Annual report
2019

serrapilheira

Board of trustees

Branca Vianna

Edgar Dutra Zanotto

Fernando Reinach

João Moreira Salles

Luiz Orenstein

Pedro Wongtschowski

Executive team

Hugo Aguilaniu
Executive Director

Gisela Cordeiro
Director of Institutional Management

Cristina Caldas
Science Director

Natasha Felizi
Science Outreach Director

Michel Chagas
Science Manager

Clara Queiroz
Science Outreach Manager

Clarice Cudischevitch
Communications Analyst

Camila Teicher
Relationship Advisor

Scientific advisory board (until July)

Amie Wilkinson
Mathematics

Ana Carolina Carnaval
Life Sciences

Cristina P. de Campos
Geosciences

Edgar Dutra Zanotto
Engineering

Fatima Maria de Souza Moreira
Life Sciences

Luiz Davidovich
Physics

Mayana Zatz
Life Sciences

Oswaldo Luiz Alves
Chemistry

Patrícia Florissi
Computer Science

Paulo J. M. Monteiro
Engineering

Stevens Rehen
Life Sciences

Vanessa Sperandio
Life Sciences

Table of contents

Introduction

Founded in 2017, Instituto Serrapilheira was created to raise the value and visibility of scientific knowledge. As the first private non-profit institution for the advancement of science in Brazil, we focus on two fronts: science and science outreach, in order to cultivate a culture of science in Brazil.

On the science front, besides identifying and supporting top-notch research by young scientists in the fields of the natural sciences, computer science and mathematics, Serrapilheira promotes training workshops and opportunities for diversity and inclusion. On the science outreach front, the institute maps and backs not only projects in different fields, but also suggests and provides strategies and opportunities for training and collaboration with Brazilian promoters. Serrapilheira has supported 97 research and 25 science outreach projects so far.

The support for science and science outreach is made possible through a budget allocation from a 350 million BRL endowment established in 2016.

A word from the trustees

Branca Vianna

Chair of the Board of Trustees

In many ways 2019 was a special year for Serrapilheira. The implementation of strategies to support diversity in the sciences, initiated in 2018, was crucial to our progress. Since we believe that diversity in the sciences is essential, different perspectives can generate new ideas and lead to science excellence. In order to maintain this policy, we had specialists develop a “Best Practices Guide for Diversity in Science” (found on our website) that outlines our actions and suggests measures for training more inclusive research groups.

One of our initiatives was an optional 300,000 BRL bonus (provided to awardees of our 700,000 BRL research grant) to be used for training and including people from under-represented groups in science. This bonus was made available in 2019, when we announced the first cohort of 12 grantees who won our largest awards.

Investing 12 million BRL in a small group of young scientists underscores our principle of concentrating rather than diluting our funding to support fundamental, daring and risky research with high-impact potential.

Therefore, we have reached a stage where we are consolidating our Science Support Program, which relied on the indispensable contributions of our first Science Advisory Board (SAB) whose three-year term sunsetted in 2019. We extend our heartfelt appreciation to the 12 members of the SAB for their invaluable guidance up to this point in our quest.

Regarding the Science Outreach Program, the two editions of Camp Serrapilheira, in 2018 and 2019, enabled us to map the field and get to know who the active Brazilian promoters of science are and their work on different projects ranging from journalism to the arts and digital media. Since 2018, we have been busy connecting to and building a network of collaborations.

In the next several years, together with the community of researchers, promoters and national and international institutions, we hope to promote a culture of science in Brazil.

A word from the Executive Director

Hugo Aguilaniu

Executive Director,
Instituto Serrapilheira

Instituto Serrapilheira's first three-year cycle has come to a close. Although we are just starting our mission, we can already make an assessment and see that our values are becoming more visible.

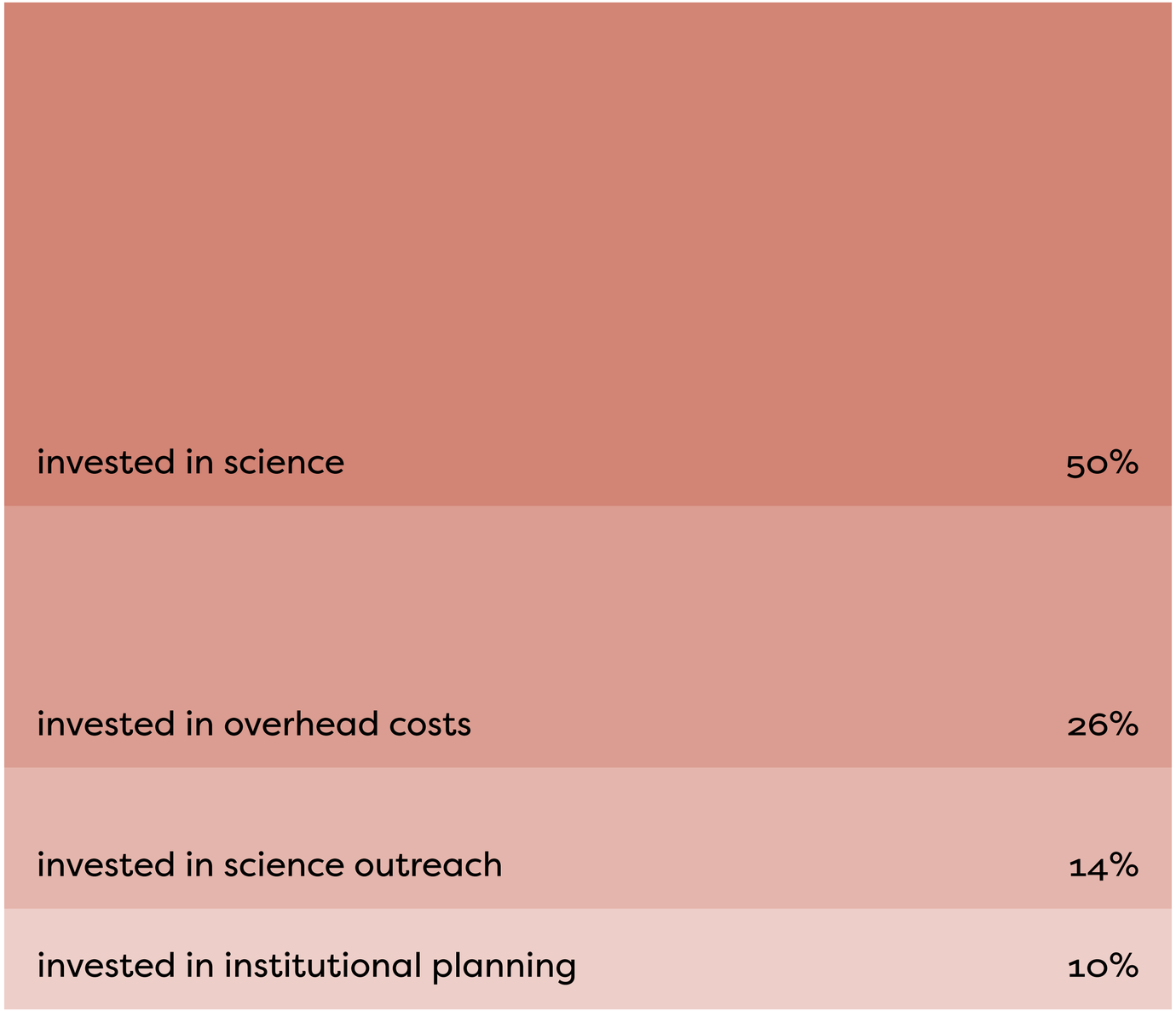
From the outset we seek excellence, a fundamental value of the institute that is reflected by the selections we make for our Science and Science Outreach programs. We call on leading researchers all over the world to ensure rigor in our project evaluation processes. Our events are known for their content and for the quality of these carefully organized meetings.

We also place a high value on transparency. We encourage our grantees to make their data accessible, and we even issued a guide on open science. Furthermore, as part of our commitment to ensure transparency during the evaluation of projects, we publish our entire process on our website.

Finally, we pay attention to under-represented groups in science. We deplore the historical inequality in our world, both for the social reasons as well as the obstacle the absence of diversity imposes on the development of fresh and daring science. Therefore, we adopted a mechanism that encourages our grantees to include and train people from under-represented groups, thereby incorporating them into the research teams.

In addition to persistently improving our existing programs, the Institute's second three-year cycle will focus on establishing new initiatives. With the support of our Scientific Advisory Board, we will work on the strategic planning of our investments with the goal of continuing the promotion of excellence, transparency and diversity in Brazilian science.

Executive summary: Serrapilheira by the numbers



2019
annual budget
(BRL)

18.309 million

Science

42
grantees

22
institutions

8
states in Brazil

12
researchers with funding renewed

First Call (out of 65 grantees)

Total funding provided:
11.8 million BRL

funds disbursed over three years

6
new researchers with funding

First Call

Total funding provided:
600,000 BRL

part of the funding was disbursed in 2018

24
researchers supported

Second Call (out of 663 proposals received)

Total amount provided:
2.3 million BRL

part of the funding will be disbursed in 2020

9
microfunds granted

events, awards, grants and other initiatives.

Total funds provided:
111,000 BRL

disbursed in full in 2019

Learn more about a few of them on page 13 (No-budget Science Hack Week) and on page 44 (CAPES Dissertation Award)

other projects supported

Jangada Dinâmica

Total funding provided:
1.2 million BRL

funding to be disbursed over five years as of December 2019

Learn more on page 26

488 proposals received

Third Call (results to be announced in May 2020)

Investment by field of science

Life Sciences	40%
Physics	12,6%
Chemistry	11,6%
Geosciences	10,6%
Computer Science	9,5%
Mathematics	8,4%
Engineering	7,4%

Science outreach

14

projects supported

Camp Serrapilheira session 1

(13 brazilian states)
fields:
art
education
journalism
digital media

Total funding provided:
1.4 million BRL

funds disbursed in 2019

15

projects selected

Camp Serrapilheira session 2

(8 brazilian states)
8 new and 7 renewed proposals

Total funding provided:
1.5 million BRL

funds will be disbursed in 2020

other projects supported

Total funding provided:
360,000 BRL

funds partially disbursed in 2018

Learn about the projects we supported on pages 29-34

Our values

Diversity: the keystone for cutting-edge science

Serrapilheira believes that risk taking in science produces impactful results. Such science is only possible when there is freedom of thought and diverse perspectives. Therefore, it is essential to have a more diverse pool of young researchers who have different perspectives on science.

In 2019, we enhanced our diversity in science policies and launched a best practices guide produced by a committee of specialists in the field. The goal is to inspire our grantees and other institutions to promote inclusion by guiding those who wish to create more diverse research groups.

Our main mechanism for supporting diversity started with a 300,000 BRL bonus to be invested in activities aimed at training and including people from under-represented groups. The amount was provided to the twelve researchers who won the 700,000 BRL grants (learn more on page 18).

Diversity spearheaded several of our discussions this year. In order to consider groups historically excluded from scientific activity (including Black people in science as a whole and women in the fields of mathematics, physics and computer science), it is important to actively seek individuals who in spite of meeting our criteria do not necessarily have access to our Public Calls.

In June, at the third Serrapilheira Scientific Retreats (*Encontros Serrapilheira*) the science grantees discussed meritocracy and inclusion with Professor Marcia Lima from the University of São Paulo's Department of Sociology. In the fourth meeting, held in December, we welcomed philosopher Sueli Carneiro and anthropologist and historian Lilia Schwarcz, both of whom discussed the role science plays in constructing racism in Brazil. For more information check out "the role of science in building racism" on the Serrapilheira website.

Meet the committee that helped to create the guide

Andre Degenszajn
Instituto Ibirapitanga

Debora Diniz
UNB (University of Brasilia) / Brown University

Iara Rolnik
Instituto Ibirapitanga

Juarez Xavier
Unesp (São Paulo State University)

Katemari Rosa
UFBA (Federal University of Bahia)

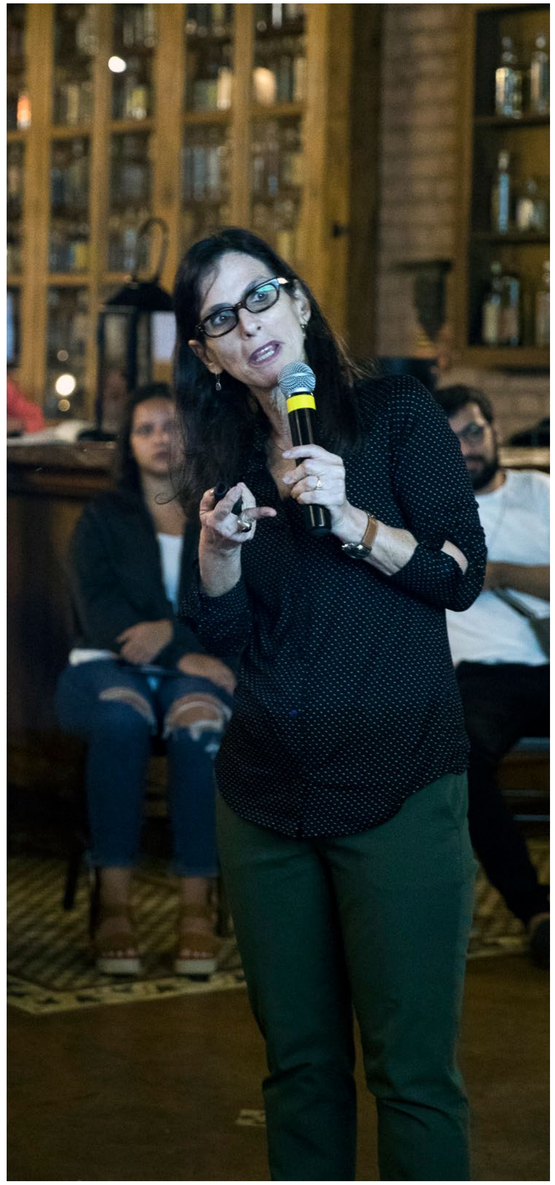
Marcia Barbosa
UFRGS (Federal University of Rio Grande do Sul)

Marcia Lima
USP (University of São Paulo)

The outcomes of the No-Budget Science Hack Week

During the No-Budget Science Hack Week, an intensive workshop focused on developing low-cost scientific solutions held in July, a group of participants looked into Serrapilheira's Second Call for Science Proposals and studied its selection process. The group focused on evaluating whether the process included a gender bias. This was an issue because women made up 42.6% of the applicants and only 29% of the grantees admitted. The study concluded that there was no difference between men and women in terms of performance during the evaluation but noted that there are fewer women researchers submitting proposals in the so-called "harder" sciences. Therefore, the selection ended up mirroring the gender make-up in those fields and revealed that there is a need not just for more women in fields like mathematics, physics and computer science, but also for more applications from them in our calls for proposals. See more details on our website "Why we still have few women among Serrapilheira grantees?"

* The No-Budget Hack Week was partially funded by Serrapilheira



From left to right: Sociologist Marcia Lima during the Third Serrapilheira Scientific Retreats; historian and anthropologist Lilia Schwarcz and philosopher Sueli Carneiro in the Fourth Scientific Retreats

Open and reproducible science

Serrapilheira issued the “Best Practices Guide in Open and Reproducible Science” under the assumption that science is a practice that requires continuous review and, therefore, access to it ought to be universal. Open data allows researchers to collaborate in research, share knowledge, reuse results, data and methods. Such are essential procedures for the advance of science and the reliability of its results.

However, the guide goes beyond open science and provides recommendations on how to find rigor in scientific activity—from creating the project and carrying out the experiments to analyzing and publishing data.

Serrapilheira commissioned Olavo Amaral to produce the document, which is available on the Serrapilheira website. Amaral is a researcher at the Leopoldo de Meis Medical Biochemistry Institute at the Federal University of Rio de Janeiro (UFRJ) and the mastermind behind the Brazilian Reproducibility Initiative. The document was reviewed by the grantees in the different fields of research.

Discussion about open science with Olavo Amaral from the Brazilian Reproducibility Initiative and grantee Ulisses Barres from the Brazilian Center for Research in Physics (CBPF) during the Third Serrapilheira Scientific Retreats

The Brazilian Reproducibility initiative

Inaugurated in 2018, The Brazilian Reproducibility Initiative is a project devoted to the systematic replication of 70 to 100 published Brazilian biomedical research experiments from the past 20 years. This first-of-its-kind project aims to measure how reproducible a given area of science is in Brazil.

In 2019, the project's coordinators defined the protocols and started building a network of collaborators, which now involves over 70 laboratories. The labs will reproduce experiments in mice and cells using three common biomedical research techniques. Prior to starting their work, volunteer scientists signed up to participate in the research that aims to check whether it is possible to foresee which experiments can be successfully replicated.

The project has also started gaining international recognition. In February, the *open-access eLife* journal, a journal dedicated to research in the life and biomedical sciences, published an article about the Brazilian Reproducibility Initiative. The article's authors, who belong to the initiative's team, explained the establishment, objectives, and methods of the initiative. In May, the project was also covered in a report in *Nature*.

Testing whether an experiment used in a study can be replicated by other laboratories is essential for guaranteeing the quality and reliability of scientific research – a rare practice not just in Brazil, but worldwide. Recent surveys in specific areas of research suggest that a large share of published experiments are not reproducible and make this an urgent issue in international science.

Science

“In 2019, we learned many lessons and reflected deeply about our selection process. The publication of the ‘Best Practices Guide for Diversity in Science’ and the implementation of the bonus for investing in training and inclusion of people from under-represented groups led to significant institutional maturity. One of the goals for the following years is to improve upon each successive Call for Proposals by innovating and optimizing how we identify and support young researchers from a diversity of backgrounds.”

Cristina Caldas,
Science Director

The first 700,000 BRL grants

In May, we announced the funding renewal for the first grantees, each awarded an additional 700,000 BRL, plus an optional bonus of 300,000 BRL for investing in the inclusion and training of people from under-represented groups in science (learn more on page 12). The funding will be used over the next three years. Twelve researchers were selected from the pool of 56 researchers supported in the First Call for Science Proposals.

The initiative to offer more substantial grants to a smaller number of projects aligns with Serrapilheira’s objective of making long-term investments in young researchers with great potential.

Meet the 12 renewed grantees

Alexander Birbrair
Field: Life Sciences

Institution: Federal University of Minas Gerais, Minas Gerais

Project: Regulation of Cancer through the Peripheral Nervous System

Ayla Sant'Ana da Silva
Field: Life Sciences

Institution: National Institute of Technology, Rio de Janeiro

Project: Biotechnological Routes for Converting Açai (*Euterpe oleracea*) Seeds into Energy and High Value-Added Products

Carlos Eduardo Ganade de Araújo
Field: Geosciences

Institution: Mineral Resources Research Company, Rio de Janeiro

Project: Orogen Superposition, Nucleation of Shear Zones and Exhaust Tectonics in Northeastern Brazil

Daniela Barretto Barbosa Trivella
Fields: Chemistry, Computer Science and Life Sciences

Institution: Brazilian Center for Research in Energy and Materials (CNPEM) / Brazilian Biosciences National Laboratory (LNBio), São Paulo

Project: NP3: Computer-Aided Platform for Iterative-Cycle Interpretation of Experimental Data for the Rapid Discovery of New Bioactive Natural Products

Daniel Youssef Bargieri
Field: Life Sciences

Institution: University of São Paulo, São Paulo

Project: The Quest for New Transmission-Blocking Antimalarial Compounds

Guilherme Ortigara Longo
Field: Life Sciences

Institution: Federal University of Rio Grande do Norte, Rio Grande do Norte

Project: Are Brazilian Reefs Ready for Global Changes?

Guilherme Zepon
Field: Engineering

Institution: Federal University of São Carlos, São Paulo

Project: High-Entropy Alloy Design for Applications in Hydrogen Storage

Karín Menéndez-Delmestre
Field: Physics

Institution: Federal University of Rio de Janeiro / Valongo Observatory, Rio de Janeiro

Project: A Lighthouse in the Dark: Unveiling Dark Matter through Extragalactic Observations

Marco Antonio Zanata Alves
Field: Computer Science

Institution: Federal University of Paraná, Paraná

Project: Energy-Efficient Smart Memory for Data-Intensive Computing

Narcizo Marques Souza Neto
Field: Physics

Institution: Brazilian Center for Research in Energy and Materials (CNPEM) / Brazilian Synchrotron Light Laboratory (LNLS)

Project: An X-Ray View of Superconductivity

Tiago Pereira da Silva
Field: Mathematics

Institution: University of São Paulo/ICMC, São Paulo

Project: Rebuilding Complex Networks: Critical Transition Forecasting

Vinicius Gripp Barros Ramos
Field: Mathematics

Institution: Institute for Pure and Applied Mathematics, Rio de Janeiro

Project: Simple Geometry, Contact Dynamics and Billiards

Internationalizing the selection process

Since Serrapilheira's foundation, we have conducted three calls for proposals for funding in the sciences. Ever since the second call, applicants have been examined by a panel of international scientists. This provides not only a global perspective on Brazilian science, but also avoids potential conflicts of interest through a greater degree of separation between judges and candidates.

Beyond the grant: the Serrapilheira Scientific Retreats

Although funding projects represents one of our main activities, we also provide our researchers with a network guided by our values. We organize events aimed at integrating, training, conducting workshops and laying the groundwork for interdisciplinary collaborations.

In 2019, we held the third and fourth sessions of the Serrapilheira Scientific Retreats, one in June and the other in December. In the former, the grantees presented their papers, participated in a conversation about meritocracy and inclusion (learn more on page 14), debated open science and engaged in workshops on science outreach. The December event provided an opportunity for the researchers to improve their presentation and paper-writing skills. The grantees also returned to the subject of diversity in science, only this time they focused on the structural aspects of racism in Brazil (more on page 13).

Training sessions, upon the grantees' requests, focused on career development opportunities and creating an environment conducive to excellence in research.

Left: Grantees at the Third Serrapilheira Scientific Retreats held in June

Right: Grantees and their children at the Serrapilheira Scientific Retreats. In this photo, astronomer Karín Menéndez-Delmestre with daughter Ilana and Gabriel, son of mathematician Vinicius Ramos

Storytelling workshop with the creators of *37 Graus*, a science podcast, during the third Serrapilheira Scientific Retreats

Workshop on science outreach with Jean-Luc Doumont from Belgian group Principae, during the fourth Serrapilheira Scientific Retreats

Investment in mathematics: the Jangada Dinâmica project

In December, Serrapilheira announced a 1.2 million BRL investment in an unprecedented initiative called Jangada Dinâmica, which aims to boost research in mathematics in the Brazilian state of Ceará. Yuri Lima, a professor at the Federal University of Ceará (UFC) was granted funding for his idea through our First Call for Proposals. Local researchers in the areas of dynamic systems and ergodic theory will participate in the project.

Planned to run for five years, Jangada Dinâmica anticipates holding summer school, events, workshops and collaborations between UFC and other institutions in northeastern Brazil. The idea is that the university act as a hub that connects recent graduates from the northeastern region with prominent international researchers,

Mathematics is traditionally dominated by white men, so to change this statistic in favor of more diversity in this field, 30% of the Jangada Dinâmica activities will be geared specifically for under-represented groups.

Yuri Lima, the brain behind Jangada Dinâmica

Science outreach

“After two years spent mapping the field, funding projects, and holding events, we found promising initiatives and contributed to developing a network of Brazilian promoters who share our values. We encouraged media outlets and scientific laboratories to develop strategies for science outreach and lent our support to young organizations to develop sustainable business models. We also identified and supported initiatives aimed at structuring the field of science outreach in Brazil – see some examples on the following pages. In the years to come, we hope that similar initiatives will make good use of these structures, products and relationships promoted by our program.”

Natasha Felizi,
Science Outreach Director

Camp Serrapilheira: mapping, connecting and supporting projects

In December, Serrapilheira announced the 15 organizations that participated in Camp Serrapilheira. They will receive support for their science outreach initiatives in 2020, including mentorship and financial resources to make their plans a reality.

The selected initiatives include some of those supported in the first session of Camp Serrapilheira and whose grants were renewed. Of the 15 projects awarded, seven are renewals and eight are new proposals. Get to know some of the projects:

Agência Bori: Bridging the gap between scientists and the media

Bori will provide scientific studies from research institutions throughout Brazil, before they are published, and make them available to the press along with press releases, the corresponding author's contact information, and audiovisual material to facilitate coverage by journalists. This approach mirrors the US-based initiative EurekAlert, and the project aims to facilitate scientific coverage by journalists.

bori
agência

"The Serrapilheira funding was just what we needed to be able to produce content and create our visual identity. Additionally, we had a survey conducted on the international scientific journals that publish Brazilians most to enter into partnerships with them and obtain papers in advance."

Sabine Righetti and
Ana Paula Morales,
founders of Bori

Amerek – UFMG: Training in science communication

Launched in the second half of 2019, Amerek is a Federal University of Minas Gerais (UFMG) program that specializes in public communication about science. The program's target audience includes journalists, educators, managers, scientists and any other professionals interested in publicizing science through different media channels.

"Serrapilheira's funding was fundamental since it made it possible for us to carry out (and gain visibility for) activities involving contributors from around Brazil, a diversity of approaches and innovations vital to the success of our mission."

Yurij Castelfranchi and Veronica Soares, Amerek coordinators

Lab 37: Narrative science

Podcast *37 Graus* (37 Degrees) was one of the six projects selected by the Google Podcast Creator Program, a contest that received over 10,000 applications from around the world. The podcast is a platform for telling stories related to science with human warmth, using storytelling and audio communication techniques. Lab 37, a communication company specializing in audio production, was founded to support 37 Graus and other projects.

Lab37

"Thanks to the funding we were able to start dedicating ourselves full-time to producing *37 Graus* and we really stepped up the quality of our product. Through Lab 37, we are producing other podcasts as well an audio guide for museums in addition to providing consulting services and courses on science communication and podcast production."

Sarah Azoubel
and Beatriz Guimarães,
founders of *37 Graus*

Nexo Jornal:
The new science journalism

This project aims to expand access to quality information about science and enhance the audience's knowledge, especially that of young people, about Brazilian scientists. In the first stage, the journal produced a series of twelve minibiographies of historic Brazilian scientists and twelve interviews with young scientists today.

"The audience for and the reception of this kind of content show that the project was the right thing at the right time. We managed to have a foothold in scientific journalism and could thus talk with other initiatives working in the field. We expanded our channels for conversations with scientists, researchers, promoters and people interested in science in general; finally, we participated in science outreach events that allowed us to broaden the base of our sources and audience connected to the sciences."

José Orenstein,
Nexo representative

Marine Ecology Lab at the Federal University of Rio Grande do Norte (UFRN): #EyeOnTheCoral

With its interdisciplinary approach, the #EyeOnTheCoral (#DeOlhoNosCorais) project goes beyond marine biology research. This initiative for science outreach and science-citizen engagement is aimed at reinvigorating society's role in monitoring coral reefs and sharing knowledge about them on social media and in exhibition spaces.

"Science communication had the whole laboratory abuzz bringing up all sorts of questions and new plans for the project, not to mention including a course on science outreach in UFRN's graduate program in ecology."

Guilherme Longo, mastermind behind #EyeOnTheCoral

Get to know the other selected organizations

Center for Science Communication at the Ceará State University (UECE)
digital media

Location: Quixadá and Fortaleza, Ceará

Silo – Rural Art and Latitude
art/education

Location:
Visconde de Mauá, Rio de Janeiro

Agência Pública
journalism/podcast

Location:
Rio de Janeiro, Rio de Janeiro

Science on the Streets
journalism/ digital media

Location: São Paulo, São Paulo

Physics Institute of the Federal University of Rio Grande do Sul (UFRGS) (Frontiers of Science)
podcast

Location:
Porto Alegre, Rio Grande do Sul

Laboratory of Archaeology and Environmental and Evolutionary Anthropology (LAAAE)
diversity/ digital media

Location: São Paulo, São Paulo

Labverde - Manifesta Arte and Cultura
art

Location: Manaus, Amazonas

Museu Paraense Emilio Goeldi
museology

Location:
Belém, Pará

Peixe Babel
digital media

Location:
Belo Horizonte, Minas Gerais

Brazilian Astronomical Society
digital media

Location:
Rio de Janeiro, Rio de Janeiro

How Camp Serrapilheira works

Camp Serrapilheira, a Science Outreach Program initiative, involves a call for proposals and an event. The science promoters selected are awarded with funding and guidance to carry out projects aimed at enhancing a culture of science in Brazil.

Camp Serrapilheira was held for the second time in September during four days of lectures, film sessions, workshops and art installations that offered new perspectives on the role of science in our culture. We discussed what role journalism and digital media like YouTube and podcasts play in science outreach; best practices for fact-checking data in the age of misinformation; the importance of questioning and making errors in scientific researches that tackle grand issues; and major subjects that have appeared in scientific news in the last several years such as gene editing. All activities were open to the public.

Jen Wong (Guerilla Science) and Ian Cheney (filmmaker, The Most Unknown) in a conversation about new ways of connecting different audiences to science, moderated by Natasha Felizi (Serrapilheira's Science Outreach Director)

Left: Brooke Borel (The Chicago Guide to Fact-Checking) and Greg Boustead (Science Sandbox) debate how to reconcile information accuracy and good narratives about science, moderated by Tai Nalon (Aos Fatos)

Right: Space Yoga held by British group Guerilla Science. This activity reproduces the effects of microgravity in the human body

Left: YouTubers Julia Jaccoud (A Matemaníaca) and Ana Carolina da Hora (Computação sem Caô), who participated in the discussion at Camp Serrapilheira

Right: A sound immersion session led by Projeto Sonora about an imaginary museum in the Amazon

“Fundamental questions”: science and intuition in a video series

In July, Serrapilheira released a video series (available on our YouTube channel) to understand the source of questions that drive scientists and their discovery processes. In the video, five researchers supported by Serrapilheira discuss the role of intuition and creativity: Bruno Mota (physics and neuroscience); Marina Hirota (mathematics and ecology); Tiago Jalowitzki (geology); Rafael Chaves (quantum physics) and Rafael Silva (chemistry).

Fundamental science: a blog about young scientists

In November, we signed a partnership with *Folha de São Paulo* aimed at launching a blog where we invite scientists to reflect upon the fundamental questions of their fields of study. Through this project we intend to spotlight top young researchers and encourage them to hone their skills in communicating with diverse audiences

CIÊNCIA FUNDAMENTAL

O que pensam os jovens cientistas no Brasil?

ESTATÍSTICA BIOLOGIA GEOCIÊNCIAS ASTRONOMIA CIÊNCIAS AMBIENTAIS FÍSICA

9.abr.2020 às 2h00

A pesquisa científica é um processo orgânico

Ilustração: Catarina Bessell

Ciência Fundamental

Por Karín Menéndez-Delmestre

A ciência é cheia de ideias, mas ideias refutáveis

*

Todos temos "teorias" sobre por que uma ou outra coisa acontecem. Mas para que elas sejam de fato teorias científicas, e não apenas ideias, opiniões, elas precisam ser refutáveis: deve ser possível colocá-las à prova e mostrá-las verdadeiras ou falsas. O princípio da falseabilidade

CIÊNCIA FUNDAMENTAL

O que pensam os jovens cientistas no Brasil?

ESTATÍSTICA BIOLOGIA GEOCIÊNCIAS ASTRONOMIA CIÊNCIAS AMBIENTAIS FÍSICA

2.abr.2020 às 2h00

Uma pista para a juventude eterna

Arte: Catarina Bessell

Ciência Fundamental

Por Hugo Aguilaniu

Alterações no metabolismo poupam equatorianos com nanismo dos efeitos do envelhecimento

*

Não existe remédio para viver mais e melhor além de alimentação equilibrada, exercícios físicos regulares e distância de comportamentos de risco e excessos em geral. Mas hoje temos alguns indícios de como prolongar a expectativa de vida ou atenuar os efeitos do

Institutional affairs

Nature Conference: an international scientific meeting

The Nature Conference: “Advances in Metabolic Communication,” held in October in Rio de Janeiro, brought together about 200 researchers to discuss metabolism from different scientific perspectives and approaches ranging from bioenergetics to metabolism’s health impact. This international event organized through an unprecedented partnership between Serrapilheira and the Nature group was the second Nature Conference ever held in South America (the first took place in 2014 at the University of Campinas, UNICAMP) and marked the launch of the journal, *Nature Metabolism*.

According to the publication’s editor-in-chief, Christoph Schmitt, the meeting provided an opportunity to interact with the local scientific community, encouraged article submissions from Brazilian researchers to the Nature group’s journals, and also showcased Brazil’s significant contribution to this field of study. Learn more by searching for “Brazil has grown to become a reference in the field of metabolism” on the Serrapilheira website.

Participants in the Nature Conference held in October at the Copacabana Palace, Rio de Janeiro

Left: Event organizers Christoph Schmitt (*Nature Metabolism*), Marcelo Mori (UNICAMP), Fernanda Cunha (UNIFESP), Hugo Aguilaniu and Cristina Caldas (Serrapilheira) and Elena Bellafante (*Nature Metabolism*)

Right: The event honored scientists Aníbal Vercesi (in the photo) and Leopoldo de Meis, prominent names in metabolism research in Brazil

Institutional partnerships: serrapilheira in the scientific ecosystem

In 2019, Serrapilheira established a partnership with major players in Brazilian science. Together with Fundação Arthur Bernardes (FUNARBE), in charge of disbursing our funding, we advocated for reducing bureaucracy in the sciences in favor of streamlining processes and enabling scientists to have more time and freedom for their research.

Another partnership established has been with Companhia das Letras, a publishing company. At the Camp Serrapilheira in September, neuroscientist Stuart Firestein's book, *Ignorance: How It Drives Science*, was launched, which kicked off the partnership with Companhia da Letras to public more science books.

Considering the importance of gestures that acknowledge the work of young researchers committed to excellence, in December we participated in the 2019 CAPES Dissertation Awards and funded two of the event's three main awards.

Launch of *Ignorance: How It Drives Science* at Camp Serrapilheira

A network in biodiversity

Serrapilheira started developing the idea of a new program dedicated to biology, ecology and the sciences in biodiversity. While it is still in the structuring phase, in 2019 the Executive Director met with players in this field (in Brazil and worldwide) to better understand its panorama.

Meeting with players in the field of biodiversity held in December 2019, in São Paulo

The new Scientific Advisory Board

2019 marked the close of the first three-year term of Serrapilheira's Scientific Advisory Board (SAB). As of 2020, it will be made up of a new roster of members and is already being referred to as SAB in both English and Portuguese.

The first SAB played a crucial role by contributing to the institution's initial activities, and by advising the Executive Team and the Board of Trustees regarding scientific issues.

In addition to being a year for renewing the SAB, 2020 will also kick off the partial renewal of the Board of Trustees. The term of each member of the Board will be at least three years and each member will be replaced the year the term is fulfilled. This rotation system is adopted in the spirit of healthy governance based on management cycles.

LIFE SCIENCES

Antonio Coutinho
Trustee – Fundação Champalimaud (Portugal)

Faith Osier
Research Group Leader – Center of Infectious Disease Research / Biosciences Department, KEMRI-Wellcome Trust (Kenya/Germany)

Simon Levin
Professor – Department of Ecology and Evolutionary Biology, Princeton University (USA)

Thomas Lovejoy
Professor – Department of Environmental Science and Policy, George Mason University (USA)

SCIENCE OUTREACH

Deborah Blum
Director of the Knight Science Journalism program at the Massachusetts Institute of Technology (EUA)

MATEMÁTICA

(Sun-Yung) Alice Chang
Professora – Universidade de Princeton (EUA)

Marcelo Viana
Director-General – Institute of Pure and Applied Mathematics (Brazil)

PHYSICS

Luiz Davidovich
President – Brazilian Academy of Sciences / Professor – Institute of Physics of the Federal University of Rio de Janeiro (Brazil)

Marcela Carena
Chair – Department of Theoretical Physics, Fermilab / Professor – University of Chicago (USA)

CHEMISTRY

Vanderlan Bolzani
Professor – Institute of Chemistry, São Paulo State University Araraquara / member of São Paulo Research Foundation's (FAPESP) Superior Council (Brazil)

Serrapilheira in the media

In 2019, Serrapilheira—either the Institute itself or the researchers it supports—was mentioned about 450 times in the media. Overall, the institution was mentioned in different media: print and online newspapers, magazines, institutional websites, newswires, blogs, television, radio and podcasts.

Certain key moments received more media attention than others. In May, the news about the 12 grantees awarded funding totaling 12 million BRL was carried by several media outlets including *Folha de São Paulo* and *O Globo*. Around the same time an interview granted by Serrapilheira's Executive Director, Hugo Aguilaniu to *Folha* was widely covered by the media. In the interview, Aguilaniu stated that although private investment is important for science, public funding is the core to fostering science. Aguilaniu also published articles in *O Globo* and in *Veja* magazine, enhancing Serrapilheira's position as an opinion maker.

In January, a report in *Folha* announced Serrapilheira's 1 million BRL sponsorship of the Brazilian Reproducibility Initiative, a project that was also highlighted in an article in *Nature* in May.

PÁGINA ABERTA

PACIÊNCIA COM A CIÊNCIA

Em tempos minguados para a pesquisa, é vital lembrar que o caminho para a descoberta traz risco, envolve criatividade e leva tempo, mas quem não apostar nele vai ficar para trás

HUGO AGUILANIU*

PARA MELHOR COMPREENDER o desafio do financiamento da ciência, antes de mais nada é preciso entender o que é pesquisa científica, evitando simplificações perigosas. Como dizia Einstein, "tudo deve ser feito de forma tão simples quanto possível, mas não mais simples do que isso" (em inglês, "*everything should be made as simple as possible, but no simpler*"). A pesquisa científica é um processo lento e trabalhoso, que visa a descrever e decifrar o mundo em que vivemos. Nisso, ela se assemelha a outras atividades criativas, como a arte ou a literatura. Seu motor é a curiosidade dos cientistas, parecida com a de nossos filhos até, que nos fazem mil perguntas sobre o que nos cerca. A intensa curiosidade, aliada a uma formação científica sólida, compõe a receita da descoberta.

Frequentemente a pesquisa científica começa pela intuição, e só então é formalizada pelo método científico. E a intuição é, além de misteriosa, imprevisível — surge sem avisar e pode mudar o mundo. Um dos maiores matemáticos do século XX, Henri Poincaré (1854-1912) dizia que "é com a intuição que descobrimos e com a lógica que provamos". O filósofo Gilles Deleuze (1925-1995) admitia de bom grado que a filosofia não era capaz de explicar o acaso. É como se a intuição científica fosse um encontro entre a ideia e um cientista preparado para agarrá-la em pleno voo.

Uma vez passada a fase intuitiva, chega-se à etapa da formalização da ideia, o que implica um método para testá-la — uma língua internacional que põe à prova as hipóteses, para confirmá-las ou refutá-las. É esse sistema, desenvolvido desde a Grécia antiga e que se quer objetivo, não sujeito ao experimentador ou ao teórico que o pratica, que dá à ciência sua credibilidade. A pesquisa se alimenta, portanto, de ideias novas, de intuições, e as submete à prova do método científico para transformá-las em conhecimentos universais que nos permitem melhor entender o mundo.

Sabemos que quase tudo o que nos rodeia hoje é produto da ciência e que conhecimento se traduz em valor de mercado, ainda que o ganho financeiro não seja o objetivo da maioria. A pesquisa básica produz ideias e as valida, e a ciência aplicada se serve desses saberes para desenvolver novas tecnologias. Algumas das quimioterapias mais utilizadas no mundo nasceram do interesse de três cientistas da Universidade de Cambridge por um minúsculo nematoide. Ao contarem as células do embrião desse verme microscópico — abundante no solo, na água e presente em bichos e plantas —, os especialistas perceberam que algumas delas, sempre as mesmas, cometiam um tipo de suicídio em determinada etapa de seu desenvolvimento. E foi nesse mecanismo de suicídio celular, a apoptose, que a medicina se espelhou em sua briga para derrotar o câncer.

A pesquisa aplicada, mais tecnológica, geradora de produtos ou serviços de alto valor, é, por óbvio, mais tradicionalmente financiada pelo setor privado. Mas como financiar a base, o terreno fértil no qual eventualmente podem germinar descobertas? Quem poderia prever que a contagem de células de um embrião de nematoide resultaria em tratamento oncológico? É aí que o investimento público se torna imprescindível. Reservar verbas para pesquisa básica é pensar em um retorno de longo prazo e altamente incerto, que quase nenhuma empresa pode se permitir fazer. Mas é um excelente investimento para a sociedade, inadiável, porque afirma nossa vontade de descobrir e entender o mundo. Isso posto, cabe ao setor público assegurar esses recursos, sem se preocupar com retorno financeiro imediato, porque a ciência em sua essência não funciona dessa forma.

Parece simples: o setor privado financiaria a pesquisa aplicada e o setor público, a pesquisa básica. Assim,

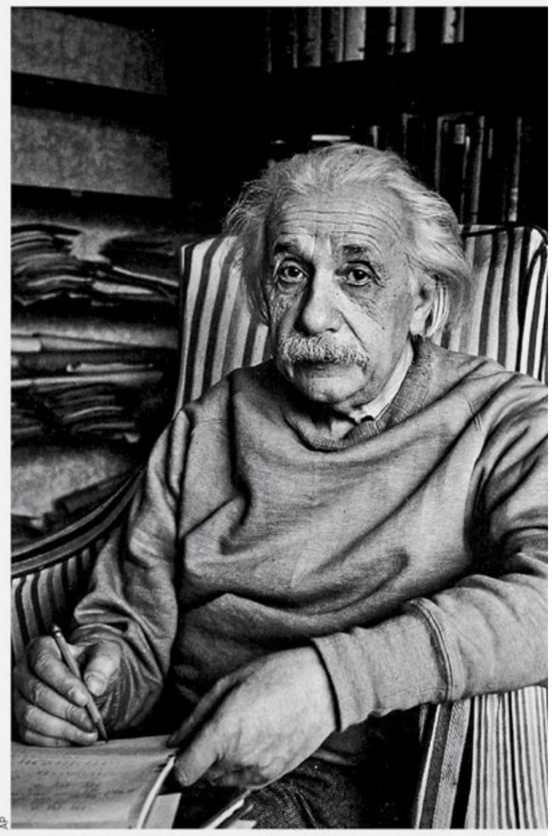
> "O investimento privado sem fins lucrativos pode ser mais audacioso e se aventurar onde ninguém pisa. Mas esse tipo de iniciativa é raro"

o Estado deveria focar a produção de conhecimento — os embriões de nematoide —, e a iniciativa privada, os resultados dessas descobertas — o desenvolvimento de medicamentos quimioterápicos, por exemplo. Mas não é tão trivial. Para entender a equação em sua inteireza, é importante ter em mente que o investimento público pode apresentar limites de muitas naturezas. De um lado, ele é passível de admitir matizes ideológicos que levam a mudanças inesperadas de rumo. Para se defender dos ventos da incerteza, é vital para um país a solidez das instituições que controlam tais recursos: são elas que protegem a ciência de modismos e ideologias e garantem o pensamento livre. Os gestores públicos têm grande responsabilidade — precisam tomar precauções e manter o bom poder de avaliação sobre quanto e onde aplicar os recursos. Muitas vezes, isso se traduz em apoios pulverizados para o maior número de pesquisas possível.

Há um tipo de projeto científico que raramente encontra financiamento. Com enorme potencial mas temerário, não recebe o apoio de empresas porque é básico demais e de pouca aplicação de curto prazo; tampouco é patrocinado pelo poder público, por ser incipiente ou demasiado arriscado. É uma lástima. A pesquisa ainda embrionária pode fracassar, é verdade, mas, se bem-sucedida, tem uma gigantesca força transformadora. Como uma aposta arriscada na bolsa de valores, que pode render um retorno magistral ou perdas substanciais, pesquisas ousadas têm o potencial de modificar o mundo, ainda que tragam embutido o risco de não resultar em nada.

O investimento privado sem fins lucrativos pode ser mais audacioso e se aventurar por essa terra onde ninguém pisa. Um dos exemplos mais notáveis é o Institute for Advanced Study (IAS), na Universidade Princeton. Inteiramente privado e sem fins lucrativos, o instituto abrigou alguns dos grandes pesquisadores do século XX, aos quais deu total liberdade para que assumissem riscos na confirmação de suas teorias. O IAS investe no escuro — e, entre seus membros, contou com os físicos Albert Einstein e Robert Oppenheimer. A contribuição deles é inigualável, tanto em termos de descobertas fundamentais quanto em aplicações científicas.

Essas iniciativas ainda são raras no Brasil, e deveria haver mais delas por aqui. O Instituto Serrapilheira, no Rio de Janeiro, propõe-se a financiar tais pesquisas. Acaba de anunciar apoio de 12 milhões de reais a doze cientistas (peneirados pela lupa da excelência entre quase 2 000 candidatos) e seus projetos ousados. E também investiu 1,4 milhão de reais em outra área relevante, a da divulgação científica, a fim de identificar profissionais inovadores que traduzam ciência para o



NA MEDIDA Einstein: "Tudo deve ser feito de forma tão simples quanto possível, mas não mais simples do que isso"

grande público. Hoje compreendemos que apressar a pesquisa pode cobrar um preço alto. Imagine pressionar Rodin, um dos maiores escultores de todos os tempos, a finalizar *O Pensador*. A lentidão é intrínseca ao processo criativo. Se não é exequível acelerar a intuição, podemos criar condições propícias para que ela floresça, combinando financiamentos públicos e privados para fomentar a pesquisa. Como na gestão de nossa poupança, é importante que a ciência diversifique seu portfólio. E não pare de avançar. ■

* Hugo Aguilaniu, biólogo geneticista francês, é diretor-presidente do Instituto Serrapilheira, de fomento à pesquisa, no Rio de Janeiro

ciência

'Verba pública é o coração do fomento à ciência', diz diretor do Serrapilheira

Diretor do órgão privado de fomento à pesquisa diz que ela não pode ser feita só com fins de lucro

Phillippe Watanabe

O geneticista francês Hugo Aguilaniu, diretor do instituto privado de fomento à ciência Serrapilheira Ricardo Borges-22.mar.17/Folhapress

Hugo Aguilaniu, 43
Geneticista francês, foi selecionado entre 138 candidatos por um comitê de busca (que tinha representantes do meio acadêmico e do meio empresarial) para dirigir o Instituto Serrapilheira, no Rio. É pesquisador licenciado da Escola Normal Superior de Lyon

> Obviamente há problemas nas universidades, mas sem o mínimo de recursos fica complicado. O laboratório não é algo que você possa desligar e religar seis meses depois. Precisa de continuidade
>
> Hugo Aguilaniu

Festival junta cientistas e população no bar para papo sobre ciência

'Deus vult' o quê?

Quem macaqueia lema das Cruzadas tem de saber o que está pedindo

Reinaldo José Lopes

ciência

Projeto quer responder: quão confiável é a ciência brasileira?

Iniciativa reproduzirá estudos publicados e receberá R$ 1 mi do Serrapilheira

A partir da esq.: os pesquisadores Olavo Amaral, Kleber Neves, Clarissa Carneiro, e Ana Paula Sampaio Ricardo Borges/Folhapress

Gabriel Alves

Cientistas vão replicar experimentos brasileiros

Entenda a Iniciativa Brasileira de Reprodutibilidade

1. Escolha — Serão escolhidos entre 50 e 100 experimentos entre aqueles já reportados por artigos científicos brasileiros da área biomédica
2. Replicação — Depois da elaboração de um protocolo padronizado, três ou mais laboratórios distintos vão replicar cada um desses experimentos
3. Conclusão — Se o resultado original estiver dentro da expectativa dada pelos resultados obtidos na iniciativa, considera-se que ele é reprodutível

71 Laboratórios, de 18 estados e do DF, estão participando da iniciativa

Entre as instituições com mais laboratórios cadastrados estão

Instituição	Laboratórios
UFRJ	12
USP	6
Fiocruz-RJ	6
UFRGS	4
Unifesp	3
UFSC	3

Motivação dos participantes

Motivação	Em %
Importância para a ciência	26
Interesse pessoal	19
Avanço da ciência brasileira	19
Crescimento do próprio laboratório	13
Proximidade a alguém da equipe	2
Obrigação moral	1

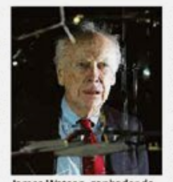
Técnicas a serem utilizadas

Elas foram selecionadas com base na frequência em que aparecem na literatura científica brasileira. Algumas delas são:

1. Ensaio de viabilidade celular MTT — Uso de um corante para saber que proporção das células em cultura estão vivas
2. Labirinto em cruz elevado — Teste comportamental que permite estimar nível de ansiedade do roedor, que pode ser alterado por alguma droga ou tratamento
3. Reação em cadeia da polimerase em tempo real (real-time PCR) — Teste possibilita a mensuração da quantidade de material genético em uma amostra e permite medir a expressão de determinados genes
4. Western blot — Teste que permite detectar e medir a quantidade de determinada proteína em uma amostra, com o auxílio de anticorpos

Pai da genética atrai críticas com falas sobre raça e inteligência

Amy Harmon



James Watson, ganhador do Nobel em 1962 Odd Andersen/AFP

> Existe diferença nos testes de QI dos brancos e dos negros. Se trata de uma diferença genética
>
> James Watson
> Fundador da genética

The New York Times, tradução de Paulo Migliacci

Printouts of reports and articles about Serrapilheira in 2019

The outlook for 2020

Over our three years of activity we have constantly sought to establish Serrapilheira as an institution that is earnestly dedicated to science and science outreach in Brazil and abroad. It was an honor to be classified as a “Friend of Science” by the Brazilian Society for the Advancement of Science (SBPC) in July of 2019. This pleased us immensely since it is a token of recognition for our work from the scientific community.
We are grateful for all the partnerships that made this track record possible.

Now that we have managed to establish a solid footing and make our Science and Science Outreach programs robust, we seek to define new strategic directions.
In addition to seeking to further develop our two main programs, we are looking into structuring new strategic areas related to Brazil, particularly surrounding issues directly connected to the country’s own specificities.

Timeline

apr

Announced the 24 grantees selected in the Second Call for Science Proposals

may

Opened the submission period for Camp Serrapilheira 2019 proposals

Announced the renewal of the 12 grantees from the First Call for Science Proposals

jun

Diversity Committee meeting

Third Serrapilheira Scientific Retreats

jul

Received recognition from the Brazilian Society for the Advancement of Science

sep

Camp Serrapilheira 2019

Opened the Third Call for Proposals

oct

Nature Conference

nov

Partnership with *Folha de São Paulo* – Fundamental Science blog

dec

Fourth Serrapilheira Scientific Retreats

Meeting on the topic of "Exploring the Field of Biology and Biodiversity"

CAPES Dissertation Awards

Announced the 15 projects selected by Camp Serrapilheira 2019

Announced support for Jangada Dinâmica

Editorial team

Director of Communications
Natasha Felizi

Writer
Clarice Cudischevitch

Editor
Maria Emilia Bender

Collaborator
Pedro Lira

Translator
John Ellis

Graphic design and layout
Celso Longo, Daniel Trench

Assistent
Isadora Bertholdo

Instituto Serrapilheira

contato@serrapilheira.org

+55 21 3952-9060

Rua Dias Ferreira, 78, s202,
Leblon, Rio de Janeiro-RJ. Brasil.
CEP: 22431-050

Image credits

© Angela Siemsen
– Estúdio Momento (p. 5)

© Bel Junqueira (p. 19-21, 26)

© Bela Baderna [p. 14, 23 (children of grantees), 25]

© El Tigre Studio [p. 14 (Marcia Lima), 16, 23 (grantees), 24]

© Larissa Kreili (p. 35-37, 42-43, 45)

© Leo Eloy (p. 29-33)

© Ricardo Borges (p. 6)

© Serrapilheira (p. 46)

© Personal archive (p. 48-49)

serrapilheira