Políticas de Saúde de Países em Desenvolvimento: Qual o papel da ciência, tecnologia e inovação?

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Centro de Desenvolvimento Tecnológico em Saúde (CDTS)

Instituto Nacional de Ciência e Tecnologia de Inovação em Doenças Negligenciadas (INCT-IND)

Health Policies of Developing Countries: What role for science, technology and innovation?

Carlos M. Morel

Center for Technological Development in Health (CDTS)

National Institute of Science and Technology on Innovation on Neglected Diseases (INCT-IND)

Overview of this presentation

- The heterogeneity of developing countries
- Health and social/economic development
- What is innovation?
- Health innovation
  - Historical evolution
  - Challenges
  - Opportunities
- Health innovation at Fiocruz,

Different history, different trajectories, different outcomes

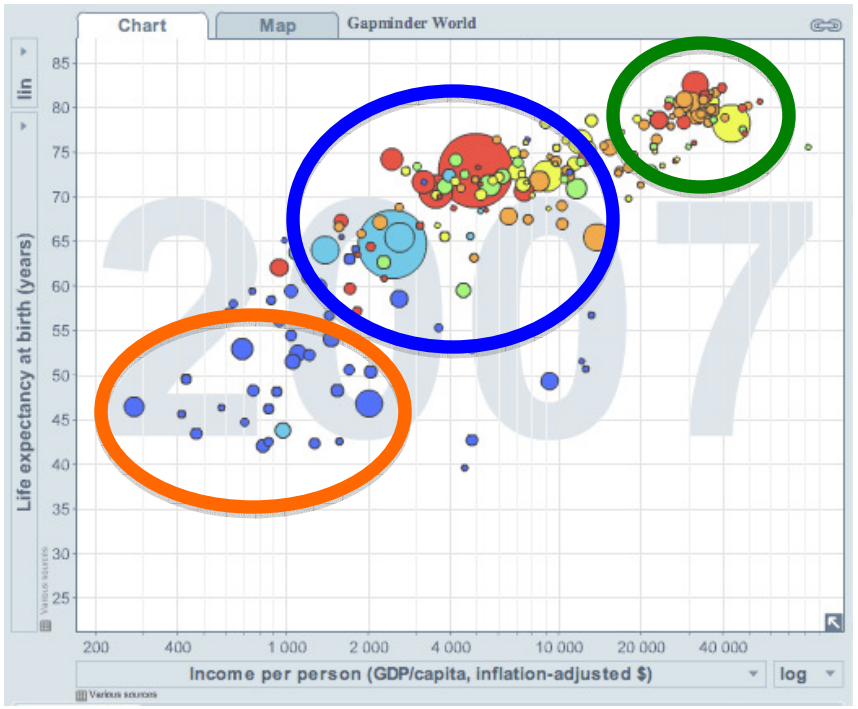
DEVELOPING COUNTRIES

The world is no longer bipolar

The world of the 1950s : The "North" and the "South"

The world today: The "North", the "South" and countries in transition

Life expectancy at birth (years) →

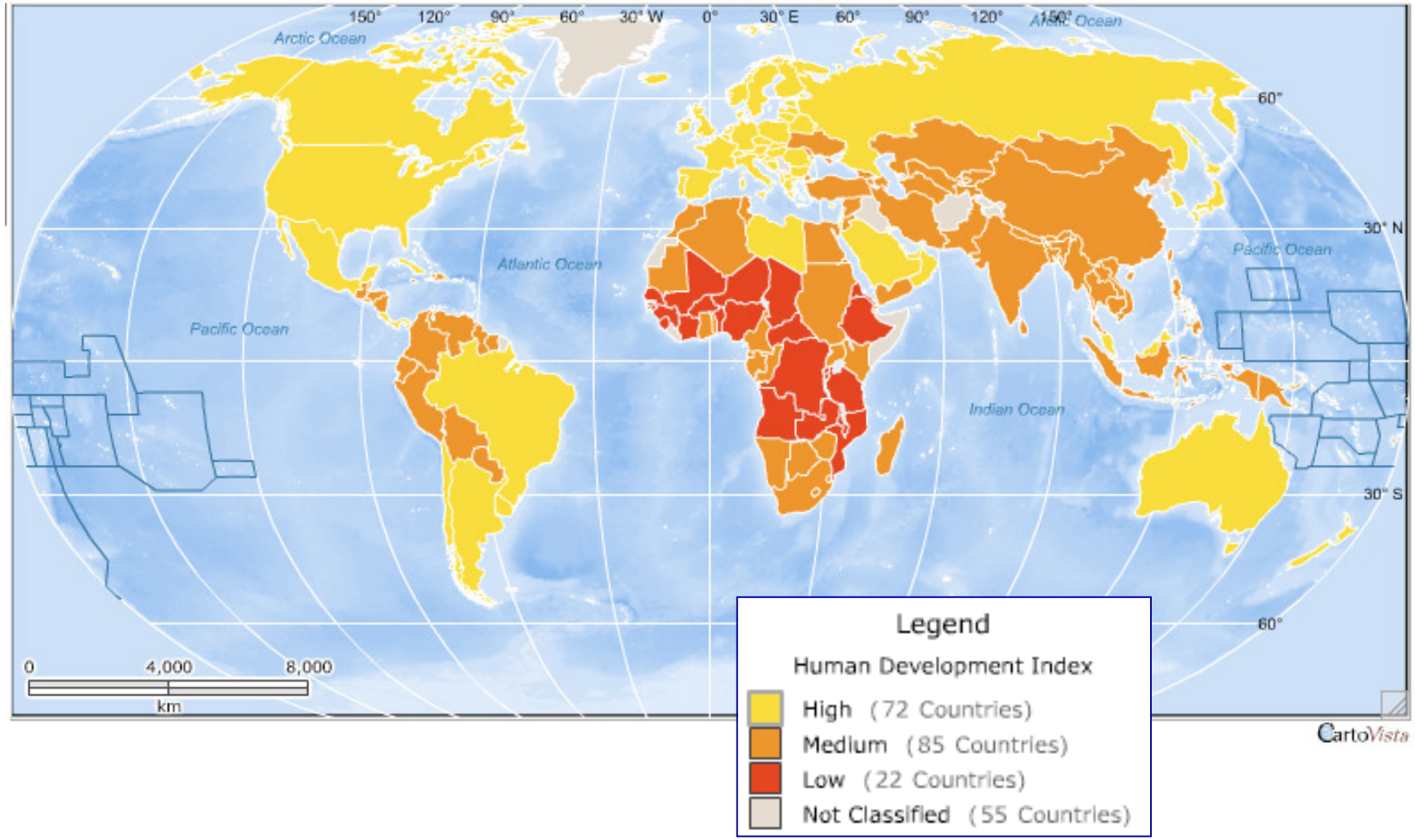


Income per person (GDP/capita, inflation adjusted →

http://www.gapminder.org/

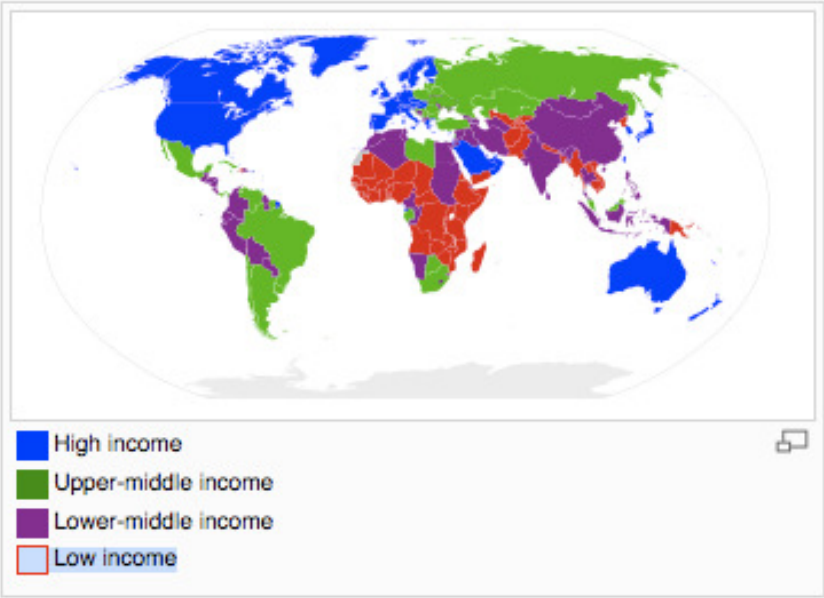
Map of countries according to HDI

http://www.canadiangeographic.ca/worldmap/cida/cidaworldmap.aspx

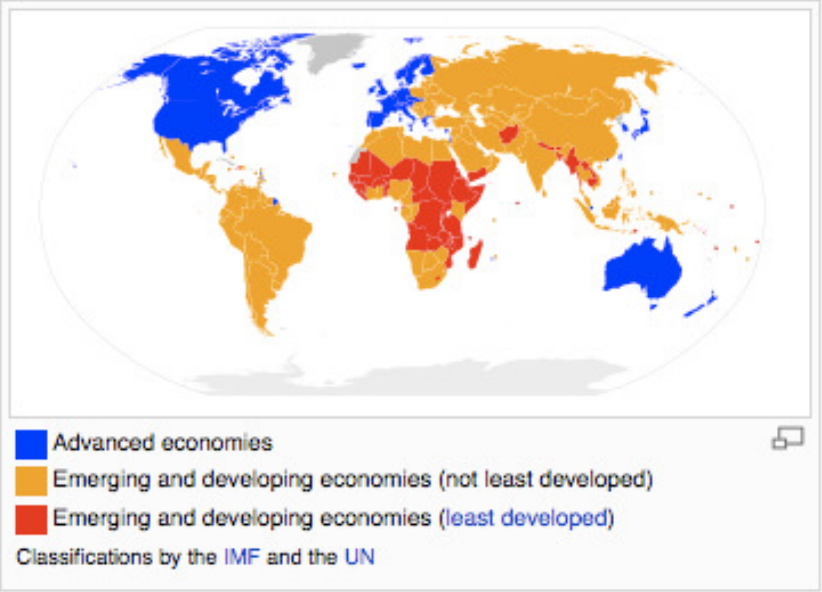


Heterogeneity of developing countries

World Bank income groups



IMF and UN groups

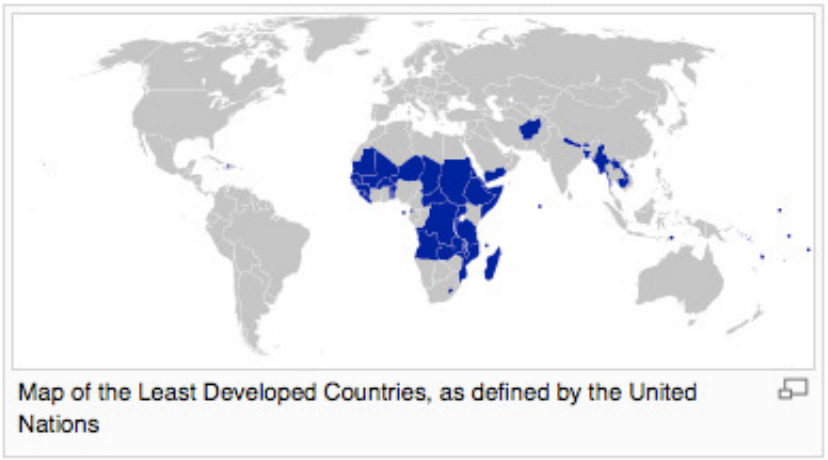


Heterogeneity of developing countries

Newly industrialized countries

Newly industrialized countries as of 2007

Least developed countries (also known as "Failed States")



Map of the Least Developed Countries, as defined by the United Nations

Also used:

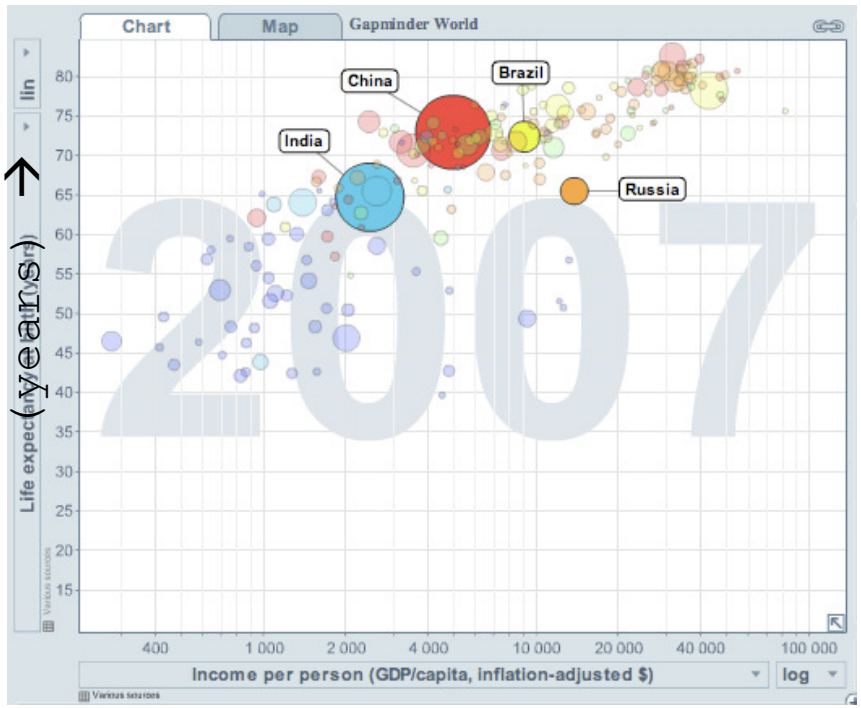
- BRICs/BRICS: **Brazil, Russia, India, China** (South Africa often also included)
- IDCs: **Innovative Developing Countries** (Morel et al, *Science*, **2005**, *309*:401-404)

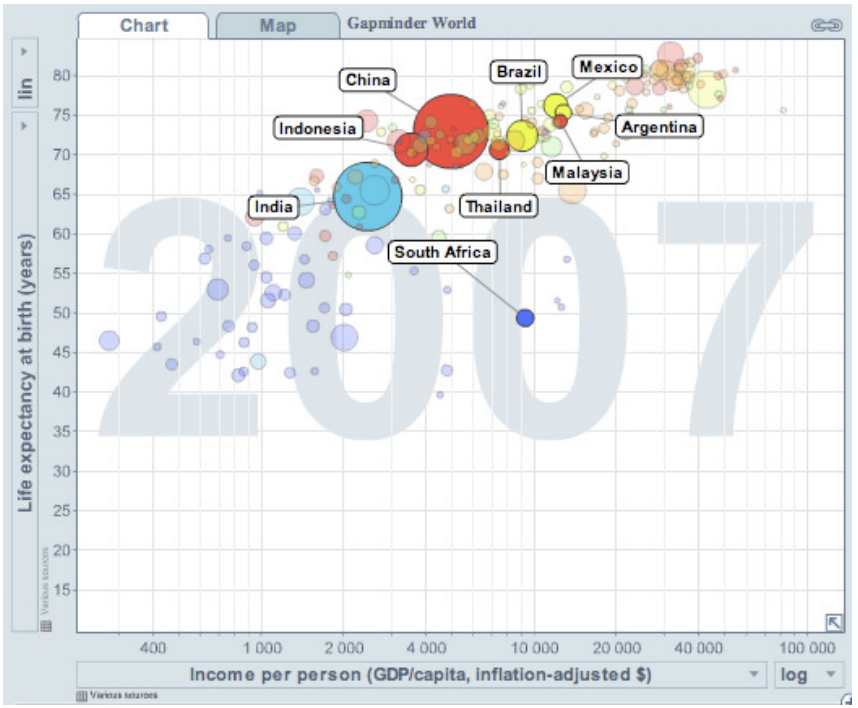
Some countries are moving towards social and economic development

Brazil, Russia, India and China (the "BRICs") in 2007

Some "Innovative Developing Countries" (IDCs) in 2007

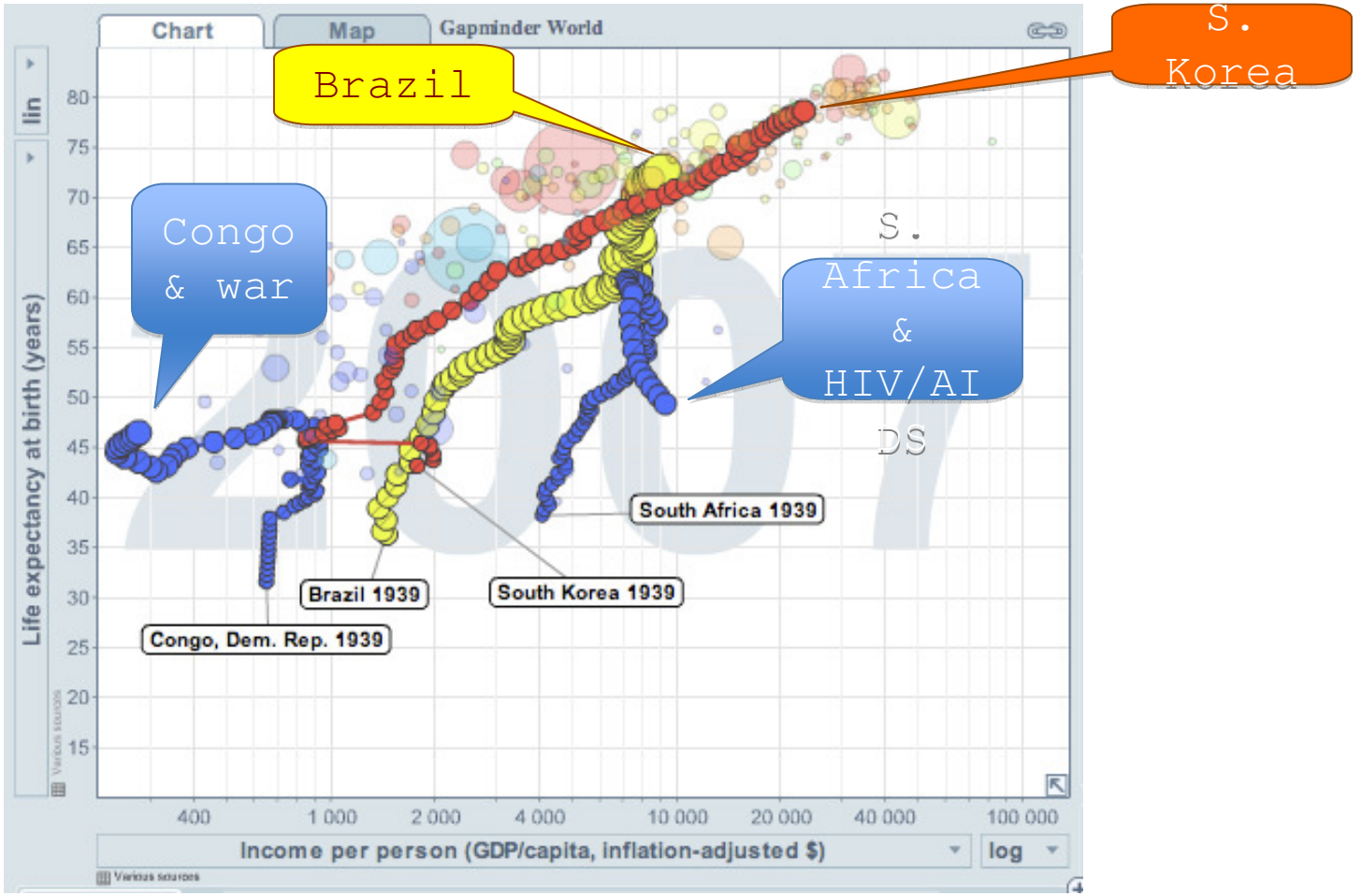
Life expectancy at birth (years) →





Income per person (GDP/capita, inflation adjusted →

Trajectories of developing countries: some lessons to take home



Life expectancy at birth (years) →

Income per person (GDP/capita, inflation adjusted →

HEALTH AND DEVELOPMENT

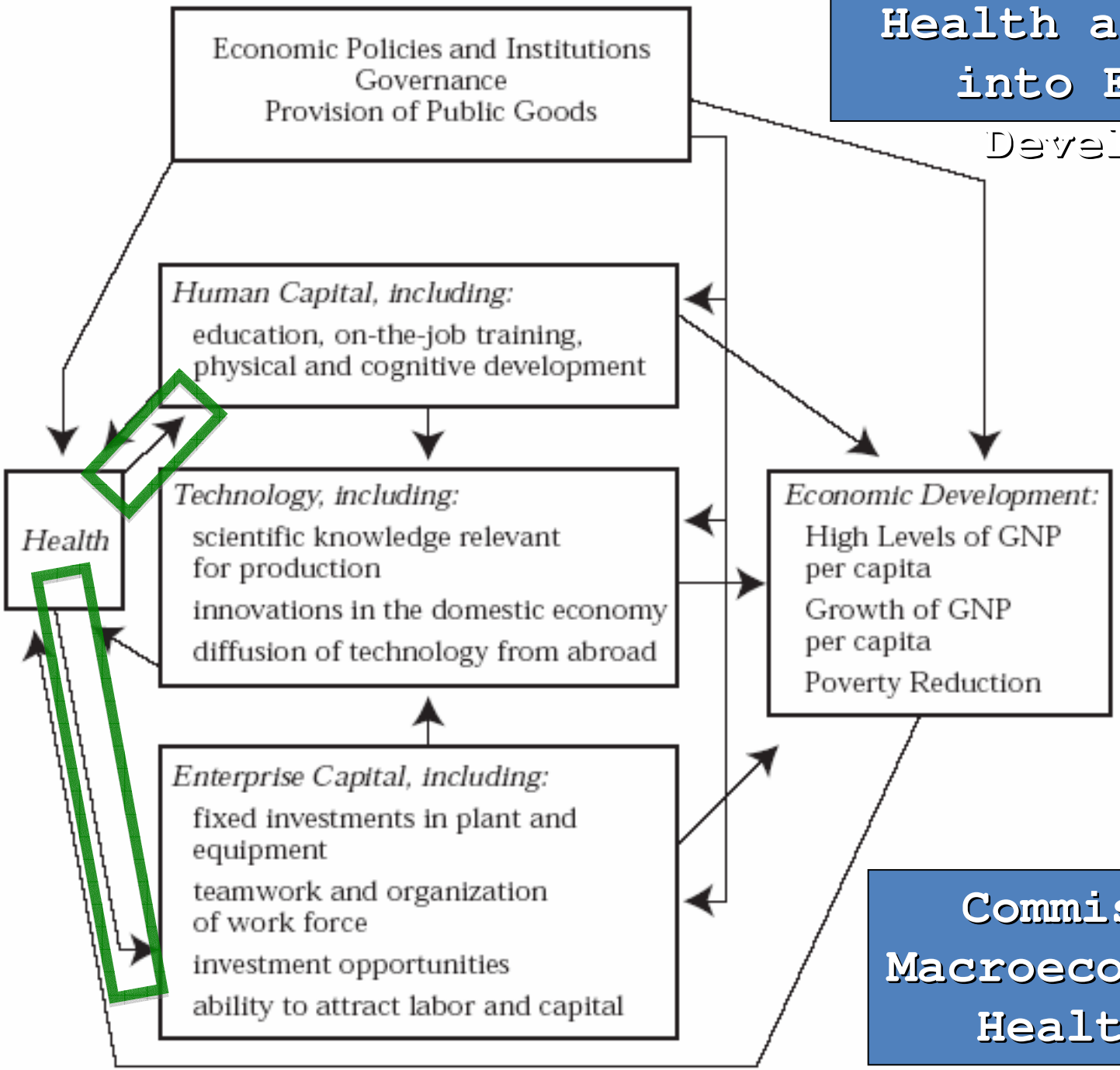
Health: consequence of, but also a requisite for, social and economic development

- "*Improving the health and longevity of the poor is an end in itself, a fundamental goal of economic development. But it is also a* means *to achieving the other development goals relating to poverty reduction. The linkages of health to poverty reduction and to long-*

Commission on Macroeconomics and Health,

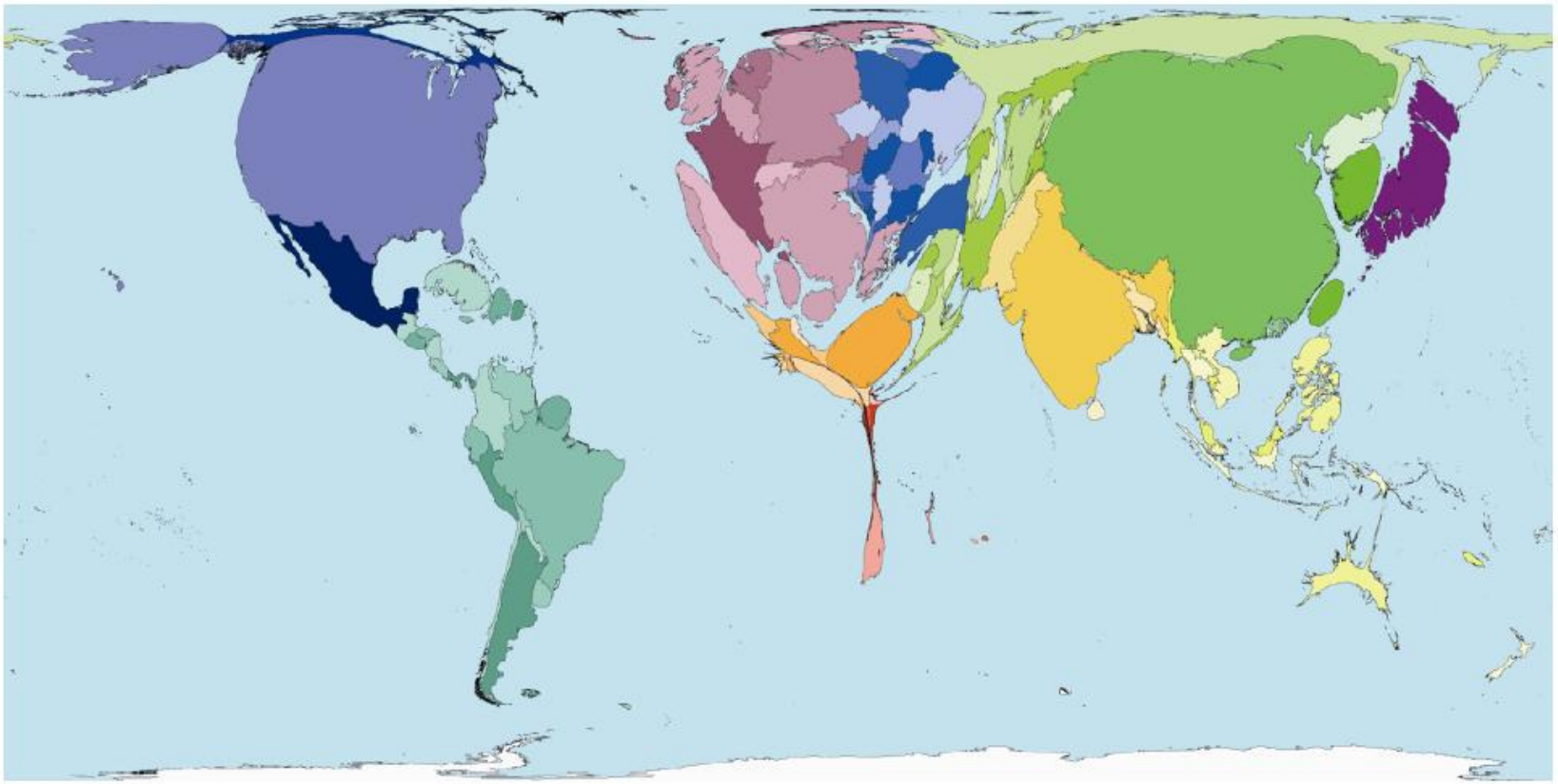
powerful, much stronger than is

Health as an Input into Economic Development



Commission on Macroeconomics and Health, 2000

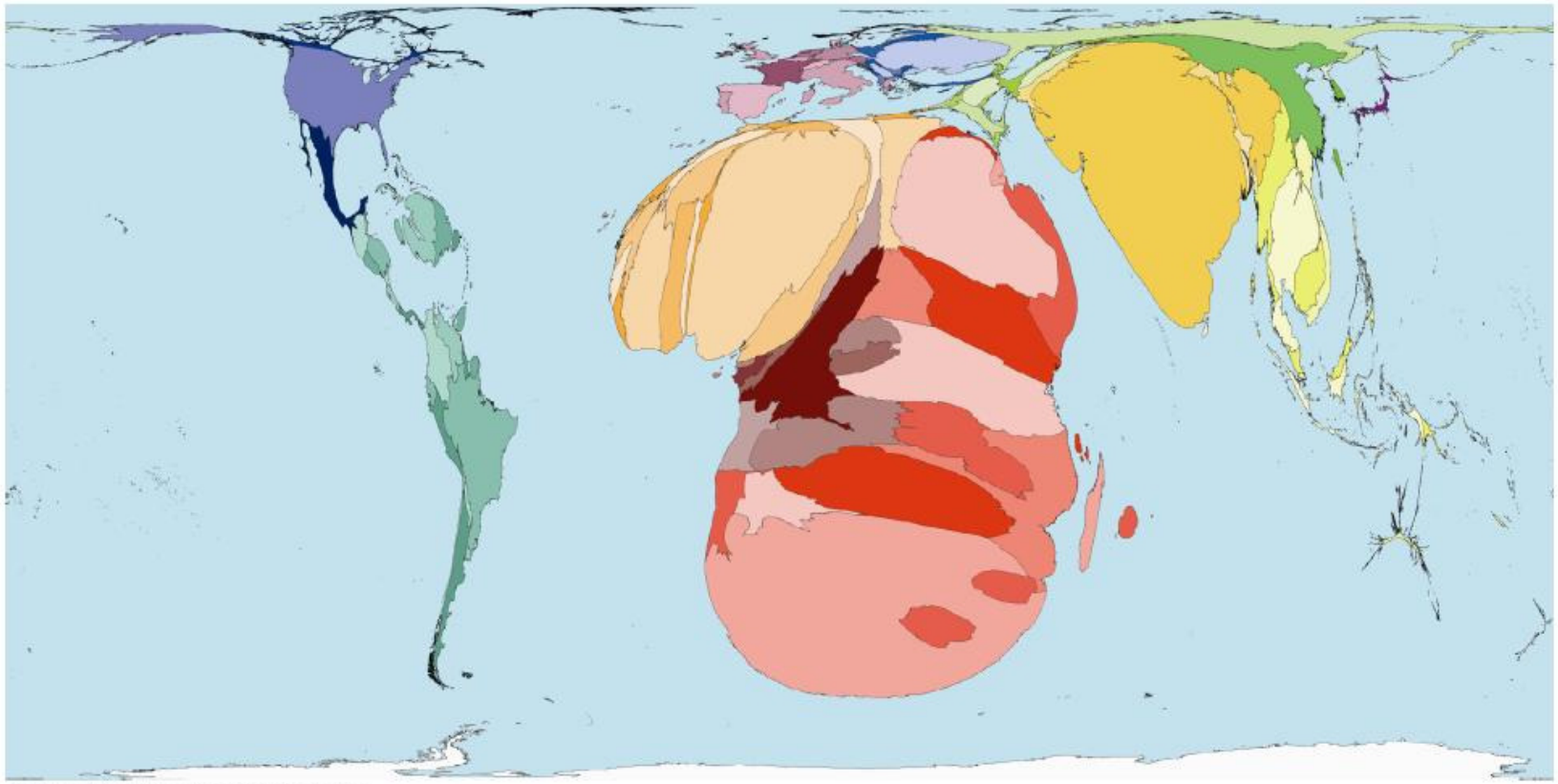
Worldmapper: area of countries proportional to physicians working



doi:10.1371/journal.pmed.0040001.g003

Figure 3. Physicians Working: Worldmapper Poster 219
Source of data used to create map: World Health Organization, 2004, Human Resources for Health, Basic data.

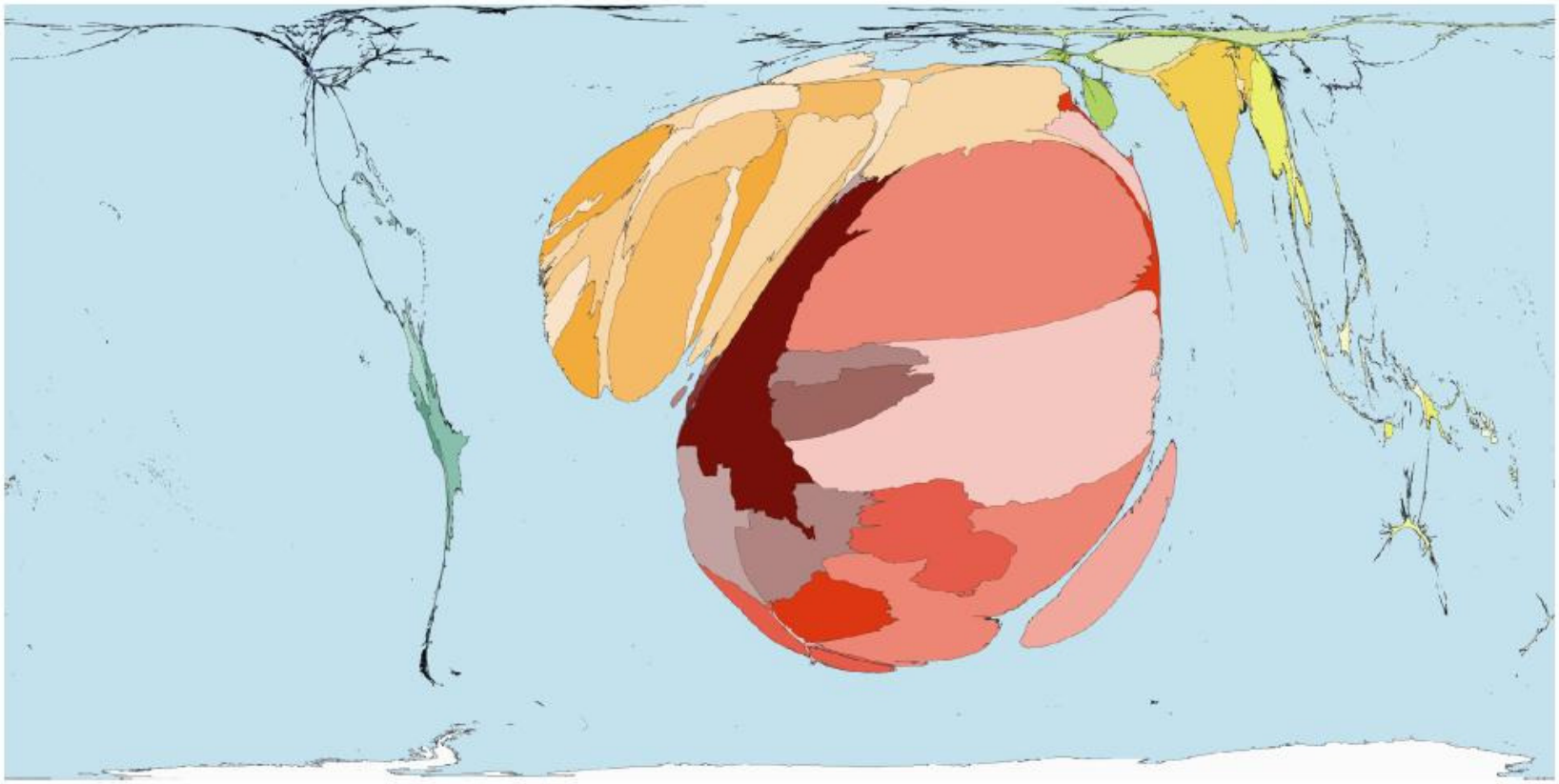
Worldmapper: area of countries proportional to HIV/AIDS prevalence



doi:10.1371/journal.pmed.0040001.g005

Figure 5. HIV/AIDS Prevalence: Worldmapper Poster 227
Source of data used to create map: United Nations Development Programme, Human Development Report 2004.

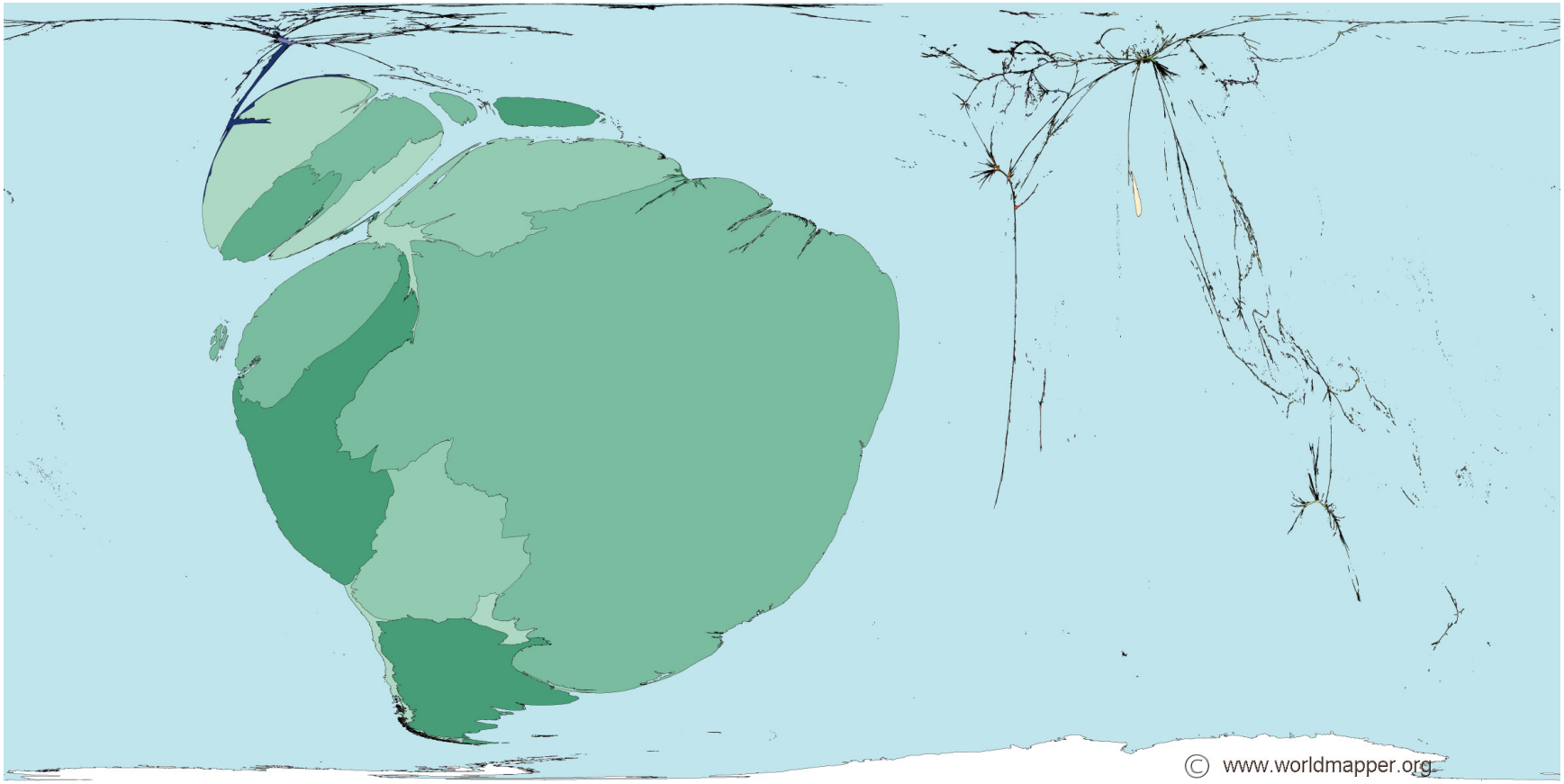
Worldmapper: area of countries proportional to malaria cases



doi:10.1371/journal.pmed.0040001.g006

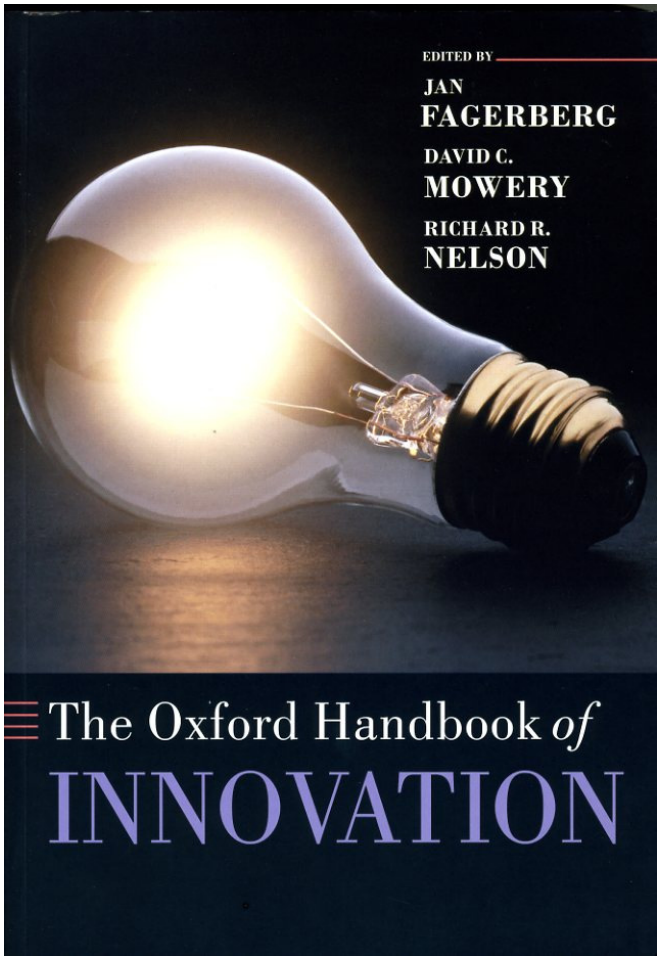
Figure 6. Malaria Cases: Worldmapper Poster 229
Source of data used to create map: World Health Organization and UNICEF, World Malaria Report 2005.

Worldmapper: area of countries proportional to deaths due to Chagas disease (2002)



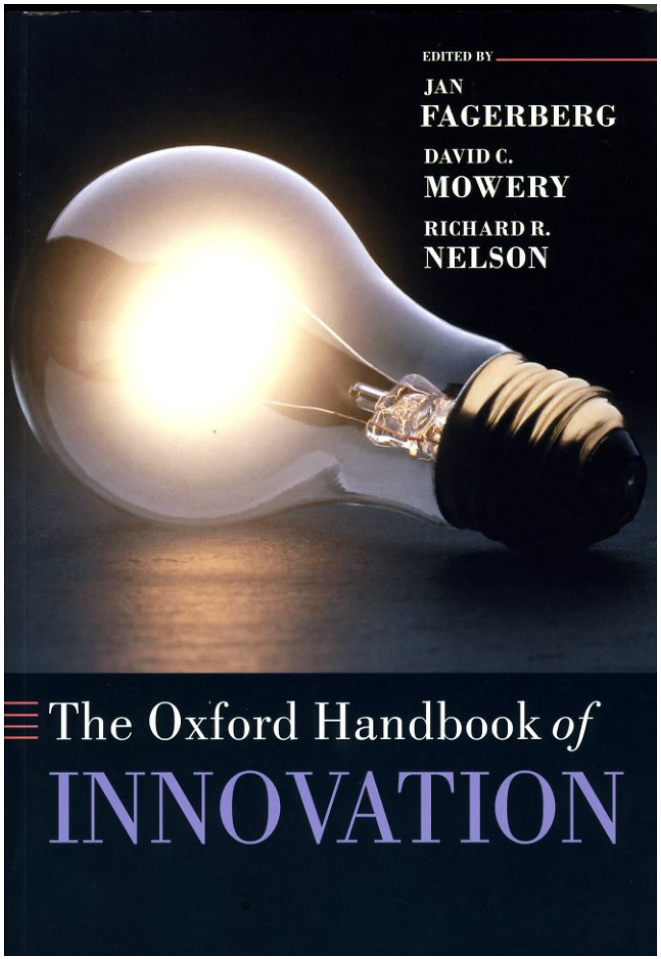
WHAT IS INNOVATION?

What is innovation?



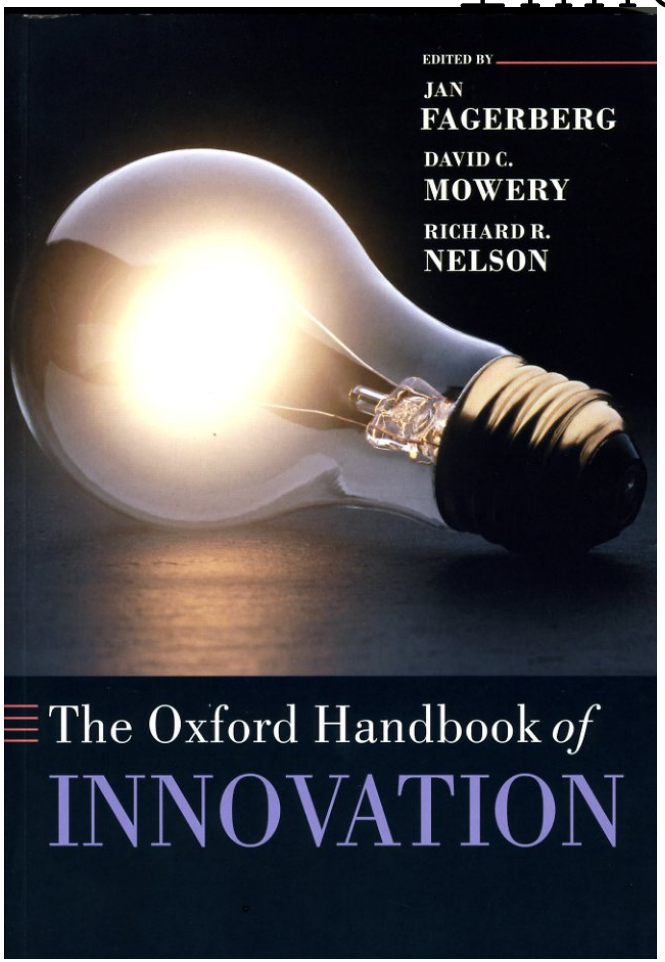
- *"Innovation is not a new phenomenon. Arguably, it is as old as mankind itself. There seems to be something inherently 'human' about the tendency to think about new*

What is innovation?



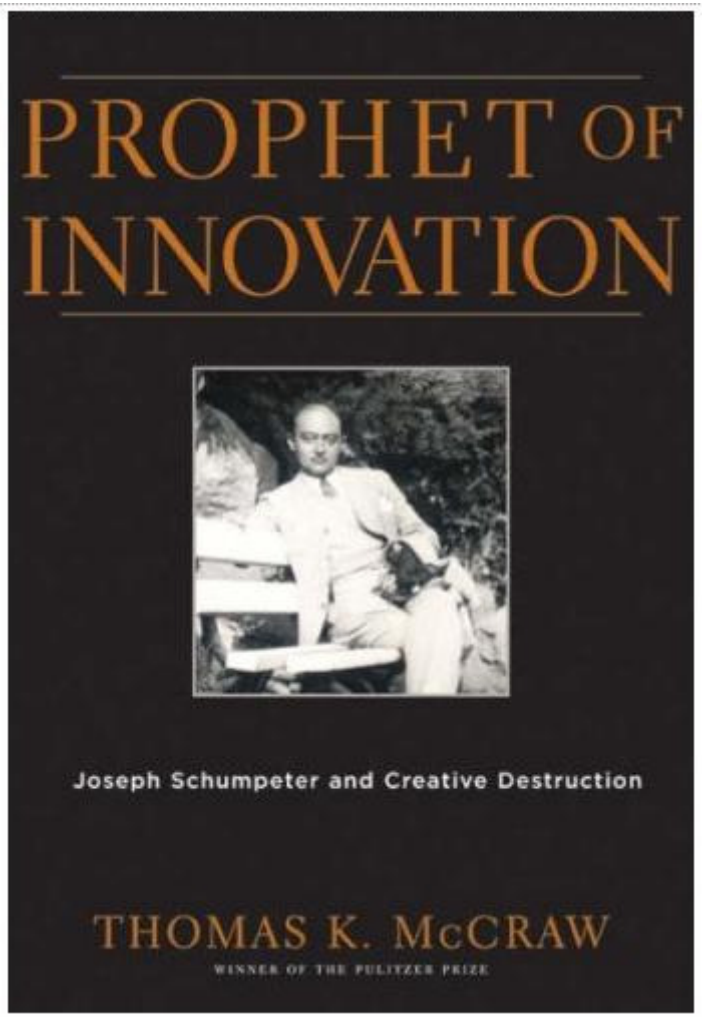
- ***Invention*** is the first occurrence of an idea for a new product or process
- ***Innovation*** if the first attempt to carry it out into practice
- Sometimes invention and innovation are closely linked; in many cases, however, there is a considerable

Example of time lag between invention and innovation



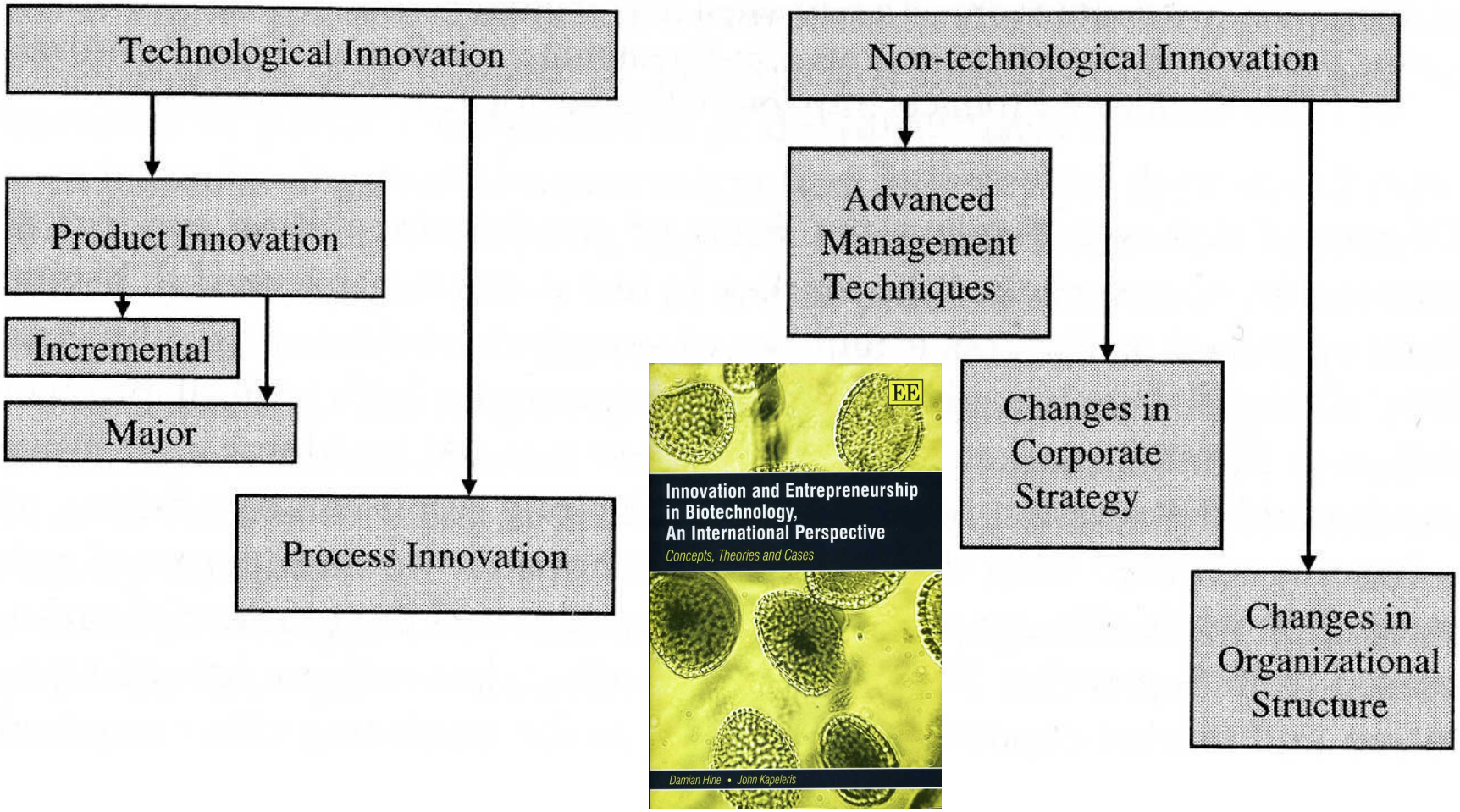
- ***Invention***
  - **1947:** Dias and Pellegrino in Brazil and Romaña and Abalos in Argentina demonstrate the efficacy of organochlorine insecticides against domiciliated triatomine bugs
- ***Innovation***
  - **1990s:** Political decisions at the

Joseph Schumpeter and '*creative destruction*'



- New products
- New methods of production
- New sources of supply
- Exploitation of new markets
- New ways to organize business

Types of innovation



Hine and Kapeleris (2006) Edward Elgar Publishing Ltd, UK, 259 pp. ISBN-10 1 84376 584 4

Introduction

HEALTH INNOVATION

Health innovation

- ***Products***
  - New vaccines, drugs, diagnostics, devices
- ***Processes***
  - Alternative ways to synthesize or administer a drug
- ***Policies***
  - "National Immunization Days"
- ***Strategies***
  - TRIPS compulsory licenses
  - Taxation on financial transactions → purchase of antiretrovirals

Health innovations & smallpox eradication

- ***Product*** innovation
  - Lyophilized vaccine → avoidance of cold-chains
- ***Process*** innovation
  - Bifurcated needle

- ***Policy*** innovation
  - Maximum use of underutilized health personnel
  - Community participation: teachers, religious leaders, elders
- ***Strategy*** innovation
  - "Circle" vaccination, instead of mass vaccination

Types of innovation

COMMENTARY

Technological And Social Innovation: A Unifying New Paradigm For Global Health

Developing countries need R&D partnerships and implementation research networks to play a more prominent role in global health.

by Charles A. Gardner, Tara Acharya, and Derek Yach

Gardner et al, *Health Affairs* 2007, **26(4)**:1052–1061.

Historical periods

Health Innovation: evolution

Health innovation: Major historical periods

- 1850-early 1900s': ***Era of the public sector***
  - Epitomized by the work of Pasteur
- 1900s'-1970s': ***Era of the private sector***
  - Emerged in Germany & chemical companies
- 1970s'-2000: ***Era of public sector reawakening***
  - United Nations: WHO Special Programmes (HRP, TDR)
  - USA: Bayh-Dole Act; NIH budget increase
- 2000- : ***Era of public-private pa[illegible]***
  - [illegible] PDPs)
  - Innovative Product Development Initiatives (IPDIs)

Mahoney, R & Morel, C. (2006) A Global Health Innovation System (GHIS). *Innovation Strategy Today* 2(1):1-12

Health innovation: Major historical periods

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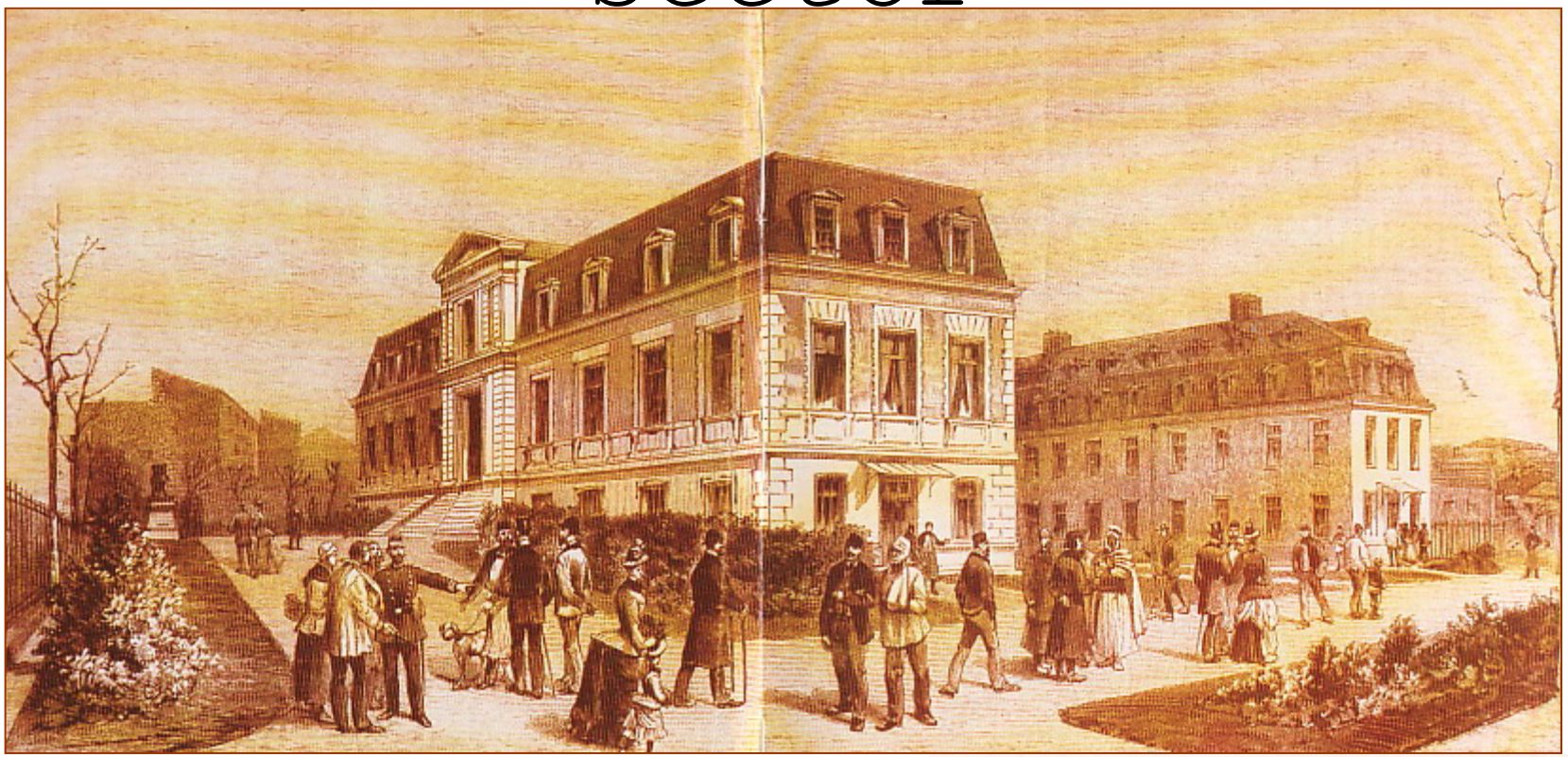
  - [illegible] PDPs)
  - [illegible] (IDCs)

Mahoney, R & Morel, C. (2006) A Global Health Innovation System (GHIS). *Innovation Strategy Today* 2(1):1-12

The era of the public sector



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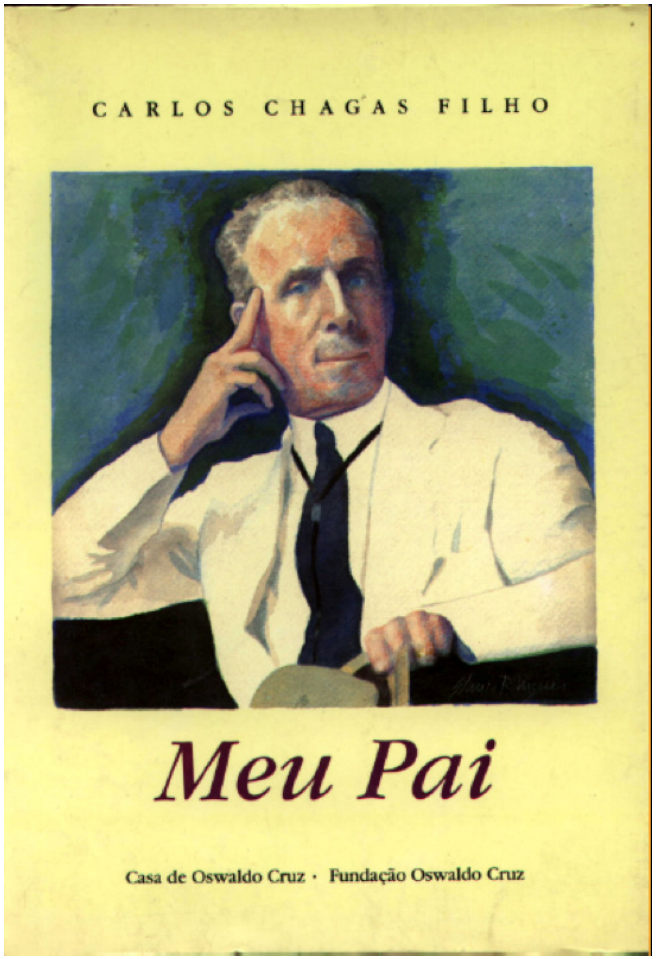

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- 2000– : ***Era of public-private pa***
  - PDPs)
  - Innovation Commons (IDCs)

Mahoney, R & Morel, C. (2006) A Global Health Innovation System (GHIS). *Innovation Strategy Today* 2(1):1-12

The era of the private sector

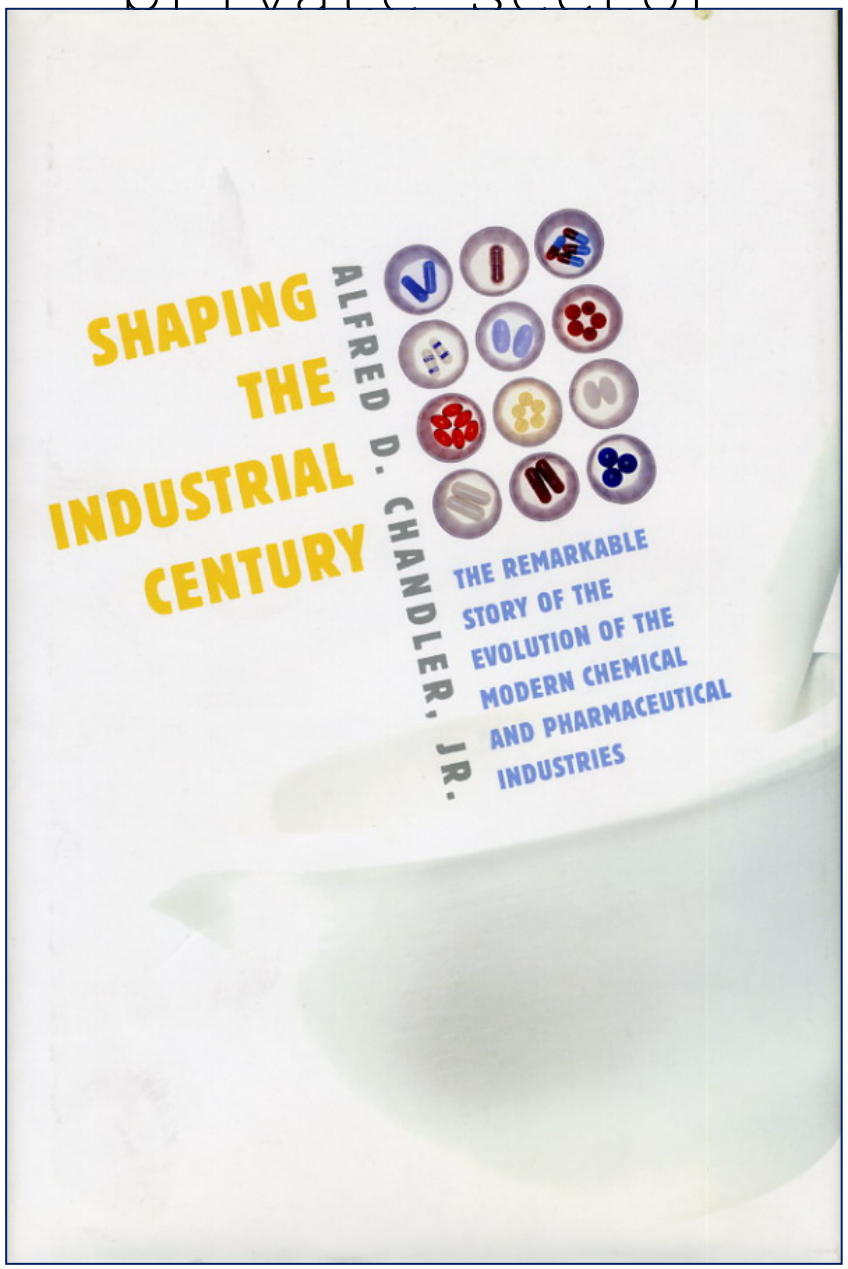


Table 1.2 The world's thirty largest producers of pharmaceuticals, 1993 (in $ billions of pharmaceutical and medical devices revenues)

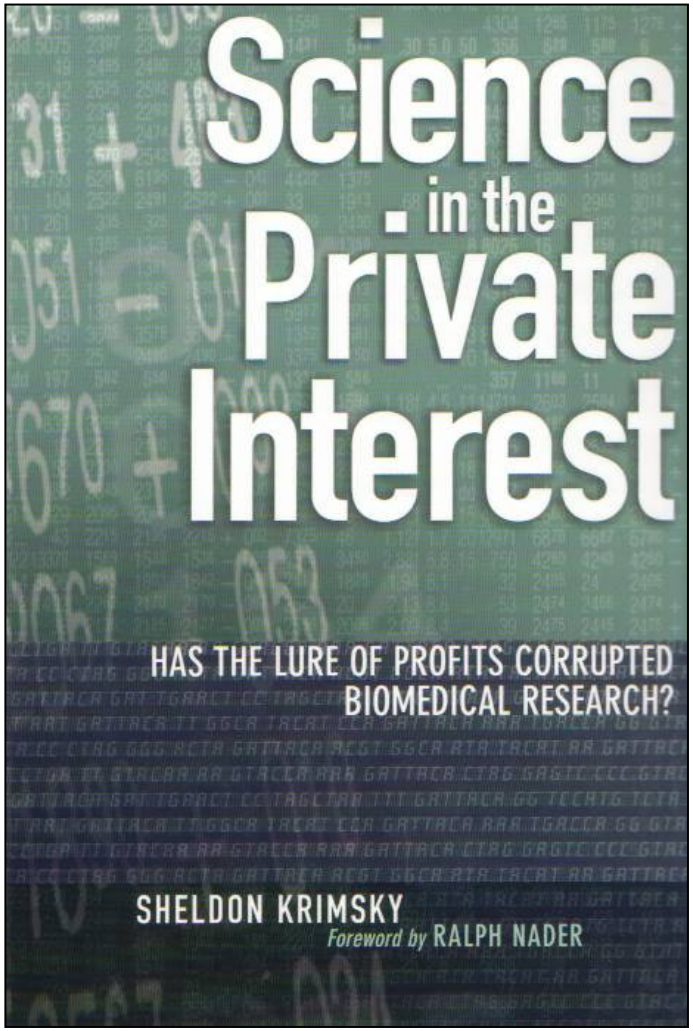
Rank	Company	Estimated revenue ($ billions)
U.S. core companies (10)		
1	Bristol-Myers Squibb	11.1
2	Merck	10.4
4	SmithKline Beecham[a]	9.2
5	Abbott Laboratories	8.4
6	American Home Products	8.3
10	Pfizer	7.4
14	Eli Lilly	6.4
16	Warner-Lambert	5.7
21	Schering-Plough	4.3
22	Upjohn	3.6
Non-U.S. core companies (12)		
3	Roche Holding (Switzerland)	9.6
8	Glaxo Holdings (U.K.)	8.0
12	Takeda Pharmaceutical (Japan)	6.7
19	Sankyo (Japan)	4.7
20	Pharmacia (Sweden)	4.5
23	Boeringer-Ingelheim (Germany)	3.4
24	Yamanouchi Pharmaceutical (Japan)	3.4
25	Schering (Germany)	3.2
26	E. Merck (Germany)	3.2
27	Shionogi (Japan)	3.1
28	Wellcome[b] (U.K.)	3.1
29	Astra (Sweden)	3.0
U.S. companies in related industries (2)		
18	Johnson & Johnson	5.2
30	Procter & Gamble	3.0
Non-U.S. chemical companies (6)		
7	Hoechst (Germany)	8.1 (1995)
9	Bayer (Germany)	7.7 (1995)
11	Ciba-Geigy (Switzerland)	7.0 (1991)
13	Rhône-Poulenc (France)	6.5 (1995)
15	Sandoz (Switzerland)	6.3 (1991)
17	ICI Zeneca (U.K.)	5.5 (1994)

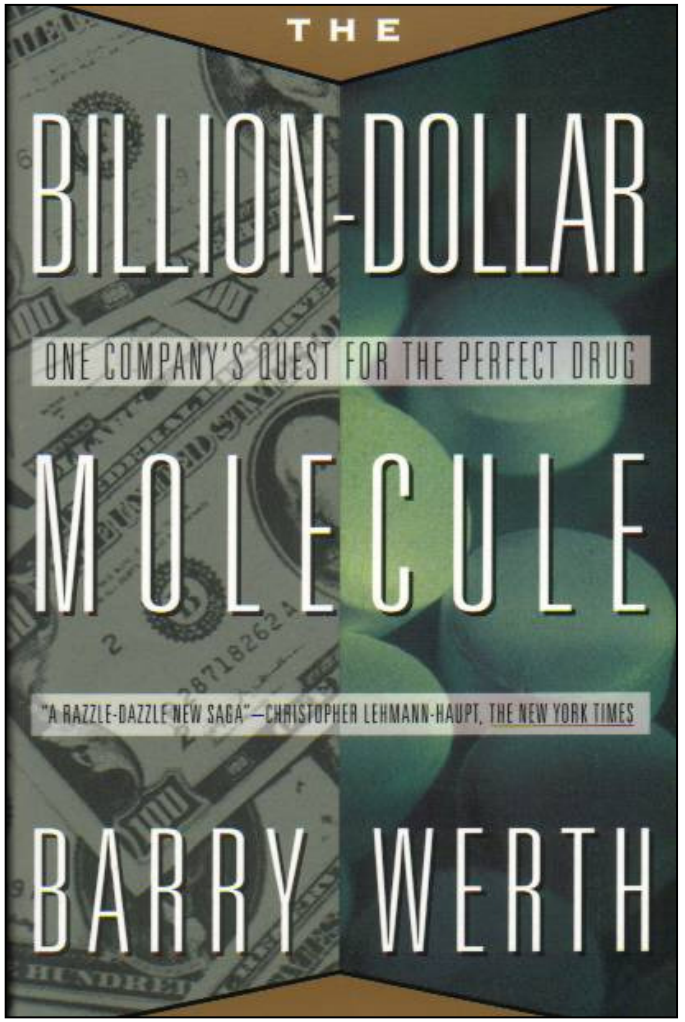
Source: Compiled and calculated from "*Fortune* Global 500," *Fortune*, July 25, 1994, pp. 178, 180; *Hoover's Handbook of American Companies;* and other sources.

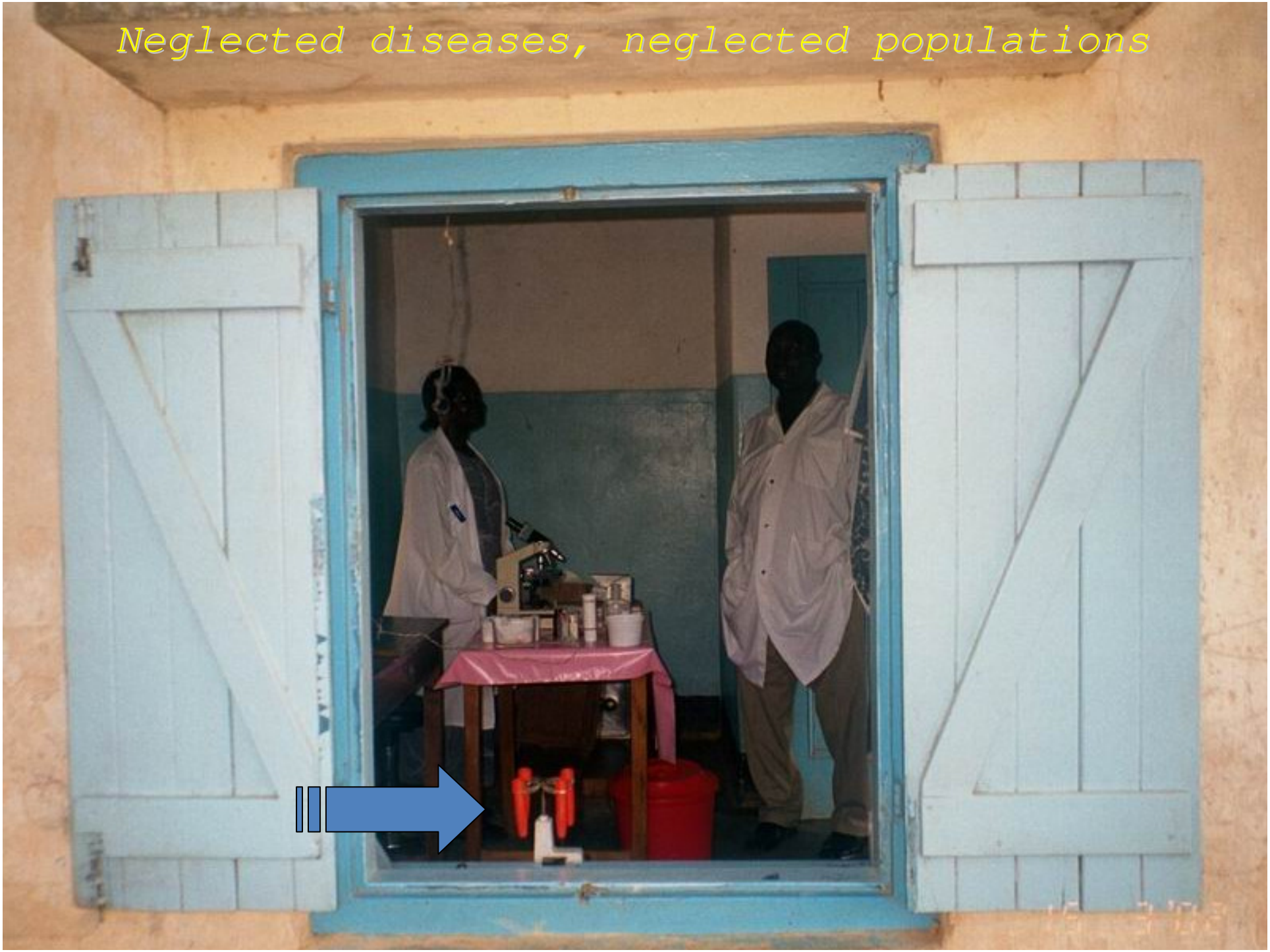
a. Formed as a merger of SmithKline Beckman and Beecham in 1989.

b. Acquired by Glaxo Holdings to form Glaxo Wellcome in 1995.

The era of the private sector






Neglected diseases, neglected populations

Health innovation: Major historical periods

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- 2000– : ***Era of public-private partnerships (PDPs)***
  - [illegible] PDPs)
  - Innovation Observatories (IDOs)

Mahoney, R & Morel, C. (2006) A Global Health Innovation System (GHIS). *Innovation Strategy Today* 2(1):1-12

Research on neglected priority needs

Building on our 30 year history, TDR is supporting innovative research on neglected priority needs for disease control. Through focused, time-limited activities, our goal is to support research in the countries where the diseases are prevalent that fosters:

- innovation for product discovery and development
- research on development and evaluation of interventions in real-life settings
- research to increase access to interventions.

TDR has restructured its operations, creating nine research lines, which may vary over time. Some are functionally specific, while others are focused on specific diseases.

Health innovation: Major historical periods

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  - USA: Bayh-Dole Act; NIH budget increase
- 2000– : ***Era of public-private partnerships (PPPs)***
  - [illegible] PDPs)
  - Innovative Product Pipelines (IPCs)

Mahoney, R & Morel, C. (2006) A Global Health Innovation System (GHIS). *Innovation Strategy Today* 2(1):1-12

The era of PDPs: Partnerships for the Development of Products

1996

1999

2000

2002

2003

2003

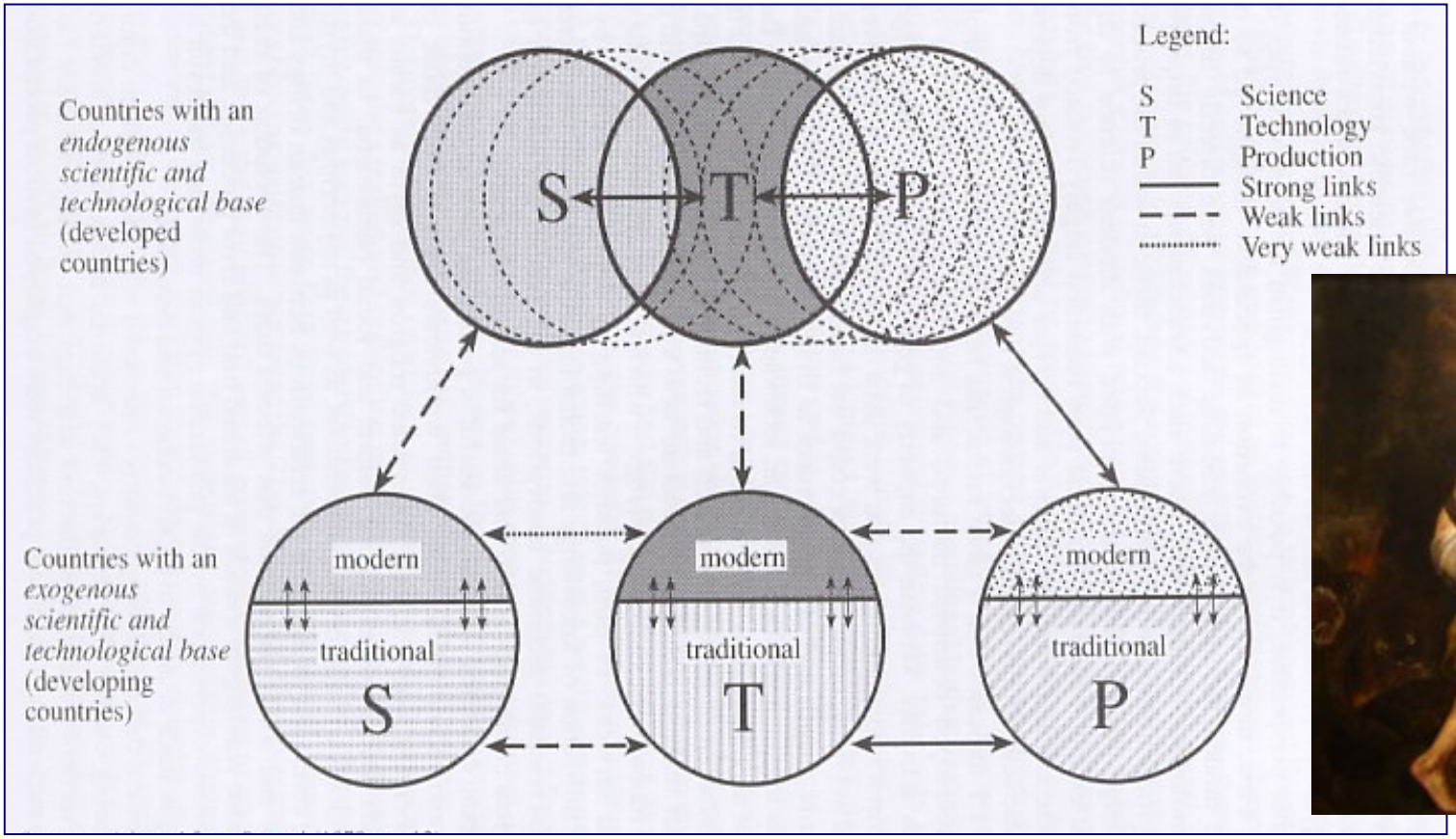
2003

The Sisyphus Challenge

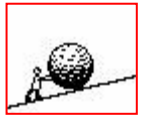
The Valley of Death

Health Innovation: Challenges

The Sisyphus challenge of the 21st century



Francisco Sagasti. ***Knowledge and innovation for development. The Sisyphus challenge of the 21st century***, Cheltenham, UK; Northampton, USA:Edward Elgar, 2004. 151 pages



The Sisyphus challenge in Chile

Jointly published by Akadémiai Kiadó, Budapest and Springer, Dordrecht

Scientometrics, Vol. 72, No. 1 (2007) 93–103
DOI: 10.1007/s11192-007-1737-5

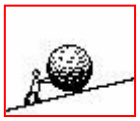
Low awareness of the link between science and innovation affects public policies in developing countries: The Chilean case

MANUEL KRAUSKOPF,[a,b] ERWIN KRAUSKOPF,[a,b,c] BERNARDITA MÉNDEZ[a,b,c]

[a] *Universidad Andrés Bello, Santiago (Chile)*
[b] *Millenium Institute for Fundamental and Applied Biology, Santiago (Chile)*
[c] *Fundación Ciencia para la Vida, Santiago (Chile)*

Scientometrics

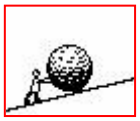
72(1):93–103, 2007



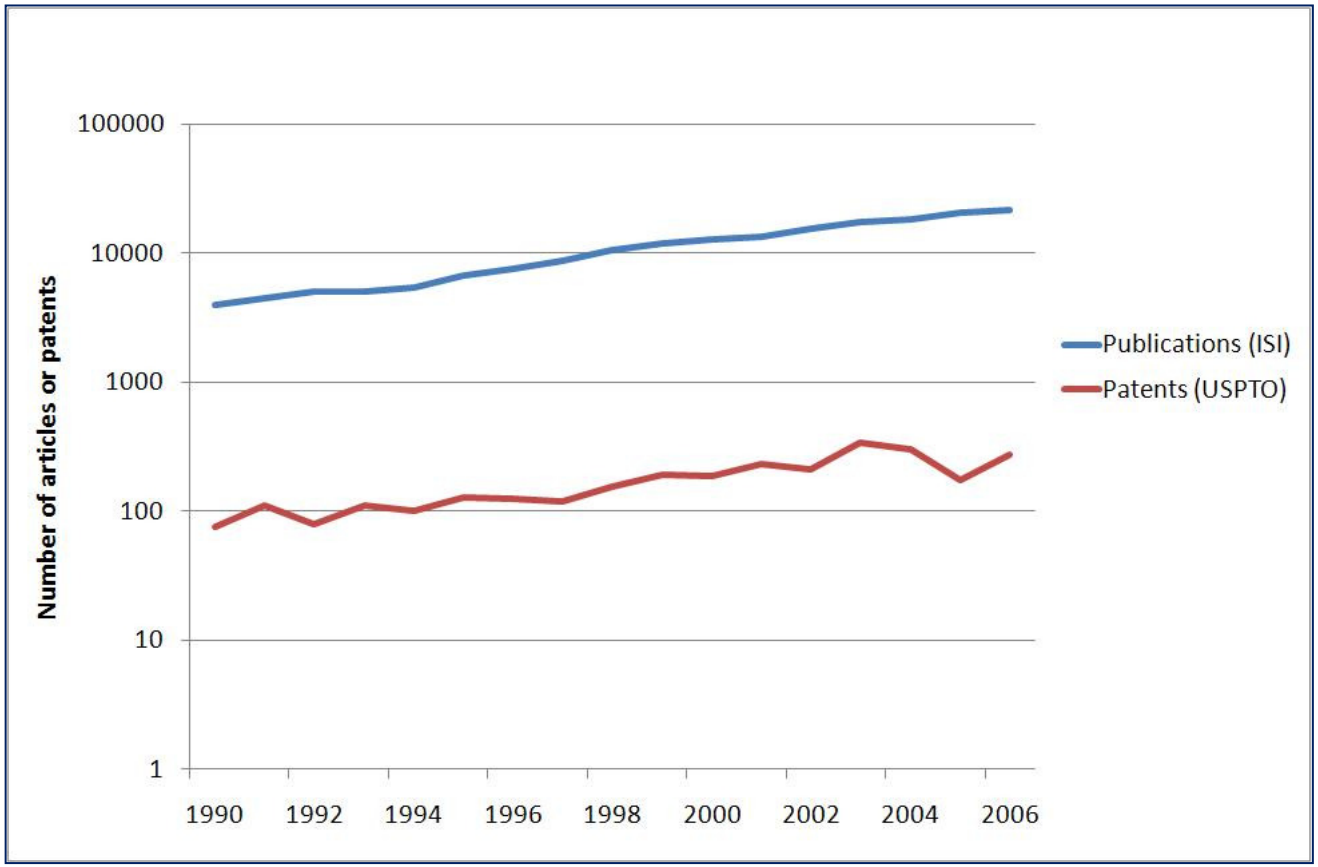
The Sisyphus challenge in Chile

- "*Developing countries share disbelief about the benefits of the endogenous production of science as a tool for economical growth. Hence, public policies to strengthen science and technology and promote the cu re, in general, weak and*

Scientometrics
72 (1) 93–103, 2007

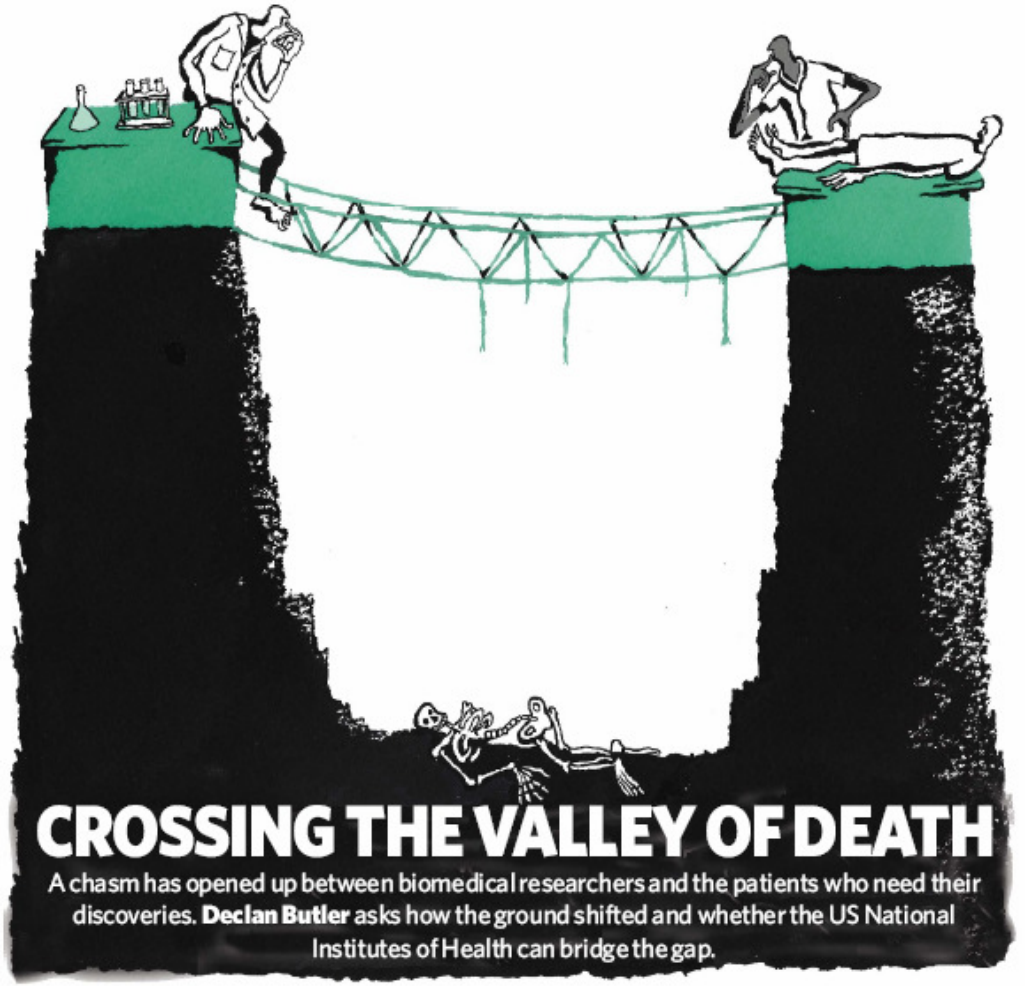


The Sisyphus challenge in Brazil



Morel et al (2007) The road to recovery. *Nature* 449:180-182

Translational research: "*Crossing the Valley of Death*"



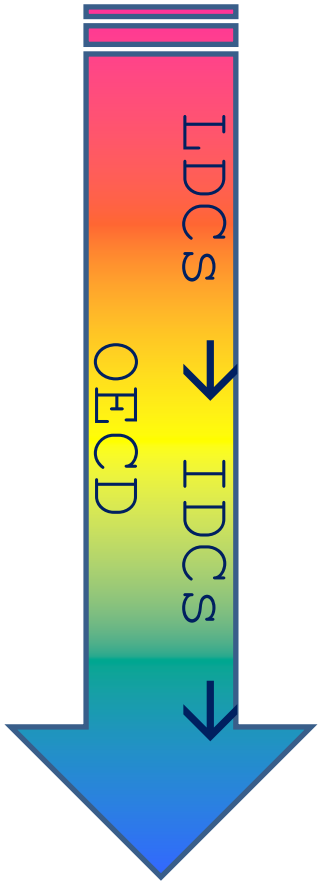
Butler D (2008) Translational research: crossing the valley of death. *Nature* **453**: 840-842

The path from health innovation to application: Six components/determinants (*)

1. Capacity for and undertaking **R&D**
2. Capabilities to **manufacture** products to appropriate standards
3. Promoting and sustaining **domestic markets**
4. Promoting and sustaining **export markets**
5. Creating and implementing systems for **intellectual property** management

(*) Morel et al (2005) *Innovation Strategy Today* 1:1-15
Mahoney et al (2007) *Vaccine* 25:4003-4011

LDCs → IDCs → OECD and the six components of health innovation



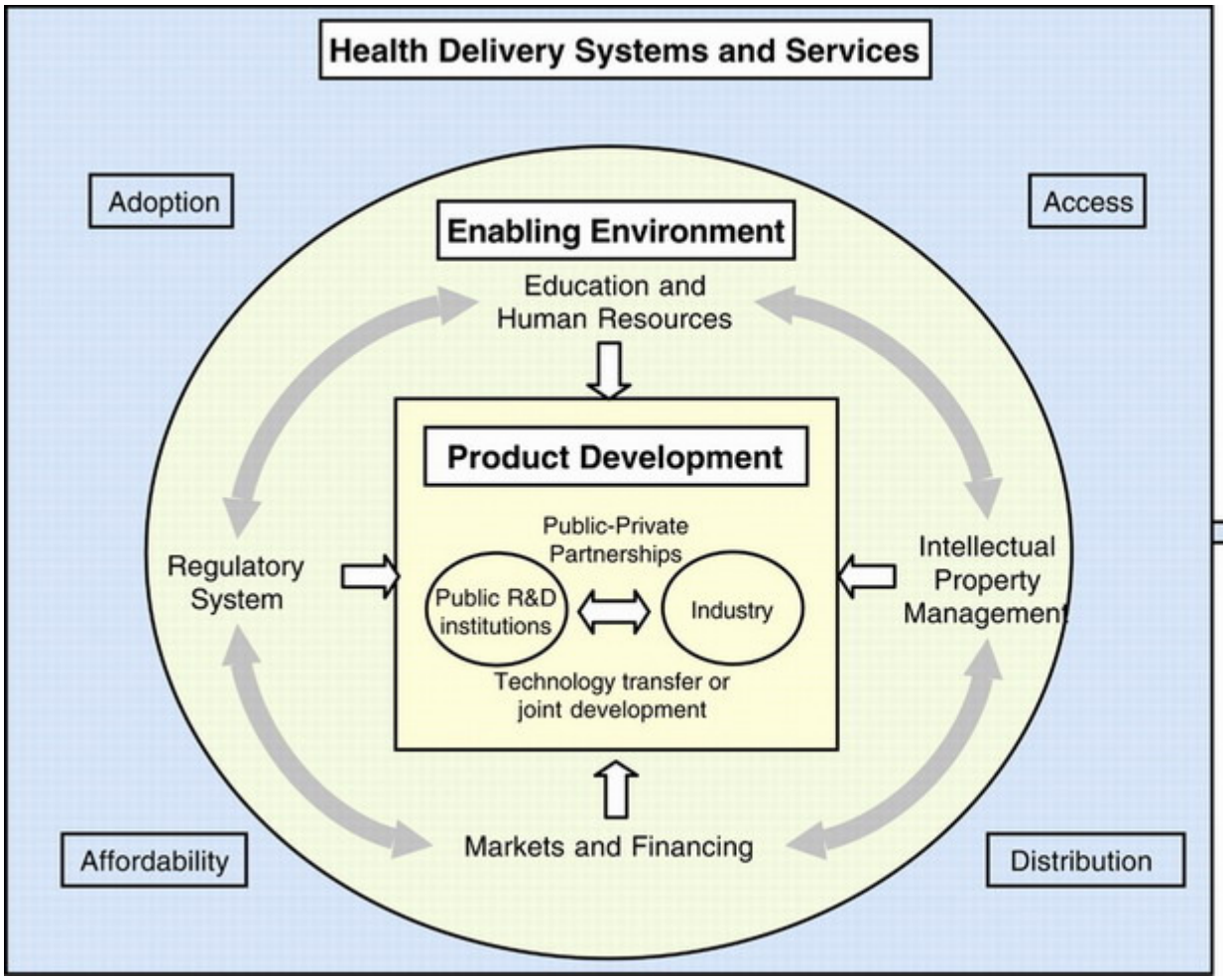
	Manufacture	Domestic Market	Export Market	R&D	IP System	Drug Regulatory System
Stage 1	Assembly of imported components	Small market	Very little except as toll manufacturer	Very little	Very limited understanding of IP; no IP protection	Very limited
Stage 2	Production on license or by copy with significant cost-advantages over Northern products	Growing domestic market of increasing interest to foreign companies; some import substitution; significant share of imports come from other developing countries	Growing trade; companies learning how to establish export markets; significant share of exports go to other developing countries	Local government and foreign donor-funded R&D to understand technology either to produce on license or to copy	Patents allowed for local inventors, but foreign inventors and investors still not interested because of lack of markets and IP protection; few local public-private partnerships (PPPs)	Limited services without enforcement capabilities
Stage 3	Manufacture of domestically developed high technology products with significant cost-advantages over Northern products; growing source of outsourcing	Rapidly growing domestic market of interest to foreign companies	Increasing exports make significant contribution to GNP; significant share of exports go to other developing countries	Scientifically advanced; funded predominantly by local government, and carried out predominantly by local public research institutions; capable of innovation	Advanced IP system, but poorly enforced; moderate experience with technology management in local PPPs	Advanced capabilities but not at highest level because of need to strengthen capabilities as appropriate
Developed countries	*Most developed capabilities to produce high technology drugs, vaccines, and devices*	*Highly profitable market in both the public and private sectors generating profits to support, in part, advanced research*	*Global companies*	*Generous support for health research from basic to applied. Large research investment by private companies including large pharmaceutical manufacturers and biotechnology companies*	*Established system of IP protection, and management of technology in local PPPs (e.g., university-industry R&D agreements)*	*A dedicated agency overseeing regulatory approvals of drugs/vaccines. In addition, the government oversees clinical trials & production facilities and enforces rules and regulations.*

6 components or determinants

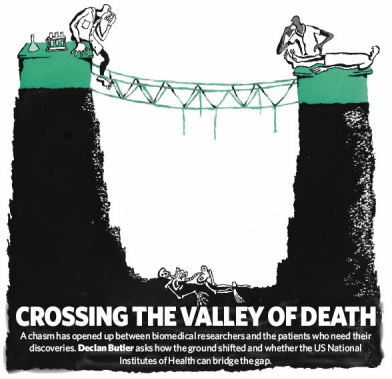
Today 1(1):1–15

http://www.biodevelopments.org/innovation/inde

National Health Innovation System



Health Improvement & Economic Growth



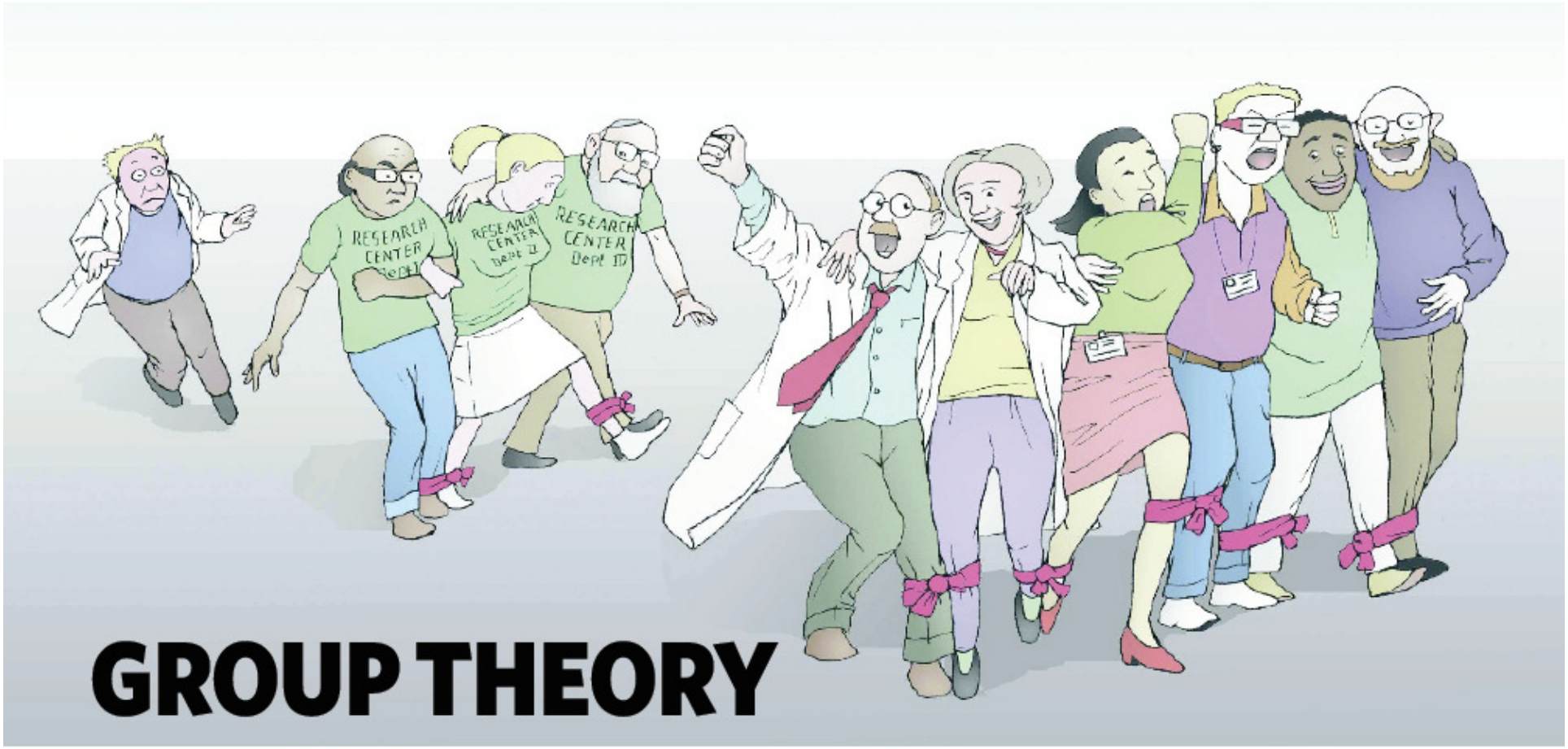
Morel et al (2005) *Science* 309:401–404, 2005

Networks and partnerships

Health Innovation: Opportunities

Evolution of the scientific enterprise (Barabási AL (2005) *Science*

Evolution of the scientific enterprise. (**Left**) For centuries, creative individuals were embedded in an invisible college, that is, a community of scholars whose exchange of ideas represented the basis for scientific advances. Although intellectuals built on each other's work and communicated with each other, they published alone. Most great ideas were attributed to a few influential thinkers: Galileo, Newton, Darwin, and Einstein. Thus, the traditional scientific enterprise is best described by many isolated nodes (blue circles). (**Middle**) In the 20th century, science became an increasingly collaborative enterprise, resulting in such iconic pairs as the physicist Crick and the biologist Watson (left), who were responsible for unraveling DNA's structure. The joint publications documenting these collaborations shed light on the invisible college, replacing the hidden links with published coauthorships. (**Right**) Although it is unlikely that large collaborations—such as the D0 team in particle physics or the International Human Genome Sequencing Consortium pictured here—will come to dominate science, most fields need such collaborations. Indeed, the size of collaborative teams is increasing, turning the scientific enterprise into a densely interconnected network whose evolution is driven by simple universal laws.

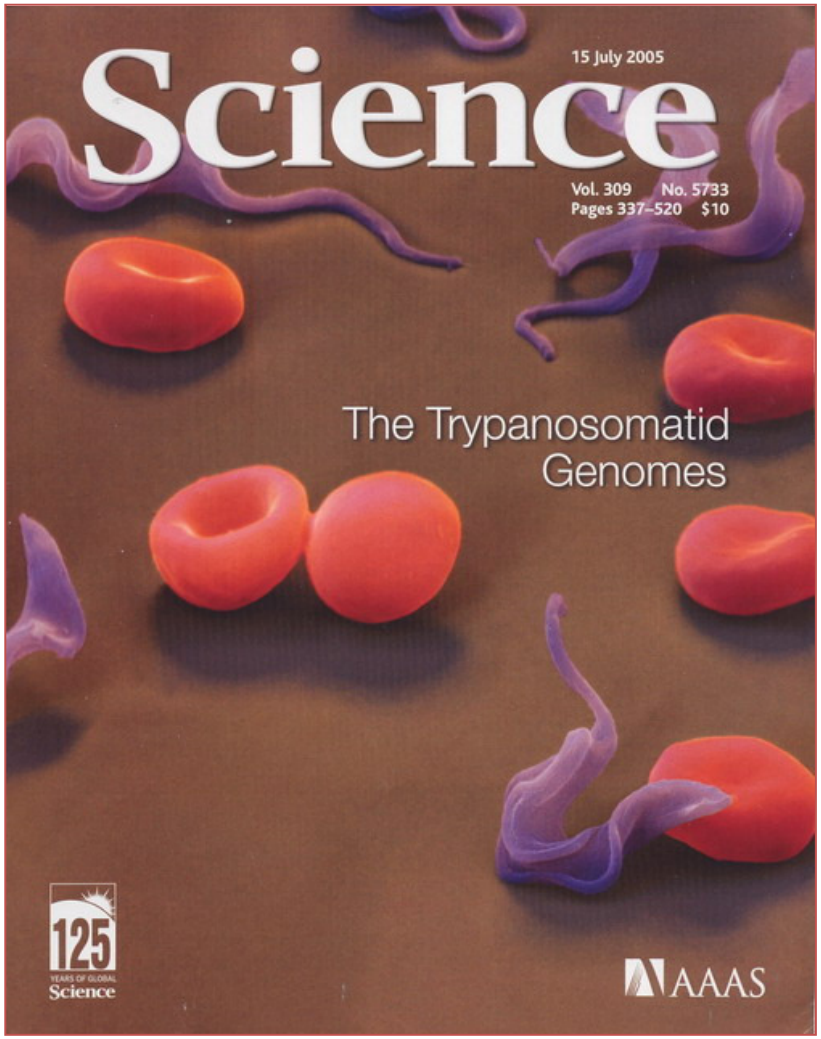


GROUP THEORY

What makes a successful team? **John Whitfield** looks at research that uses massive online databases and network analysis to come up with some rules of thumb for productive collaborations.

Whitfield J (2008) Nature
455:720-723

Health Innovation Networks



VIEWPOINT

SPECIAL SECTION

Health Innovation Networks to Help Developing Countries Address Neglected Diseases

Carlos M. Morel,[1*] Tara Acharya,[2] Denis Broun,[3] Ajit Dangi,[4] Christopher Elias,[5] N. K. Ganguly,[6] Charles A. Gardner,[7] R. K. Gupta,[8] Jane Haycock,[9] Anthony D. Heher,[10] Peter J. Hotez,[11] Hannah E. Kettler,[12] Gerald T. Keusch,[13] Anatole F. Krattiger,[14] Fernando T. Kreutz,[15] Sanjaya Lall,[16] Keun Lee,[17] Richard Mahoney,[14] Adolfo Martinez-Palomo,[18] R. A. Mashelkar,[19] Stephen A. Matlin,[20] Mandi Mzimba,[21] Joachim Oehler,[22] Robert G. Ridley,[23] Pramilla Senanayake,[24] Peter Singer,[25] Mikyung Yun[26]

Gross inequities in disease burden between developed and developing countries are now the subject of intense global attention. Public and private donors have marshaled resources and created organizational structures to accelerate the development of new health products and to procure and distribute drugs and vaccines for the poor. Despite these encouraging efforts directed primarily from and funded by industrialized countries, sufficiency and sustainability remain enormous challenges because of the sheer magnitude of the problem. Here we highlight a complementary and increasingly important means to improve health equity: the growing ability of some developing countries to undertake health innovation.

sources amounts to more than all that was spent in 2004 by the above-mentioned PDPs engaged in the development of drugs, vaccines, and diagnostics for diseases of the poor (*8*, *9*).

Patents and well-cited publications indicate the productivity of research investments, and in this light, IDCs have made major progress. The number of U.S. patents per capita is a common proxy used to measure the relative innovation

- Developing Country Vaccine Manufactures' Network
  - Brazil, Cuba, China, India, Indonesia, Mexico
- WHO Developing Countries' Vaccine Regulators Network
  - Brazil, China, Cuba, India, Indonesia, Russia, South Africa, South Korea, Thailand

Morel et al (2005) *Science* 309:401-404, 2005

DND*i* networks: 'LEAP'

(DND*i*: Drugs for Neglected Diseases *initiative*)

> LEISHMANIASIS EAST AFRICA PLATFORM (LEAP)

- Target disease: VL
- Core partners:
  KEMRI, Kenya; Addis Ababa University, Ethiopia; Gondar University, Ethiopia; Drug Administration & Control Authority, Ethiopia; Institute of Endemic Diseases, University of Khartoum, Sudan; Makarere University, Uganda; MSF; WHO; TDR; Ministries of Health in Kenya, Ethiopia, Sudan, and Uganda.
- DND*i* contact: Monique Wasunna
- Project start:
  August, 2003; Khartoum, Sudan

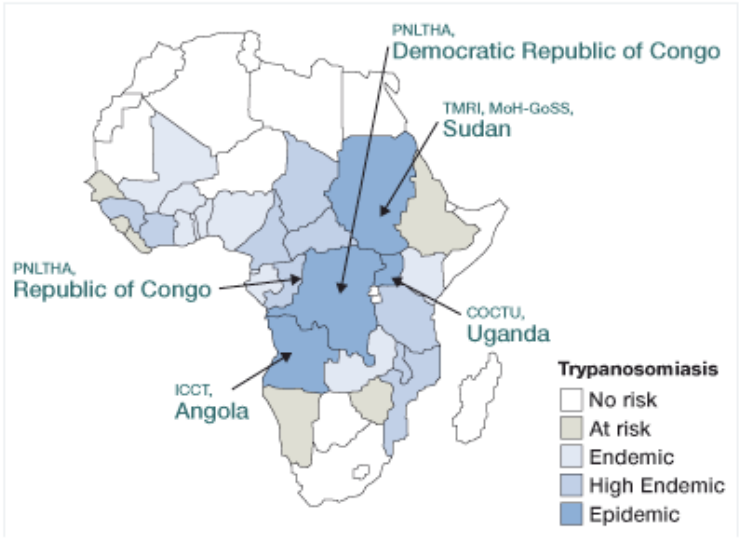

MINISTRY OF HEALTH
HARAMBEE
KIMALEL HEALTH CENTRE
P.O.Box. 71, MARIGAT.
DNDi / KEMRI
KENYA MEDICAL RESEARCH INSTITUTE
KEMRI
Drugs for Neglected Diseases initiative.
Kenya Medical Research Institute.
Kala-azar Research & Treatment Centre.

Kimalel Health Centre, Ministry of Health of Kenya, a KEMRI-DNDi partnership

http://picasaweb.google.com/cmmorel/20090620To25Kenya#

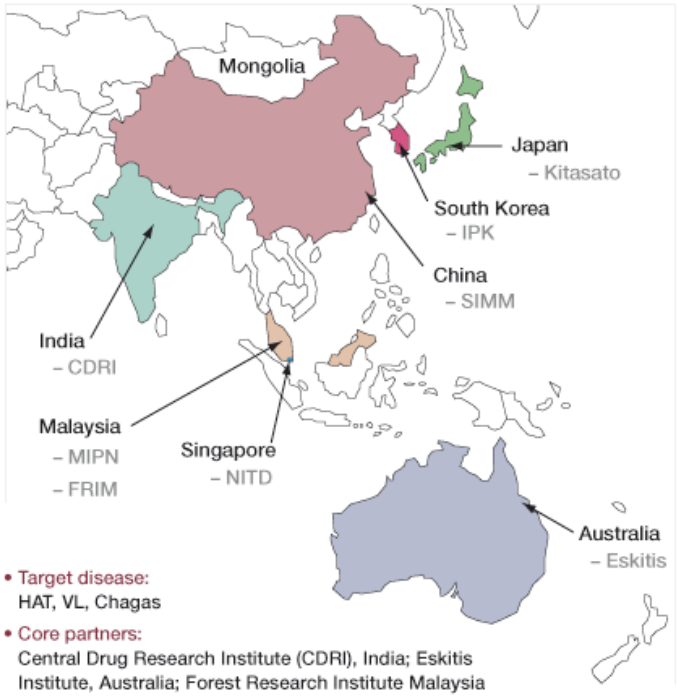
DNDi networks: HAT, PAN4ND

> THE HAT PLATFORM



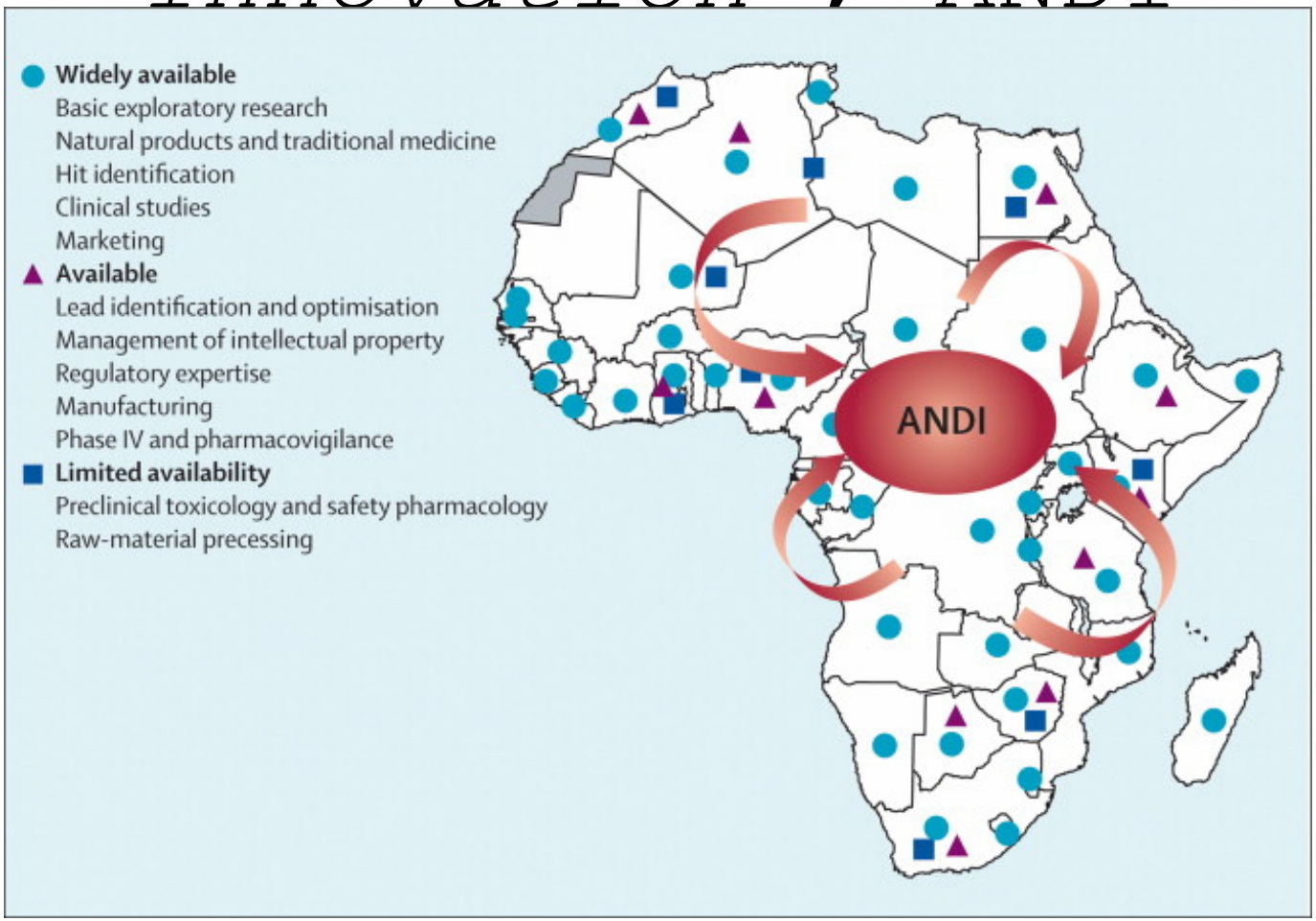
- Target disease:
  HAT
- Core partners:
  STI; national HAT control programmes of most affected endemic countries (see map on left); national and international research groups (eg. ITMA, INRB, CDC, and KARI-TRC); NGOs like MSF; FIND; WHO; TDR; regional networks (eg. EANETT, PABIN, AMANET)
- DND*i* contact: Augustin K. Ebeja
- Project start:
  August 2005; Kinshasa, DRC

> DISCOVERY RESEARCH PAN-ASIAN NETWORK FOR NEGLECTED DISEASES (PAN4ND)
> NATURAL SUBSTANCES SCREENING



- Target disease:
  HAT, VL, Chagas
- Core partners:
  Central Drug Research Institute (CDRI), India; Eskitis Institute, Australia; Forest Research Institute Malaysia (FRIM); Institut Pasteur Korea (IPK); Kitasato Institute (KI), Japan; Malaysian Institute of Pharmaceuticals and Neutraceuticals (MIPN), Malaysia; Novartis Institute of Tropical Diseases (NITD), Singapore; Shanghai Institute of Materia Medica (SIMM), China.
- DND*i* contact: Jean-Robert Ioset
- Project start:
  May 2006; Tokyo, Japan

"*African Network for Drugs and Diagnostics Innovation*", ANDI

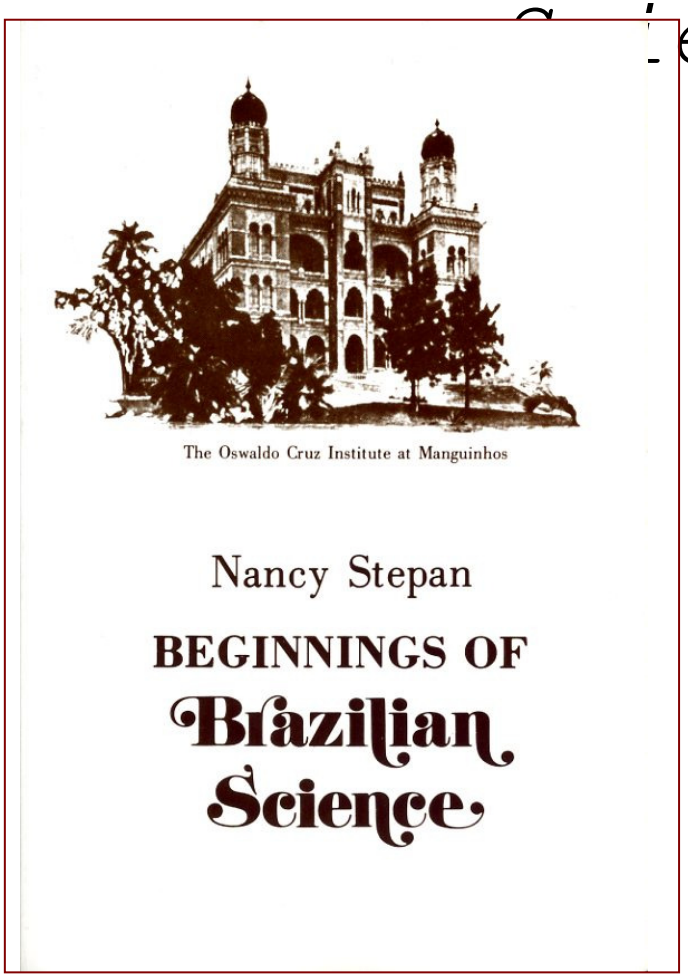


Mboya-Okeyo, Ridley and Nwaka (2009) *The Lancet* **373**:1507-1508

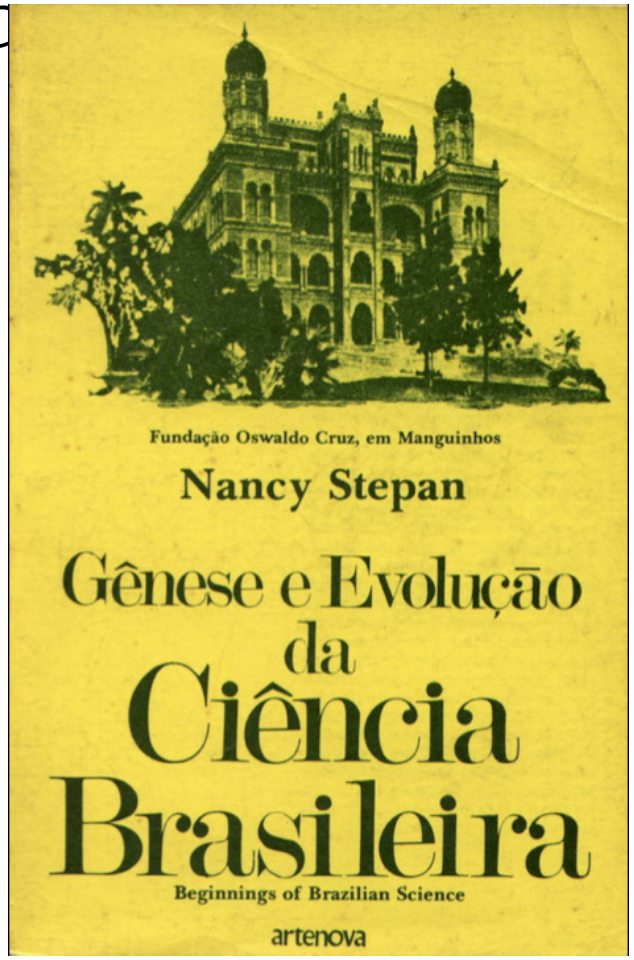
Learning from history, planning the future

HEALTH INNOVATION, FIOCRUZ 2009

Learning from History – Nancy Stepan: *Beginnings of Brazilian Science*



© Science History Publications, 1976



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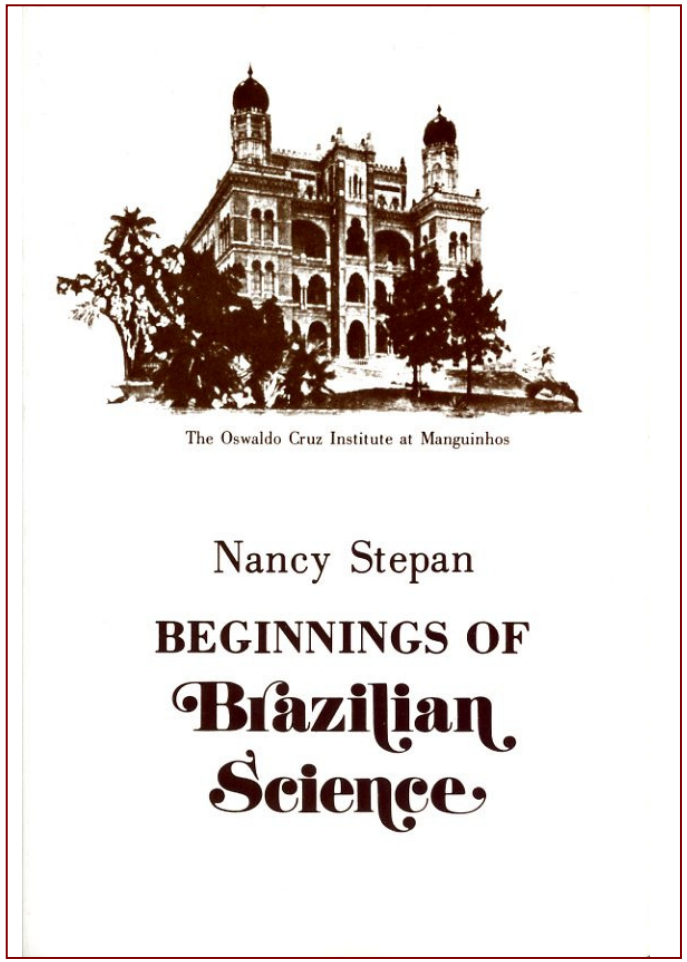
Beginnings of Brazilian Science



- *...In its research, barriers between basic and applied science broke down; many investigations originally undertaken for their scientific value yielded unexpected practical results, while practical studies often led to new research. There was as a result a*

Origens da ciência biomédica brasileira

- *... As barreiras entre a ciência básica e aplicada se romperam; muitas investigações realizadas originalmente, por seu valor científico, produziram resultados práticos inesperados, ao passo que estudos práticos levaram muitas vezes a novas pesquisas. Houve, em conseqüência, uma realimentação contínua e benéfica de*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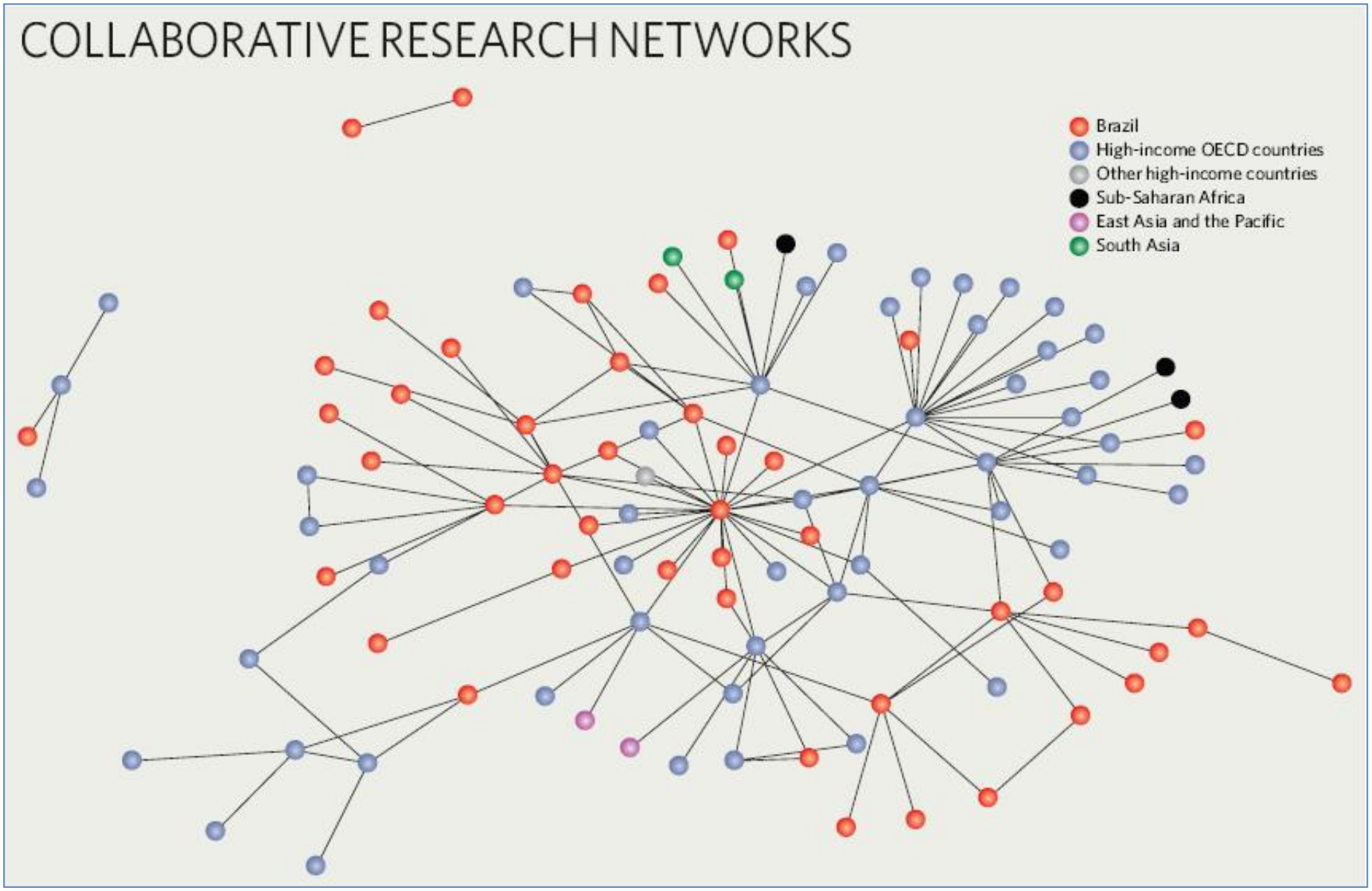
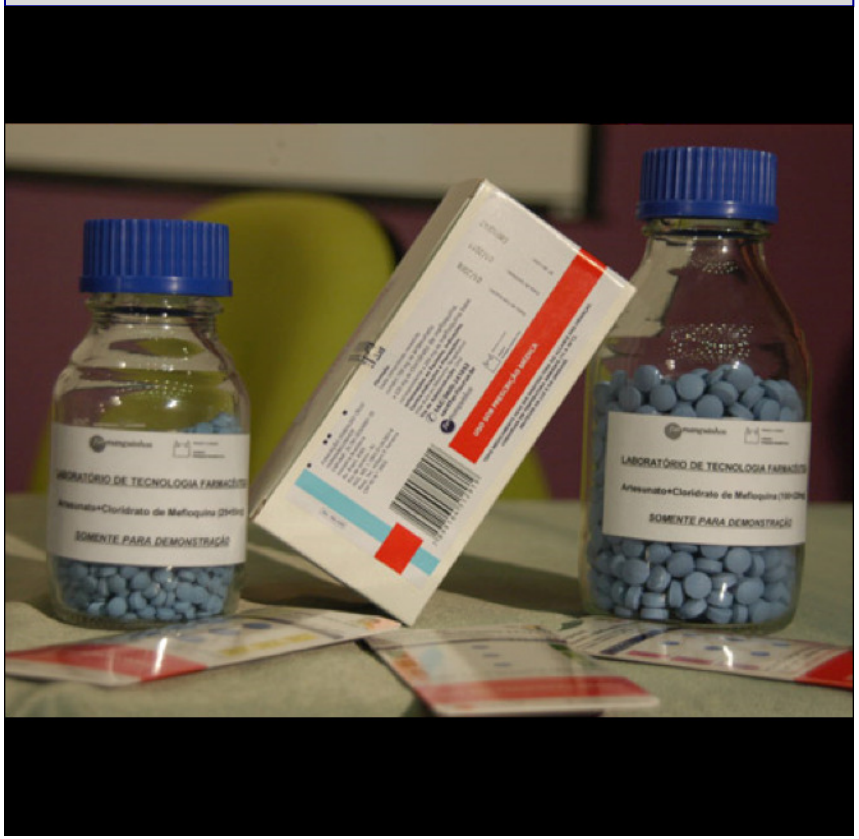
Development in Health
CDTS/FIOCRUZ



Morel CM, Carvalheiro JR, Romero CNP, Costa EA, Buss PM: The road to recovery. *Nature 2007, 449:180-182.*

Product Development Partnerships with international partners/networks

Fiocruz-DNDi: Artesunate-Mefloquine (AS/MQ) against malaria



Fiocruz-Genzyme: R&D agreement on neglected diseases

Fiocruz-Genzyme partnership: Current projects on **Chagas disease**

- Identification of biochemical targets by genomics and bioinformatics
- Synthesis of small molecules with therapeutic potential against *T. cruzi*
- Screening Genzyme compounds against *T. cruzi* both *in vitro* and *in vivo*
- Role of the Transforming Growth Factor beta (TGF-β) on *T. cruzi*

Target identification

- Presumptive biochemical targets (sterol biosynthesis) identified by genomics and bioinformatics at Fiocruz
  - Genes for phosphomevalonate kinase (FMK) and isopentenyl diphosphate isomerase (IPP) cloned at Fiocruz and sent to Genzyme.
  - Expression of FMK in progress at Genzyme.
  - High throughput screening assay

Synthesis of rhenium, palladium and nickel complexes against *T. cruzi*

- Metal-containing small molecule inhibitors of cathepsin-B protease synthesized at Genzyme and shipped to Fiocruz (CPqRR, Belo Horizonte) for testing against *T.*

Metal-containing cathepsin-B protease inhibitors inhibit growth of *T. cruzi* in vitro

- Screening capabilities at Fiocruz used for testing activity of Genzyme compounds against *T. cruzi* both in vitro and in vivo

Resultados:

Drogas	Código	Atividade (%)				
		Experimento 1	**Experimento 2**	**Experimento 3**	**Experimento 4**	**Experimento 5**
		400 µg/mL	*200 µg/mL*	*20 µg/mL*	*20 µg/mL*	*10 µg/mL*
I	Genz-649927-AA-002*	80	68	nr	#	0
II	Genz-661289-AA-002	100	13	nr	#	#
III	Genz-665612-AA-001	82	69	nr	0	0
IV	Genz-665613-AA-001	53	18	nr	47	18
V	Genz-665614-AA-001	100	100	66	79	53
VI	Genz-665615-AA-001	100	100	88	93	49
VII	Genz-665616-AA-001	86	84	80	#	57
VIII	Genz-665804-AQ-001	100	100	42	83	41
IX	Genz-665805-AA-001	89	86	0	6	0
X	Genz-665806-AA-001	100	100	65	78	19
XI	Genz-665831-AA-001	100	89	0	0	0
XII	Genz-665832-AA-001	89	83	3	14	82
XIII	Genz-665833-AA-001	83	80	28	37	#
BZ 1 µg/ml	**-**	**73**	**66**	**53**	**71**	**74**

BZ: Benzonidazol.

TGFβ and *T. cruzi*

- Anti-TGFβ antibody sent from Genzyme to Fiocruz
  - Confirmed that host TGFβ is required for *T. cruzi* invasion and differentiation both in vitro and in vivo
  - Parasite TGFβ receptor may represent a possible drug target

Fiocruz-Genzyme partnership: Mutual capacity building

- Senior chemist from Fiocruz spent 6 months at Genzyme working on organic synthesis of cathepsin-B inhibitors.
- Two Fiocruz project managers spent 2 weeks at Genzyme working with other project managers and scientists.
- Senior biologist from Fiocruz to spend a month at Genzyme characterizing the *T. cruzi* TGFβ receptor.
- Senior scientist from Genzyme to spend 3 weeks at Fiocruz in fall ’09.
- Several scientific exchanges both in Brazil and USA to review data, plan upcoming studies

Teams involved in collaborative networks

DNDi

Bernard Pécoul
Isabela Ribeiro
Jean-Pierre Paccaud
Jean-René Kiechel
Michel Lotrowska

CAPES-Fiocruz Steering Committee

CAPES
Antonio Carlos C. Carvalho
Eliezer Barreiro
José Luiz de Lima Filho

Fiocruz
Maria das Graças Henriques
Ricardo Galler

Fiocruz

Alvaro Romanha
Ana Paula Brum
Eduardo Costa
Jamaira Giora
James Wardell
Jorge Costa
Jorge Mendonça
Maria das Graças Henriques
Mariana Waghabi
Marcelo Ferreira
Marcus Souza
Nubia Boechat
Patricia Seixas
Renata Curi
Renata Souza
Solange Wardell
Wim Degrave

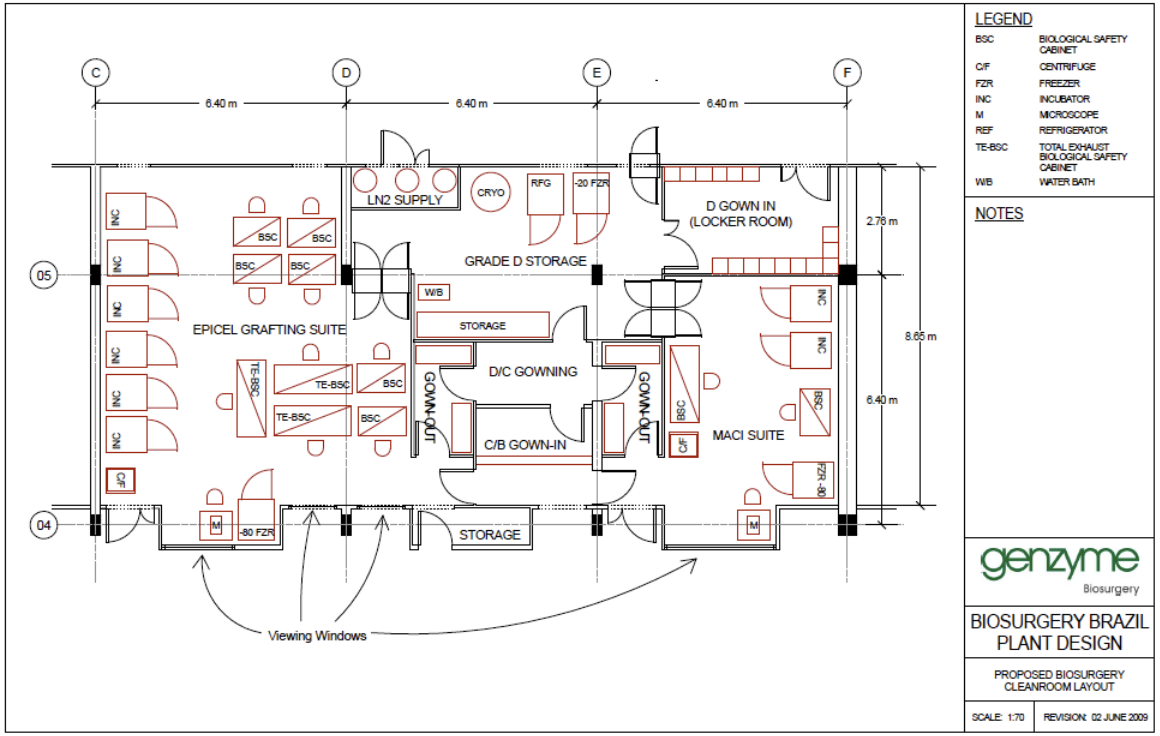
Genzyme

Carol Sherako
Cassandra Celatka
Clarence Wang
Edmund Sybertz
Elisabeth Tsilikounas
Hanlan Liu
Jeff Klinger
James Geraghty
Katherine Klinger
Michael Booker
Paulo Braga
Renato Skerlj
Rogerio Vivaldi
Robert Barker
Steve Ledbetter
Sunil Mhaskar

Fiocruz-Genzyme collaboration

Fiocruz–Genzyme partnership: Moving beyond neglected diseases?

- Discussions in progress around role for Genzyme in Fiocruz new *Center for Technological Development in Health* (CDTS) in collaboration with the *Brazi*



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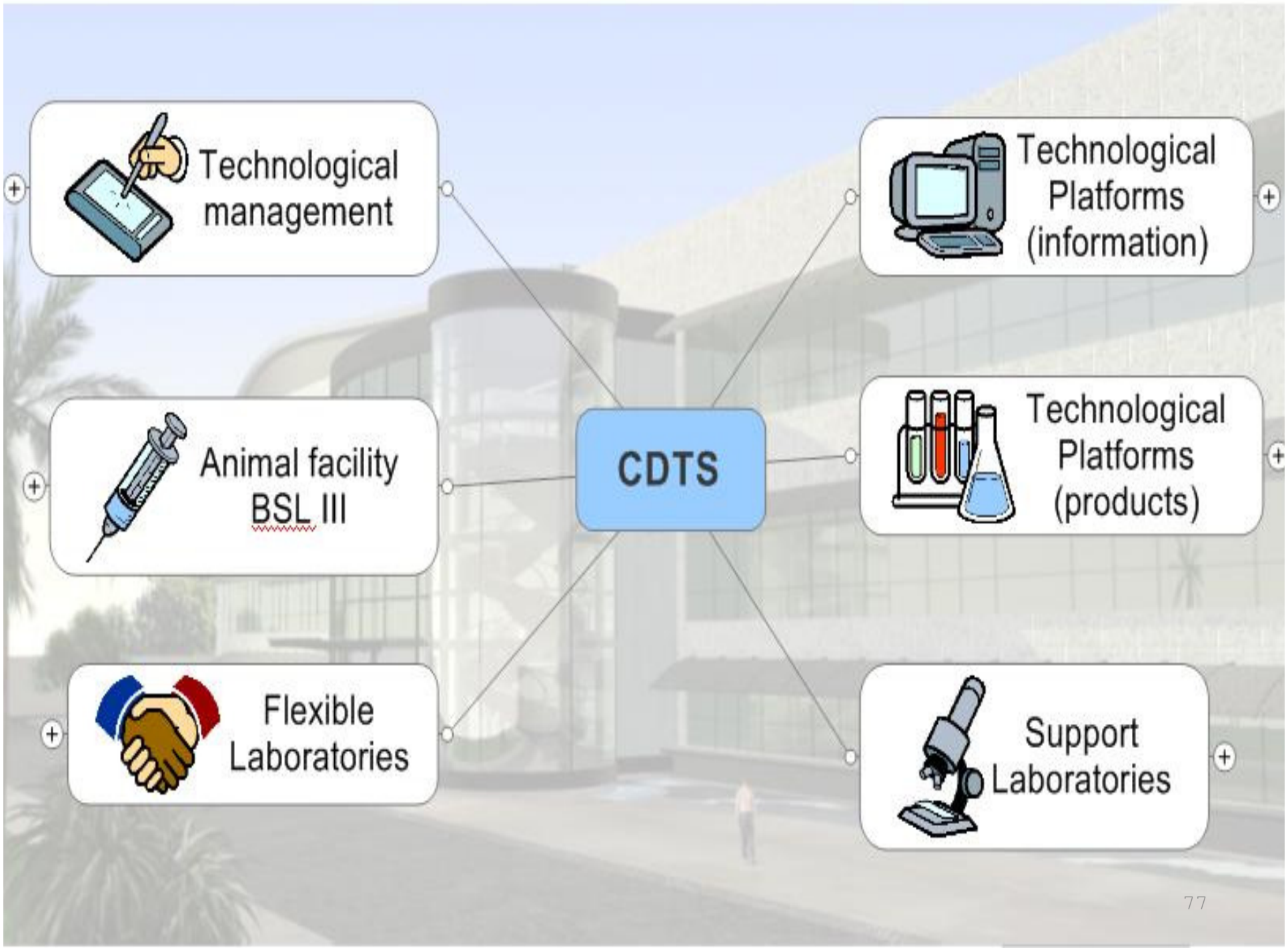

Technological management
Animal facility BSL III
Flexible Laboratories
CDTS
Technological Platforms (information)
Technological Platforms (products)
Support Laboratories

CDTS @ Fiocruz, Rio de Janeiro, Brazil

This blog informs the progress of the construction of the Center for Technological Development in Health (CDTS) of the Oswaldo Cruz Foundation (Fiocruz; www.fiocruz.br), Rio de Janeiro, Brazil

May 25, 2009

Photo taken at the construction site, May 2009

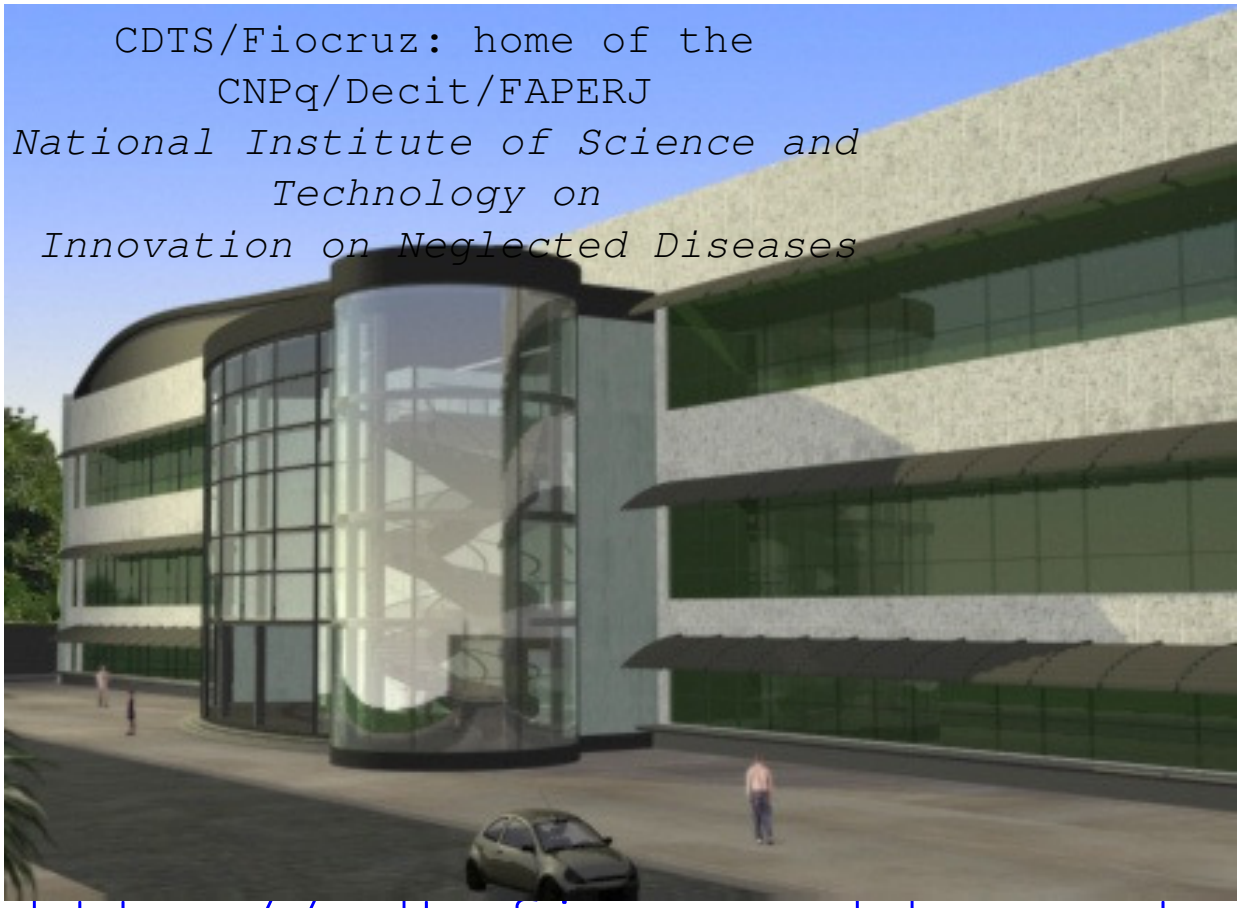
Posted by Carlos M. Morel, MD DSc at ***10:54 PM 0 comments***

Video: CTDS maquette

Source: ATPeng

Photos: CDTS maquette

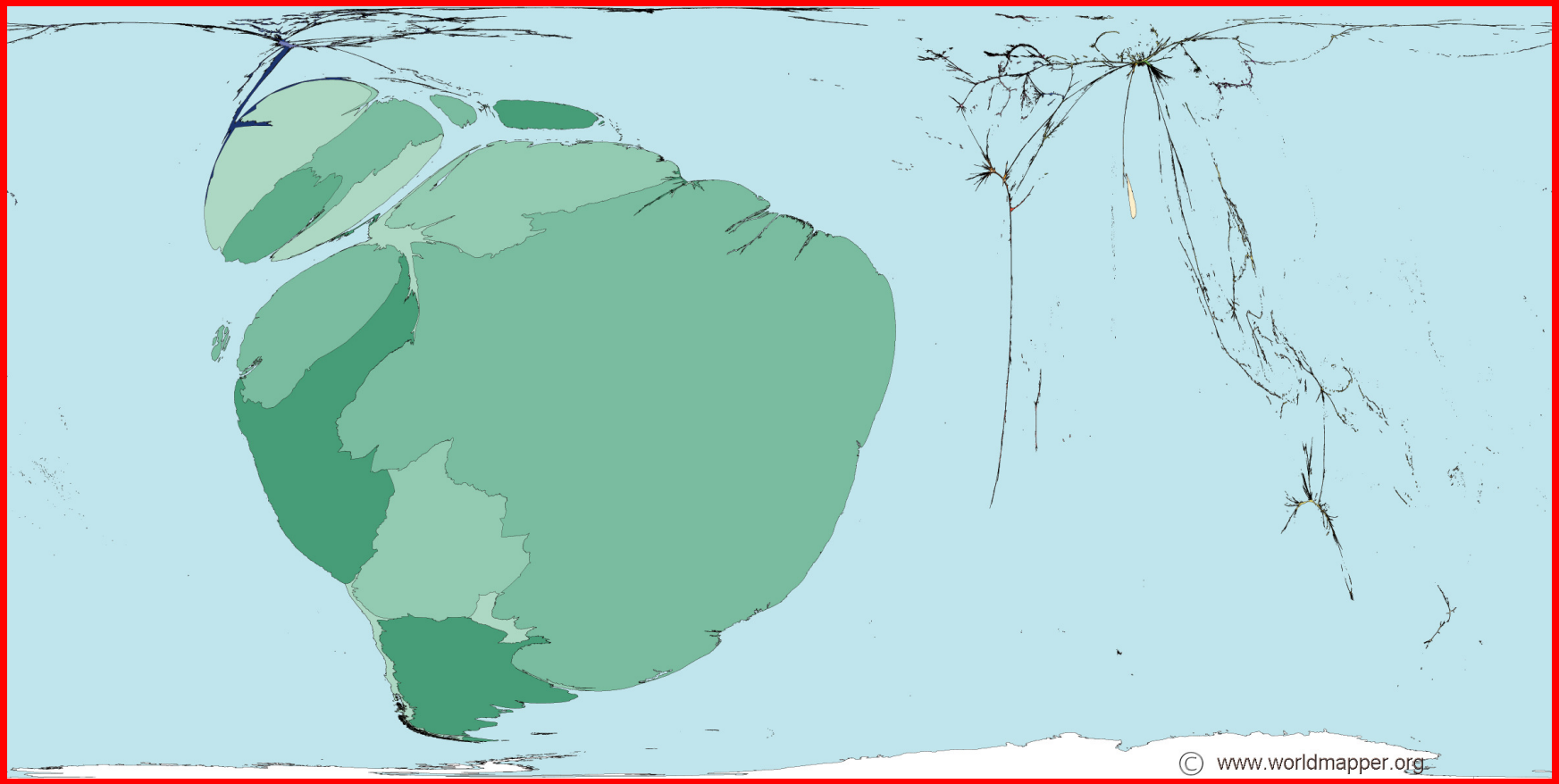
CDTS/Fiocruz: home of the
CNPq/Decit/FAPERJ
National Institute of Science and Technology on Innovation on Neglected Diseases



http://cdtsfiocruz.blogspot.com

http://cdtsfiocruz-english.blogspot.com

Doença de Chagas:
Prevenção não BASTA!



Thank you

Muito obrigado

morel@cdts.fiocruz.br