
Science and Technology in São Paulo, Brazil

Carlos H. de Brito Cruz
Scientific Director
Fapesp

Presentation at
FAPESP Week, Beijing, Apr. 16, 2014
Peking University

Brazil: 198 million people, 7th GDP in the world (2012)



State of São Paulo, Brasil



- 41 Million people
- 34% of Brazil's GDP
- 50% of Brazilian science
- 13% of State budget to HE and R&D
- 1.6% GDP for R&D

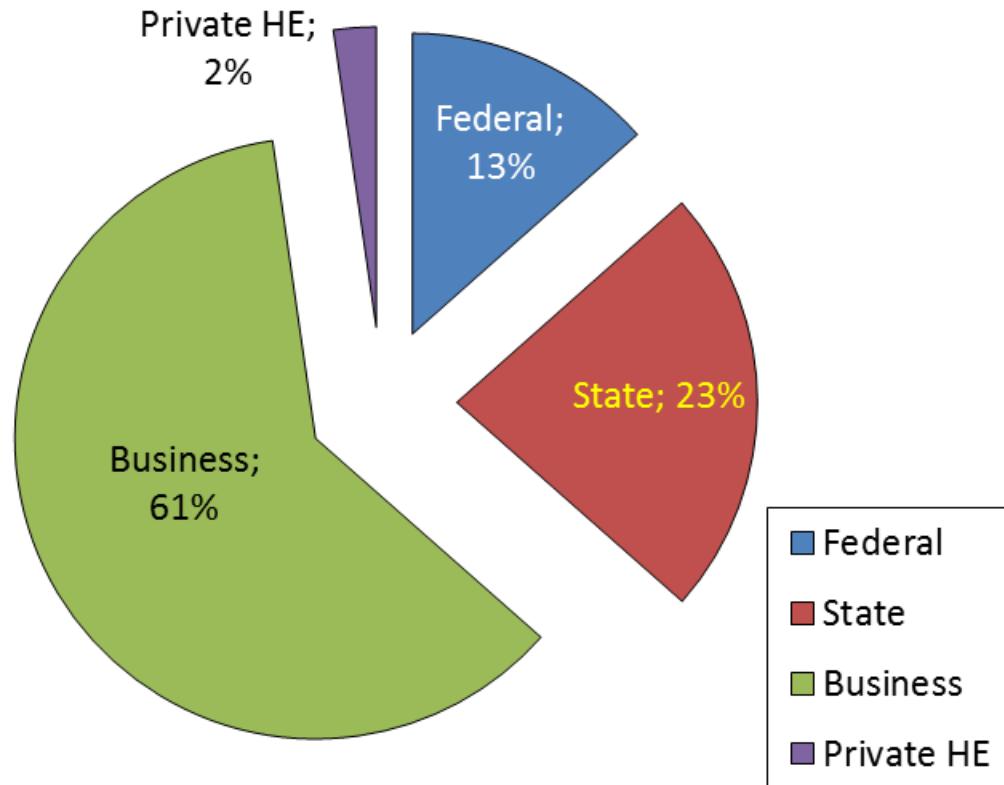
- 3 State Universities
- 3+1 Federal H.E. institutions
- 52 State Tech Faculties
- 45% of the PhDs graduated in Brazil (4,937 in 2010)
- 22 Research Institutes (19 state/3 federal)

Higher Education and Research in São Paulo, Brazil

	Faculty	Student selectivity	Undergrads	DR stud. enrolled	DR awarded
USP	5,500	1:12	57,902	14,000	2,214
Unicamp	1,700	1:17	16,682	5,779	818
UNESP	3,400	1:12	35,929	4,395	756
PUCSP	1,406				355
UFABC	410	1:13	4,200		
UNIFESP	1,207	1:29	5,106		235
UFSCAR	1,127	1:14	8,851	914	175
ITA	182	1:50	572		

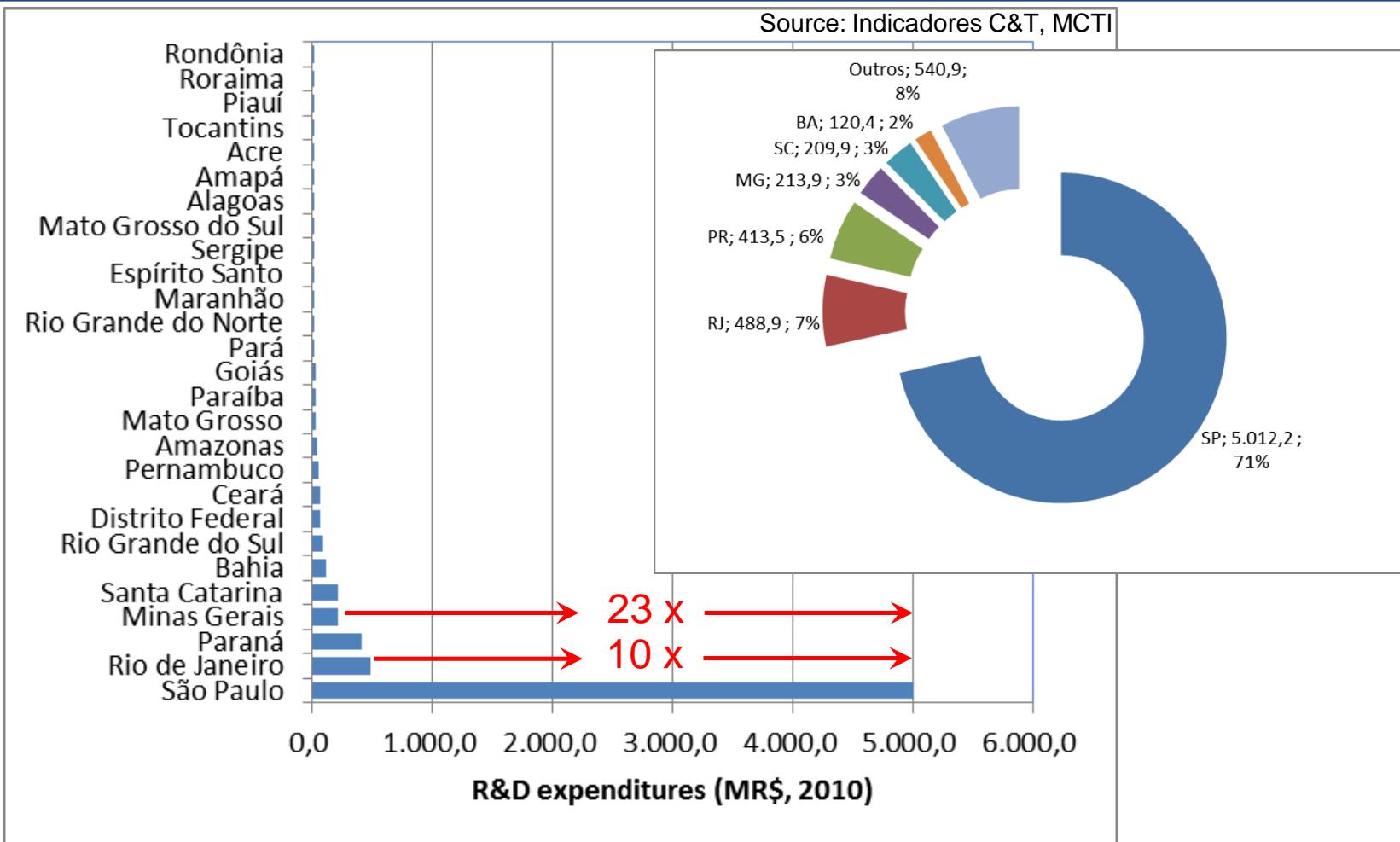
São Paulo: R&D Expenditures, 2011, by source

Sources of funds for R&D expenditures in São Paulo,
2011

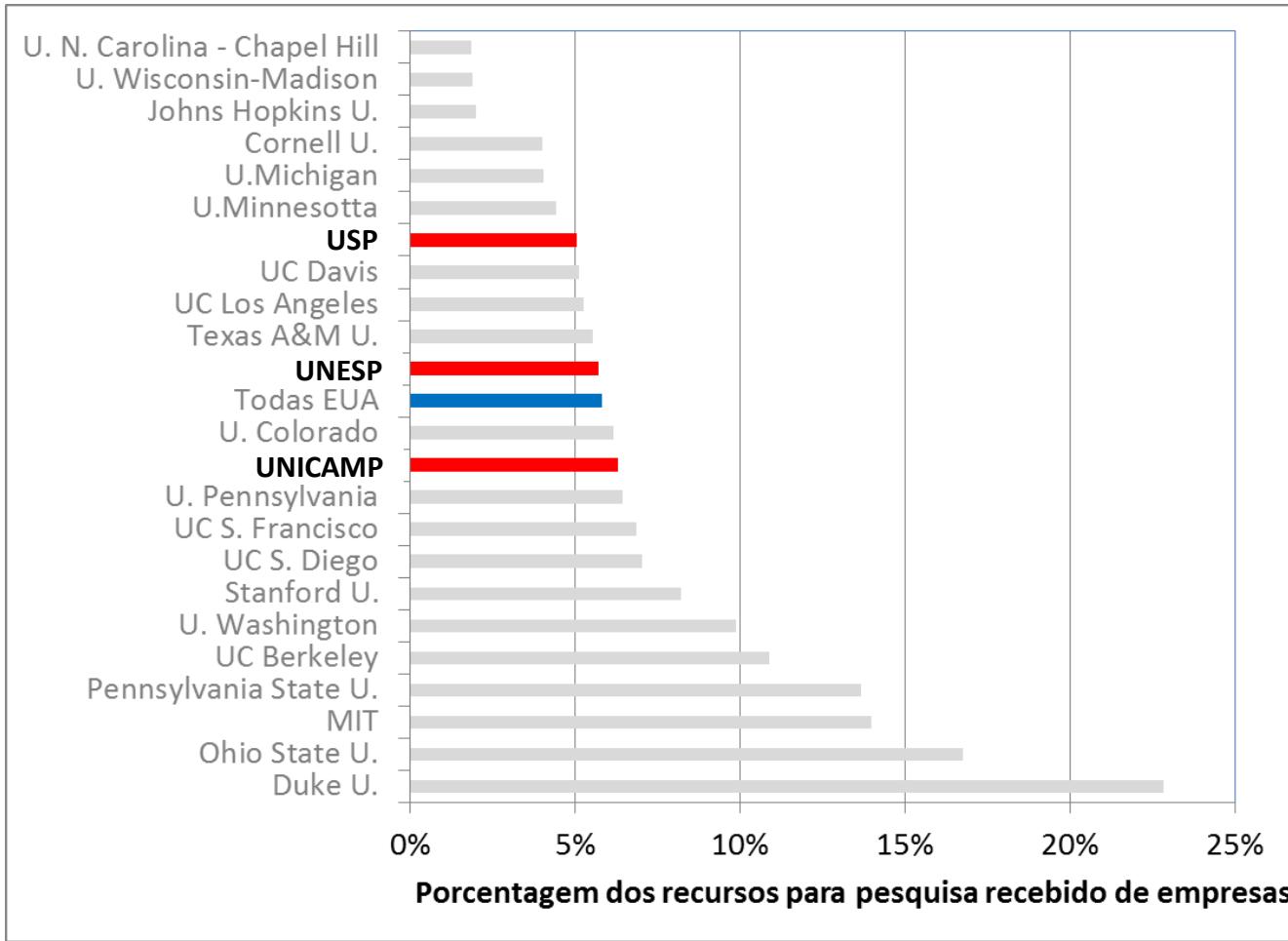


- R&D expenditures total 1.6% of state GDP
 - Grew from 1.52% in 2008
- Public expenditures
 - State 63%
 - Federal 37%

State level support for R&D in Brazil, 2010

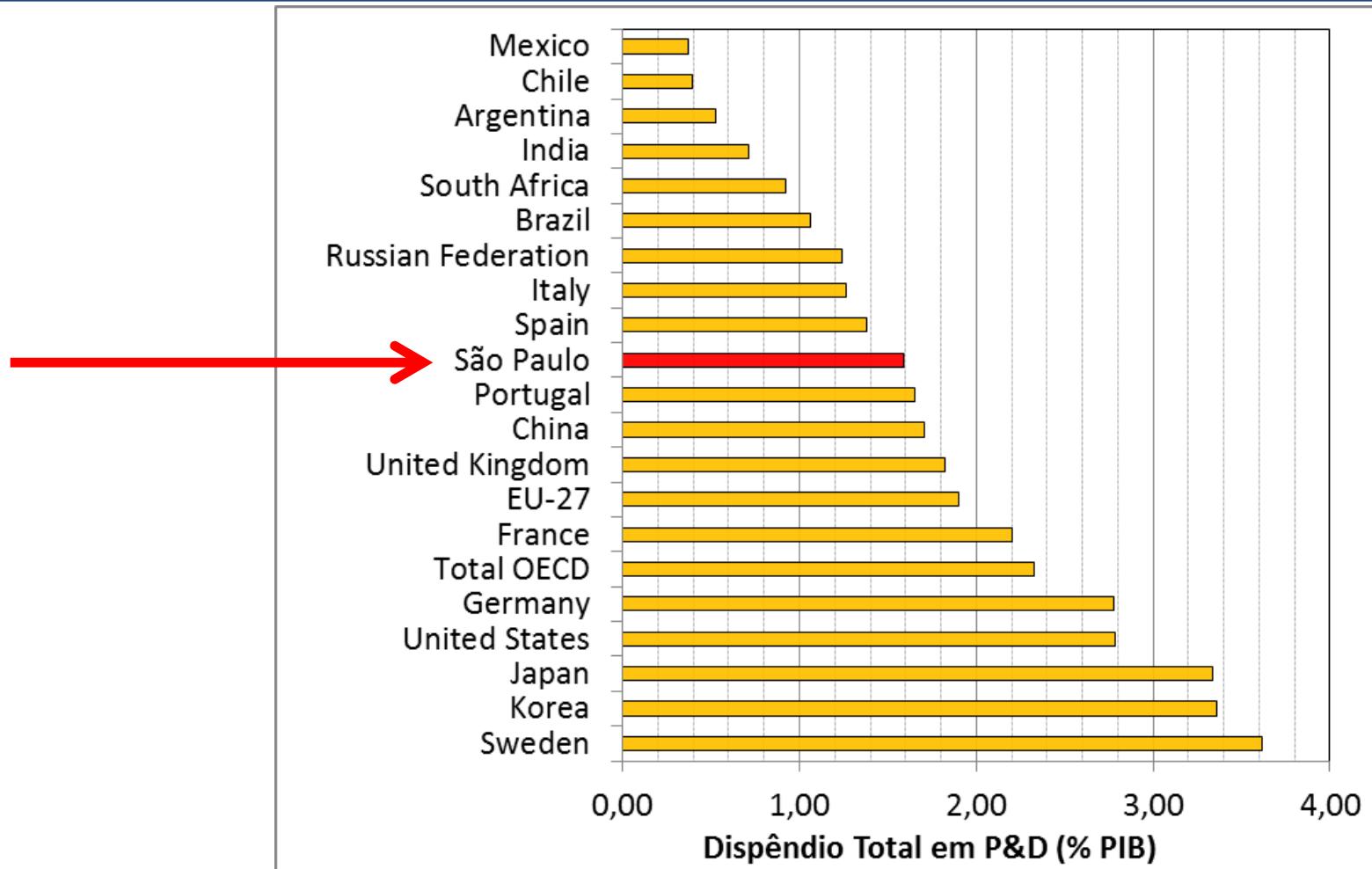


University –Industry joint research



São Paulo R&D Expenditures

International standing

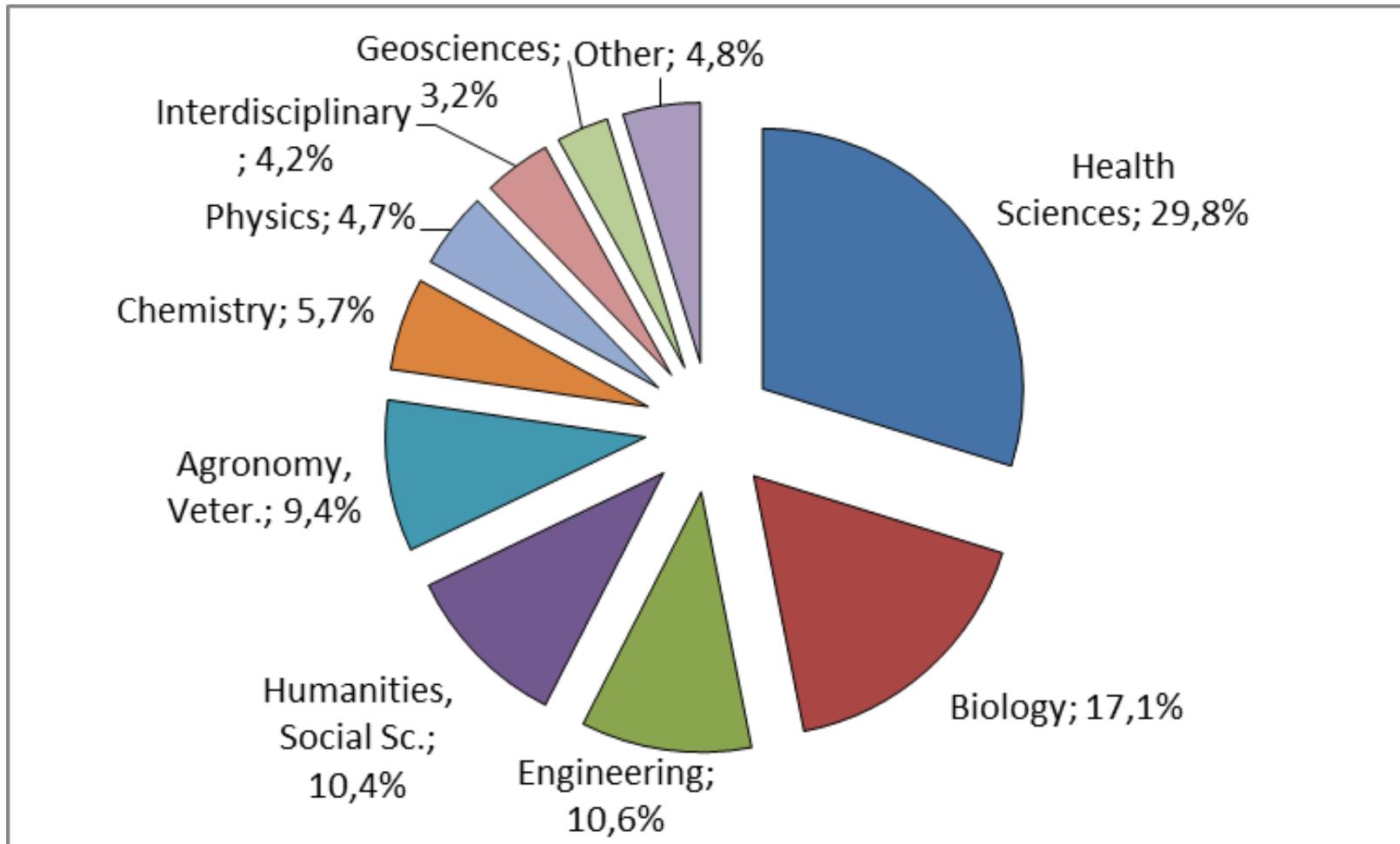


Fapesp: São Paulo Research Foundation

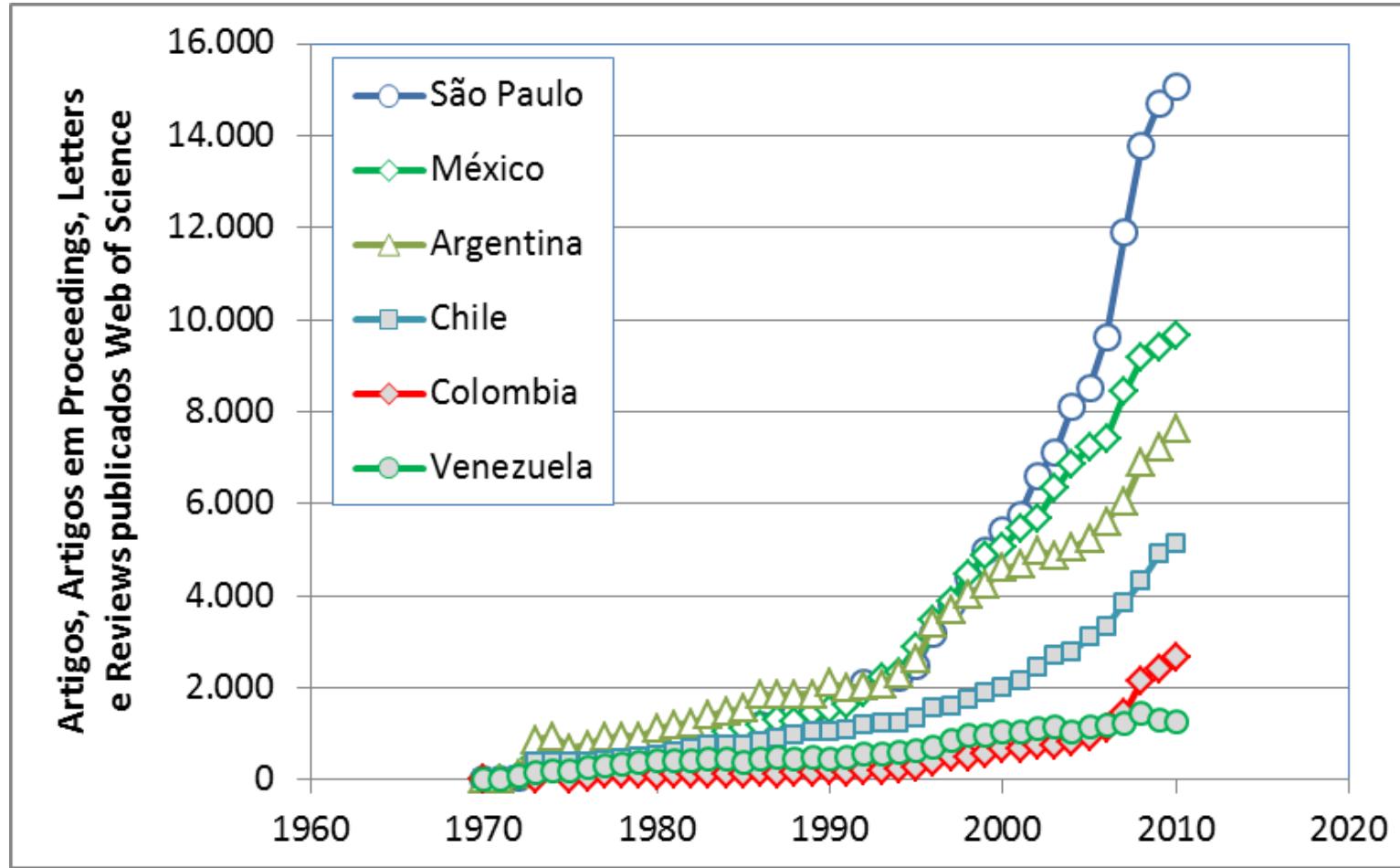
- Mission: support research in all fields
- Funded by the State of São Paulo with 1% of all state revenues
- All proposals are peer reviewed (21,400 proposals in 2012)
 - Average time for decision – 65 days
- Annual budget: \$PPP 600 M in 2012
 - Fellowships (3,000 SI, 2,600 MSc, 4,000 DrSc, 1,800 Post-docs, 800 other)
 - Academic R&D (RIDC, Thematic, Young Investigators, Regular)
 - University-Industry Joint R&D: Microsoft, Agilent, Braskem, Oxiteno, SABESP, VALE, Natura, Petrobrás, Embraer, Padtec, Biolab, Cristalia, Whirlpool, Boeing , GSK, BP, BG, PSA (Peugeot-Citroën), ...
 - Small business R&D: 1,200 SBE's (two PIPE+PAPPE awards per week in 2013)

FAPESP expenditures, 2012

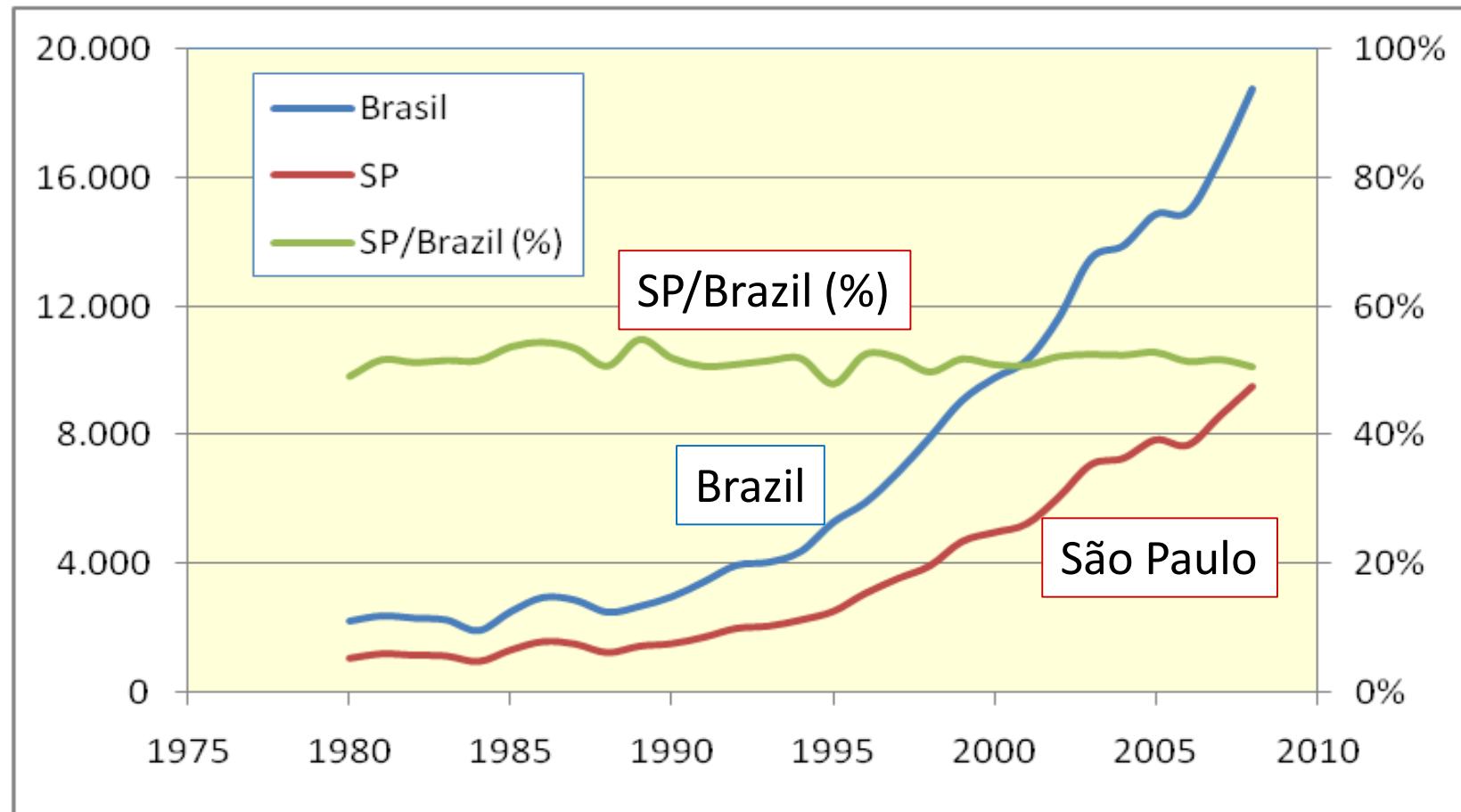
Total: R\$ 1,035 million



São Paulo creates more articles than any country in Latin America



Brazil: growing number of scientific articles in international journals





FAPESP: Basic Science Focus

- In the World and in Brazil there is an “utilitarian” view about Science
 - Science that makes business more competitive
 - Science that heals the sick
 - Science that makes the poor rich
- In addition, FAPESP also values a not so “utilitarian” item
 - Science that makes mankind wiser
 - In all fields there are fundamental questions
 - Philosophy, Archeology, Literature, Linguistics, High Energy Physics, Cosmic Rays, Astronomy, Evolution,..

SOAR: Southern Observatory for Astrophysical Research

J.B. Haislip et al., “A photometric redshift of $z = 6.39 \pm 0.12$ for GRB 050904”, Nature 440, 181-183 (9 March 2006).



Infrared afterglow observation after a GRB - unveils the explosion which happened 13 billion years ago.

These results demonstrated that GRBs can be used to trace the star formation, metallicity, and reionization histories of the early Universe.

USP, UFRGS, UNC Ch.Hill
Fapesp, CNPq, NSF,...

BIOTA: cascading effects in evolution

SCIENCE 2013

31 MAY 2013 VOL 340 SCIENCE www.sciencemag.org

Functional Extinction of Birds Drives Rapid Evolutionary Changes in Seed Size

Mauro Galetti,^{1*} Roger Guevara,² Marina C. Côrtes,¹ Rodrigo Fadini,³ Sandro Von Matter,⁴ Abraão B. Leite,¹ Fábio Labecca,¹ Thiago Ribeiro,¹ Carolina S. Carvalho,⁵ Rosane G. Collevatti,⁵ Mathias M. Pires,⁶ Paulo R. Guimarães Jr.,⁶ Pedro H. Brancalion,⁷ Milton C. Ribeiro,¹ Pedro Jordano⁸

Local extinctions have cascading effects on ecosystem functions, yet little is known about the potential for the rapid evolutionary change of species in human-modified scenarios. We show that the functional extinction of large-gape seed dispersers in the Brazilian Atlantic forest is associated with the consistent reduction of the seed size of a keystone palm species. Among 22 palm populations, areas deprived of large avian frugivores for several decades present smaller seeds than nondefaunated forests, with negative consequences for palm regeneration. Coalescence and phenotypic selection models indicate that seed size reduction most likely occurred within the past 100 years, associated with human-driven fragmentation. The fast-paced defaunation of large vertebrates is most likely causing unprecedented changes in the evolutionary trajectories and community composition of tropical forests.



SP Environment Secretary bases Resolution on BIOTA research



SECRETARIA DE ESTADO DO MEIO AMBIENTE

GABINETE DO SECRETÁRIO

PUBLICADA EM 14/03/88 - SEÇÃO I - PÁG.36

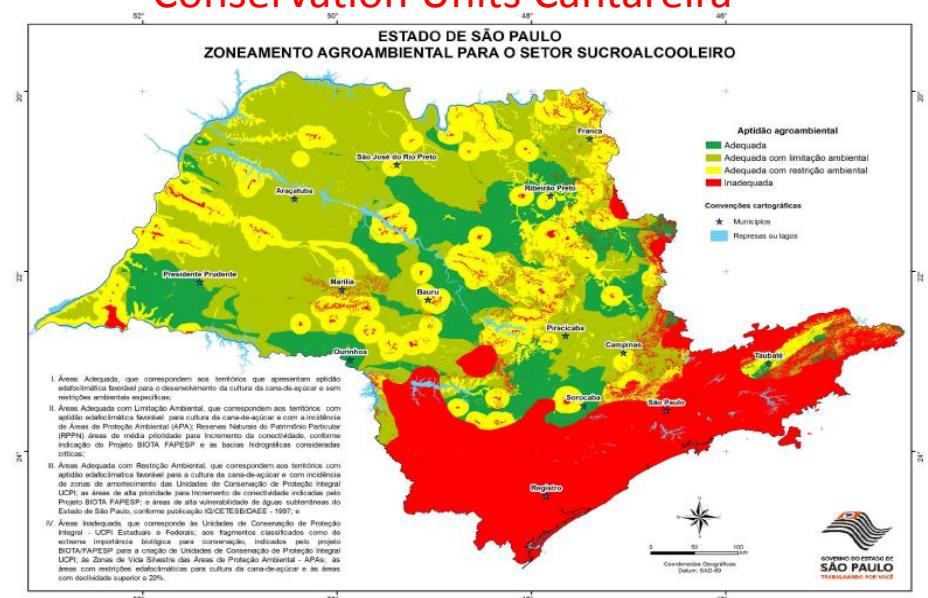
RESOLUÇÃO SMA-15 DE 13 DE MARÇO DE 2008.

Dispõe sobre os critérios e parâmetros para concessão de autorização para supressão de vegetação nativa considerando as áreas prioritárias para incremento da conectividade.

O **SECRETÁRIO DE ESTADO DO MEIO AMBIENTE**, em cumprimento ao disposto nos artigos 23, VII, e 225, § 1º, I, da Constituição Federal, nos artigos 191 e 193 da Constituição do Estado, nos artigos 2º e 4º da Lei federal nº 6.938, de 31 de agosto de 1981, e nos artigos 2º, 4º e 7º da Lei estadual nº 9.509, de 20 de março de 1997, e

Considerando os resultados obtidos pela equipe de pesquisadores do Projeto Biota FAPESP e as informações presentes no mapa de "Áreas prioritárias para incremento da conectividade" e "Areas prioritárias para criação de Unidades de Conservação" resultantes do Projeto Biota FAPESP:

- Several Governor Decrees and Resolutions
 - Decree 53.939, 06Jan09 – Legal Reserves
 - Decree 54.746, 04Sep09 – Conservation Units Cantareira



FAPESP's BIOEN research program: 84 → 148 → 212 → 381 ton/Ha??

Plant Biotechnology
Journal



Plant Biotechnology Journal (2010) 8, pp. 263–276

doi: 10.1111/j.1467-7652.2009.00491.x

Review article

Sugarcane for bioenergy production: an assessment of yield and regulation of sucrose content

Alessandro J. Waclawovsky^{1,†,‡}, Paloma M. Sato^{1,‡}, Carolina G. Lembke¹, Paul H. Moore² and Gláucia M. Souza^{1,*}

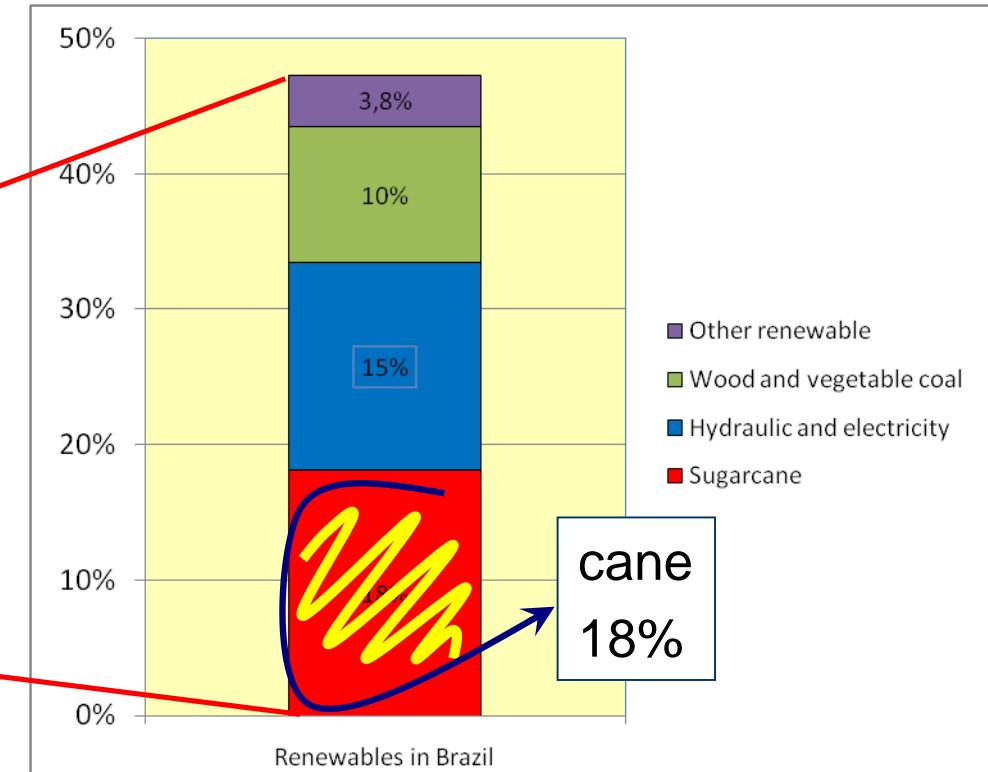
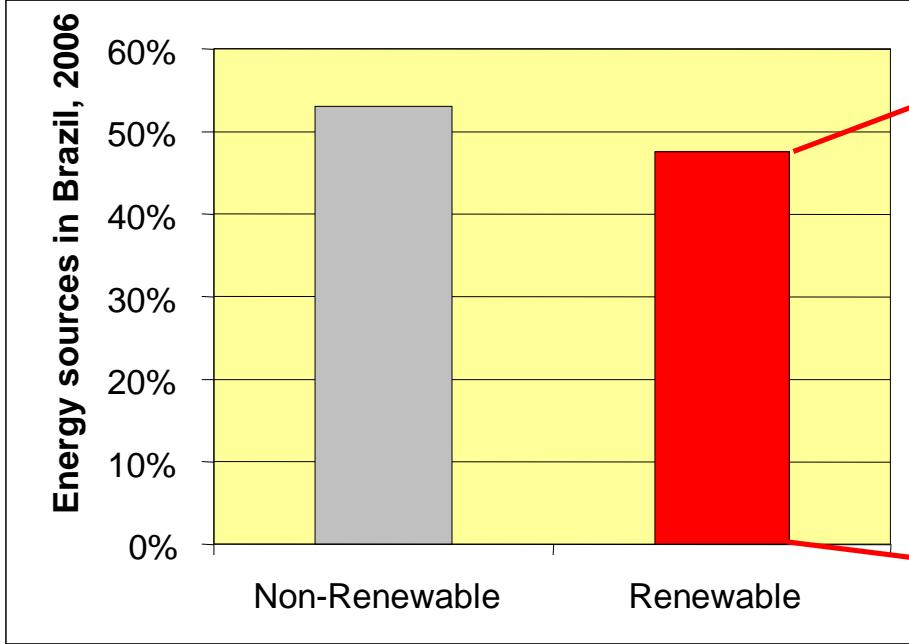
¹Departamento de Bioquímica, Instituto de Química, Av. Prof. Lineu Prestes, São Paulo, Brazil

²Hawaii Agriculture Research Center, Kūnāia, HI, USA

Table 1 Average, maximum and theoretical sugarcane yields (Australia, Colombia, and South Africa) and total dry matter production

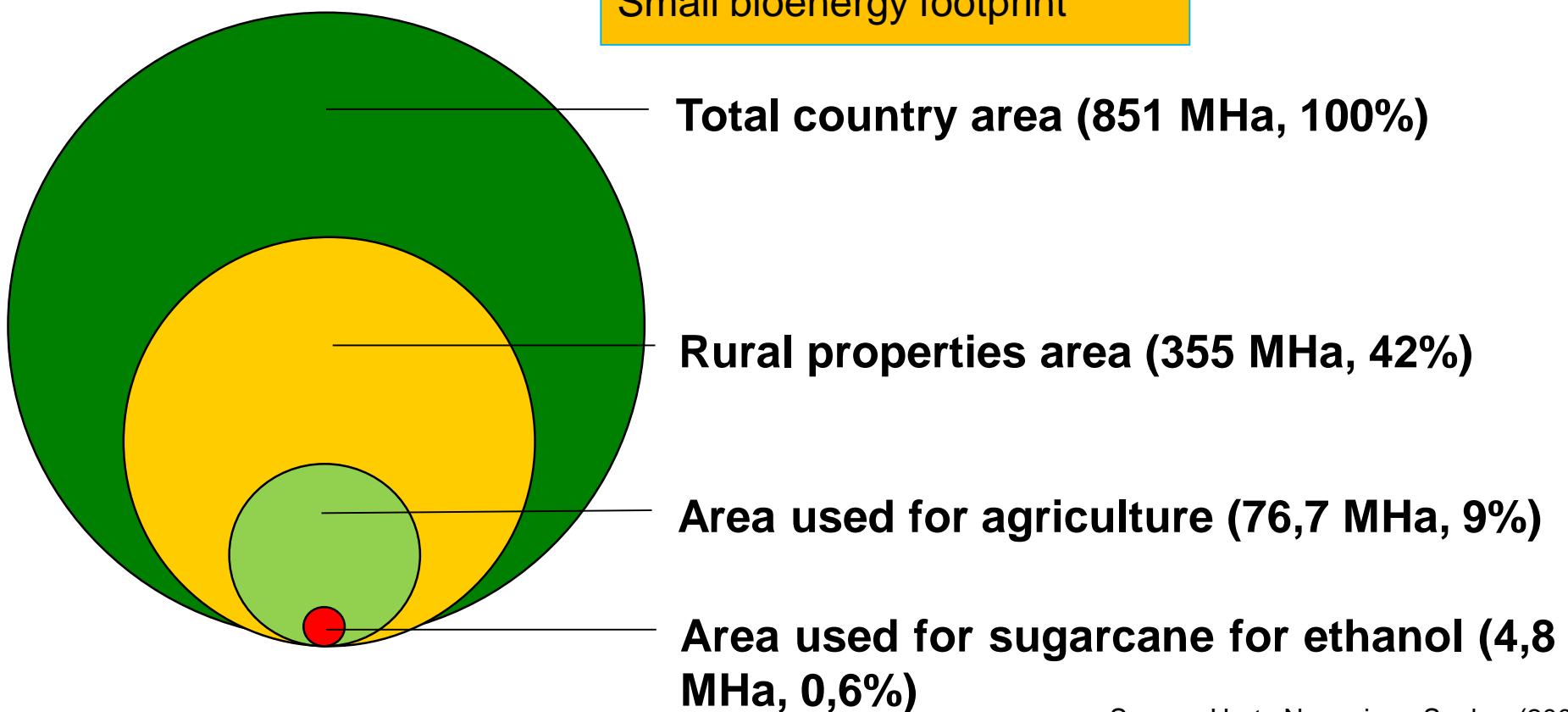
Type of yield	Cane yield	Biomass*	
	t/(ha yr)	t/(ha yr)	g/(m ² d)
Commercial Average	84	39	10.7
Commercial maximum	148	69	18.8
Experimental maximum	212	98	27.0
Theoretical maximum	381	177	48.5

Brazil: 47% of energy from renewable sources (2009); 18% from sugarcane



Renewables in Brazil: 47%; World: 13%; OECD: 7,2%

Sugarcane for ethanol uses 0,6% of total area



Source: Horta Nogueira e Seabra (2008)
modified for 2008 data

Ancient Philosophy

Philosophia Antiqua

A Series of Studies on Ancient Philosophy

Previous Editors

J.H. Waszink†

W.J. Verdenius†

J.C.M. van Winden

Edited by

K.A. Algra

F.A.J. de Haas

J. Mansfeld

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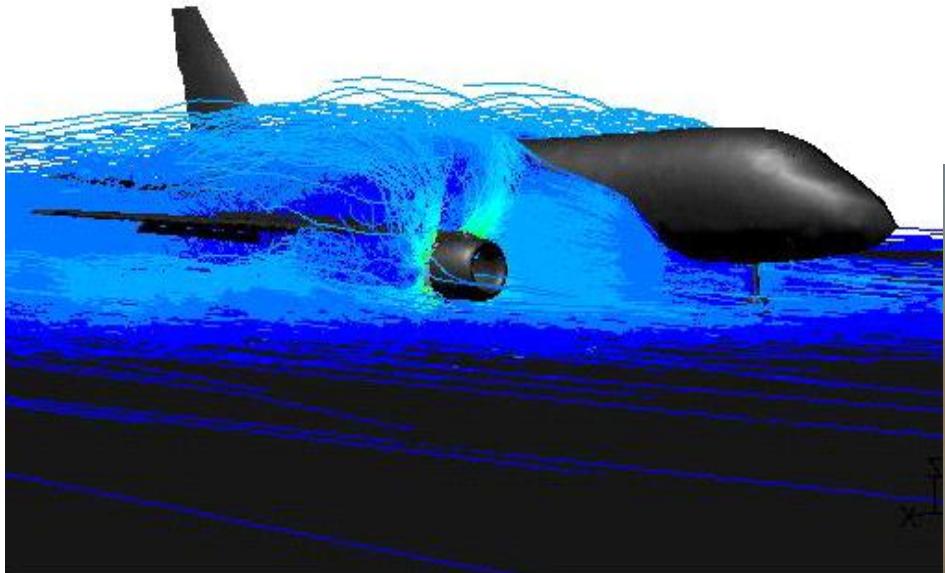
VOLUME 106

*AKRASIA AND THE METHOD OF ETHICS**

MARCO ZINGANO

The discussion of the phenomenon of *akrasia* carried on by Aristotle displays, as one knows, several difficulties, which have caused reiterated debates amongst contemporary interpreters. These controversies are not just concerned to side issues, but they touch, as it turns out, central issues. In this essay I shall focus my attention on an issue that is mainly a methodological one. My main interest is to understand the role that the Socratic thesis plays in Aristotle's discussion of the topic. It still is an issue of debate what Aristotle's position regarding the Socratic doctrine exactly is: does he simply expose it, or does he adopt it—and, in the latter case, up to what extent? There is place, however, for a more initial, and stronger, astonishment: why does Aristotle busy himself with it at all? After all, Socrates denied altogether the possibility of the weakness of will, and Aristotle not only wants to tackle this problem in a dialectical context in which *akrasia* is, on the contrary, taken as existent (so that the Socratic thesis is seen as something clearly opposed to the

Embraer-FAPESP: R&D to build an innovative jet



Computational Fluid Dynamics
(CFD) simulation and tests
Research co-funded by FAPESP,
using several universities



Vaccines research



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Brazilian scientists to test AIDS 'vaccine' on monkeys

Brazilian scientists have developed an HIV vaccine and plan to begin testing on monkeys later this year, a sponsor institution has said.



Scientists plan to test the 'vaccine' on a colony of rhesus monkeys provided by São Paulo state's Laranjeiras Research Institute. www.laranjeiras.faperj.br
Photo: Alamy

AIDS:

28 November 2006 - Volume 20 - Issue 18 - p 2263–2273

doi: 10.1097/01.aids.0000253353.48331.5f

Basic Science

Identification of novel consensus CD4 T-cell epitopes from clade B HIV-1 whole genome that are frequently recognized by HIV-1 infected patients

Fonseca, Simone G^{a,b,c}; Coutinho-Silva, Adriana^{a,b,c}; Fonseca, Luiz Augusto M^{a,c}; Segurado, Aluisio C^{c,d}; Moraes, Sandra L^{a,c,e}; Rodrigues, Hélcio^b; Hammer, Juergen^f; Kallás, Esper G^{c,g}; Sidney, John^h; Sette, Alessandro^h; Kalil, Jorge^{a,b,c}; Cunha-Neto, Edecio^{a,b,c}

OPEN ACCESS Freely available online

PLOS one

A Vaccine Encoding Conserved Promiscuous HIV CD4 Epitopes Induces Broad T Cell Responses in Mice Transgenic to Multiple Common HLA Class II Molecules

Susan Pereira Ribeiro^{1,3*}, Daniela Santoro Rosa^{1,3*}, Simone Gonçalves Fonseca^{1,2}, Eliane Conti Mairena^{2,3}, Edilberto Postól^{2,3}, Sergio Costa Oliveira⁴, Luiza Guilherme^{2,3}, Jorge Kalil^{1,2,3}, Edecio Cunha-Neto^{1,2,3*}

1 Laboratory of Clinical Immunology and Allergy-LIM60, Division of Clinical Immunology and Allergy, Department of Medicine, University of São Paulo School of Medicine, São Paulo, Brazil, **2** Heart Institute (InCor), University of São Paulo School of Medicine, São Paulo, Brazil, **3** Institute for Investigation in Immunology-INCT, São Paulo, Brazil,

4 Department of Biochemistry and Immunology, Federal University of Minas Gerais, Belo Horizonte, Brazil

FAPESP's International Collaboration Strategy: Two lanes

- FAPESP's programs
 - visiting researcher, post-doctoral fellowships, young investigators, scholarships for Brazilian researchers abroad
- International agreements
 - With Funding agencies: fostering joint research projects
 - Conceived together, written together, performed together
 - Typically from 3 years, US\$ 300k to 5 years, US\$ 5 million
 - With universities: offering seed money for initial exchanges towards preparing full research proposals

FAPESP: international agreements for joint research funding

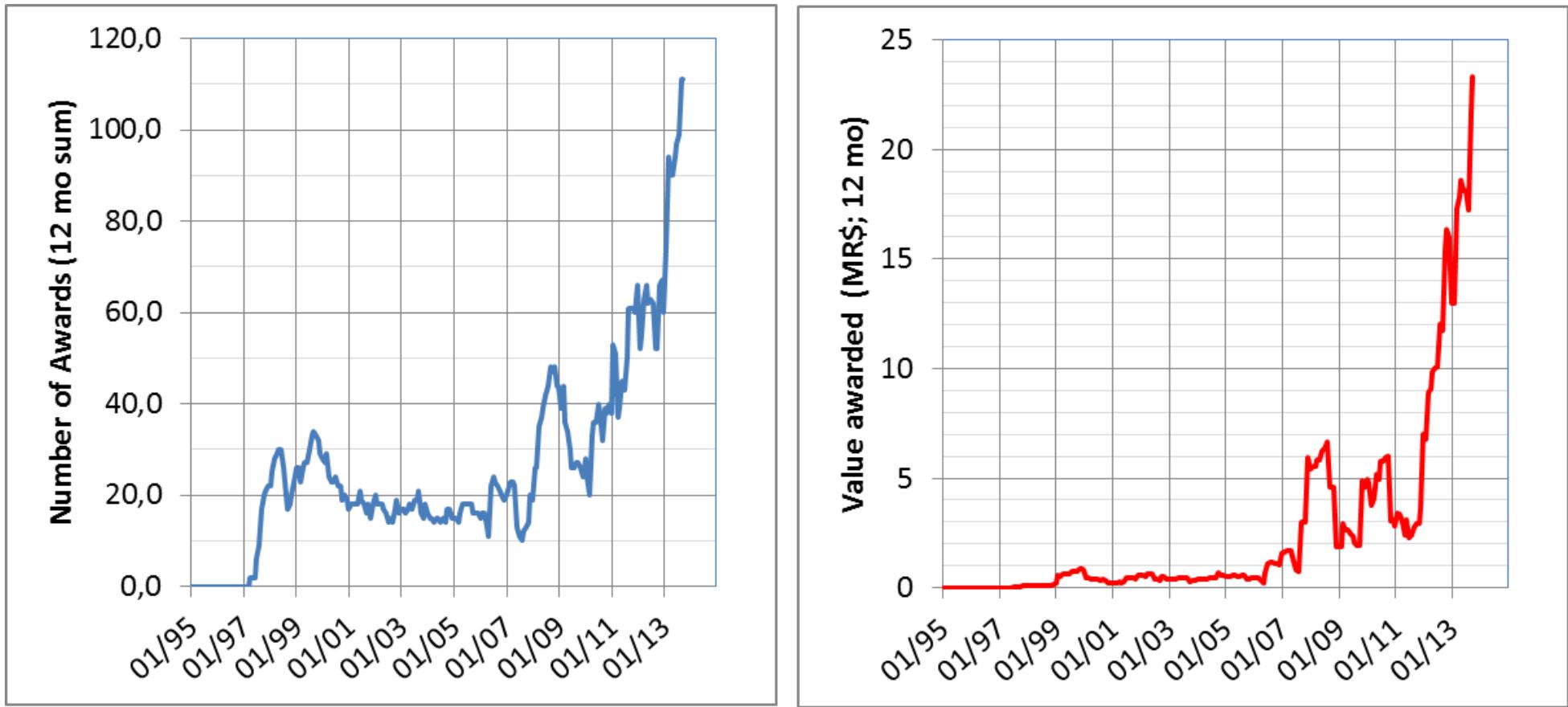
- Agreements with foreign funding agencies, universities and companies

UK: RCUK; KCL; Surrey; Southampton;
Nottingham, Manchester, Keele,
IoE/UoL; Bangor, Birmingham, Bath,
East Anglia, York, Edinburgh,
Cambridge; BG, GSK, BP
Ge: DFG
Fr: ANR; CNRS; INSERM; INRIA; INRA
Ca: ISTP; NSERC; U. Toronto; U. Wetern
Ontario, McMaster, CALDO
EU: CNPq (Bioenergy)

Is: Hebrew Univ. Jerusalem ; MATIMOP
Ar: CONICET; Cl: CONICYT
U.S.: NSF – CNIC and ICC;
Microsoft Research; Boeing; Agilent
Technologies
MIT, USC, U Michigan, UC Davis
Portugal: FCT
Fi: AkA / De: DCSR
Spain: Salamanca, CSIC

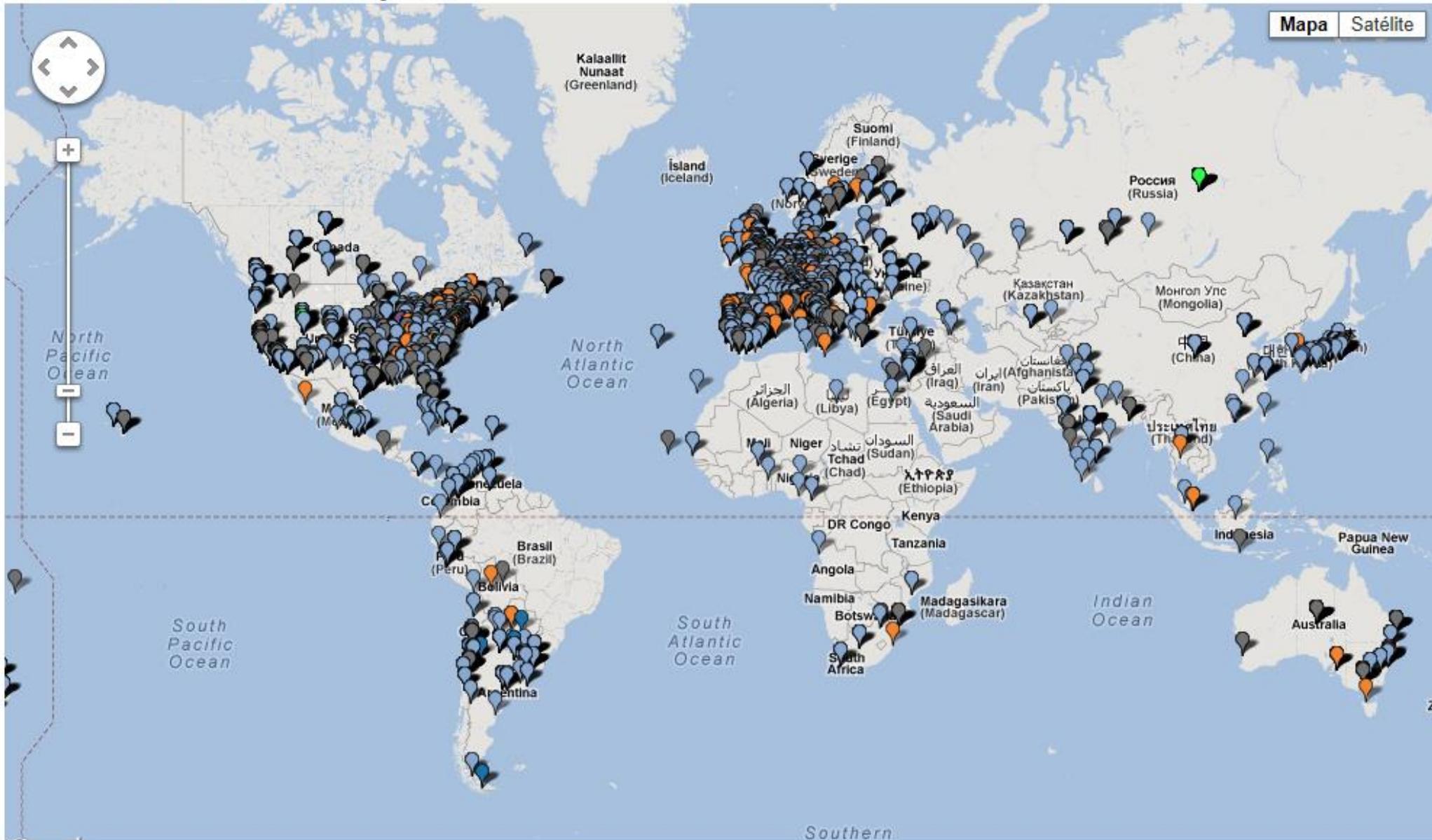
- 303 joint proposals supported, 2005-2010
 - U.S 115; France 87; Germany 41; U.K. 27; Argentina 11; Canada 8; Portugal 8

International cooperation: number of awards and value (12 mo. running sum)



Colaborações em Pesquisa

Mapa Satélite



Opportunities for foreign scientists in SP: Post-doctoral fellowships

- Three to Five years duration
 - Brazilian or Foreign
 - Stipend
 - Support for moving and installation and Travel for awardee and his family
 - Plus 15% for research incidentals (travel, small equip.)
- 1,521 proposals, 830 awards in 2012
 - 55% success rate
 - 1,900 fellowships paid in Mar. 2013
 - FAPESP looks for candidates from any country and nationality
- Find opportunities
 - Open positions at <http://www.fapesp.br/oportunidades/en/>
 - Or contact a supervisor to submit a proposal

Opportunities for foreign scientists in SP: Young Investigator Awards

- 4 years grant
 - Typical value ranges from US\$ 200 th to US\$ 2 million
 - Fellowship for PI (including travel and installation)
 - Equipments
 - Consummables
 - Travel
 - Fellowships for students
- 2,922 proposals, 1,016 awards since 1996
 - 219p/78a in 2010 (1.5 awards per week)
- Info at <http://www.fapesp.br/en/4479>

FAPESP international collaboration: bringing foreign scientists to SP

- Post doctoral fellowships (1,018 in 2012)
 - Stipend, travel, some research money
- Young Investigator Awards (1.5 awards per week)
 - Stipend, travel, research money
- Visiting scientists
 - 275 in 2010 (travel, stipend; 2 weeks to 12 months)
- São Paulo Schools of Advanced Science (SPSAS)
 - Each one with 50-100 young Dr students from abroad
- São Paulo Excellence Chairs (SPEC)
 - For senior level scientists from abroad: full research grant for staying 12 weeks per year in SP for 3-5 years

FAPESP international collaboration: sending scientists from SP abroad

- Research fellowships (2-12 mo; 201 in 2012)
- Special grants for participation in international conferences (863 awarded in 2012)
- Fellowship for short stays for FAPESP fellowship holders (undergrads, grads, post-docs)
 - 4 mo – 12 mo doing research work abroad
 - Eligible: all 11,000 FAPESP fellowship holders

To know about research in São Paulo: FAPESP Newsletter – in English

- <http://agencia.fapesp.br/en/>

The screenshot shows a Microsoft Internet Explorer browser window displaying the Agência FAPESP website at <http://agencia.fapesp.br/en/>. The page is in English and features a dark blue header with the Agência FAPESP logo and the text "News Agency of the São Paulo Research Foundation". A top navigation bar includes links for "About", "Contact us", "RSS", and "Unsubscribe". On the right, there's a search bar and social media links for "Newsletter", "Facebook", and "Twitter". The main content area contains several news articles with images and descriptions. One article is titled "U.S. scientists evaluate FAPESP Week" and discusses a Washington symposium. Another article is titled "FAPESP and GSK in partnership against tropical diseases" and shows two men signing a document. The footer includes a copyright notice and a link to the site's RSS feed.

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U.S. scientists evaluate FAPESP Week

Opportunities to learn about cutting edge research in Brazil and conduct partnerships with scientists in the country were highlighted by participants in the Washington symposium.

FAPESP and GSK in partnership against tropical diseases

FAPESP and Glaxo SmithKline Brasil signed a letter of intent for joint investment to support research on tropical diseases in São Paulo State.

FAPESP evaluates impact of programs

Three FAPESP programs – Fellowships, BIOTA and Multiuser Equipment (EMU) – will be evaluated in a study conducted by the Foundation's Scientific Department with the support of the Study Group on Organization of Research and Innovation (GFOPI).

16/04/2014

<http://agencia.fapesp.br/en/14774>

100%

32

