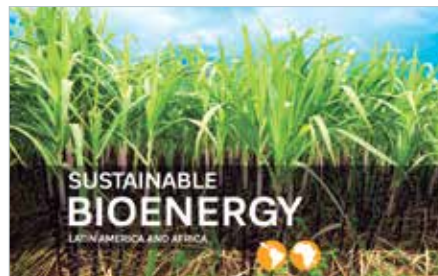
RIDC Research Grant – Center for Computational Engineering and Sciences (CCES)
FAPESP Processes 2013/08293-7, 2014/10448-1, 2016/22956-7
Principal Investigator: Munir Salomão Skaf

SEE MEDIA
COVERAGE
on page 57

BIOENERGY AND SUSTAINABILITY

A study coordinated by researchers belonging to the BIOEN, RPGCC and BIOTA programs resulted in the report “Bioenergy and Sustainability: Latin America and Africa”. Issued in 2018, the publication was authored by 154 researchers in 31 countries under the aegis of the Scientific Committee on Problems of the Environment (SCOPE).

www.bioen.fapesp.org/scopebioenergy



SEE MEDIA
COVERAGE
on page 53

The University of São Paulo's Engineering School (POLI-USP) designed a chip called SAMPA that will renew the detection system used by ALICE (A Large Ion Collider Experiment), one of four major experiments at CERN's Large Hadron Collider (LHC). SAMPA has been greenlighted for mass production: 88,000 units will be needed to upgrade ALICE.

Thematic Project, FAPESP Process 2012/04583-8
Principal Investigator: Marcelo Gameiro Munhoz

Regular Research Grant, FAPESP Process 2013/06885-4
Principal Investigator: Wilhelmus Adrianus Maria van Noije

Special Project, FAPESP Process 2014/12664-3
Principal Investigator: Wilhelmus Adrianus Maria van Noije

Newsorthy results in 2018

PRE-SALT LAYER CAVERNS TO STORE CO₂

Scientists affiliated with the Research Center for Gas Innovation (RCGI) applied to the National Industrial Property Institute (INPI) for a patent on a system that separates carbon dioxide (CO₂) from methane (CH₄) by gravity. These two gases are dissolved in the crude oil extracted from wells, especially in subsalt oilfields where the seabed is up to 3 km below the surface. CO₂ separation and retention can be performed in caverns made in the salt layer. Each cavern would be large enough to store 8 million metric tons of CO₂. Hosted by the University of São Paulo, RCGI is an ERC funded by FAPESP and Shell.

VER REPERCUSSÃO
Página 69



ERC – Research Center for Gas Innovation (RCGI)
FAPESP Process 2014/50279-4
Principal Investigator: Julio Romano Meneghini

SCIENTIFIC REPORTS

Article | OPEN | Published 25 September 2018

GA-Hecate antiviral properties on HCV whole cycle represent a new antiviral class and open the door for the development of broad spectrum antivirals

Mariana Nogueira Batista, Paulo Ricardo da Silva Sanchez, Bruno Moreira Carneiro, Ana Cláudia Silva Braga, Guilherme Rodrigues Fernandes Campos, Eduardo Maffud Cilli & Paula Rahal

Scientists at the Center for Research & Innovation in Biodiversity & Drug Discovery (CIBFAR) synthesized a compound that inhibits replication of the hepatitis C virus in several stages of its life cycle. The study consisted of combining existing molecules to produce new biological compounds. The new compound, called GA-hecate, is also capable of acting on bacteria, fungi and cancer cells. The study was described in an article published in *Scientific Reports*, an online journal owned by Springer Nature.

RIDC – Center for Research and Innovation in Biodiversity and Drug Discovery (CIBFAR), FAPESP Process 2013/07600-3
Principal Investigator: Glaucius Oliva

Doctorate Fellowship, FAPESP Process 2015/23244-8
Principal Investigator: Eduardo Maffud Cilli

Doctorate Fellowship, FAPESP Process 2016/02174-4 and Research Internships Abroad (BEPE), FAPESP Process 2017/00287-9
Principal Investigator: Paula Rahal

MOLECULES USED AS MUCOLYTICS CAN COMBAT BACTERIAL CROP DISEASES



SEE MEDIA
COVERAGE
on page 53

Researchers affiliated with the Sylvio Moreira Citriculture Center attached to São Paulo State's Agronomy Institute (IAC) discovered that an anti-oxidant molecule called N-acetylcysteine (NAC), used in human health as a mucolytic or "cough syrup" to clear the airways, can be used to control diseases that attack crops such as citrus, olive trees, tomatoes and greens. The discovery resulted in two NAC-based products, one for spraying and the other for application to the plant's roots as a fertilizer.

Thematic Project, FAPESP Process 2013/10957-0
Principal Investigator: Alessandra Alves de Souza

FAPESP HIGHLIGHTS IN 2018

Newsworthy results in 2018



A new system for rapid diagnosis of dengue and Zika was described by researchers from the United States and Brazil in the April 26 issue of the journal *Science* and featured on the cover of the issue. The diagnostic platform is called SHERLOCK, short for Specific High Sensitivity Reporter unLOCKing. It detects nucleic acids (RNA and DNA) in various types of samples via an enzymatic reaction that can be performed in a test tube or on a strip of paper. A laboratory is not required.

Thematic Project, FAPESP Process 2013/21719-3
Principal Investigator: Maurício Lacerda Nogueira



Two studies showed that the Zika virus can be used to treat aggressive tumors of the central nervous system. One study was conducted by researchers at the University of Campinas's School of Pharmaceutical Sciences (FCF-UNICAMP) and published in the *Journal of Mass Spectrometry*. The other was coordinated by researchers at the Human Genome & Stem Cell Research Center (HUG-CELL), one of FAPESP's Research, Innovation & Dissemination Centers (RIDCs), and featured on the cover of the journal *Cancer Research*.

SEE MEDIA COVERAGE
on page 58



Thematic Project, FAPESP Process 2011/50400-0
Principal Investigator: Aníbal Eugênio Vercesi

RIDC – Human Genome and Stem-Cell Research Center (HUG-CELL),
FAPESP Process 2013/08028-1
Principal Investigator: Mayana Zatz



Researchers at the University of São Paulo's Ribeirão Preto Medical School (FMRP-USP) identified seven biomarkers that can tell physicians

which patients diagnosed with glioma, a type of brain cancer, will tend to progress to a more aggressive form of the disease in the event of relapse. The article was published in *Cell Reports*.

Young Investigators Grants
FAPESP Process 2015/07925-5
Principal Investigator: Houtan Noshmeh



The Center for Metropolitan Studies (CEM) launched the book *As políticas de urbano em São Paulo* (published by Editora UNESP) on public policy and proposals in housing, budgetary governance, municipal politics, elections and government formation, street cleaning, traffic, mass transit, large urban projects and subway line design, among other topics.

RIDC – Center for Metropolitan Studies (CEM)
FAPESP Process 2014/50279-4
Principal Investigator: Marta Teresa da Silva Arretche

Newsorthy results in 2018

Researchers at the University of São Paulo's Psychology Institute (IP-USP) who analyzed the behavior and cognitive and visual skills of capuchin monkeys found that they are able to distinguish between dangerous and harmless snakes and that they use rocks to crack open at least four species of seeds and fruits. Their research resulted in the publication of two articles in the journal *Primate*.



Thematic Project, FAPESP Process 2014/04818-0
Principal Investigator: Eduardo Benedicto Ottoni



A study by researchers at the University of Campinas's Geoscience Institute (IG-UNICAMP) analyzed the geographical distribution of knowledge-intensive entrepreneurship in cities across São Paulo State. The results showed correlations between the emergence and density of this type of entrepreneurship in some urban areas and a local presence of research-oriented universities, access to capital and business activities. The researchers also detected a moderating effect attributable to "agglomeration diseconomies" due mainly to fast and disorderly urban growth. They criticized the use of concepts common in advanced economies, such as "entrepreneurial ecosystem", without adaptation to conditions in developing countries. The study was published in *Entrepreneurship and Regional Development*.

SPEC
FAPESP Process 2013/50524-6
Principal Investigator:
Nicholas Spyridon Vonortas

Scientists affiliated with the Center for Research, Technology & Education in Vitreous Materials (CerTEV), one of the RIDCs funded by FAPESP, and the Department of Materials Science & Engineering at Penn State University in the United States proposed a new definition of glass: it is a solid material that continuously relaxes toward the liquid state. An article describing their findings was published in the *Journal of Non-Crystalline Solids*.



RIDC – Center for Research, Teaching, and Innovation in Glass (CEPIV)
FAPESP Process 2013/50524-6
Principal Investigator: Edgar Dutra Zanotto

CHAPTER



1



THE INSTITUTION

About FAPESP

Governance

Proposal selection

THE INSTITUTION

ABOUT FAPESP

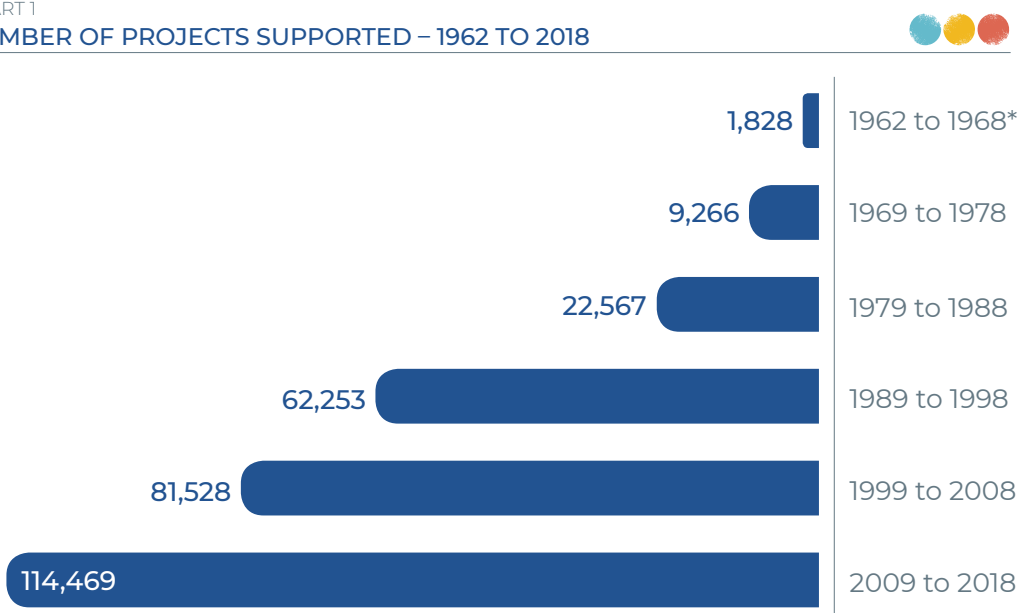
The São Paulo Research Foundation (FAPESP) is one of Brazil's leading public agencies for the funding of research. FAPESP was formally created by State Law 5918 (dated October 18, 1960), which established that the Foundation's remit was to support scientific research and science dissemination in São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

Pursuant to São Paulo State's 1947 Constitution, as ratified by the State's 1989 Constitution, the law requires that 1% of the state's annual tax revenue be transferred to FAPESP for it 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.

In accordance with its funding strategies, FAPESP supports the following: Research for Innovation, Basic and Applied Research, Strategic Research, Training of Human Resources for Research, Research Infrastructure and Communicating Science to the Public.

CHART 1
NUMBER OF PROJECTS SUPPORTED – 1962 TO 2018



* Number of projects calculated per decade, except for the first seven years of FAPESP's operations.

GOVERNANCE

FAPESP is managed 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 for FAPESP and makes key decisions regarding scientific, administrative and asset management policy. The Board has 12 members, who each serve a six-year term that can be renewed 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 2018

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THE INSTITUTION

PROPOSAL SELECTION

The research projects proposed in applications submitted to FAPESP for support from its various funding lines are evaluated by peer review. Committees of recognized experts called Area Panels are responsible for coordinating the evaluation process in each major knowledge area under the aegis of FAPESP's Science Directorate.

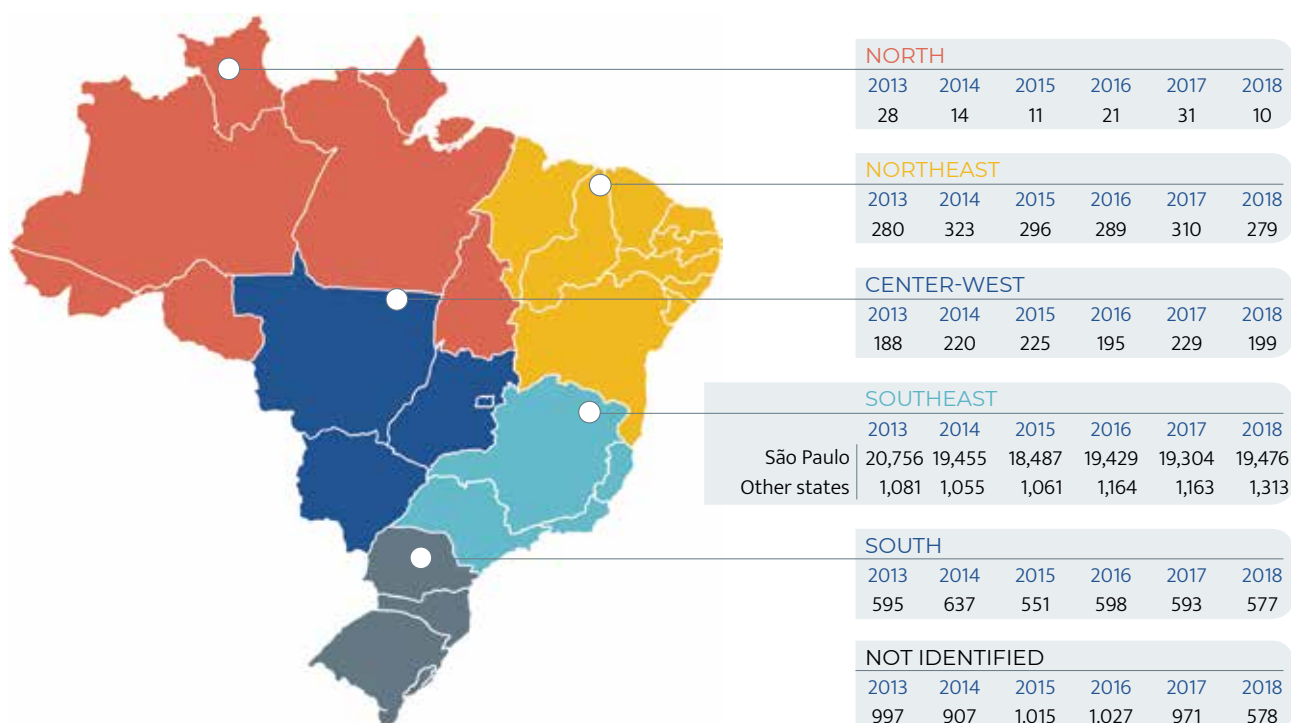
Applications for funding go first to the Area Panel corresponding to the knowledge area for each project. The Area Panel selects ad hoc reviewers to analyze the proposal and issue a merit assessment. The proposal is then returned to the Area Panel, which issues an approval or denial recommendation to the Science Directorate. The Science Directorate makes the final decision, with the assistance of a supervisory panel comprising 19 associate coordinators. Each decision must be ratified by the Executive Board and endorsed by the Board of Trustees.

TABLE 1
AD HOC REVIEWERS AND ASSESSMENTS
2013 to 2018

Number of assessments per reviewer	N° of reviewers per year					
	2013	2014	2015	2016	2017	2018
1 a 4	7,624	7,867	7,867	7,748	7,759	7,852
5 a 9	1,198	1,114	1,035	1,113	1,082	1,086
10 a 14	80	66	43	67	67	79
15 or +	5	8	5	4	7	4
Total reviewers	8,907	9,055	8,950	8,932	8,915	9,021

NOTE: Data for previous years updated after consolidation of FAPESP's databases.

CHART 2
N° OF ASSESSMENTS BY REVIEWERS' REGIONS OF ORIGIN – 2013 TO 2018



THE STEPS IN THIS PROCESS ARE SUMMARIZED BELOW:

1 Area Panels Receive Applications	Each application received by FAPESP goes to the Area Panel corresponding to the knowledge area for the project.
2 Selection of <i>ad hoc</i> reviewers and issuance of opinions	After analyzing project summaries and applicants' institutional affiliations, the Area Panels select specialists with specific competencies in each project's subject matter and ask them to issue expert opinions, avoiding potential conflicts of interest. These <i>ad hoc</i> reviewers analyze the proposals and issue merit assessments. 9,021 <i>ad hoc</i> reviewers issued 22,162 opinions in 2018
3 Analysis by Area Panel	The proposals return to the Area Panels, which analyze the reviewers' assessments and recommend approval or denial by the Science Directorate. MAIN AREAS OF PROPOSALS APPRAISED IN 2018: 48% Life Sciences 20.5% Human and Social Sciences 30% Natural and Earth Sciences and Engineering 1.5% Interdisciplinary
4 Joint analysis by Supervisory Panel	The Science Directorate also works with a supervisory panel comprising 19 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 Scientific Directorate Decision	The Science Directorate's decisions are based on the recommendations of the Supervisory Panel and Area Panels. 70 days was the average time taken to analyze each of the 19,648 initial assessments in 2018
6 Executive Board's Approval	The Executive Board (CTA) approves the Science Directorate's decisions subject to ratification by the Board of Trustees.
7 Board of Trustees	The Board of Trustees ratifies the Executive Board's decisions.

CHAPTER



2



GENERAL INDICATORS

- Income in 2018
- Disbursement for research funding
- Disbursement, number of active projects and new projects contracted – 2018
 - By Funding Strategies
 - By Major Knowledge Areas
 - By Institutions
 - Funding Strategies by Scholarships/Fellowships and Grants
- Annual Evolution of Disbursement – 2012 to 2018
 - By Funding Strategies
 - By Types of Scholarships/Fellowships and Research Grants
- Annual Evolution of the number of projects contracted – 2012 to 2018
 - By Total of Scholarships/Fellowships and Research Grants

GENERAL INDICATORS

INCOME IN 2018

FAPESP's income totaled **\$ 675,014,131** in purchasing power parity (PPP).

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

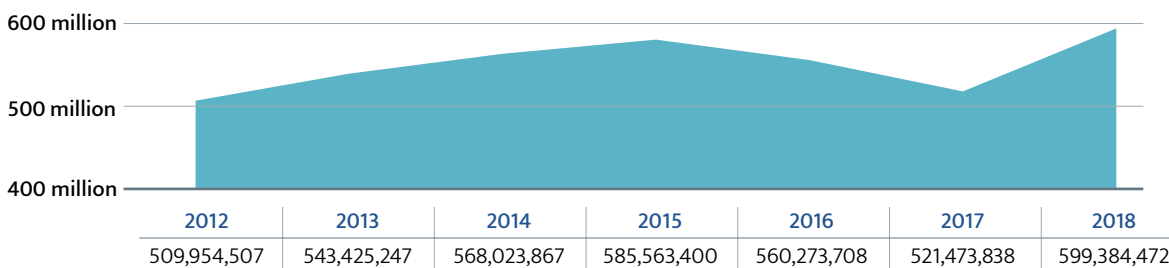
CHART 3
INCOME



DISBURSEMENT

In 2018, FAPESP disbursement **\$ PPP 599,384,473** to fund **24,720** active scientific and technology research projects in the year.

CHART 4
ANNUAL EVOLUTION OF DISBURSEMENT FOR RESEARCH FUNDING (\$ PPP) – 2012 TO 2018



DISBURSEMENT, NUMBER OF ACTIVE PROJECTS AND NEW PROJECTS CONTRACTED – 2018

TABLE 2
BY FUNDING STRATEGIES



Funding Strategies	Disbursement \$ PPP	Active projects	New projects contracted
Training of Human Resources for Research	144,230,540	10,222	4,386
Basic and Applied Research	307,843,237	11,114	5,008
Research for Innovation	55,951,791	1,662	836
Strategic Research	26,907,297	906	344
Research Infrastructure	56,165,232	798	359
Communicating Science to the Public	8,286,376	18	13
TOTAL	599,384,473	24,720	10,946

TABLE 3
BY MAJOR KNOWLEDGE AREAS – 2018



Major Knowledge Areas	Disbursement \$ PPP	Active projects	New projects contracted
Life Sciences	281,293,169	12,354	5,315
Natural and Earth Sciences and Engineering	197,525,998	7,573	3,488
Human and Social Sciences	55,290,533	4,165	1,865
Interdisciplinary	65,274,773	628	278
TOTAL	599,384,473	24,720	10,946

TABLE 4
BY INSTITUTION – 2018



Institution	Disbursement \$ PPP	Active projects	New projects contracted
USP	259,035,557	9,189	3,841
UNICAMP	88,358,600	3,275	1,361
UNESP	66,943,862	4,561	2,099
Federal Research Institutions	74,839,103	3,519	1,638
State Research Institutions	37,087,371	1,187	505
Private Higher Education and Research Institutions	25,277,195	1,427	665
Companies	43,704,051	1,452	746
Scientific Associations and Societies	1,893,909	56	56
Municipal Institutions	583,510	41	24
Others	1,661,315	13	11
TOTAL	599,384,473	24,720	10,946

GENERAL INDICATORS

TABLE 5
FUNDING STRATEGIES BY SCHOLARSHIPS/FELLOWSHIPS AND GRANTS

Funding Strategies		Disbursement \$ PPP	Active projects	New projects contracted
TOTAL		599,384,473	24,720	10,946
TRAINING OF HUMAN RESOURCES FOR RESEARCH		144,230,540	10,222	4,386
Scholarships and Fellowships in Brazil and Abroad	Regular Scholarships (SI, MS, DR, DD) and Regular Fellowships (PD) in Brazil and Abroad not associated with research grants ⁽¹⁾	144,230,540	10,222	4,386
BASIC AND APPLIED RESEARCH		307,843,237	11,114	5,008
Long-term Research	Thematic Project Grant and associated scholarships/fellowships and grants	121,878,648	3,220	1,393
	Research, Innovation and Dissemination Centers (RIDC) and associated scholarships/fellowships and grants	42,856,087	678	223
	São Paulo Excellence Chair Grant (SPEC) and associated scholarships/fellowships and grants	3,485,630	68	31
	Special Projects and associated scholarships/fellowships and grants	11,715,670	23	6
	Young Investigators Grant (YIG) and Fellowship and associated scholarships/fellowships and grants	29,354,682	1,099	395
Subtotal		209,290,717	5,088	2,048
Regular Research Grants	Regular Research Grants not associated to other grants and associated scholarships/fellowships	82,557,951	4,450	1,581
	Regular Grants – (participating in or organization of scientific meetings, visiting researchers, publication of books and articles) not associated to other grants	15,994,569	1,576	1,379
Subtotal		98,552,520	6,026	2,960
RESEARCH FOR INNOVATION		55,951,791	1,662	836
Partnership with Companies Research	Research Partnership for Technological Innovation Program (PITE) and associated scholarships/fellowships and grants	4,997,662	105	37
	Engineering Research Centers/Applied Research Centers (ERC/ARC) and associated scholarships/fellowships and grants	5,913,273	92	48
	Innovative Research in Small Business Program (PIPE), Fellowship PE and associated scholarships/fellowships and grants	43,772,808	1,455	747
	Intellectual Property Support Program (PAPI-Nuplitech) and associated scholarships/fellowships and grants	221,624	9	3
	Innovation Districts	1,046,424	1	1



Funding Strategies		Disbursement \$ PPP	Active projects	New projects contracted
STRATEGIC RESEARCH		26,907,297	906	344
Strategic projects	FAPESP Research Program on Biodiversity Characterization, Conservation, Restoration and Sustainable Use (BIOTA) and associated scholarships/fellowships and grants	6,740,801	202	83
	FAPESP Bioenergy Research Program (BIOEN) and associated scholarships/fellowships and grants	5,658,801	233	84
	FAPESP Research Program on Global Climate Change (RPGCC) and associated scholarships/fellowships and grants	6,461,961	228	99
	FAPESP Research Program on eScience and DataScience and associated scholarships/fellowships and grants	697,554	34	8
	Modernization of São Paulo's Research Institutes and associated scholarships/fellowships and grants	5,279,121	25	25
	Research in Public Policies Program (PPP) and associated scholarships/fellowships and grants	914,938	84	27
	Research in Public Policies for National Health Care System (PP-SUS) and associated scholarships/fellowships and grants	896,115	46	11
	Public Education Research Program (EP)	258,006	54	7
RESEARCH INFRASTRUCTURE		56,165,232	798	359
Modernization and Conservation of Research Facilities	Multi-user Equipments Program	25,911,709	205	78
	Equipment Repair Award	2,101,656	286	151
	ANSP Network	8,938,999	3	1
	Research Overheads	19,212,866	304	129
COMMUNICATING SCIENCE TO THE PUBLIC		8,286,376	18	13
	Studies of the overall status of research in São Paulo	373,266	12	10
	Dissemination of Scientific Knowledge in the State of São Paulo	2,789,730 ⁽²⁾	3 ⁽²⁾	2
	<i>Pesquisa FAPESP</i> Magazine	4,197,257	1	0
	Mapping of research institutions in São Paulo (BV)	926,122 ⁽²⁾	2 ⁽²⁾	1


⁽¹⁾ SI=Scientific Initiation; MS=Masters; DR=Doctorate; DD=Doctorate (applicant without MSc degree); PD=Postdoctoral).

⁽²⁾ Disbursement in 2018 corresponds to the last two months of projects begun in 2017 (March 1st, 2017 - February 28th, 2018) and the first ten months of projects begun in 2018 (March 1st, 2018 - February 28th, 2019).

GENERAL INDICATORS


ANNUAL EVOLUTION OF DISBURSEMENT (\$ PPP) – 2012 TO 2018

TABLE 6
BY FUNDING STRATEGIES



Funding Strategies		2018	2017	2016	2015	2014	2013	2012
Training of Human Resources for Research		144,230,540	145,511,131	164,459,603	184,835,901	192,234,175	179,407,057	146,205,648
Basic and Applied Research	Long-term research	209,290,717	172,839,514	166,241,916	165,442,140	148,035,975	114,040,128	105,227,661
	Regular Grants not associated to other grants	98,552,521	92,337,012	104,949,935	124,638,326	131,223,802	150,607,378	158,063,533
Research for Innovation		55,951,791	42,494,350	36,941,541	21,520,692	17,514,957	15,996,735	12,880,914
Strategic Research		26,907,297	18,920,494	19,429,199	22,700,421	22,746,916	25,776,748	25,574,322
Research Infrastructure		56,165,232	42,281,583	61,586,865	58,851,066	47,228,008	47,975,082	52,364,871
Communicating Science to the Public		8,286,376	7,089,753	6,664,648	7,574,853	9,040,035	9,622,121	9,637,560
TOTAL		599,384,473	521,473,838	560,273,708	585,563,400	568,023,868	543,425,248	509,954,508


TABLE 7
BY TYPES OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS



Types	2018	2017	2016	2015	2014	2013	2012
Scholarships/Fellowships ¹	247,411,171	228,469,055	234,750,571	245,643,822	247,579,158	228,305,629	190,301,652
Grants ²	351,973,301	293,004,783	325,523,003	339,919,579	320,444,710	315,119,619	319,652,856
TOTAL	599,384,473	521,473,838	560,273,708	585,563,400	568,023,868	543,425,248	509,954,508

ANNUAL EVOLUTION OF THE NUMBER OF PROJECTS CONTRACTED – 2012 TO 2018

TABLE 8
BY TOTAL OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS



Types	2018	2017	2016	2015	2014	2013	2012
Scholarships/Fellowships ¹	7,276	6,584	6,653	6,247	7,234	8,030	8,614
Grants ²	3,670	3,602	3,827	3,823	4,375	4,363	4,697
TOTAL	10,946	10,186	10,480	10,070	11,609	12,393	13,311

For details of disbursements and new scholarships/fellowships and grants contracted in 2018, see pp. 98-101.

¹ Scholarships/Fellowships = Regular Scholarships (SI, MS, DR, DD) and Fellowships (PD, Technical Training, Science Journalism, Courses, Young Investigator, PIPE and Public Education), in Brazil and abroad, associated or not associated files.

² Grants = all research grants.

CHAPTER



3

FUNDING STRATEGIES

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

TRAINING OF HUMAN RESOURCES FOR RESEARCH

F

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

In 2018, FAPESP disbursed **\$ PPP 144.2 million** for **10,222** human-resource training scholarships in Brazil and abroad, and it contracted for **4,386** new scholarships.

TYPES OF TRAINING SCHOLARSHIPS AND FELLOWSHIPS

REGULAR SCHOLARSHIPS/FELLOWSHIPS NOT ASSOCIATED WITH GRANTS

In Brazil

SCHOLARSHIPS

- Scientific Initiation (SI)
- Master's (MS)
- Doctorate (DR)
- Direct Doctorate (DD) – www.fapesp.br/en/postdoc

FELLOWSHIPS

- Postdoctorate (PD) – www.fapesp.br/bolsas/pd

Abroad

- Research Internships Abroad (RIA) – www.fapesp.br/en/bepe
- Research Fellowships Abroad (RFA)

Fellowships Opportunities in São Paulo: www.fapesp.br/oportunidades

The table below shows disbursements for training scholarships and fellowships not associated with research grants. Full details of FAPESP's investment in scholarships and fellowships, both associated and not associated with grants for specific projects, can be found on pp. 98-99.

TABLE 9

TRAINING OF HUMAN RESOURCES FOR RESEARCH

Types of scholarships/fellowships, disbursement, number of active projects and new projects contracted for in 2018

Regular Scholarships/Fellowships not associated to grants		Disbursement \$ PPP	Active projects	New projects contracted
In Brazil		102,681,307	8,781	3,422
SCHOLARSHIPS	Scientific Initiation (SI)	10,597,716	3,529	1,911
	Master's (MS)	11,700,990	1,487	573
	Doctorate (DR)	39,088,404	2,250	517
	Direct Doctorate (DD)	5,373,521	359	92
FELLOWSHIPS	Postdoctorate (PD)	35,920,676	1,156	329
Abroad		41,549,233	1,441	964
Research Internships Abroad (RIA)				
RIA - SI		977,805	93	95
RIA - MS		2,160,626	165	116
RIA - DR		11,989,047	526	328
RIA - DD		1,833,895	67	56
RIA - PD		14,577,381	265	163
Research Fellowships Abroad (RFA) - PD		10,010,479	325	206
TOTAL		144,230,540	10,222	4,386

Media coverage of research results

Weight reduction could avoid 15,000 cancer cases per year in Brazil

A study conducted at FM-USP and published in Cancer Epidemiology estimated that a reduction in overweight and obesity could avoid at least 15,000 annual cancer cases, or 3.8% of the total.

News stories on the study were published by **341** media outlets.

www.agencia.fapesp.br/27852



RESEARCH FELLOWSHIPS ABROAD – FAPESP Process 2016/21390-0

Epidemiology

INSTITUTION

Medical School, University of São Paulo (FM-USP),
in collaboration with Harvard University

PRINCIPAL INVESTIGATOR

José Eluf Neto

SUPERVISOR ABROAD

Edward Giovannucci

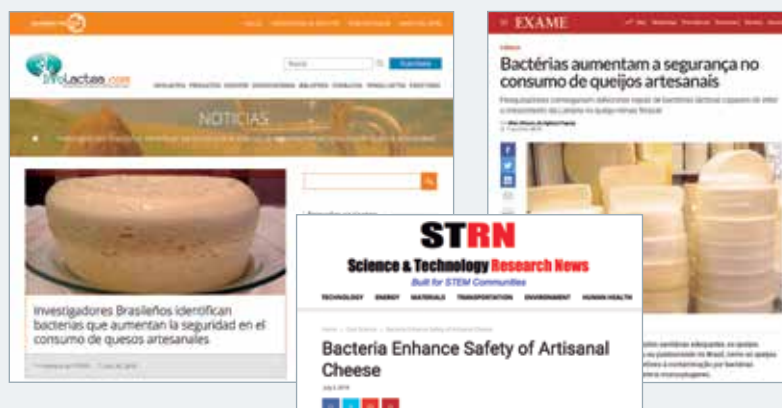
GRANTEE: Leandro Fórnia de Rezende

Bacteria increase the safety of craft cheese

Researchers at UNICAMP proposed a way of helping craft cheese makers guarantee the safety of their produce and comply with federal regulations on cured cheese ripening.

News stories on the study were published by **32** media outlets.

www.agencia.fapesp.br/28111



DOCTORATE SCHOLARSHIP – FAPESP Process 2014/14891-7

Veterinary medicine

INSTITUTION

Universidade of Campinas (Unicamp)

PRINCIPAL INVESTIGATOR

Anderson de Souza Sant'Ana

GRANTEE

Fernanda Bovo Campagnollo

Biological markers facilitate the diagnosis of hemorrhagic dengue

Researchers at UNICAMP identified lipids that function as biological markers of hemorrhagic dengue.

News stories on the study were published by **291** media outlets.

www.agencia.fapesp.br/29114



DOCTORATE SCHOLARSHIP – FAPESP Process 2016/17066-2

Medicine

INSTITUTION

School of Medical Sciences, University of Campinas (UNICAMP)

PRINCIPAL INVESTIGATOR

Rodrigo Ramos Catharino

GRANTEE

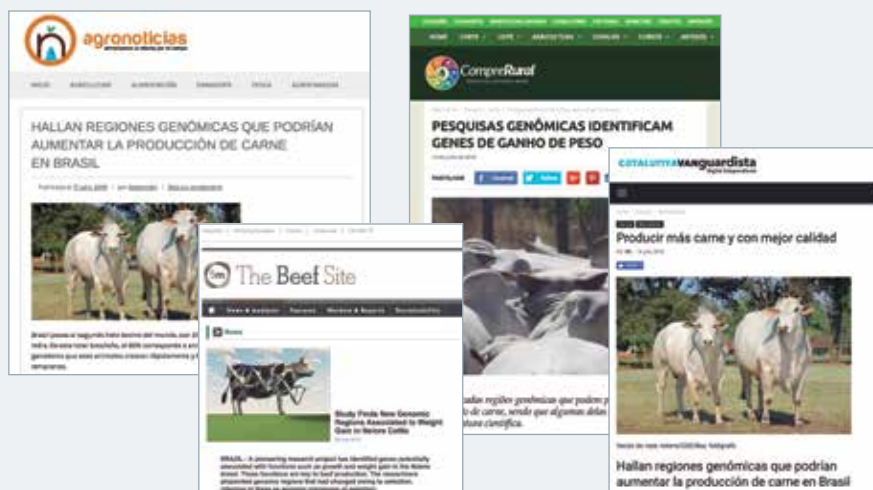
Carlos Fernando Odir Rodrigues Melo

This study identifies genomic regions that could permit an increase in meat production

Groundbreaking research conducted at UNESP identified genes potentially associated with functions such as growth and weight gain in Nelore cattle.

News stories on the study were published by **26** media outlets.

www.agencia.fapesp.br/28157



POSTDOCTORATE FELLOWSHIP – FAPESP Process 2016/22490-8

RESEARCH INTERNSHIPS ABROAD – FAPESP Process 2018/11460-0

Animal husbandry

INSTITUTION

Jaboticabal School of Agrarian Sciences & Veterinary Medicine, São Paulo State University (FAC-UNESP)

PRINCIPAL INVESTIGATOR

Humberto Tonhati

SUPERVISOR ABROAD

Antonio Reverter-Gomez

GRANTEE: Diercles Cardoso

BASIC AND APPLIED RESEARCH

Research for knowledge advancement comprises basic and applied research projects conducted over the long term – as part of Thematic Projects Grant, programs such as RIDC, SPEC and YIG, or Special Projects – and research completed in comparatively short periods with the support of regular research grants and awards for visiting researchers, publications, and participation in or organization of scientific meetings such as São Paulo Schools of Advanced Science, all not associated with other programs. In 2018, different types of grants and scholarships were associated with long-term research projects, while only regular scholarships and technical training scholarships were associated with short-term research projects.

In 2018,
FAPESP disbursed
\$ PPP 307.8 million
and contracted for **5,008**
new long- and short-term
research projects.

RELATED PROGRAMS

Long-term research

- Thematic Project Grant – www.fapesp.br/thematic
- São Paulo Excellence Chair Grant (SPEC)
- Research, Innovation and Dissemination Centers (RIDCs) – www.cepid.fapesp.br/en/home
- Young Investigators Grant (YIG) – www.fapesp.br/en/6251
- Special Projects

Regular Grants not associated to other grants

- Research Grants – Regular – www.fapesp.br/apr
- 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) – www.espca.fapesp.br/home

TABLE 10

BASIC AND APPLIED RESEARCH

Disbursement and new projects contracted in 2018 by major knowledge area

Programs	Life Sciences		Natural and Earth 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	68,170,280	645	47,065,496	643	6,061,948	96	580,925	9
SPEC and associated	1,451,262	14	1,688,222	14	212,899	2	133,248	1
RIDC and associated	6,708,279	92	7,054,447	116	471,056	14	28,622,305	1
YIG and associated	20,787,804	264	7,485,359	101	996,411	26	85,107	4
Special Projects and associated	0	0	11,715,670	6	0	0	0	0
Regular Grants not associated to other grants	59,180,272	1,439	28,660,777	881	6,222,245	596	4,489,226	44
TOTAL	156,297,897	2,454	103,669,970	1,761	13,964,559	734	33,910,810	59

THEMATIC PROJECTS GRANT

Goal: support for research projects with ambitious objectives conducted by multidisciplinary teams for periods of up to 5 years.

TABLE 11

THEMATIC

Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
Research Grants – Thematic Project*	69,144,919
Research Grants – Regular	359,482
Regular Grants – Participation in Scientific Meetings	275,980
Regular Grants – Visiting Researcher	1,638,771
Regular Grants – Publications	27,909
Regular Scholarships/Fellowships	48,936,264
Fellowship – Technical Training	1,471,697
Fellowship – Science Journalism	23,626
TOTAL	121,878,648

* Not including Thematic Grants associated with other programs.

SPECIAL PROJECTS

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

TABLE 12

SPECIAL PROJECTS

Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
Special Projects Grants	11,162,800
Regular Grants – Visiting Researcher	32,146
Regular Scholarships/Fellowships	371,228
Fellowship – Technical Training	149,496
TOTAL	11,715,670

Media coverage of research results: Thematic Project

The discovery of zika virus in monkeys suggests that the disease may also have a wild cycle in Brazil

Researchers affiliated with the Zika Network, which is supported by FAPESP, found zika virus in monkey carcasses. The discovery pointed to a potential wild cycle for zika in Brazil, as is already the case with yellow fever.

News stories on the study were published by **287** media outlets.

www.agencia.fapesp.br/29081



THEMATIC PROJECT – ZIKA NETWORK – FAPESP Process 2013/21719-3

Microbiology

INSTITUTION

São José do Rio Preto Medical School (FAMERP)

PRINCIPAL INVESTIGATOR

Maurício Lacerda Nogueira

The new face of Luzia and the Lagoa Santa people

Two monumental studies, both involving Brazilian scientists, rewrote the history of the first inhabitants of the Americas with the aid of DNA. One was published in the journal *Cell*, the other in *Science*. Their achievements included the first whole-genome analysis of various prehistoric Brazilians.

News stories on the research were published by **56** media outlets.

www.revistapesquisa.fapesp.br/en/2019/06/18/when-indigenous-people-occupied-lagoa-santa and www.agencia.fapesp.br/29168



THEMATIC PROJECT – FAPESP Processes 2004/01321-6, 1999/12684-2, 2004/11038-0 and 2017/16451-2

Anthropology and archeology

INSTITUTIONS

Biosciences Institute (IB) and Museum of Archeology and Ethnology (MAE) of University of São Paulo

PRINCIPAL INVESTIGATORS

Walter Neves, Levy Gigutti, Paulo Antônio Dantas de Blasis and André Strauss

Molecules used as mucolytics can combat bacterial crop disease

Orange growers in the northwest of São Paulo State and olive growers in Italy face a common problem: diseases caused by the bacterium *Xylella fastidiosa*, which do considerable economic damage. Researchers at São Paulo's Agronomy Institute (IAC) discovered a solution.

News stories on the study were published by **12** media outlets.

www.agencia.fapesp.br/28932



THEMATIC PROJECT – FAPESP Process 2013/10957-0

Genetic

INSTITUTION
The Agronomy Institute (IAC)

PRINCIPAL INVESTIGATOR
Alessandra Alves de Souza

Media coverage of research results: Special Projects

Chip developed at the University of São Paulo (USP) will be a key piece of LHC upgrade

ALICE (A Large Ion Collider Experiment), one of the major experiments at CERN's Large Hadron Collider (LHC) on the Swiss-French border, will receive 88,000 units of a chip designed at USP's Engineering School (POLI) with FAPESP's support. Called SAMPa, the chip was tested in several countries, validated by an international group of experts, and greenlighted for mass fabrication.

News stories on the project were published by **23** media outlets.

www.agencia.fapesp.br/27589



SPECIAL PROJECTS – FAPESP Process 2014/12664-3 / THEMATIC PROJECT – FAPESP Process 2012/04583-8
REGULAR RESEARCH GRANT – FAPESP Process 2013/06885-4

Physic

INSTITUTION
Polytechnic School and Physics Institute/University of São Paulo (USP)

PRINCIPAL INVESTIGATORS
Wilhelmus Adrianus Maria van Noije
and Marcelo Gameiro Munhoz

BASIC AND APPLIED RESEARCH

RESEARCH, INNOVATION AND DISSEMINATION CENTERS (RIDCs)

Goal: 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 will be supported by FAPESP until 2024:

- Center for Research and Innovation in Biodiversity and Drug Discoverys (CiBFar): USP – São Carlos
- Center 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 (CEPIV): 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 Centers (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 Research and Development of Functional Materials (CDFM): UFSCar – São Carlos.

2nd ASSESSMENT BY INTERNATIONAL COMMITTEE

The RIDCs had their excellence recognized in a second assessment by an international committee comprising 15 experts in several fields and with substantial expertise in the functioning of internationally competitive research centers. Based on this evaluation, which referred to the period 2015-17, the agreements covering the RIDCs were extended until 2023.

The report highlighted the quality of the researchers and students affiliated with the RIDCs, stressing that they had genuinely fulfilled their key mission of organizing activities in terms of research, dissemination and knowledge transfer.

Reports sent individually to each RIDC recommended a number of actions to concentrate and intensify progress and ensure they would continue to carry out their mission with excellence.

The results of the international committee's first assessment, covering the period 2013-15, were also positive.

HIGHLIGHTS IN INNOVATION & DISSEMINATION
2018● **First Symposium on Science Diffusion and Dissemination**

Organized as an initiative of CDFM, the First Symposium on Science Diffusion & Dissemination gathered researchers in different knowledge areas, communicators, and other professionals to discuss challenges and plan actions designed to disseminate scientific knowledge more widely.

During the year Ludo Educativo, a group that develops educational games as an extension project of CDFM, launched “Patrulheiros da História – Angola”, a game focusing on player reactions. CDFM has produced free games on various topics that are relevant to the day-to-day lives of children and adolescents, such as water shortage, environmental preservation and preparation for university entrance exams.

● **First Technical Course on Glass Production in Brazil**

Organized by CEPIV, the first technical course on glass production in Brazil began in February at Presidente Vargas State Technical School (ETEC) in Mogi das Cruzes, São Paulo State. It consisted of theoretical and practical classes on different glass production processes, the physical properties of glass, and quality control and recycling techniques. It resulted from a partnership between Centro Paula Souza, the Brazilian Glass Industry Association (ABIVIDRO), and Nadir Figueiredo, a leading Brazilian manufacturer of household utensils.

● **Surviving in Adversity: Markets and Life Forms**

Published in 2018, the book *Sobreviver na Adversidade: Mercados e Formas de Vida* is the third volume of Coleção Marginalia de Estudos Urbanos (“Urban Studies Marginalia Collection”), created by the Federal University of São Carlos’s publishing house (EDUFScar) in partnership with CEM. The book investigates the relationships between illegal informal markets and the life forms that have emerged in outlying suburbs of São Paulo and other Brazilian mega-cities.

● **5th BRAINN Congress**

The 5th BRAINN Congress was attended by researchers as well as undergraduate and graduate students from Brazil and abroad working in neuroscience, neurotechnology and related fields.

● **CeTICS on Wheels**

CeTICS created a traveling exhibition called “CeTICS on Wheels” to display the results of its research projects, especially to teach children and adolescents more about what scientists do.

TABLE 13

RIDCs

Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
Research Grants RIDC	28,486,692
Research Grants – Regular	55,062
Regular Grants – Participation in Scientific Meetings	75,231
Regular Grants – Visiting Researcher	306,658
Regular Grants – Publications	4,858
Regular Scholarship/Fellowships	13,415,118
Fellowship – Technical Training	484,940
Fellowship – Science Journalism	27,526
Total	42,856,087

Media coverage of research results: RIDCs

Brazilian studies could lead to the production of new antimalarial drugs

A novel molecule synthesized in the laboratory by researchers at CIBFar is a strong candidate for the development of a drug against malaria.

News stories on the research were published by **185** media outlets.

www.agencia.fapesp.br/28400



RIDC – Center for Research and Innovation in Biodiversity and Drug Discovery (CIBFar)
FAPESP Process 2013/07600-3

Biophysics

HOST INSTITUTION
São Carlos Institute of Physics (IFSC) of University of São Paulo (USP)

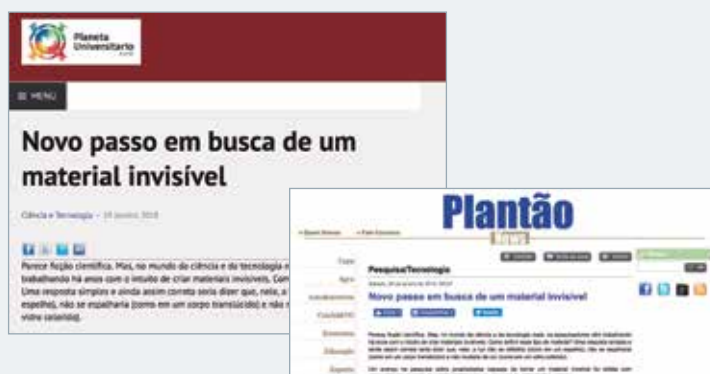
PRINCIPAL INVESTIGATOR
Glaucius Oliva

Significant progress toward the development of novel invisible materials

Scientists affiliated with CDFM, in collaboration with researchers at the University of Michigan, found properties capable of making a material invisible in cobalt oxide nanoparticles synthesized in the presence of the amino acid L-cysteine.

News stories on the research were published by **7** media outlets.

www.agencia.fapesp.br/27019



RIDC – Center for Research and Development of Functional Materials (CDFM)
FAPESP Process 2013/07296-2

Materials engineering and Metallurgy

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

PRINCIPAL INVESTIGATOR
Elson Longo da Silva

Research enhances plastic-degrading enzyme

An international group including researchers affiliated with the Center for Computing in Engineering & Science (CCES) increased the plastic-degrading capacity of the enzyme PETase.

News stories on the research were published by **47** media outlets.

www.agencia.fapesp.br/27855



RIDC – Center for Computational Engineering and Sciences (CCES)
FAPESP Process 2013/08293-7

Chemistry

HOST INSTITUTION

Institute of Chemistry, University of Campinas (IQ-Unicamp)

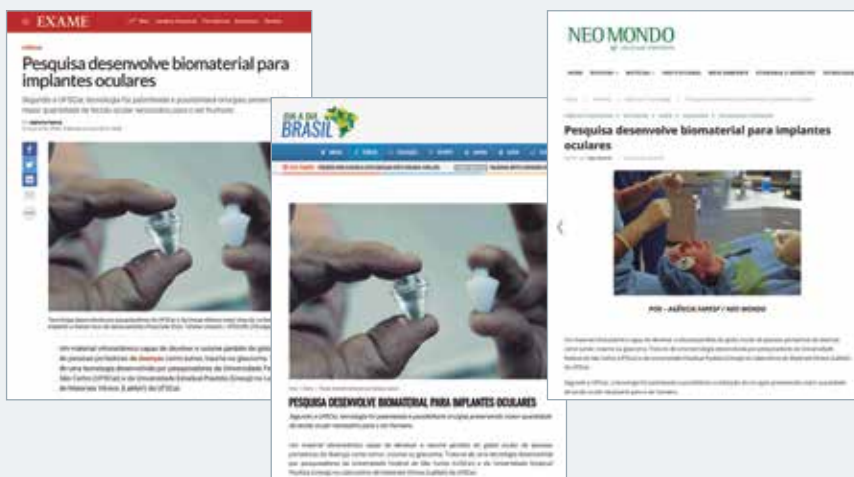
PRINCIPAL INVESTIGATOR

Munir Salomão Skaf

Researchers have developed biomaterials for ocular implants

A novel glass-ceramic material that can be used to implant artificial eyes in patients with tumors, traumas or glaucoma was developed by researchers at CerTEV. The technology has been patented. News stories on the research were published by **11** media outlets.

www.agencia.fapesp.br/27935



RIDC – Center for Research, Teaching, and Innovation in Glass (CEPIV)
FAPESP Process 2013/07793-6

Materials engineering and Metallurgy

HOST INSTITUTION

Center of Exact Sciences and Technology (CCET), Federal University of São Carlos (UFSCar)

PRINCIPAL INVESTIGATOR

Edgard Dutra Zanotto

Media coverage of research results: RIDCs

Zika eliminates advanced tumors of the human central nervous system

A study conducted at the Human Genome & Stem Cell Research Center (HUG-CELL) showed for the first time in a live model that the Zika virus can be used as a tool to treat aggressive tumors of the human central nervous system.

News stories on the study were published by **150** media outlets.

www.agencia.fapesp.br/27677



RIDC – Human Genome and Stem-Cell Research Center (HUGH-CELL)
FAPESP Process 2013/08028-1

Genetics

HOST INSTITUTION

Institute of Bioscience, University of São Paulo (IB-USP)

PRINCIPAL INVESTIGATOR

Mayana Zatz

Butantan Institute develops ointment against brown spider bite

Researchers at Butantan Institute affiliated with CeTICS tested a tetracycline ointment for use in treating the bite of *Loxosceles* brown recluse spiders.

News stories on the research were published by **104** media outlets.

www.agencia.fapesp.br/29289



RIDC – Center for Research on Toxins, Immune-Response and Cell Signaling (CeTICS)
FAPESP Process 2013/07467-1

Biochemistry

HOST INSTITUTION

Butantan Institute

PRINCIPAL INVESTIGATOR

Hugo Aguirre Armelin

Effects of quantum turbulence

A team led by researchers affiliated with CePOF found that a disturbance introduced into a cold atom cloud of the chemical element rubidium produced a wave phenomenon similar to light.

News stories on the research were published by **3** media outlets.

www.revistapesquisa.fapesp.br/2018/01/16/efeitos-da-turbulencia-quantica



RIDC – Optics and Photonics Research Center (CEPOF)
FAPESP Process 2013/07276-1

Physics

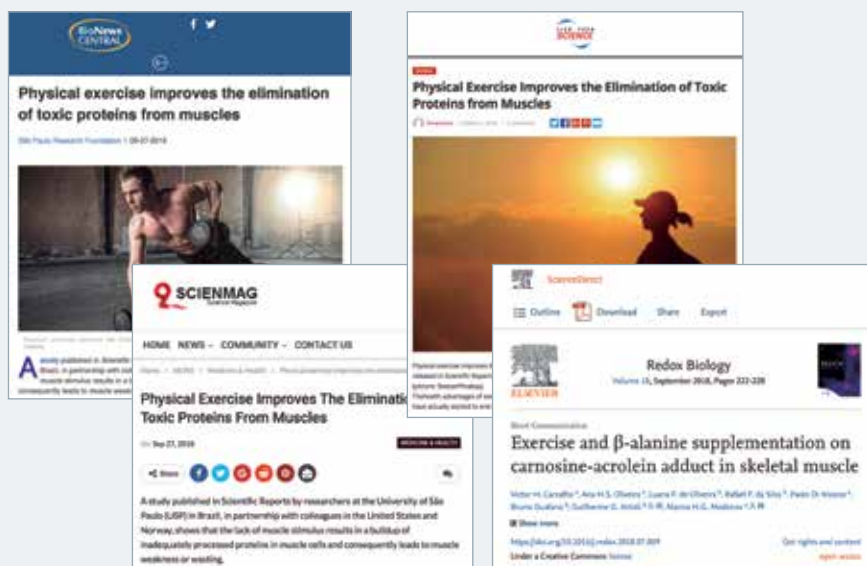
HOST INSTITUTION
São Carlos Institute of Physics, University of São Paulo (IFSC-USP)

PRINCIPAL INVESTIGATOR
Vanderlei Salvador Bagnato

Supplement increases detoxification in athletes' muscles

Researchers affiliated with the RIDC Redoxome observed for the first time the action of a food supplement in skeletal muscle. This discovery could assist in the treatment of disease caused by oxidative stress. News stories on the research were published by **45** media outlets.

www.agencia.fapesp.br/29614



RIDC – Center for Research on Redox Processes in Biomedicine (Redoxome)
FAPESP Process 2013/07937-8

Biochemistry

HOST INSTITUTION
Chemistry Institute, University of São Paulo (IQ-USP)

PRINCIPAL INVESTIGATOR
Ohara Augusto

BASIC AND APPLIED RESEARCH

SÃO PAULO EXCELLENCE CHAIR GRANT (SPEC)

Goal: 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 aim to stay in Brazil for 12 weeks per year for the duration of the project, which must last at least five years, coordinating a group of FAPESP grantees comprising postdoctoral researchers, PhDs and scientific initiation students. In 2018, 11 research centers supported under the aegis of the SPEC program were active at UNICAMP, Mackenzie, USP, UNESP and Brazil's National Energy & Materials Research Center (CNPEM). They were led by researchers affiliated with the following: Harvard University, Michigan State University, University of Georgia, George Washington University and University of Minnesota, USA; Vrije University Brussels, Belgium; Imperial College London, UK; Université Laval, Canada; Institut de Biologie Structurale, Grenoble, France; Graphene Research Center, National University of Singapore; and University of Hawaii at Manoa.

TABLE 14

SPEC

Disbursement in 2018

Fellowships and Grants associated	Disbursement \$ PPP
Research Grant SPEC *	2,130,425
Research Grants – Regular	7,028
Regular Grants – Participation in Scientific Meetings	17,227
Regular Grants – Visiting Researcher	29,393
Regular Scholarships/Fellowships	1,289,650
Fellowship – Technical Training	11,904
Total	3,485,630

* Not including SPEC grants associated with other programs.

YOUNG INVESTIGATORS GRANT (YIG)

Goal: attracting young PhDs from Brazil and other countries to create new research groups; training new science leaders with the aim of building a scientific community of excellence in São Paulo State. In 2018, FAPESP issued a call for proposals under Phase 2 of the Young Investigators Grant to consolidate research lines initiated by researchers who received support from Phase 1 of the program and achieved excellence in their performance during the development of their projects.

TABLE 15

YOUNG INVESTIGATORS

Disbursement in 2018

Fellowships and Grants associated	Disbursement \$ PPP
Young Investigators Grants ¹	17,729,539
Young Investigators Fellowships ¹	348,715
Research Grants – Regular	156,119
Regular Grants – Participation in Scientific Meetings	12,268
Regular Grants – Visiting Researcher	118,613
Regular Grants – Publication	5,772
Regular Scholarships/Fellowships	7,582,231
Fellowship – Technical Training	262,949
Total	29,354,682

¹ Not including Young Investigators Grants and Fellowships associated with other programs.

Media coverage of research results: SPEC

Social and environmental costs of dams are underestimated, study concluest

When calculating the total cost of large hydropower dams such as Belo Monte in Pará, environmental and social impacts should be taken into account, concludes a study led by Emilio Moran, a scientist based at Indiana University (USA) and a visiting professor at UNICAMP. The study was published in *Proceedings of the National Academy of Sciences of the United States of America* (PNAS).

News stories on the study were published by **13** media outlets.

www.agencia.fapesp.br/29529



SPEC – FAPESP Process 2012/51465-0

Interdisciplinary

HOST INSTITUTION

Environmental Research Center, University of Campinas (Nepam-Unicamp)

VISITING RESEARCHER

Emilio Federico Moran, Indiana University, USA

Technique permits scale gain in the production of materials with graphene

Researchers at MackGrafe developed strategies for the production of plastic and graphene nanocomposites on an industrial scale rather than in the laboratory as done previously. News stories on the project were published by **10** media outlets.

www.agencia.fapesp.br/29581



SPEC – FAPESP Process 2012/50259-8

Physics

HOST INSTITUTION

Center for Advanced Research in Graphene, Nanomaterials & Nanotechnology (MackGrafe), Mackenzie Presbyterian University (UPM)

VISITING RESEARCHER

Antônio Hélio de Castro Neto
National University of Singapore (NUS), Singapore

Media coverage of research results: Young investigators

An artificial magnetic field produces exotic behavior in a graphene sheet

A study conducted by a young Brazilian researcher and featured on the cover of *Physical Review Letters* showed graphene to be so versatile that it can be manipulated to display hitherto unexplored regimes.

News stories on the study were published by **26** media outlets.

www.agencia.fapesp.br/29227



YOUNG INVESTIGATORS – FAPESP Process 2018/04955-9

Physics

INSTITUTION

Institute for Theoretical Physics, São Paulo State University (IFT-Unesp)

PRINCIPAL INVESTIGATOR

Aline Ramires Neves de Oliveira

Brazil-Germany collaborative research seeks to understand electrochemical reactions

A study based at UFABC aims to optimize electrochemical reactions in fuel cells and other devices.

News stories on the study were published by **4** media outlets.

www.agencia.fapesp.br/29491



YOUNG INVESTIGATORS – FAPESP Process 2017/10292-0

Physics

INSTITUTION

Center for Natural & Human Sciences,
Federal University of the ABC (CCNH-UFABC)

PRINCIPAL INVESTIGATOR

Luana Sucupira Pedrosa

PRINCIPAL INVESTIGATOR

Mariana Rossi Carvalho

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 who wish to receive support for individual research projects. The following types are awarded: Research Grants – Regular; Grants for Participation in Scientific Meetings, Organization of Scientific Meetings, Publications and Visiting Researchers.

São Paulo School of Advanced Science (SPSAS)

SPSAS awards are a type of regular grant for scientific organizations to support short courses for graduate students and postdocs from Brazil and elsewhere delivered by leading Brazilian and foreign scientists. Thirteen SPSASs were held in 2018 – seven at USP, three at UNICAMP, one at Mackenzie Presbyterian University (UPM), one at the Energy & Nuclear Research Institute (IPEN), and one at CEBRAP, a São Paulo think tank. The topics related to the following fields: immunology, public health, chemistry, oceanography, management, psychology, mechanical engineering, electrical engineering, sociology, medicine, and political science. In 2018, FAPESP held a Dialogue on Support for the Organization of Courses in Advanced Research in connection with the 14th SPSAS call. The purpose was to present the criteria used to review and select proposals and answer questions from participants.

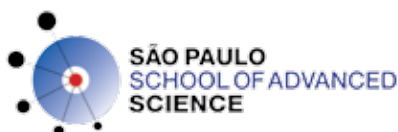
TABLE 16
REGULAR GRANTS
Disbursement in 2018



Regular Grants ¹ not associated to other grants and fellowships associated	\$ PPP ²
Research Grants – Regular	80,440,645
Regular Grants – Participation in Scientific Meetings	2,680,813
Regular Grants – Organization	10,582,164
Regular Grants – Visiting Researcher	1,655,745
Regular Grants – Publication	1,075,848
Fellowship – Technical Training	2,082,215
Fellowship – Academic Training	5,016
Regular Fellowship – Postdoctorate	30,074
Total	98,552,520

¹ Not including Regular Research Grants associated with other programs. For a complete overview of FAPESP's investment in all types of grant, see page 100.

² Minor differences in \$ PPP are due to rounding of cents.



Media coverage of research results: Regular Grants

Cattle tick resistance mechanisms

Researchers at USP identified mechanisms whereby the cattle tick develops resistance to ivermectin, one of the drugs most widely used to combat *Rhipicephalus microplus*.

News stories on the research were published by **139** media outlets.

www.agencia.fapesp.br/29116



REGULAR RESEARCH GRANT – FAPESP Process 2016/09659-3

Genetics

INSTITUTION

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

PRINCIPAL INVESTIGATOR

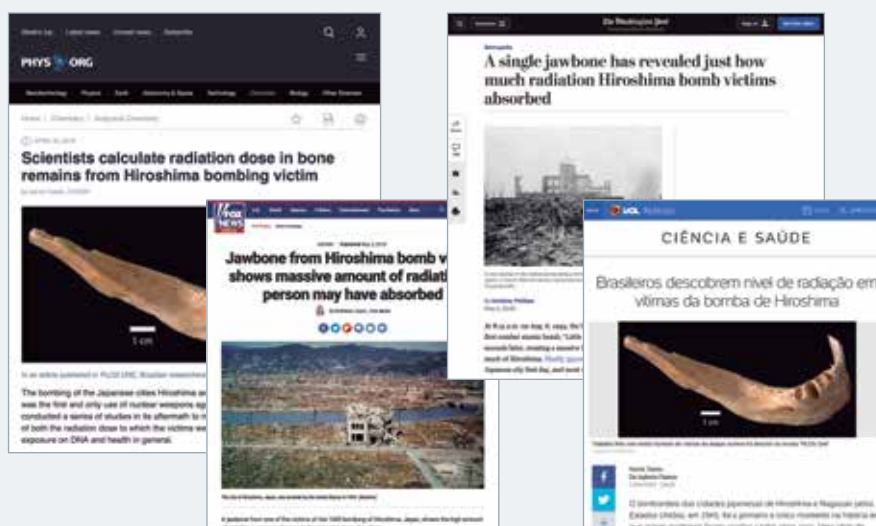
Tatiana Teixeira Torres

Brazilians develop method of measuring radiation levels in Hiroshima bomb victims

Brazilian researchers developed a method capable of accurately measuring the radiation absorbed by bone samples from victims of the atomic bombs dropped on Hiroshima and Nagasaki in Japan.

News stories on the project were published by **76** media outlets.

www.agencia.fapesp.br/27697



REGULAR RESEARCH GRANT – FAPESP Process 2007/06720-4

Physics

INSTITUTION

Ribeirão Preto School of Philosophy, Science and Letters, University of São Paulo (FFCLRP)

PRINCIPAL INVESTIGATOR

Oswaldo Baffa Filho

Legislation on invisible water

A compilation of the laws governing groundwater in Brazil was edited by researchers at UNICAMP and UNESP. These are state laws that regulate the use of groundwater and its management to avoid contamination. News stories on the project were published by **12** media outlets.

www.agencia.fapesp.br/28619



REGULAR RESEARCH GRANT – FAPESP Process 2013/10689-6

Law

INSTITUTION

The School of Applied Sciences, University of Campinas (FCA-Unicamp)

PRINCIPAL INVESTIGATOR

Luciana Cordeiro de Souza Fernandes

Jaboticaba peel extract combats prediabetes

Researchers at IB-UNICAMP discovered that jaboticaba peel extract can prevent prediabetes and fatty liver accumulation (hepatic steatosis) in mice. An article describing the research was published in the *Journal of Functional Foods*.

News stories on the project were published by **316** media outlets.

www.agencia.fapesp.br/29400



REGULAR RESEARCH GRANTS – FAPESP Process 2015/25714-1

Cytology and cellular biology

INSTITUTION

Biology Institute and School of Food Engineering, University of Campinas (IB-UNICAMP)

PRINCIPAL INVESTIGATOR

Valéria Helena Alves Cagnon Quitete

RESEARCH FOR INNOVATION

FAPESP runs a number of research programs that promote collaboration between companies and universities or research institutions and 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 2018, FAPESP disbursed
\$ PPP 55.9 million
 for collaborative research
 projects involving
 universities and companies
 as well as research projects
 for innovation by small
 business.

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-Nuplitech)

TABLE 17

RESEARCH FOR INNOVATION

Disbursement for research in partnership with companies in 2018 (\$ PPP)

By major knowledge area	PITE and associated	ERCs/ARCs and associated	PIPE and associated	PAPI-Nuplitech and associated	Innovation Districts	TOTAL
Life Sciences	444,833	1,350,352	12,920,663	0	0	14,715,848
Natural and Earth Sciences and Engineering	2,140,618	2,740,765	25,828,497	56,189	0	30,766,069
Human and Social Sciences	5,371	662,223	944,736	15,501	0	1,627,832
Interdisciplinary	2,406,839	1,159,933	4,078,913	149,934	1,046,424	8,842,042
TOTAL	4,997,662	5,913,273	43,772,808	221,624	1,046,424	55,951,791

TABLE 18

RESEARCH FOR INNOVATION

Number of research projects in partnership with companies contracted in 2018

By major knowledge area	PITE and associated	ERCs/ARCs and associated	PIPE and associated	PAPI-Nuplitech and associated	Innovation Districts	TOTAL
Life Sciences	9	9	234	0	0	252
Natural & Earth Sciences and Engineering	18	33	406	1	0	458
Human and Social Sciences	0	2	32	2	0	36
Interdisciplinary	10	4	75	0	1	90
Total	37	48	747	3	1	836

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

ERCs/ARCs conduct strategic research and operate in accordance with an innovative collaborative research model: they are co-funded for a long period (five to ten years) by FAPESP, a partner company and a host institution responsible for operating costs and salaries.


Since the program's inception in 2012, ten ERCs have been established in partnership with the following companies: Peugeot-Citroën (one), GlaxoSmithKline (GSK) (two), Shell (five), Natura (one) and EMBRAPA (one). Two were set up in 2018: the Center for Innovation in New Energies (CINE), a partnership with Shell with four research divisions; and the Genomics for Climate Change Research Center (GCCRC), a partnership with EMBRAPA.

Three other centers were at the stage of proposal selection and approval at end-2018: the Engineering Research Center in Oil Reservoir & Production Management, a partnership with Equinor; the Center for Research on the Control of Sugarcane Diseases, a partnership with Usina São Martinho; and a center for research on biological pest control, a partnership with Koppert.

In 2018, FAPESP disbursed
\$ PPP 5.9 million to fund ten
Engineering Research Centers/
Applied Research Centers
(ERCs/ARCs) established in
partnership with five companies
and academic institutions.

TABLE 19
ERCs/ARCs

Amounts disbursed, projects in progress and new projects contracted in 2018, including associated scholarships/fellowships and grants



Fellowships and Grants associated	Disbursement FAPESP (\$ PPP)	Active projects	New projects contracted
Grants – ERCs/ARCs	4,439,801	10	5
Regular Research Grants	101,075	6	3
Regular Scholarships/Fellowships in Brazil	1,179,465	66	33
Regular Scholarships/Fellowships Abroad	171,636	4	4
Fellowships – Technical Training	21,296	6	3
TOTAL	5,913,273	92	48

TABLE 20

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

Contracted until end-2018



Name ERCs/ARCs	Partner Company	Host Institution	Partner institutions	Principal Investigator
ERC Professor Urbano Ernesto Stumpf	Peugeot-Citroën	UNICAMP	USP, ITA and Instituto Mauá de Tecnologia	Waldyr Luiz. R Gallo
Mission: Research on combustion engines adapted or developed specifically for biofuels				
Research Center for Gas Innovation (RCGI)	Shell	USP	USP São Carlos, IPEN and São Francisco Law School	Julio R. Meneghini
Mission: Increasing natural gas as a share of Brazil's energy mix				
Center of Excellence in New Target Discovery (CENTD)	GSK	Butantan Institute	–	Ana Marisa C. Tavassi
Center of Excellence for Research in Sustainable Chemistry (CERSusChem)	GSK	UFSCar	UNICAMP, USP-Ribeirão Preto, UNESP and Federal University of Santa Catarina (UFSC)	Arlene G. Guerra
Mission: Development and use of sustainable chemistry to surmount challenges in organic synthesis				
Center for Applied Research in Wellbeing & Human Behavior	Natura	USP	UNIFESP and Mackenzie Presbyterian University	Emma Otta
Mission: Multidisciplinary studies to evaluate and promote human wellbeing in Brazil				
Genomics for Climate Change Research Center (GCCRC)	Embrapa	UNICAMP	–	Paulo Arruda
Mission: Generating biotechnological assets that increase plant resistance to drought and heat; transferring technology to the productive sector				
Center for Innovation in New Energies (CINE)				
Mission: New energy storage devices with zero greenhouse gas emissions, among other goals				
Division 1 - Computational Material Science	Shell	USP	–	Juarez Lopes Ferreira da Silva
Division 2 - Sustainable route for conversion of methane with advanced electrochemical technologies	Shell	IPEN	–	Fabio Coral Fonseca
Division 3 - Advanced Energy Storage	Shell	UNICAMP	–	Rubens Maciel Filho
Division 4 - Dense energy carriers	Shell	UNICAMP	–	Ana Flavia Nogueira
In pipeline for 2019				
ERC in Biological Pest Control	Koppert	Esalq-USP	–	José Roberto Postali Parra
ERC in Oil Reservoir & Production Management	Equinor	UNICAMP	–	Antonio Carlos Bannwart
Center for Research on the Control of Sugarcane Diseases	Usina São Martinho	Final stage of selection	–	–

Media coverage of research results: ERCs/ARCs

Lithium-air batteries can store energy for cars, homes and factories

Current lithium-ion battery technology will probably be unable to cope with the substantial demand predicted for the decades ahead. The Center for Innovation in New Energies (CINE), established in 2018, is studying lithium-air batteries as an alternative. Li-air cells exist only in the lab right now. They store more energy based on an electrochemical reaction that forms lithium oxide.

News stories on the research were published by **54** media outlets.

www.agencia.fapesp.br/29794



ERC CENTER FOR INNOVATION IN NEW ENERGIES – FAPESP Process 2017/11958-1

Interdisciplinary

HOST INSTITUTION

School of Chemical Engineering, University of Campinas (FEQ-UNICAMP)

COMPANY

BG E&P Brasil Ltda.

PRINCIPAL INVESTIGATOR

Rubens Maciel Filho

Subsalt caverns can store CO₂

Scientists affiliated with RCGI applied to INPI for a patent on a system to separate carbon dioxide (CO₂) from methane (CH₄) by gravity. These two gases are dissolved in the crude oil extracted from wells, especially in subsalt oilfields where the seabed is up to 3 km below the surface.

News stories on the research were published by **19** media outlets.

www.pesquisaparainovacao.fapesp.br/876



ERC RESEARCH CENTRE FOR GAS INNOVATION (RCGI) – FAPESP Process 2017/19282-7

Mechanical Engineering

HOST INSTITUTION

Polytechnic School,
University of São Paulo
(Poli-USP)

PARTNER INSTITUTION

Institute of Energy and Environment (IEE) and São Carlos Institute of Chemistry, University of São Paulo (USP); São Francisco Law School and Nuclear and Energy Research Institute (IPEN)

PRINCIPAL INVESTIGATOR

Julio R. Meneghini

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.

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 company, an industry or an economic sector (PITE Agreements).

In 2018, FAPESP signed PITE cooperation agreements with three more companies: Andaraguá S.A., SABESP, and GSK. In addition, it contracted for **37 new projects** to be conducted by four companies with which it already had cooperation agreements.

In 2018, FAPESP disbursed
\$ PPP 4.9 million to support
105 research projects
proposed by 19 companies,
for development in
partnership with universities
and research institutions.

IN 2018

- Eleven companies with projects in progress under PITE Agreements:

Ananse Química Ltda., AstraZeneca, Embraer, Fundação O Boticário, GlaxoSmithKline (GSK), IBM Brasil, Instituto de Estudo de Saúde Suplementar, Intel, Microsoft, Padtec and Sabesp.

- Eight companies with projects in progress under PITE Spontaneous Demand:

AgroBio, BioMéruex Brasil S.A., Companhia Brasileira de Metalurgia e Mineração, Cooxupé – Cooperativa Regional de Cafeicultores in Guaxupé, Infibra S.A., Proteca Biotecnologia Florestal Ltda., Medicines for Malaria Venture and Structural Genomics Consortium.

TABLE 21

PITE

Disbursement, number of active projects and new projects contracted for in 2018

Fellowships and Grants associated	Disbursement \$ PPP	Active projects	New projects contracted
Research Grants – PITE	4,301,325	49	12
Research Grants – Regular	307	01	01
Fellowships – Technical Training	115,319	28	13
Regular Scholarships/Fellowships in Brazil	580,711	27	11
Total	4,997,662	105	37

Media coverage of research results: PITE

Scientists aim to train robots to identify plants automatically

Phenotyping research at EMBRAPA supported by FAPESP aims to reconstruct plant species in three dimensions using computational knowledge and techniques such as robotics and artificial intelligence.

News stories on the research were published by **32** media outlets.

www.agencia.fapesp.br/28372



PITE – FAPESP Process 2017/19282-7

Computing Science

COMPANY
EMBRAPA Agricultural Informatics (SP)
under FAPESP/IBM agreement

PRINCIPAL INVESTIGATORS
Thiago Teixeira Santos
Eric Rohmer

The first EMBRAPII unit specializing in drugs is unveiled at UNICAMP

The Protein Kinase Chemical Biology Center at the University of Campinas (SGC-UNICAMP), set up in 2015 with support from FAPESP's PITE program, became the first unit of EMBRAPII, the Brazilian Industrial Research & Innovation Corporation, specializing in pharmaceuticals and biopharmaceuticals.

News stories on the event were published by **6** media outlets.

www.agencia.fapesp.br/27151



PITE – FAPESP Process 2013/50724-5

Interdisciplinary

COMPANY
Structural Genomics Consortium

HOST INSTITUTION
Biology Institute, University of Campinas (Unicamp)

PRINCIPAL INVESTIGATOR
Paulo Arruda

RESEARCH FOR INNOVATION

INNOVATIVE RESEARCH IN SMALL BUSINESS PROGRAM (PIPE)

PIPE supports entrepreneurs who want to convert knowledge into novel products or services. Proposals submitted by startups and firms with up to 250 employees are selected in four annual calls for proof-of-concept testing (Phase 1) and project development proper (Phase 2).

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.

Since its inception in 1997, PIPE has supported **2,234** projects conducted by **1,368** SMEs in **139** municipalities across São Paulo State. In 2018 alone, it disbursed **\$ PPP 43.8 million** for **1,455** projects.

TABLE 22

PIPE

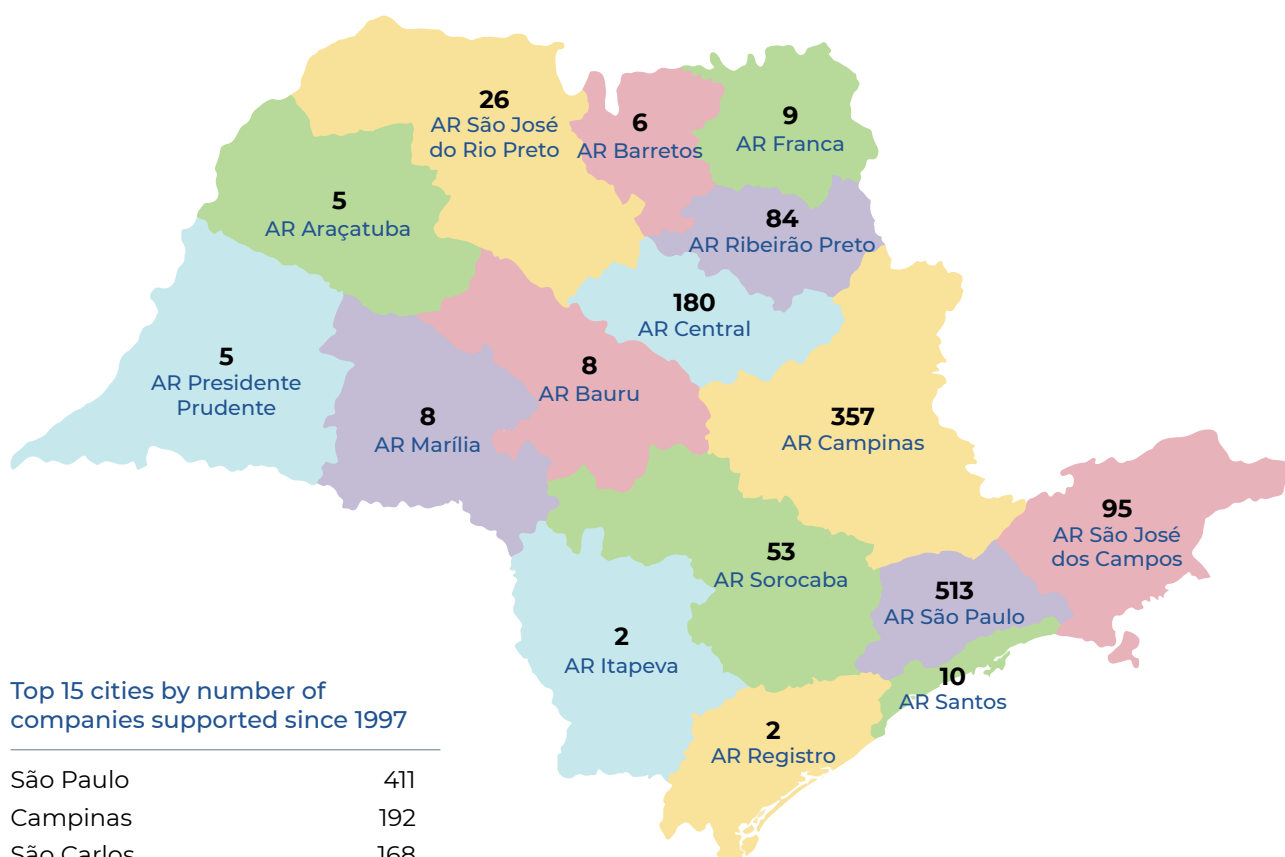
Disbursement, number of active projects and new projects contracted for in 2018

Fellowships and Grants associated	Disbursement \$ PPP	Active projects	New projects contracted
Research Grants – PIPE	32,172,733	640	270
Fellowship – Research in Small Business	6,268,789	269	145
Fellowships – Technical Training	5,255,410	541	330
Fellowships – Academic Training	4,199	1	1
Regular Scholarships/Fellowships in Brazil	46,809	2	0
Regular Scholarships/Fellowships Abroad	16,054	1	0
Regular Grants – Participation in Scientific Meetings Abroad	8,814	1	1
TOTAL	43,772,808	1,455	747

CHART 5

GEOGRAPHY OF INNOVATION IN SÃO PAULO STATE

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



* Not city identified for five companies.

INTERNATIONALIZATION OF FIRMS FUNDED BY PIPE

In 2018, several firms supported by PIPE and PIPE/PAPPE strengthened their positions in the international market. Some examples follow.

Hoobox Robotics developed a facial recognition platform that can be used to translate a wheelchair user's expressions into control commands. Development of the technology began in a master's dissertation at the University of Campinas (UNICAMP) and served as the foundation for a company that since 2018 has been part of Intel's startup accelerator program "AI for Social Good". It plans to optimize the performance of its facial recognition algorithms with the aid of Intel's hardware and software. In Brazil, Hoobox is being supported by Eretz.bio, a healthcare startup incubator operated by the Albert Einstein Jewish-Brazilian Charitable Society (SBIBAE) in São Paulo, and in the US, it is aided by JLABS, Johnson & Johnson Innovation's life science startup incubator at Texas Medical Center in Houston, Texas. In late 2018, it began setting up a subsidiary in Suzhou, China, to offer facial recognition technology for security purposes to clients in Shanghai, Qingdao, Nanjing and Shenzhen.



Photo: Hoobox

AB InBev will use a technology called Flowe supplied by **I.Systems** to increase production line efficiency in its US plants. I. Systems began its internationalization process in 2016, when mining company BHP began using the firm's first product, called Leaf, in Australia. Having grown at an annual rate of 50% in the last five years, I. Systems plans to sell to the South American market from its base in Brazil and build a strong presence in the US.

In September 2018, the US Department of Defense (DoD) chose **Griaule Biometrics** to supply software that identifies individuals on the basis of fingerprints, palm prints, voice, face and iris in a contract worth USD 75 million. In October, Griaule was picked by Arizona's Department of Public Safety to assist police investigations and supply criminal records and background checks for state employees.

Autaza, which developed an intelligent inspection technology to detect car body defects – already implemented by GM in the US – embarked on the process of opening a subsidiary in Ann Arbor, near Detroit, Michigan. It plans to have its systems certified by the world's leading auto makers and win commercial agreements with local partners.

São Paulo-based startup **Finamac**, established an office in the US and acquired an industrial shed there in which to assemble the ice cream machines it makes in Brazil. The US market accounts for 50% of its sales.

Agrosmart, a Campinas-based integrated weather forecasting, crop monitoring and pest management firm, began internationalizing in 2018. It already has clients in Mexico, Guatemala, Peru, Honduras, Colombia and Israel and has set up a US subsidiary.

At the end of 2018, **Kryptus**, an information security firm also based in Campinas, was awaiting FIPS 140-2 certification from the US National Institute of Standards & Technology (NIST) for its product kNET; it plans to grow its share of the US market. Its foreign clientele has been expanding since 2016, when a Swiss group invested in the firm. Exports to South America (Colombia, Peru and Chile), Europe and the US now account for 30%-40% of its sales. In Brazil, Kryptus is accredited as a "strategic defense company" (Empresa Estratégica de Defesa, EED) by Brazil's Defense Ministry, and some of its products have been awarded certification by ICP-Brasil, Brazil's public key infrastructure (PKI), overseen by the National Information Technology Institute (ITI). Its clients in Brazil include Savis, a subsidiary of Embraer, as well as the Brazilian Army's Communications & Electronic Warfare Center (CCOMGEX) and Mectron Comm, among others.

For more information:

www.agencia.fapesp.br/29854



Photo: Autaza

PIPE

INICIATIVAS DO PIPE EM 2018

● PIPE IMPACT ASSESSMENT

www.agencia.fapesp.br/28662

Preliminary results of the second PIPE impact assessment published in 2018 show that 80% of the projects completed between 2006 and 2016 produced innovations and that the average number of people employed by PIPE-funded startups rose from 8.5 to 11.1. The study, which analyzed 189 projects in Phase 2 of the program – 44% of all the projects completed in the period, implemented by 180 organizations – was conducted by FAPESP's Program Assessment Panel with support from PIPE's steering committee, FAPESP's Virtual Library (BV), and the Laboratory for Studies on the Organization of Research & Innovation (GEOPI) at the University of Campinas (UNICAMP).

AVERAGE NUMBER OF
EMPLOYEES PER STARTUP

Before PIPE – 8,5

During PIPE – 11,0

After PIPE – 11,1

● PIPE DIALOGUE MEETING THROUGHOUT THE STATE OF SÃO PAULO

In addition to the four annual editions of the Dialogue on Support for Small Business Innovation Research held at its São Paulo headquarters, FAPESP organized a meeting with entrepreneurs in three cities in the interior of the state: Araraquara, Marília, and Ribeirão Preto. These events are opportunities for firms interested in presenting projects to PIPE to obtain answers to questions about submission procedures before the deadline for applications to the program in one of its four annual calls for proposals.

● LEADERS IN INNOVATION FELLOWSHIPS PROGRAMME (LIF)

www.agencia.fapesp.br/28533

In 2018, another edition of the Leaders in Innovation Fellowships Program held a two-week course in the UK to train entrepreneurs with projects selected for PIPE Phase 1. Under the aegis of a partnership between FAPESP and the Royal Academy of Engineering, the course offered intensive training in the development of business plans in the area of innovation, entrepreneurship and leadership, as well as access to experts and international networking opportunities.

● PARTNERSHIP WITH SÃO PAULO CITY GOVERNMENT

FAPESP signed an agreement with the City of São Paulo's Innovation Department, with the Health Department also playing a key role, to support scientific and technological research by small firms via a call for proposals on "Smart Mega-Cities" issued under the aegis of the PIPE/PAPPE Grant Program.

● PARTNERSHIP WITH CITY OF JUNDIAÍ

The City of Jundiaí and FAPESP signed an agreement in 2018 to support companies committed to the development of solutions, services or products relating to smart cities.

● PIPE ENTREPRENEUR

Four editions of PIPE's Program of Training in High-Tech Entrepreneurship (PIPE Entrepreneur) were held in 2018 for representatives of startups selected in PIPE Phase 1. The program is designed to align business plans with market demand and increase the chances of success for the firms involved.

● PARTNERSHIP WITH CANADIAN COMPANIES

www.agencia.fapesp.br/28722

Three projects were selected in a call for proposals issued by FAPESP in cooperation with the National Research Council Canada (NRC). Visiona Tecnologia Espacial, based in São José dos Campos, will partner with Canada's Tesera Systems to develop satellite image processing technology for use in monitoring trees. Genotyping Laboratórios de Biotecnologia, based in Botucatu, will partner with Norgen Biotek to develop a method for isolating and diagnosing microorganisms in human blood. Dentillo e Gavio Identificação e Quantificação Molecular, based in Ribeirão Preto, will partner with MJMG Holdings to develop a simple, fast and cheap nucleic acid test to diagnose viral hepatitis C.

RESEARCH FOR INNOVATION

INTELLECTUAL PROPERTY SUPPORT PROGRAM (PAPI/NUPLITEC)

The Intellectual Property Support Program (PAPI), established in 2000, works to foster a technology patenting and licensing culture among researchers in São Paulo State via the Technology Patenting & Licensing Center (Nuplitech).

Between 1982 and 2018, **1,393 patent applications** of interest to FAPESP were filed with the National Industrial Property Institute (INPI), Brazil's patent office. In 2018, **291** of these applications had resulted in patents, **926** were still being processed, and **176** had been denied.

In 2018, FAPESP allocated **\$ PPP 221,600** to PAPI-Nuplitech, which supports the protection of intellectual property and licensing of rights to the results of research funded by FAPESP.

CHART 6
PATENT APPLICATIONS FILED – 1982-2018
PAPI/NUPLITEC PROGRAM ESTABLISHED

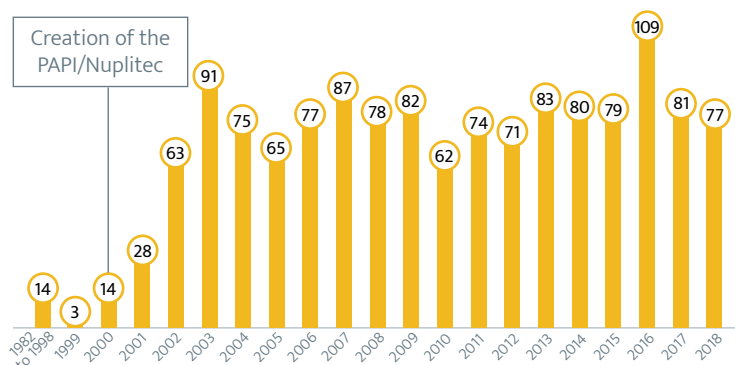


TABLE 24
BREAKDOWN OF 1,393 PATENT APPLICATIONS
FILED BY IPC CLASS – 1982-2018

Section A	Human necessities	610
Section B	Performing operations; Transporting	167
Section C	Chemistry; Metallurgy	799
Section D	Textiles; Paper	12
Section E	Fixed constructions	10
Section F	Mechanical Engineering; Lighting; Heating; Weapons; Blasting	16
Section G	Physics	284
Section H	Electricity	88

* Some applications were classified in more than one IPC class by INPI.

TABLE 23
PATENT APPLICATIONS FILED –
1982-2018 PAPI/NUPLITEC
PROGRAM ESTABLISHED
By knowledge area

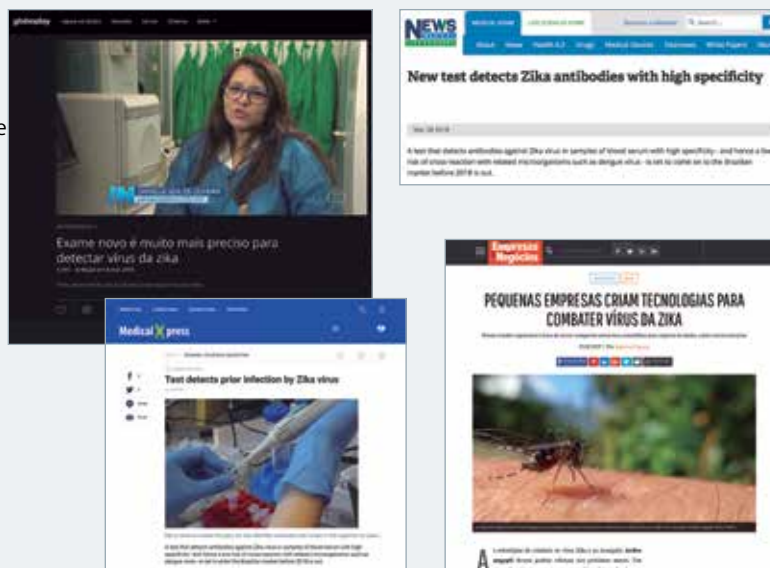
Knowledge area	Numer
Biological sciences	374
Engineering	336
Natural sciences	309
Health sciences	215
Agrarian sciences	124
Chemistry	21
Human sciences	4
Interdisciplinary	4
Agronomy and veterinary sciences	1
Architecture and urbanism	1
Linguistics, literature and arts	1
Not identified	3
TOTAL	1,393

Media coverage of research results: PIPE

USP and company supported by PIPE develop a test to detect prior infection by Zika virus

A test to detect antibodies against Zika virus in blood serum samples with high specificity – and hence a low risk of cross-reactivity with related microorganisms, such as dengue virus – was developed by the company Inovatech in partnership with the University of São Paulo's Biomedical Science Institute (ICB-USP). News stories on the project were published by **140** media outlets.

www.agencia.fapesp.br/27435



PIPE – PAPPE GRANT (FINEP) – FAPESP Process 2016/08727-5

Microbiology

COMPANY
Inovatech

PARTNER INSTITUTIONS
Biomedical Science Institute (ICB-USP) and Butantan Institute

PRINCIPAL INVESTIGATOR
Danielle Bruna Leal de Oliveira

Startup develops computational resources for speech technology

A system designed for use by speech technology-based service companies in segments such as e-commerce, e-learning and e-banking is to be brought to market in 2019 by startup SpeechTera.

News stories on the project were published by **13** media outlets.

www.pesquisaparaainovacao.fapesp.br/810



PIPE – FAPESP Process 2016/08355-0

Interdisciplinary

COMPANY
SpeechTera Desenvolvimento de Programas para Computadores Ltda.

PRINCIPAL INVESTIGATOR
Vanessa Marquifável Serrani

Smart packaging cuts costs for industry

Reciclapac developed a device and a platform to monitor and manage smart packaging. Its customers include automotive manufacturers such as GM and Nissan, heavy farm machinery and vehicle manufacturer Case New-Holland (CNH), and Cebrace, market leader in the Brazilian flat glass sector.

News stories on the event were published by **12** media outlets.

www.pesquisaparinovacao.fapesp.br/776



PIPE – FAPESP Processes 2017/08126-4, 2016/50205-6 and 2014/50399-0

Computer Science and
Transportation Engineering

COMPANY

Reciclapac Soluções para Embalagens Ltda.

PRINCIPAL INVESTIGATORS

Helio Avelino da Silva and Rogério Junqueira Machado

Brazilian startup and Canadian company to develop innovative diagnostic test to detect hepatitis C

DGLab, a startup incubated in Ribeirão Preto's Supera Technological Innovation Park, has joined forces with Custom Biologics, based in Toronto, Canada, to develop a simple, low-cost nucleic acid test to diagnose viral hepatitis C. DGLab will receive funding from FAPESP's PIPE program, while Custom Biologics will be supported by the Canadian International Innovation Program. News stories on the initiative were published by **9** media outlets.

www.pesquisaparinovacao.fapesp.br/856



PIPE – FAPESP Process 2017/25709-3

Public Health

COMPANIES

DGLab, a startup incubated in Ribeirão Preto's Supera Technological Innovation Park
Custom Biologics in Toronto, Canada

PRINCIPAL INVESTIGATOR

Daniel Blasioli Dentillo

PRINCIPAL INVESTIGATOR ABROAD

Daniel Mamelak

STRATEGIC RESEARCH

This classification 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 to the modernization of research institutions in the state.

In 2018, FAPESP disbursed **\$ PPP 26.9 million** for eight programs of research on strategic issues. The total includes associated scholarships and grants of various types. The number of new strategic projects contracted in 2018 was **344**.

RELATED PROGRAMS

- FAPESP Research Program on Biodiversity (BIOTA-FAPESP) – www.fapesp.br/en/biota
- FAPESP Bioenergy Research Program (BIOEN) – www.fapesp.br/en/bioen
- FAPESP Research Program on Global Climate Change (RPGCC) – www.fapesp.br/en/rpgcc
- FAPESP Research Program on eScience & Data Science – www.fapesp.br/en/escience
- Research in Public Policies Program
- Research in Public Policies for the National Health System Program
- Public Education Research Program
- Modernization of Research Institutions in São Paulo State

TABLE 25

STRATEGIC RESEARCH

Disbursement and new projects contracted for in 2018, by major knowledge area

Programs	Life Sciences		Natural and Earth 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	5,296,479	71	952,648	10	35,863	1	455,811	1
BIOEN and associated	3,218,049	29	1,958,449	31	414,269	22	68,034	2
Global Climate Change and associated	3,341,005	45	2,679,015	35	310,716	11	131,225	8
eScience & Data Science and associated	38,167	2	578,237	5	17,148	1	64	0
Research in Public Policies and associated	1,061,118	20	215,998	4	581,692	14	210,252	7
Modernization of Research Institutions in SP and associated	3,750,438	16	1,528,683	9	0	0	0	0
TOTAL	16,705,257	183	7,913,030	94	1,359,687	49	929,322	18

BIOTA – FAPESP RESEARCH PROGRAM ON BIODIVERSITY

Goal: mapping, cataloguing and characterizing biodiversity in São Paulo State; defining mechanisms of conservation, restoration and assessment.

First Assessment Report on Biodiversity & Ecosystem Services for Brazil

The summary for policymakers of the First Assessment Report on Biodiversity & Ecosystem Services for Brazil reported that biodiversity and ecosystem services must be taken into account by the nation's development policies to guarantee the preservation of Brazil's natural resources. Researchers affiliated with BIOTA-FAPESP contributed to the report, which was issued in 2018 by the Brazilian Platform on Biodiversity & Ecosystem Services (BPBES), the Brazilian arm of the Intergovernmental Platform on Biodiversity & Ecosystem Services (IPBES).

TABLE 26

BIOTA

Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
Research Grant – BIOTA	442,110
Research Grant – Thematic	2,488,520
Young Investigators – Grants	309,980
Regular Research Grants	117,537
Young Investigators – Fellowships	41,016
Regular Scholarships/Fellowships in Brazil	2,095,920
Regular Scholarships/Fellowships Abroad	986,721
Fellowships – Technical Training	258,997
TOTAL	6,740,801

FAPESP RESEARCH PROGRAM ON GLOBAL CLIMATE CHANGE (RPGCC)

Goal: support for research projects that contribute to decision making on the societal and economic impact of global warming for Brazil. Researchers involved with the program belong to international networks at the forefront of important discoveries and recommendations on measures to mitigate the societal and economic impact of climate changes, focusing on Amazonia and on coastal and metropolitan areas, among others. Issues such as disorderly urbanization and lack of sanitation, water, ecosystem services and power are aggravated by climate change and must be analyzed in an interdisciplinary manner. These topics are on the agenda of a group of more than 50 researchers who are studying environmental governance in macrometropolitan São Paulo, an area comprising 174 municipalities in the metropolitan areas of São Paulo, Campinas, Sorocaba, Santos and environs, and the Paraíba Valley region.

TABLE 27

RPGCC

Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
Research Grant – RPGCC	374,793
Young Investigators – Grants	193,983
Research Grant – SPEC	12,286
Research Grant – Thematic	2,568,407
Research Grant – PITE	67,481
Regular Research Grants	229,324
Young Investigators – Fellowships	98,998
Regular Scholarships/Fellowships in Brazil	2,067,572
Regular Scholarships/Fellowships Abroad	610,530
Fellowships – Technical Training	196,023
Fellowships – Scientific Journalism	42,563
TOTAL	6,461,961

Media coverage of research results: BIOTA

Amazon expeditions reveal new species of toads, lizards, birds and plants

In two expeditions to Amazonia, researchers affiliated with the University of São Paulo (USP) collected 12 uncatalogued species of toads and lizards. Altogether, the group brought back for analysis more than 1,700 specimens representing over 200 different species of animals and plants.

News stories on the project were published by **168** media outlets.

www.agencia.fapesp.br/28237



BIOTA – FAPESP Process 2011/50146-6

Zoology

INSTITUTION

Institute of Bioscience, University of São Paulo (IB-USP)

PRINCIPAL INVESTIGATOR

Miguel Trefaut Urbano Rodrigues

BIOTA – FAPESP Process 2013/50297-0 Cooperation agreement with the NSF – Dimensions of Biodiversity

Zoology

HOST INSTITUTION

Institute of Bioscience, University of São Paulo (IB-USP)

INSTITUTION ABROAD

City University of New York, New York (CUNY)

PRINCIPAL INVESTIGATOR: Cristina Yumi Miyaki

PRINCIPAL INVESTIGATOR ABROAD: Ana Carolina O. Queiroz Carnaval

Deforestation favors the action of fungi that decimate amphibians

Researchers at São Paulo State University (UNESP) investigated how deforestation can affect the action of pathogens that cause diseases such as chytridiomycosis, which has devastated populations of toads and frogs in several countries.

News stories on the research were published by **17** media outlets.

www.agencia.fapesp.br/27640



BIOTA – FAPESP Process 2013/50741-7

Zoology

INSTITUTION

Institute of Biosciences, São Paulo State University (IB-Unesp)

PRINCIPAL INVESTIGATOR

Celio Fernando Baptista Haddad

Ultrafine aerosol particles intensify rainfall in the Amazon

A study conducted by researchers at the University of São Paulo (USP) and the National Space Research Institute (INPE) was published in *Science*, showing that particles of the pollution emitted by cities have a significant effect on the formation of storm clouds in the tropical forest.

News stories on the study were published by **14** media outlets.

www.agencia.fapesp.br/27125



RPGCC – FAPESP Process 2013/05014-0

Geosciences

INSTITUTION

Physics Institute, University of São Paulo (IF-USP)

PRINCIPAL INVESTIGATOR

Paulo Eduardo Artaxo Netto

RPGCC – FAPESP Process 2013/50510-5

GREEN OCEAN AMAZON AGREEMENT (GOAMAZON)

Geosciences

HOST INSTITUTION: Physics Institute, University of São Paulo (IF-USP)

INSTITUTION ABROAD: Harvard University

PRINCIPAL INVESTIGATOR

Henrique de Melo Jorge Barbosa

PRINCIPAL INVESTIGATOR ABROAD

Scot Turbull Martin

Smartphone app forecasts storms, helps farmers

SOS Chuva, a smartphone app developed by the National Space Research Institute (INPE) with FAPESP's support, predicts rain or a storm at the user's exact location, within a 1 km radius and 30 minutes to six hours in advance.

News stories on the project were published by **84** media outlets.

www.agencia.fapesp.br/27126



RPGCC – FAPESP Process 2015/14497-0

Geosciences

INSTITUTION

National Institute for Space Research (INPE)

PRINCIPAL INVESTIGATOR

Luiz Augusto Toledo Machado

STRATEGIC RESEARCH

BIOEN – FAPESP BIOENERGY RESEARCH PROGRAM

Goal: 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.

In 2018, the program issued a call for proposals that led to the selection of five research projects relating to the use of biomass as a renewable energy source.

Bioenergy and sustainability

Researchers affiliated with BIOEN, RPGCC and BIOTA coordinated the report “Bioenergy and Sustainability: Latin America and Africa”, launched in 2018 during a workshop entitled BIOEN-FAPESP RenovaBio: Science for Bioenergy Sustainability and Competitiveness. Altogether, 154 researchers from 31 countries contributed to the report, which was commissioned by the Scientific Committee on Problems of the Environment (SCOPE), attached to the International Science Council (ICS), a nongovernmental organization that collaborates closely with United Nations agencies such as UNESCO and UNEP.

TABLE 28

BIOEN

Disbursement in 2018

Fellowships and Grants associated	Disbursement \$ PPP
Research Grant – BIOEN	726,363
Young Investigator Grant	728,866
Research Grant – Thematic	1,972,458
Regular Research Grant	48,325
Regular Scholarships/ Fellowships in Brazil	1,494,413
Regular Scholarships/ Fellowships Abroad	521,534
Fellowship – Technical Training	166,841
TOTAL	5,658,800

MODERNIZATION OF RESEARCH INSTITUTIONS IN SÃO PAULO STATE

In 2018, 12 proposals submitted by 12 research institutions in São Paulo State were selected by FAPESP’s Research Institution Modernization Program. The projects will receive funding for capital and operating costs (fixed assets, supplies and third-party services, among others), as well as support from FAPESP in the form of regular scholarships for graduates and postdoctoral researchers, scholarships for Research Internships Abroad (RIA) and Research Fellowships Abroad (RFA), Visiting Researcher Awards, and funding from the Multi-user Equipment (EMU), Research in Public Policies, Research Partnership for Technological Innovation (PITE) and Young Investigators Awards (YIG) programs.

TABLE 29

MODERNIZATION OF RESEARCH INSTITUTIONS

Disbursement in 2018

Fellowships and Grants associated	Disbursement \$ PPP
Research Grant – Modernization of Research Institutions	5,238,659
Regular Scholarships/ Fellowships in Brazil	40,462
TOTAL	5,279,121

THE FOLLOWING 12 STATE RESEARCH INSTITUTIONS WERE SELECTED:

- Adolfo Lutz Institute
- Agronomy Institute
- Biology Institute
- Butantan Institute
- Dante Pazzanese Institute
- Botany Institute
- Energy & Nuclear Research Institute (IPEN)
- Institute for Technological Research (IPT)
- Food Technology Institute (ITAL)
- Animal Science Institute
- Geology Institute
- Endemic Disease Control Division (Sucen)

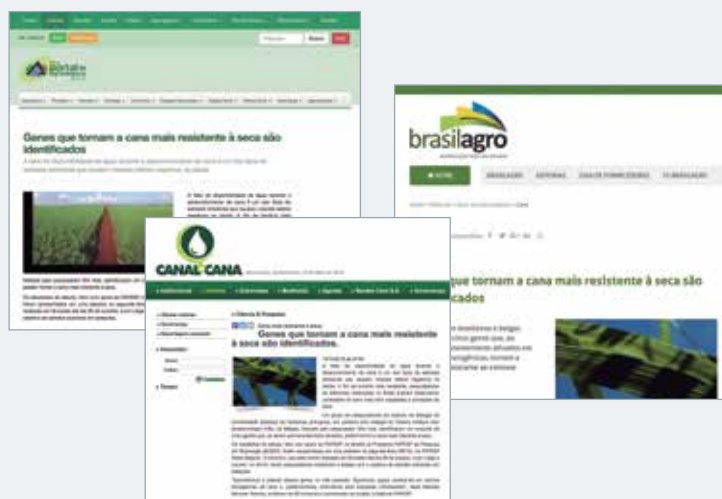
Media coverage of research results: BIOEN

Genes that make sugarcane more drought resistant are identified

Brazilian and Belgian researchers discovered five genes that make sugarcane more tolerant of water stress when they are permanently activated in transgenic varieties. Water shortages during the plant's development are among the types of environmental stress that have the most adverse effects on the crop.

News stories on the research were published by **27** media outlets.

www.agencia.fapesp.br/28927



BIOEN – FAPESP Process 2011/23264-8

Plant genetics

INSTITUTION

Institute of Biology, University of Campinas (Unicamp)

PRINCIPAL INVESTIGATOR

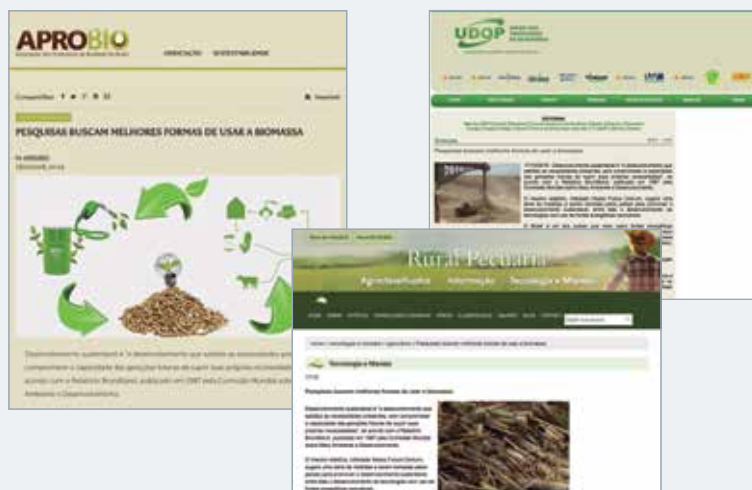
Marcelo Menossi Teixeira

Research projects seek better ways to use biomass

Eight research labs in São Paulo State designed a biorefinery based on biochemical routes to integrate biodiesel production from vegetable oils with production of first- and second-generation bioethanol.

News stories on the research were published by **13** media outlets.

www.agencia.fapesp.br/28958



BIOEN – FAPESP Process 2016/10636-8

Chemistry Engineering

INSTITUTION

Center of Exact Sciences and Technology (CCET), Federal University of São Carlos (UFSCar)

PRINCIPAL INVESTIGATOR

Roberto de Campos Giordano

STRATEGIC RESEARCH

FAPESP RESEARCH PROGRAM ON eSCIENCE & DATA SCIENCE

Goal: support for integration of research groups involved with investigation of algorithms, computational modeling and data infrastructure and groups of scientists involved with other knowledge areas, from biology to social science.

In 2018, the program issued a call for collaborative research proposals in e-agriculture to be conducted by scientists in computing and agrarian sciences.

Earth BioGenome

In 2018, researchers linked to the BIOTA-FAPESP and eScience programs joined the Earth BioGenome Project, an international consortium that aims to sequence, catalogue and characterize the genomes of all of Earth's 1.5 million species of plants, animals, fungi and other eukaryotic organisms over a period of ten years.

TABLE 30
**eSCIENCE &
DATA SCIENCE**
Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
Research Grant – eScience	137,893
Research Grant – Thematic	146,981
Regular Research Grants	2,858
Regular Scholarships/ Fellowships in Brazil	260,096
Regular Scholarships/ Fellowships Abroad	100,310
Fellowship – Technical Training	49,416
TOTAL	697,554

RESEARCH IN PUBLIC POLICIES PROGRAM

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

- Research in Public Policies Program (PPP)
- Research in Public Policies for the National Health Care System Program (PP-SUS)
- Public Education Research Program (EP)

Performance indicators for state universities in São Paulo

In 2018, an assessment of performance metrics for USP, UNICAMP and UNESP conducted under the aegis of the Public Policy Research Program was published in the book *Repensar a Universidade: desempenho acadêmico e comparações internacionais*. This publication includes the results of initial analyses and recommendations by experts. Final conclusions will be presented in 2019.

TABLE 31
**PPP, PP-SUS AND
PUBLIC EDUCATION**
Disbursement in 2018



Fellowships and Grants associated	Disbursement \$ PPP
PPP	914,938
Research Grant – PPP	470,569
Regular Scholarships/Fellowships in Brazil	63,274
Fellowship – Scientific Journalism	381,095
PP-SUS	896,115
Research Grant – PP-SUS	707,184
Regular Research Grants	3,332
Fellowship – Technical Training	185,599
Public Education	258,006
Research Grant – EP	91,510
Fellowship – EP	130,835
Fellowship – Technical Training	35,661

Media coverage of research results: eScience

Tool assists tactical training of goalkeepers

A mathematical model developed by researchers at the University of São Paulo (USP) can be used to determine the best decisions a soccer player can make in specific situations during a match. The methodology can also be applied to other sports. News stories on the project were published by 6 media outlets.

www.agencia.fapesp.br/27270



eSCIENCE & DATA SCIENCE – FAPESP Process 2015/01587-0

Computing Science

INSTITUTION

Institute of Mathematics and Statistics, University of São Paulo (IME-USP)

PRINCIPAL INVESTIGATOR

João Eduardo Ferreira

Media coverage of research results: Public Policies

Butantan Institute and pharmaceutical company to collaborate on dengue vaccine

The Butantan Institute and Merck Sharp & Dohme are to exchange information on production processes and clinical trials in developing their experimental vaccines against dengue. The Butantan Institute's vaccine was supported by FAPESP via its Public Policy for SUS Research Program (PP-SUS). The final clinical trial involving 17,000 volunteers is in progress.

News stories on the research were published by 149 media outlets.

www.agencia.fapesp.br/29434



PP-SUS – FAPESP Process 2008/50029-7

Public Health

INSTITUTION

Butantan Institute

PRINCIPAL INVESTIGATOR

Isaías Raw

RESEARCH INFRASTRUCTURE

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

- **Multi-user Equipments Program (EMU)**
Acquisition of equipment for shared use by the scientific community.
- **FAP-Livros Book Program**
Acquisition of books for libraries open to the public.
- **Equipment Repair Award**
Repair and preventive maintenance of equipment.
- **Research Infrastructure Support Program**
Maintenance of museums, information repositories, documents, and biological collections.
- **Research Overheads**
Additional funding for institutions to cover unforeseen research project expenses.
- **ANSP Network**

In 2018, FAPESP disbursed **\$ PPP 56,2 million** for **2,177** grants related to the maintenance and upgrade of research infrastructure in São Paulo State.

TABLE 32

RESEARCH INFRASTRUCTURE

Disbursement, number of active projects and new projects contracted for in 2018



Programs for Research Infrastructure	Disbursement \$ PPP	Active projects	New projects contracted
Multi-user Equipments Program	25,911,710	205	78
Equipment Repair Award	2,101,656	286	151
ANSP Network	8,939,000	3	1
Research Overhead – Institutional Research Infrastructure	17,981,270	280	121
Research Overhead – Program Coordination	235,488	11	3
Research Overhead – ANSP Network Connectivity	996,108	13	5
Total	56,165,232	798	359

Media coverage of research results: Infrastructure

Tunneling microscopy was performed using UNICAMP

A scanning tunneling microscope, the only one of its kind in São Paulo State, was installed by the Photovoltaic Research Group in the Department of Applied Physics at IFGW-UNICAMP. The microscope was purchased with the support of FAPESP's Multiuser Equipment Program.

News stories on the initiative were published by 4 media outlets.

www.agencia.fapesp.br/27211



MULTI-USER EQUIPMENT – FAPESP Process 2016/01918-0

Physics

INSTITUTION

Gleb Wataghin Physics Institute, University of Campinas (IFGW-Unicamp)

PRINCIPAL INVESTIGATOR

Luiz Fernando Zagonel

The electronic structure of uranium compounds is revealed

Research conducted at the National Synchrotron Light Laboratory (LNLS) in Brazil elucidated how the outermost layers of radioactive elements known as actinides are organized, representing a major advance in the search for room-temperature superconductors. The equipment used to make the measurements consisted of a cryostat producing a temperature of 2 K (-273.15 °C) coupled to an electromagnet producing magnetic fields of up to 1 Tesla.

News stories on the Multiuser Equipment project were published in four media outlets.

www.agencia.fapesp.br/27437



MULTI-USER EQUIPMENT – FAPESP Process 2014/05480-3
YOUNG INVESTIGATORS – FAPESP Process 2013/22436-5

Physics

INSTITUTION

National Energy & Materials Research Center (CNPEM)

PRINCIPAL INVESTIGATOR

Narcizo Marques de Souza Neto

COMMUNICATING SCIENCE TO THE PUBLIC

This funding strategy encompasses FAPESP's science dissemination initiatives to inform stakeholders and the general public about the results and societal and economic impact of public investment in scientific and technological research; publicize the Foundation's scientific policy guidelines; measure and evaluate the outcome of actions to support scientific and technological development; map research units in the state; and assess the overall status of research in the state.



PESQUISA FAPESP MAGAZINE (monthly)

www.revistapesquisa.fapesp.br/en

- Average monthly print run: **29,300**
- **4,435** paying subscribers
- **990** copies sold per month by newsvendors
- **3,459** copies distributed to state schools
- **3.24 million** website page views **(+36,4%)**
- **632** content reproductions in media **(+16%)**
- **41** unique radio programs in partnership with Radio USP
- **179,242** followers on Facebook **(+7%)**
- **77,503** followers on Twitter **(+9%)**
- **25,472** subscribers to YouTube channel **(+52%)**
- **17,800** followers on Instagram



AGÊNCIA FAPESP DE NOTÍCIAS (FAPESP News Agency – newsletter)

www.agencia.fapesp.br/home

- **106,431** subscribers
 - Portuguese (daily): **100,709**
 - English (weekly): **4,359**
 - Spanish (weekly): **1,363**
- **3 million** page views in all three languages (+30%)
- **7,151** content reproductions in Brazilian and foreign media (+10%)

SOCIAL MEDIA

- **39,968** followers on Facebook (+ 16%)



- **61,000** followers on Twitter (+13 per day)



NEWSLETTER PESQUISA PARA INOVAÇÃO (Innovative R&D)

www.pesquisaparaainovacao.fapesp.br/english

- **50** newsletters produced in 2018
- **38,900** readers
- **115** content reproductions in Brazilian media (+78,5%)
- **AUDIENCE:** entrepreneurs, researchers, parliamentarians, members of CIESP, ANPEI, EMBRAPAII and SIMPI, among others.



VIDEOS

- **97** videos posted to Facebook and YouTube by Agência FAPESP in 2018
- **60,670** views on Youtube
- **92,800** views on Facebook



COMMUNICATING SCIENCE TO THE PUBLIC

PUBLICATIONS

www.fapesp.br/en/5437

- 32 books, reports, folders, booklets and materials on research programs, including the results of research projects.
- 152 communication pieces (folders, invitations, ads, banners, exhibitions, etc.).



PRESS OFFICE

- 6,655 press releases and editorial suggestions published by the press:
 4,740 in Brazilian news media (+521%) and
 1,915 in foreign media (+224%)



MEDIA COVERAGE OF FAPESP



Brazilian and foreign media coverage of the news published by FAPESP in its communication channels can be seen on the website FAPESP na Mídia, which contains a searchable catalogue of over 135,900 news stories published since 1995. The site recorded 196,000 unique visitors in 2018.

www.namidia.fapesp.br

INDICATORS OF RESULTS

Mentions of FAPESP in Brazilian and foreign media rose **52%** in 2018 to a total of **20,244** – **87%** in Brazilian media and **13%** in **871** foreign media outlets in more than **60** countries. The Foundation's online platforms recorded more than **13 million** page views.

TABLE 33

BRAZILIAN MEDIA

Top 10 news stories in terms of media coverage



N° of publications / Title	
337	Overweight and obesity make up for more than 15,000 cancer cases per year in Brazil www.agencia.fapesp.br/27852
315	Jaboticaba peel extract promotes beneficial effects on health www.agencia.fapesp.br/29400
288	A biomarker that detects dengue hemorrhagic fever is discovered www.agencia.fapesp.br/29114
284	Study identifies a key cellular mechanism that triggers pneumonia in humans www.agencia.fapesp.br/29398
274	Discovery of Zika virus in monkeys suggests disease may also have wild cycle www.agencia.fapesp.br/29081
230	Music intensifies effects of anti-hypertensive medication www.agencia.fapesp.br/27588
182	New molecule considered promising antimalarial candidate www.agencia.fapesp.br/28400
179	Salmonella found to be resistant to different classes of antibiotics www.agencia.fapesp.br/29128
166	Expeditions to Amazonia reveal new species of toads, lizards, birds and plants www.agencia.fapesp.br/28237
138	Zika virus eliminates advanced human tumor in central nervous system of rodents www.agencia.fapesp.br/27677

TABLE 34

INTERNATIONAL MEDIA

Top 10 news stories in terms of media coverage



N° of publications / Title	
65	Scientists identify 4 extremely young asteroid families www.agencia.fapesp.br/28785
51	Music intensifies effects of anti-hypertensive medication www.agencia.fapesp.br/27588
48	Scientists calculate radiation dose in bone from victim of Hiroshima bombing www.agencia.fapesp.br/27697
32	Key gene to accelerate sugarcane growth is identified www.agencia.fapesp.br/28350
28	Colored filter improves dyslexic children's reading speed www.agencia.fapesp.br/28849
26	The new face of Luzia and the Lagoa Santa people www.agencia.fapesp.br/29168
23	Bioluminescent substance discovered in Brazilian cave worm larva www.agencia.fapesp.br/29066
22	Artificial magnetic field produces exotic behavior in graphene sheets www.agencia.fapesp.br/29227
22	Cappuccino made with jackfruit seed flour has chocolate aroma www.agencia.fapesp.br/29005
19	New laboratory-synthesized molecule appears to fight malaria effectively www.agencia.fapesp.br/28400

COMMUNICATING SCIENCE TO THE PUBLIC

PARTNERSHIPS

CIÊNCIA ABERTA (OPEN SCIENCE) TV SERIES

Produced in partnership with Folha de S.Paulo

www.fapesp.br/ciencia-aberta

- 8 programs produced in 2018
- 4,200 visits to watch the program on its website
- 12,900 views on Agência FAPESP's YouTube channel
- 18,200 views Agência FAPESP's Facebook page



PARTNERSHIP WITH ROBERTO MARINHO FOUNDATION/CANAL FUTURA

www.futuraplay.org

- ENTREVISTA (INTERVIEW) TV SERIES
13 programs on health
- CIÊNCIA PARA TODOS (SCIENCE FOR ALL) TV SERIES
Scripts for 52 programs to be recorded in 2019.



ILP-FAPESP LECTURES

- 8 lectures delivered to 900 attendees at the São Paulo State Legislative Assembly (ALESP) on health, environment, water, demographic change, innovative entrepreneurship, new technology associated with quality of life, innovation in agriculture and industry, and artificial intelligence (ILP stands for São Paulo State Legislative Assembly Institute).
- Exhibition entitled "Research is Development" was visited by 350 people.



EVENTS

www.fapesp.br/fapespweek

- 98 scientific and institutional events with 11,542 participants



FAPESP PORTAL

www.fapesp.br/en

- 2.5 million unique visits (including visits to sections and linked websites on FAPESP Week, Publications, Events, Open Science, Agreements, Multiuser Equipment, CFPs, Ad Hoc Reviewers, Indicators, Opportunities, PIPE, RIDC, SPSAS and ERC).



VIRTUAL LIBRARY (BV)

www.bv.fapesp.br/en

- 3.99 million unique visits in 2018
- 238,841 data files on scholarships and grants awarded by FAPESP between 1992 and 2018
- Over 39,000 projects in retrospective database (1962-1991)
- Over 126,000 scientific and academic publications linked to research projects



CHAPTER



4



OVERVIEW OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS

Indicators are presented in previous chapters 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 and grants of all types contracted in 2018, and a breakdown by funding strategy.

OVERVIEW OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS

TABLE 35

SCHOLARSHIPS/FELLOWSHIPS – DISBURSEMENTS IN 2018 (\$ PPP)

By types or program and funding strategies



Types	Funding Line	Training of Human Resources for Research	Basic and Applied Research	Research for Innovation	Strategic Research	Communicating Science to the Public	Total
Regular Scholarships/ Fellowships in Brazil		102,681,306	55,935,511	1,806,986	5,958,463	0	166,382,266
Scientific Initiation (SI)		10,597,716	2,217,120	65,684	197,813	0	13,078,333
Master's (MS)		11,700,990	3,495,289	90,020	279,051	0	15,565,349
Doctorate (DR)		39,088,404	9,643,737	211,527	970,743	0	49,914,411
Direct Doctorate (DD)		5,373,521	3,538,277	42,110	282,436	0	9,236,344
Postdoctorate (PD)		35,920,676	37,041,088	1,397,644	4,228,420	0	78,587,828
Regular Scholarships/ Fellowships Abroad		41,549,233	15,689,055	187,689	2,219,096	0	59,645,074
Research Internships Abroad (RIA)							
RIA - IC		977,805	183,260	17,270	0	0	1,178,336
RIA - MS		2,160,626	725,161	0	120,431	0	3,006,218
RIA - DR		11,989,047	3,120,283	0	453,309	0	15,562,640
RIA - DD		1,833,895	837,580	0	123,999	0	2,795,474
RIA - PD		14,577,381	9,473,543	170,419	1,365,688	0	25,587,032
Research Fellowships Abroad (RFA) - PD		10,010,479	1,349,227	0	155,668	0	11,515,374
Subtotal		144,230,540	71,624,567	1,994,675	8,177,558	0	226,027,339
Fellowships – Training		0	4,519,731	5,396,225	1,379,469	61,941	11,357,005
Fellowships – Technical Training		0	4,463,203	5,392,025	955,810	61,941	10,872,980
Fellowships – Academic Training		0	5,016	4,200	0	0	9,215
Fellowships – Scientific Journalism		0	51,152	0	423,658	0	474,810
Research Fellowships (Programs)		0	3,487,189	6,268,789	270,849	0	10,026,827
PE Fellowship		0	0	6,268,789	0	0	6,268,789
Public Education Fellowship		0	0	0	130,836	0	130,836
Young Investigators Fellowship		0	3,487,189	0	140,014	0	3,627,203
TOTAL		144,230,540	79,631,126	13,659,689	9,827,876	61,941	247,411,171

TABLE 36

SCHOLARSHIPS/FELLOWSHIPS – NUMBER OF NEW PROJECTS CONTRACTED FOR IN 2018



By types or program and funding strategies

Types	Funding Line	Training of Human Resources for Research	Basic and Applied Research	Research for Innovation	Strategic Research	Communicating Science to the Public	Total
Regular Scholarships/ Fellowships in Brazil		3,422	1,164	44	127	0	4,757
Scientific Initiation (SI)		1,911	409	17	42	0	2,379
Master's (MS)		573	168	3	16	0	760
Doctorate (DR)		517	165	3	18	0	703
Direct Doctorate (DD)		92	84	1	5	0	182
Postdoctorate (PD)		329	338	20	46	0	733
Regular Scholarships/ Fellowships Abroad		964	310	4	40	0	1,318
Research Internships Abroad (RIA)							
RIA - IC		95	16	1	0	0	112
RIA - MS		116	43	0	7	0	166
RIA - DR		328	84	0	11	0	423
RIA - DD		56	25	0	3	0	84
RIA - PD		163	109	3	16	0	291
Research Fellowships Abroad (RFA) - PD		206	33	0	3	0	242
Subtotal		4,386	1,474	48	167	0	6,075
Fellowships – Training		0	564	347	98	10	1,019
Fellowships – Technical Training		0	559	346	86	10	1,001
Fellowships – Academic Training		0	1	1	0	0	2
Fellowships – Scientific Journalism		0	4	0	12	0	16
Research Fellowships (Programs)		0	33	145	4	0	182
PE Fellowship		0	0	145	0	0	145
Public Education Fellowship		0	0	0	3	0	3
Young Investigator Fellowship		0	33	0	1	0	34
TOTAL		4,386	2,071	540	269	10	7,276

OVERVIEW OF SCHOLARSHIPS/FELLOWSHIPS AND GRANTS

TABLE 37

GRANTS – DISBURSEMENT IN 2018 (\$ PPP)*

By types or program and funding strategies

Types	Funding Strategies	Basic and Applied Research		Research for Innovation	Strategic Research	Research Infrastructure	Communicating Science to the Public	TOTAL
		Long-term research	Regular Grants not associated to other grants					
Regular Research Grants¹		3,122,521	96,435,214	110,195	310,320	0	7,714,582	107,692,833
Research Grants								
Thematic		69,144,919	0	0	7,176,366	0	0	76,321,285
Special Projects		11,162,801	0	0	0	0	0	11,162,801
SPEC		2,130,425	0	0	12,286	0	0	2,142,711
Young Investigators		17,729,539	0	0	1,232,830	0	0	18,962,369
RIDCs		28,486,692	0	0	0	0	0	28,486,692
PITE		0	0	4,301,325	67,481	0	0	4,368,806
PIPE		0	0	32,172,733	0	0	0	32,172,733
ERC/ARC		0	0	4,439,801	0	0	0	4,439,801
Intellectual Property (PAPI-Nuplitech)		0	0	221,624	0	0	0	221,624
BIOTA		0	0	0	533,167	0	0	533,168
BIOEN		0	0	0	726,364	0	0	726,364
Global Climate Change		0	0	0	374,793	0	0	374,793
eScience & Data Science		0	0	0	137,893	0	0	137,893
Modernization of Research Institutions in São Paulo State		0	0	0	5,238,658	0	0	5,238,658
Public Policies		0	0	0	470,569	0	0	470,569
PP-SUS		0	0	0	707,184	0	0	707,184
Public Education		0	0	0	91,510	0	0	91,510
Multiuser Equipment		0	0	0	0	25,911,710	0	25,911,710
Equipment Repair		0	0	0	0	2,101,656	0	2,101,656
ANSP Network		0	0	0	0	8,938,999	0	8,938,999
Technical Reserves Institutional Research Infrastructure		0	0	0	0	17,981,270	0	17,981,270
TR Program Coordination		0	0	0	0	235,488	0	235,488
TR Connectivity of ANSP Network		0	0	0	0	996,108	0	996,108
Research Grants Subtotal		128,654,376	0	41,135,483	16,769,102	56,165,232	0	492,730,110
Innovation Districts		0	0	1,046,424	0	0	0	1,046,424
Studies of the overall status of research in São Paulo		0	0	0	0	0	509,852	509,852
TOTAL		131,776,897	96,435,214	42,292,102	17,079,421	56,165,232	8,224,435	351,973,302

¹ Regular research grants are awarded Research Grants – Regular, Grants for Meeting Organization, Grants for Participation in Meetings, Publication Grants, and Visiting Researcher Awards.

* Minor differences in \$ PPP are due to rounding of cents.

TABLE 38

GRANTS – NUMBER OF NEW PROJECTS CONTRACTED FOR IN 2018



By types or program and funding strategies

Types \ Funding Strategies	Basic and Applied Research		Research for Innovation	Strategic Research	Research Infrastructure	Communicating Science to the Public	TOTAL
	Long-term research	Regular Grants not associated to other grants					
Regular Research Grants¹	196	2.616	5	26	0	2	2.845
Research Grants							
Thematic	72	0	0	5	0	0	77
Special Projects	0	0	0	0	0	0	0
SPEC	3	0	0	0	0	0	3
Young Investigators	50	0	0	4	0	0	54
RIDCs	0	0	0	0	0	0	0
PI TE	0	0	12	0	0	0	12
PIPE	0	0	270	0	0	0	270
ERC/ARC	0	0	5	0	0	0	5
Intellectual Property (PAPI-Nuplitech)	0	0	3	0	0	0	3
BIOTA	0	0	0	8	0	0	8
BIOEN	0	0	0	8	0	0	8
Global Climate Change	0	0	0	5	0	0	5
eScience & Data Science	0	0	0	0	0	0	0
Modernization of Research Institutions in São Paulo State	0	0	0	12	0	0	12
Public Policies	0	0	0	5	0	0	5
PP-SUS	0	0	0	0	0	0	0
Public Education	0	0	0	2	0	0	2
Multiuser Equipment	0	0	0	0	78	0	78
Equipment Repair	0	0	0	0	151	0	151
ANSP Network	0	0	0	0	1	0	1
Technical Reserves Institutional Research Infrastructure	0	0	0	0	121	0	121
TR Program Coordination	0	0	0	0	3	0	3
TR Connectivity of ANSP Network	0	0	0	0	5	0	5
Research Grants Subtotal	125	0	290	49	359	0	823
Innovation Districts	0	0	1	0	0	0	1
Studies of the overall status of research in São Paulo	0	0	0	0	0	1	1
TOTAL	321	2.616	296	75	359	3	3.670

¹ Regular research grants are awarded Research Grants – Regular, Grants for Meeting Organization, Grants for Participation in Meetings, Publication Grants, and Visiting Researcher Awards.

CHAPTER



5



COLLABORATION AND CO-FUNDING IN RESEARCH

Research co-funding agreements

Collaborative research

Domestic Research Collaboration

International Research Colaboration

FAPESP Week

Map of cooperation with funding agencies
and academic organizations

Map of cooperation with companies

COLLABORATION AND CO-FUNDING IN RESEARCH

FAPESP works on two fronts: pursuing co-funding opportunities and pursuing ways to intensify collaborative research. In 2018, it disbursed **\$ PPP 154.0 million** with these objectives.

RESEARCH CO-FUNDING AGREEMENTS

\$ PPP 47,332,677

COLLABORATIVE RESEARCH

\$ PPP 106,714,012

RESEARCH CO-FUNDING AGREEMENTS

FAPESP seeks cooperation agreements with organizations interested in co-funding research projects, such as Brazilian government bodies, São Paulo State government bodies, multilateral organizations, business organizations, funding agencies, universities, and research institutions.

There are two types of agreement. In one, the partner organization only transfers funds, and the nature of the project contracted does not entail collaboration among researchers. These are known as research co-funding agreements. In the other, collaborative scientific projects are selected and funded in Brazil or abroad. These are known as collaborative research co-funded via cooperation agreements (see pp. 105-7).

Co-funding agreements are partnerships with organizations such as CAPES, the Education Ministry's higher research council, which transfers funds to FAPESP to support master's, PhD and postdoctoral scholarships, and FINEP, the Brazilian government's innovation agency, an important partner in supporting research for innovation by small and medium business, among others. Table 39 shows how disbursement by FAPESP and its partners broke down by funding strategy in 2018. Some partners transfer funds for FAPESP to manage and award scholarships or grants.

TABLE 39

RESEARCH CO-FUNDING AGREEMENTS

Disbursement, number of active projects and new projects contracted for in 2018, by funding strategies

Funding Strategies	In Brazil		
	Disbursement \$ PPP	Active projects	New projects contracted
Training of Human Resources for Research	23,740,783	1,639	501
Basic and Applied Research	8,816,603	504	176
Research for Innovation	13,129,154	176	52
Research Infrastructure	105	3	0
Strategic Research	1,646,032	112	17
TOTAL	47,332,677	2,434	746

COLLABORATIVE RESEARCH

FAPESP encourages collaboration among researchers in Brazil and abroad to bolster the results of scientific research in areas of common interest or complementary areas and to strengthen the international impact of the science produced in São Paulo State.

Research collaboration is funded in two ways. In one approach, funding comes solely from FAPESP to enable researchers in São Paulo State to collaborate with colleagues – for example, to bring over visiting researchers; the other approach involves partnerships in Brazil and abroad for joint selection and co-funding of collaborative research projects.

In 2018, FAPESP disbursed **\$ PPP 106.7 million** for collaborative research, with cross-border collaborations accounting for **\$ PPP 83.7 million** and Brazilian collaborations for **\$ PPP 23.1 milhões**. As a result of these partnerships, **4,043** collaborative projects were in progress and **2,899** new projects were contracted for during the year.

Some of these partners also transfer funds to FAPESP, which manages and awards scholarships/fellowships and grants. In other cases, the partners disburse funds directly.

In 2018, FAPESP disbursed
\$ PPP 106.7 million
to stimulate scientific
collaboration among researchers
at institutions in São Paulo
State and research networks
in Brazil and worldwide.

TABLE 40

COLLABORATIVE RESEARCH

Disbursement by funding strategies



Funding Strategies	Internacional \$ PPP	in Brazil \$ PPP	TOTAL \$ PPP
Training of Human Resources for Research	41,549,234	0	41,549,234
Basic and Applied Research	32,699,576	17,703,515	50,403,091
Research for Innovation	4,572,408	1,919,530	6,491,937
Research Infrastructure	0	3,039,711	3,039,711
Strategic Research	4,841,976	388,062	5,230,039
TOTAL	83,663,194	23,050,818	106,714,012

COLLABORATION AND CO-FUNDING IN RESEARCH

DOMESTIC RESEARCH COLLABORATION

In 2018, collaborative projects in Brazil funded solely by FAPESP mainly involved grants for participation in or organization of scientific meetings and visiting researcher awards. Disbursement for these purposes totaled **\$ PPP 10.9 million**.

Collaborative research projects co-funded under cooperation agreements received **\$ PPP 12.1 million**.

Disbursement for a partnership with CNPq to support National Science & Technology Institutes (INCTs) in São Paulo State amounted to **\$ PPP 9.9 million** in 2018.

FAPESP disbursed **\$ PPP 1.9 million** for **83** research projects involving academia-business cooperation. The Foundation supports these projects in partnership with Brazilian companies such as Natura, SABESP and Boticário, as well as IBM Brazil. Collaborative Research for Knowledge Advancement conducted in Brazil, including **35** Thematic Projects, received **\$ PPP 6.9 million**.

\$ 23.1 million
was allocated by FAPESP
to **720** collaborative
research projects in Brazil
in 2018.

TABLE 41

DOMESTIC RESEARCH COLLABORATION

Disbursement, number of active projects and new projects contracted for in 2018

Types of cooperation by funding strategies	Disbursement \$ PPP	Active projects	New projects contracted
Collaborative research funded solely by FAPESP	10,921,515	542	551
Basic and Applied Research	10,754,126	536	545
Research for Innovation	71,103	1	0
Strategic Research	96,286	5	6
Collaborative research with co-funding under cooperation agreements with funding agencies and companies⁽¹⁾	12,129,303	178	55
Basic and Applied Research	6,949,388	73	20
Research Infrastructure	3,039,711	14	5
Research for Innovation	1,848,427	83	25
Strategic Research	291,777	8	5
TOTAL	12,129,303	720	606

⁽¹⁾ Includes only disbursement by FAPESP. Co-funding partners disburse at least the same amount as FAPESP.

INTERNACIONAL RESEARCH COLLABORATION

In 2018, FAPESP disbursed \$ PPP 65.8 million for cross-border research collaboration, mainly in the form of Research Internships Abroad (RIA) from scientific initiation to postdoc, and Research Fellowships Abroad (RFA) at the postdoc level. Disbursement for collaborative research co-funded via cooperation agreements amounted to \$ PPP 17.8 million.

In connection with international cooperation agreements, it is worth highlighting disbursement for innovation-oriented research involving projects supported jointly by companies such as Shell, Peugeot-Citroën and GSK. In these cases, the partner always invests the same amount as FAPESP or more.

In Research for Knowledge Advancement, 44 Thematic Projects and 11 YIG projects involving cross-border collaboration were in progress in 2018.

FAPESP disbursed
\$ PPP 83.7 million
for research involving cross-
border collaboration in 2018.

TABLE 42

INTERNATIONAL RESEARCH COLLABORATION

Disbursement, number of active projects and new projects contracted for in 2018



Types of cooperation by funding strategies	Disbursement \$ PPP	Active projects	New projects contracted
Collaborative research funded solely by FAPESP	65,847,227	2,574	1,954
Training of Human Resources for Research	41,456,662	1,437	958
Basic and Applied Research	21,753,052	1,057	939
Research for Innovation	216,241	9	8
Strategic Research	2,421,271	71	49
Collaborative research with co-funding under cooperation agreements with funding agencies, universities, research centers, multilateral agencies and companies⁽¹⁾	17,815,967	749	339
Basic and Applied Research	10,946,524	588	259
Research for Innovation	4,356,166	65	36
Training of Human Resources for Research	92,572	4	6
Strategic Research	2,420,705	92	38
TOTAL	83,663,194	3,323	2,293

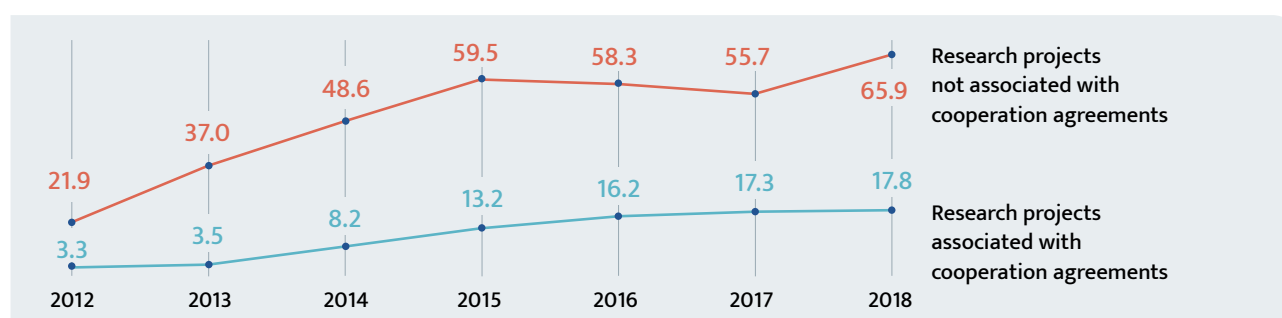
⁽¹⁾ Includes only disbursement by FAPESP. Co-funding partners disburse at least the same amount as FAPESP.

COLLABORATION AND CO-FUNDING IN RESEARCH

CHART 7

INTERNATIONAL RESEARCH COLLABORATION

Disbursement evolution – 2012 to 2018 (in \$ PPP million)



MOST FREQUENT DESTINATIONS AND ORIGINS IN 2018

- Out of 1,076 new Research Internship Abroad (RIA) awardees, 596 chose Europe, 392 North America, 30 Latin America and the Caribbean, 15 Asia, 37 Oceania, and six Africa.
- Of 240 PhDs who received Research Fellowships Abroad (RFA) in 2018 to pursue postdoctoral research, 126 chose organizations in Europe, 102 in North America, two in Latin America and the Caribbean, eight in Oceania, and two in Asia.
- The 462 participations in scientific meetings abroad occurred in Europe (224), North America (153), Latin America and the Caribbean (47), Asia (24), Oceania (10), and Africa (4).
- Of 194 visiting researchers from abroad, 99 were from Europe, 56 were from North America, ten were from Asia, 24 were from Latin America and the Caribbean, three were from Oceania, and two were from Africa.
- Twenty-three scientific meetings were held in partnership with organizations in Europe (19), North America, Asia (1), and Latin America and the Caribbean (1).
- Fifty-two scholarships in Brazil were awarded under cooperation agreements with organizations in the United States (14) and Europe (34) and with multilateral organizations (4).
- Fifty scholarship awardees participated in courses and training programs at institutions in Europe (20), North America (19), Oceania (1) and Asia (2), and at multilateral organizations (8).

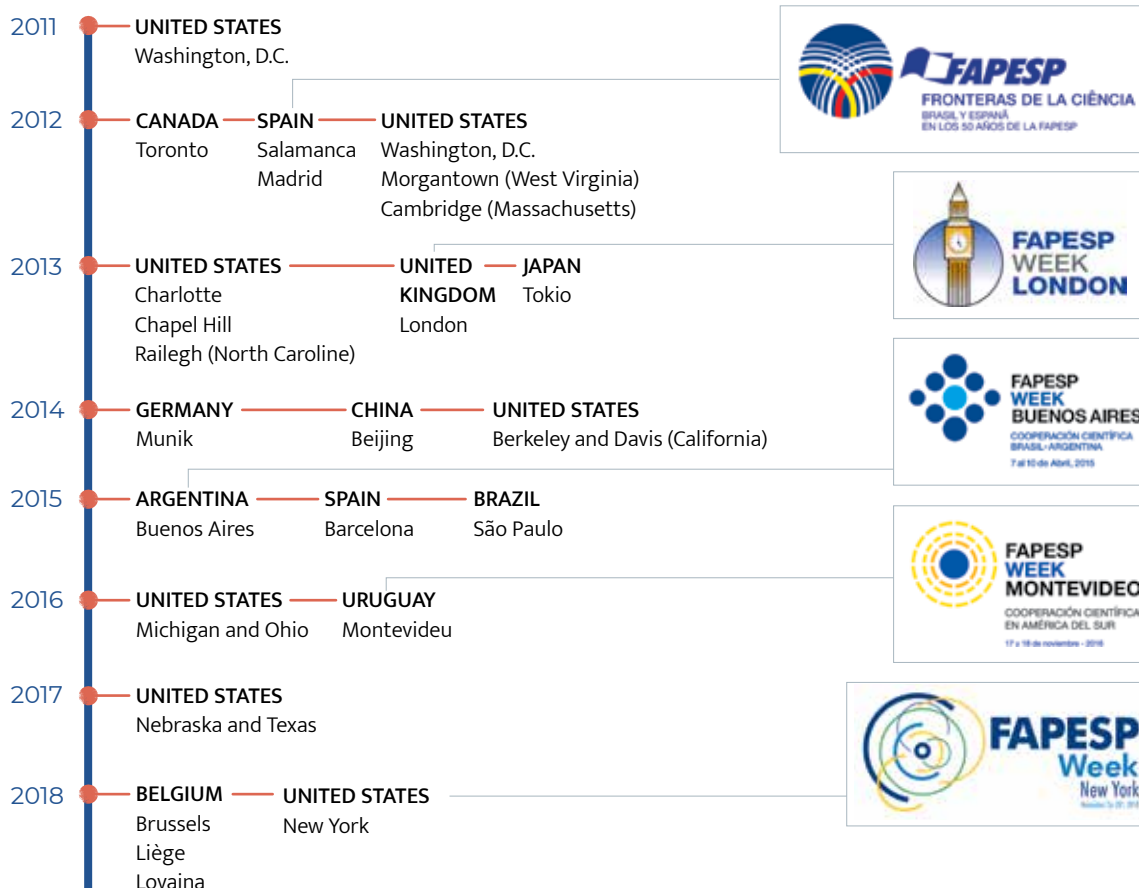
A total of **131** postdoctoral fellowships were awarded to foreigners who chose to conduct research in Brazil, mainly in natural and earth sciences (45%), engineering (15%), biological sciences (11.5%), human sciences (10%), and health sciences (9%), among others.

FAPESP WEEK

In 2018, the 16th edition of FAPESP Week in Belgium was held in Brussels, Liège and Leuven (Louvain) in October, and the 17th edition in the United States took place in New York in November.

The organization of FAPESP Week scientific symposia, which began in 2011, is part of FAPESP's strategy of creating an environment for scientific collaboration between Brazilian and foreign researchers with shared or complementary interests.

FAPESP WEEK HELD – 2011 TO 2018



COLLABORATION AND CO-FUNDING IN RESEARCH

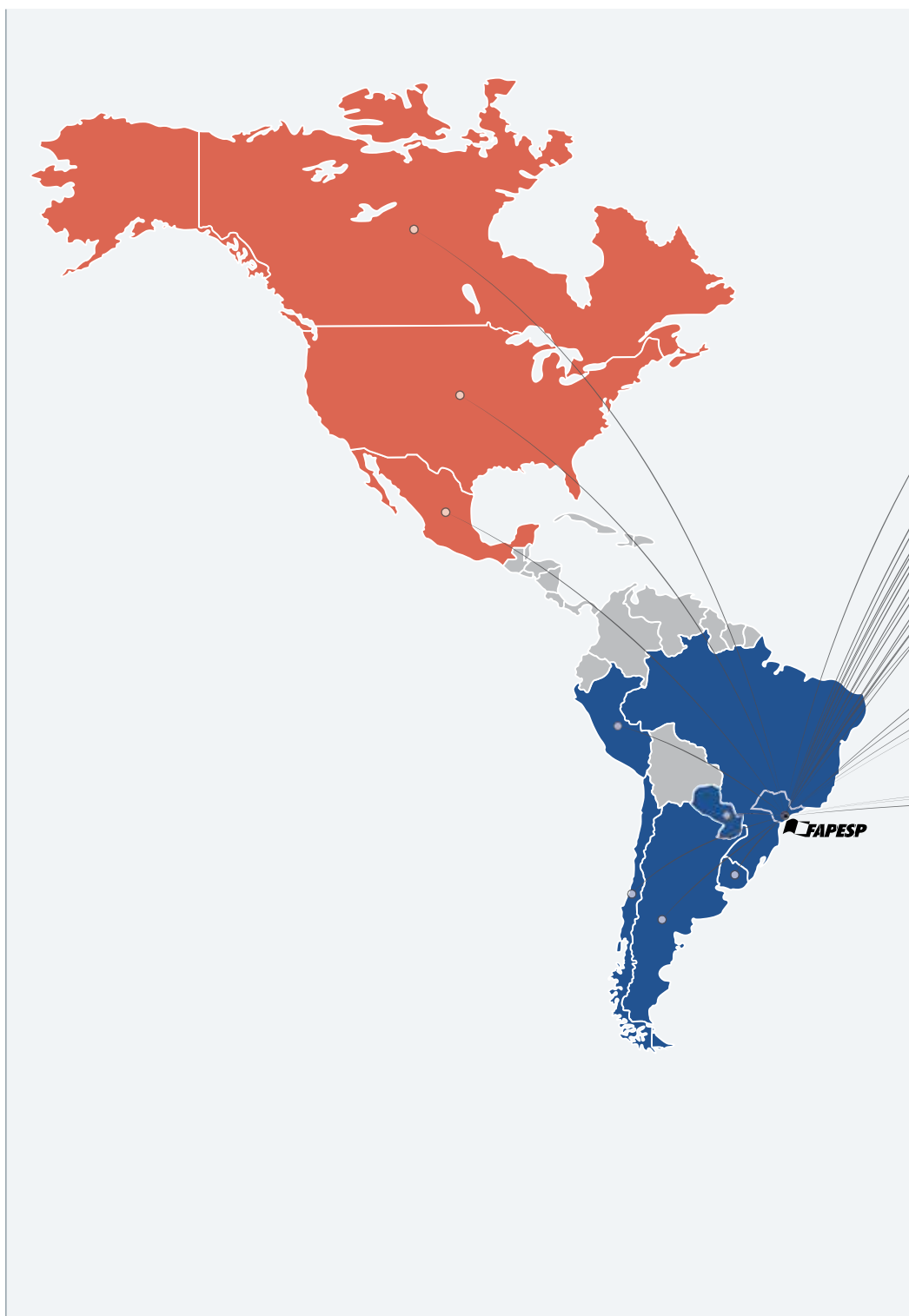
COLLABORATION AND CO-FUNDING WITH FUNDING AGENCIES AND ACADEMIC ORGANIZATIONS

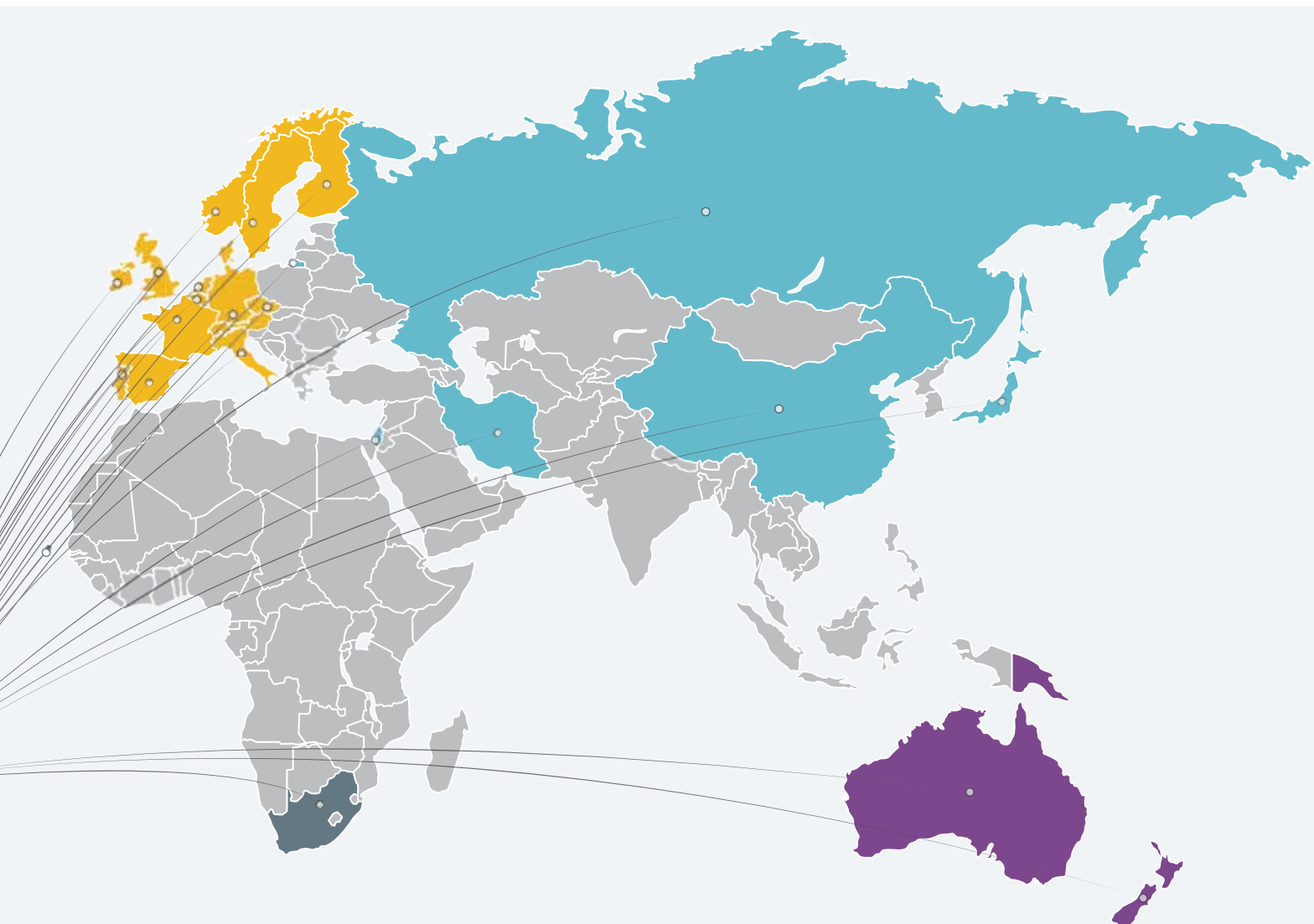
In 2018, cooperation agreements were in effect with **202** funding agencies and higher education and research institutions in Brazil and abroad. Of these, **16 were multilateral** and **186** were in **32** countries on all continents including Brazil. Twenty-seven of these agreements were signed in 2018. The list of organizations with which FAPESP had cooperation agreements can be found on pages 112 and 113.

TYPES OF ACTIVE AGREEMENTS IN 2018

- **108** academic organizations
106 international and
2 domestic
- **72** funding agencies
54 international and
18 domestic
- **16** multilateral agencies
- **6** Brazilian associations

Agreements with companies are described on pages 114-115.





AFRICA
4 organizations in 2 countries

NORTH AMERICA
40 organizations in 3 countries

SOUTH AMERICA
35 organizations in 6 countries

ASIA
12 organizations in 4 countries

EUROPE
85 organizations in 15 countries

OCEANIA
10 organizations in 2 countries

AGENCIES AND ACADEMIC INSTITUTIONS IN 2018

AFRICA

- South Africa**
 - National Research Foundation (NRF)
 - Stellenbosch University
 - University of Cape Town (UCT)
- Cabo Verde**
 - Ministério da Educação Superior, Ciência e Inovação (MESCI)

NORTH AMERICA

- Canada**
 - Agence Universitaire de la Francophonie (AUF)
 - Canada's International Development Research Centre (IDRC)
 - Carleton University
 - Consortium Alberta, Laval, Dalhousie and Ottawa (CALDO)
 - McGill University
 - Natural Sciences and Engineering Research Council of Canada (NSERC)
 - National Research Council of Canada (NRC)
 - Fonds de Recherche du Québec (FRQ)
 - University of Toronto
 - University of Victoria
 - University of Waterloo
- United States**
 - Case Western Reserve University
 - Columbia Global Centers
 - Duke University
 - Emory University
 - Gates Foundation
 - George Washington University
 - John E. Fogarty International Center
 - National Institutes of Health (NIH)
 - National Science Foundation (NSF) e universidades americanas
 - Ohio State University
 - Pew Latin American Fellows Program in the Biomedical Sciences (PEW)
 - Programa Dra. Ruth Cardoso (Capes/Fulbright/Universidade Columbia)
 - Purdue University
 - Smithsonian Institution
 - Texas Tech University (TTU)
 - Texas A&M University (TAMU)
 - The Scripps Research Institute
 - University of California San Diego (UCSD)
 - University of Georgia
 - University of Illinois
 - University of Maryland
 - University of Miami
 - University of Missouri
 - University of Nebraska - Lincoln
 - University of North Carolina - Charlotte
 - University of Virginia
 - Vanderbilt University
 - 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)
 - Ministerio de Ciencia, Tecnología e Innovación Productiva (MINCYT) e USP: Projeto LLAMA

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 de Defesa do Patrimônio Histórico, Arqueológico, Artístico e Turístico do Estado (Condephaat)
- 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 Inovação e Pesquisa (Finep)
- Fundação de Amparo à Pesquisa do Estado do Amazonas (Fapeam)
- Fundação de Amparo à Ciência e Tecnologia do Estado de Pernambuco (Facepe)
- Fundação Getúlio Vargas (FGV)
- Fundação Maria Cecília Souto Vidigal
- Fundação Sistema Estadual de Análise de Dados (Seade)
- Instituto de Estudos de Saúde Suplementar (IESS)
- Instituto Euvaldo Lodi (IEL/SP)
- Instituto Nacional de Pesquisas Espaciais (Inpe)
- Ministério da Ciência, Tecnologia, Inovações e Comunicações
- 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)

Chile

- Comisión Nacional de Investigación Científica y Tecnológica (Conycit)
- Universidad de Chile (UCH)
- Universidad de la Frontera
- Universidad de Magallanes (UMAG)

Paraguay

- Consejo Nacional de Ciencia y Tecnología (CONACYT)

Peru

- Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (CONCYTEC)

Uruguay

- Agencia Nacional de Investigación e Innovación de Uruguay (ANII)
- Asociación de Universidades Grupo Montevideo (AUGM)

ASIA

China

- Tianjin University (TJU)
- Zhejiang University (ZJU)

Iran

- Cognitive Science and Technology Council of Iran (CSTC)

Israel

- Matimop
- Technion - Instituto de Tecnologia de Israel
- The Hebrew University of Jerusalem
- University of Haifa
- Weizmann Institute of Science

Japan

- Japan Science and Technology Agency (JST)
- Japan Society for the Promotion of Science (JSPS)
- University of Tokyo
- University of Tsukuba

EUROPE

- Germany**
- Deutsche Forschungsgemeinschaft (DFG)
 - DWH – German House of Science and Innovation
 - Fraunhofer-Gesellschaft
 - Friedrich-Alexander-Universität Erlangen-Nürnberg
 - Bavarian State Ministry of Science and the Arts of the Free State of Bavaria (StMWK)
 - Ministério Federal da Educação e Pesquisa da Alemanha (BMBF)
 - German Academic Exchange Service (DAAD)
 - Max Planck Society for the Advancement of Science
 - Technische Universität München
 - Universität Hamburg
- Austria**
- Universität of Natural Resources and Life Science
 - International Institute for Applied Systems Analysis
- Belgium**
- Direction Générale Opérationnelle Economie, Emploi & Recherche du Service Public de Wallonie (DGO6/ex-DGOERR)
 - 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 Tecnológico Industrial (CDTI)
 - Consejo Superior de Investigaciones Científicas (CSIC)
 - Secretaría de Estado de Investigación, Desarrollo e Innovación (SEIDI)
 - Universidad Complutense de Madrid
 - Universidad Miguel Hernández de Elche
 - Universidad de Salamanca
- France**
- Agence Nationale de la Recherche (ANR)
 - Centre National de la Recherche Scientifique (CNRS)
 - Ecole Normale Supérieure (ENS)
 - Groupe des Écoles Centrales (GEC)
 - 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
- Netherlands**
- BE-BASIC
 - Delft University of Technology
 - Erasmus Universiteit Rotterdam
 - Leiden University
 - Netherlands Organization for Scientific Research (NWO)
 - Stichting Dutch Polymer Institute
 - Technische Universiteit Eindhoven (TU/e)
- Ireland**
- Science Foundation Ireland
- Italy**
- Consiglio Nazionale delle Ricerche (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 (FCT)
- United Kingdom**
- Bangor University
 - Brunel University London
 - British Council
 - Cardiff University
 - Coventry University
 - Durham University
 - Heriot-Watt University
 - Imperial College

- Institute of Education, University College London
 - Keele University
 - King's College London
 - London School of Economics and Political Science
 - Newton Fund
 - 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 East Anglia
 - University of Glasgow
 - University of Leeds
 - University of Manchester
 - University of Nottingham
 - University of Oxford
 - University of Southampton
 - University of Surrey
 - University of Warwick
 - University of York
- Czech Republic**
- Czech Science Foundation (GACR)
 - Technology Agency of the Czech Republic
- Russian**
- Russian Federation for Basic Research
- Sweden**
- Halmstad University
 - Karolinska Institutet
 - Lund University
 - Swedish Research Council
 - Swedish Governmental Agency for Innovation Systems (Vinnova)
 - Uppsala University

OCEANIA

- Australia**
- Australian National University (ANU)
 - Australian Technology Network of Universities (ATN)
 - Deakin University
 - Swinburne University of Technology
 - University of Melbourne
 - University of New South Wales
 - University of Queensland
 - University of Sydney
 - Victoria University
- New Zealand**
- Universities New Zealand, Te Pokai Tara (UNZ)

MULTINATIONAL AGENCIES

- Belmont Forum (IGFA)
- Crops of the Future Collaborative
- EU-CELAC IG
- EU-LIFE
- European Research Council (ERC)
- Fundo Global para o Meio Ambiente (GEF)
- Global Alliance for Chronic Diseases (GACD)
- Global Research Collaboration for Infectious Disease Preparedness (GloPID-R)
- GMT 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)

COLLABORATION AND CO-FUNDING IN RESEARCH

RESEARCH COLLABORATION WITH COMPANIES

The Research Partnership for Technological Innovation (PITE) and the Engineering Research Centers/Applied Research Centers (ERCs/ARCs) represent a new approach to collaboration with companies and research institutions.

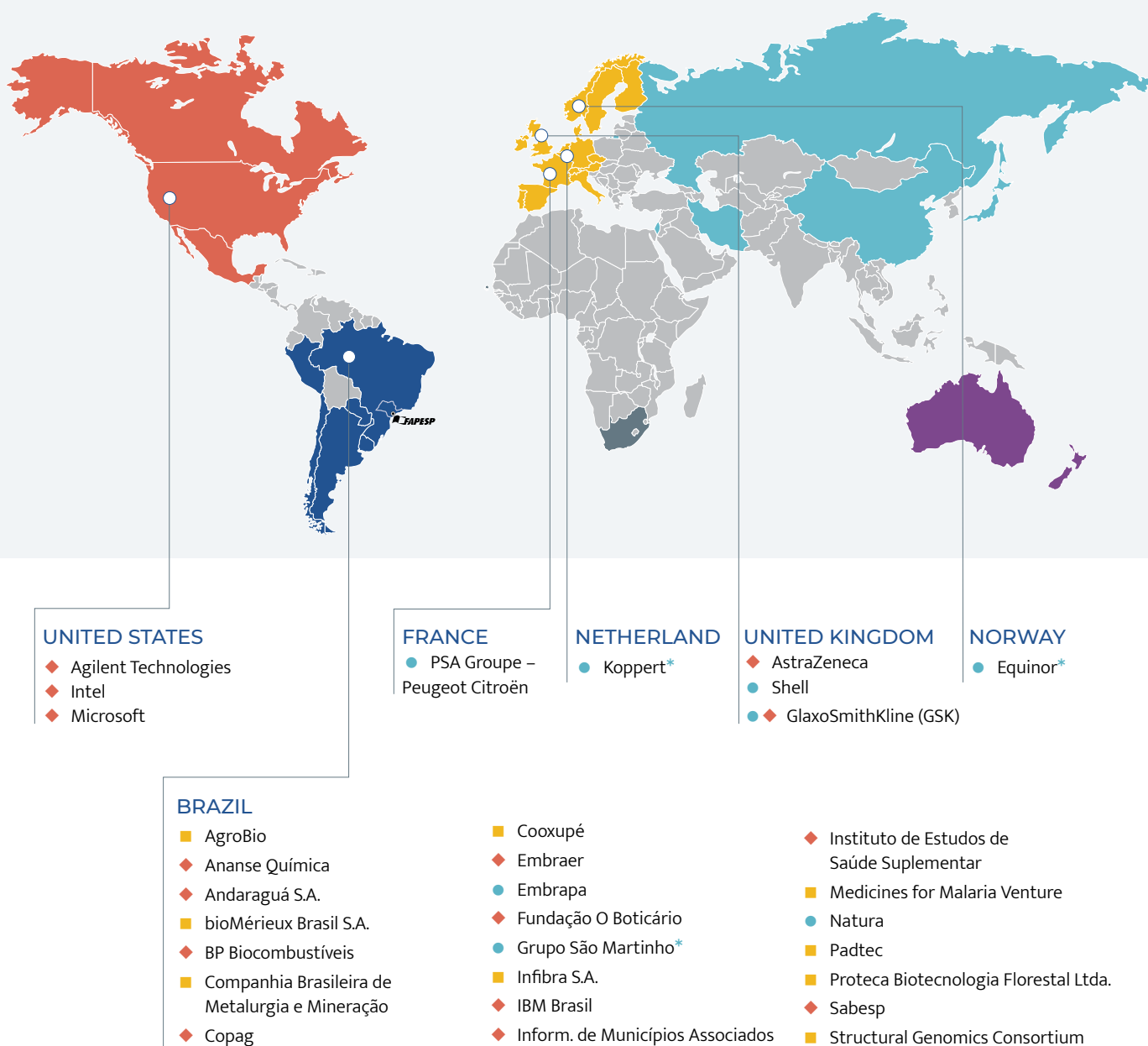
ERCs/ARCs are co-funded by FAPESP and partner companies, with matching funds from universities and research institutions selected in competitive bidding to host the research projects (see pages 67 and 68).

Ten ERCs/ARCs were up and running in 2018, involving partnerships with five companies: an ERC on Green Chemistry with GlaxoSmithKline (GSK) and the Federal University of São Carlos (UFSCar); the Center of Excellence in New Target Discovery (CENTD), also with GSK and hosted by Butantan Institute; the Center for Applied Research in Wellbeing & Human Behavior, with Natura and the University of São Paulo's Psychology Institute (IP-USP); an ERC that focuses on developing biofuel-powered combustion engines, established in partnership with Peugeot-Citroën and the University of Campinas (UNICAMP); and an ERC for innovation in natural gas, with Shell and the University of São Paulo's Engineering School (LIUSP). In 2018, FAPESP partnered with EMBRAPA to set up the Genomics for Climate Change Research Center (GCCRC) and with Shell to establish the Center for Innovation in New Energies (CINE) with four research divisions. Three other ERCs with Equinor, Koppert and Grupo São Martinho were in the approval stage.

PITE supports collaborative research in universities and/or research institutions, co-funded by companies (see page 70). In 2018, cooperation agreements were active with the following 15 companies that were developing projects at institutions selected via calls for proposals: Agilent, Ananse Química Ltda., Andaraguá S.A., AstraZeneca, BP Biocombustíveis, Copag, Embraer, Fundação O Boticário, GSK, IBM Brasil, Informática de Municípios Associados (IMA), Instituto de Estudos de Saúde Suplementar, Intel, Microsoft and SABESP. Three of these agreements were signed in 2018, with Andaraguá, SABESP and GSK.

PITE Spontaneous Demand supports collaborative research projects submitted by a researcher affiliated with a university and a researcher employed by a company. In 2018, eight companies participated in this type of partnership: Agrobio, bioMérieux Brasil S.A., Companhia Brasileira de Metalurgia e Mineração, Cooxupé, Infibra, Medicines for Malaria Venture, Proteca Biotecnologia Florestal Ltda., and Structural Genomics Consortium.

In 2018, the collaboration with companies and research institutions represented by PITE and ERC/ARC involved **31 companies**, with 193 active research projects.



◆ Companies with cooperation agreements or active projects in 2018 under PITE Agreements

● Companies with cooperation agreements for the creation of Engineering Research Centers (ERCs) and Applied Research Centers (ARCs) active in 2018

■ Companies-universities with active projects under PITE Spontaneous Demand in 2018

*Companies with research centers being contracted for

CHAPTER



6



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Amazônia II
Acrilic on Canvas
61 x 43 cm

Photo by Eduardo Cesar

In the past two decades, FAPESP's annual reports were edited by Maria da Graça Mascarenhas, the Foundation's head of communication. Maria da Graça died on March 9th, 2019.

Throughout this period, she successfully combined her fascination with science and love of art by interweaving the presentations of FAPESP's annual performance indicators with reproductions of works by leading artists based in São Paulo, such as Portinari, Rebolo, Segall, Tomie Ohtake, Bonomi and Tarsila do Amaral.

In this Annual Activity Report for 2018, FAPESP pays homage to Maria da Graça by reproducing a painting of her own.





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