

The importance of a surveillance and alert network

- Essential role of the global outbreak alert and response network (or GOARN), WHO:
 - Assist countries in their efforts to fight against diseases, by providing an appropriate technical support to populations in a timely manner
 - Investigate and characterize sanitary events and analyze the risks of a rapidly-emerging threat
 - Support the national authorities' efforts to prepare for sanitary crises
 - Contribute to the lasting confinement of epidemic threats

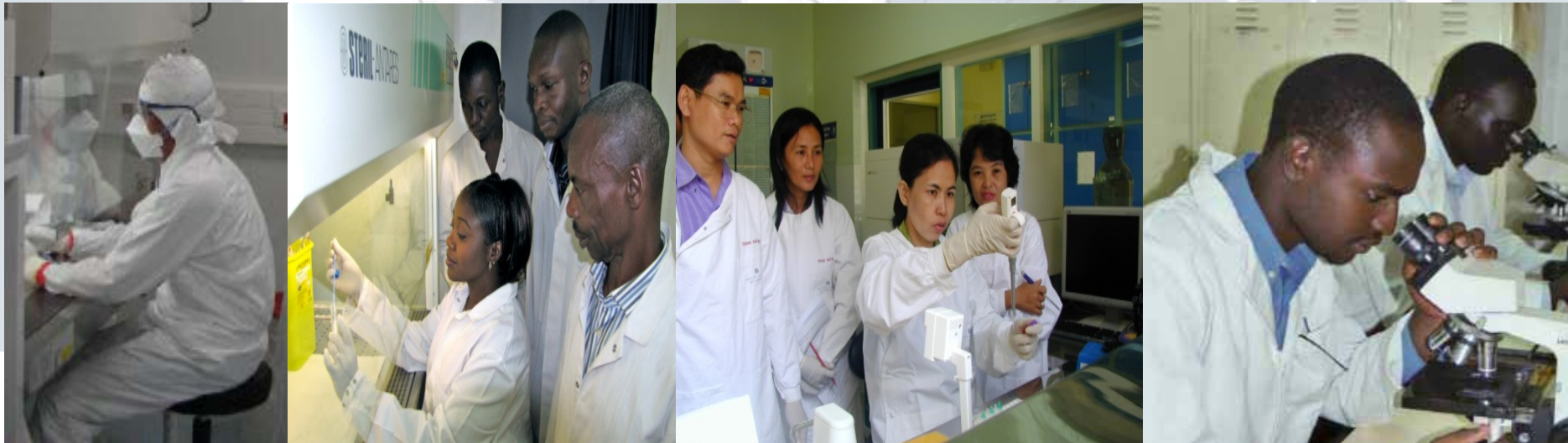


Reporting systems and early warning, essential keys to provide an effective response

- Existence of reporting systems: example of ProMed (Program for Monitoring Emerging Diseases), an Internet-based reporting system dedicated to rapid global dissemination of information on outbreaks.
- Fundamental role of an early warning of outbreaks of emerging and re-emerging diseases: enables authorities to take public health precautions in a timely manner
- Importance of sentinels: national reference laboratories, hospitals, physicians, etc → early detection is a key element to control epidemics

Promed Mail report by disease, 1994-2006
category

Disease	Number of reports
Avian influenza	1727
Foot and Mouth disease	913
Dengue	891
West Nile Virus	891
Cholera	785
Anthrax	777
Bovine spongiform encephalopathy	745
Rabies	741
Unknow illness	660
Ebola	484



- 33 institutes Pasteur gather about 9 500 people in 26 countries, over 5 continents
- ↳ in agreement with the local health authorities
 - ↳ within the international network, the institutes share their knowledge, their research programs and keep control of the development of infectious diseases
 - ↳ A major partner for international institutions, Foundations, Governments and industrials

In countries with high incidence and endemic infectious diseases



BSL3



The Institut Pasteur in Guinea



Mars 2014 : Epidémie à virus Ebola en Afrique de l'Ouest.
Rôle crucial des IP Paris et Dakar dans le diagnostic d'Ebola.



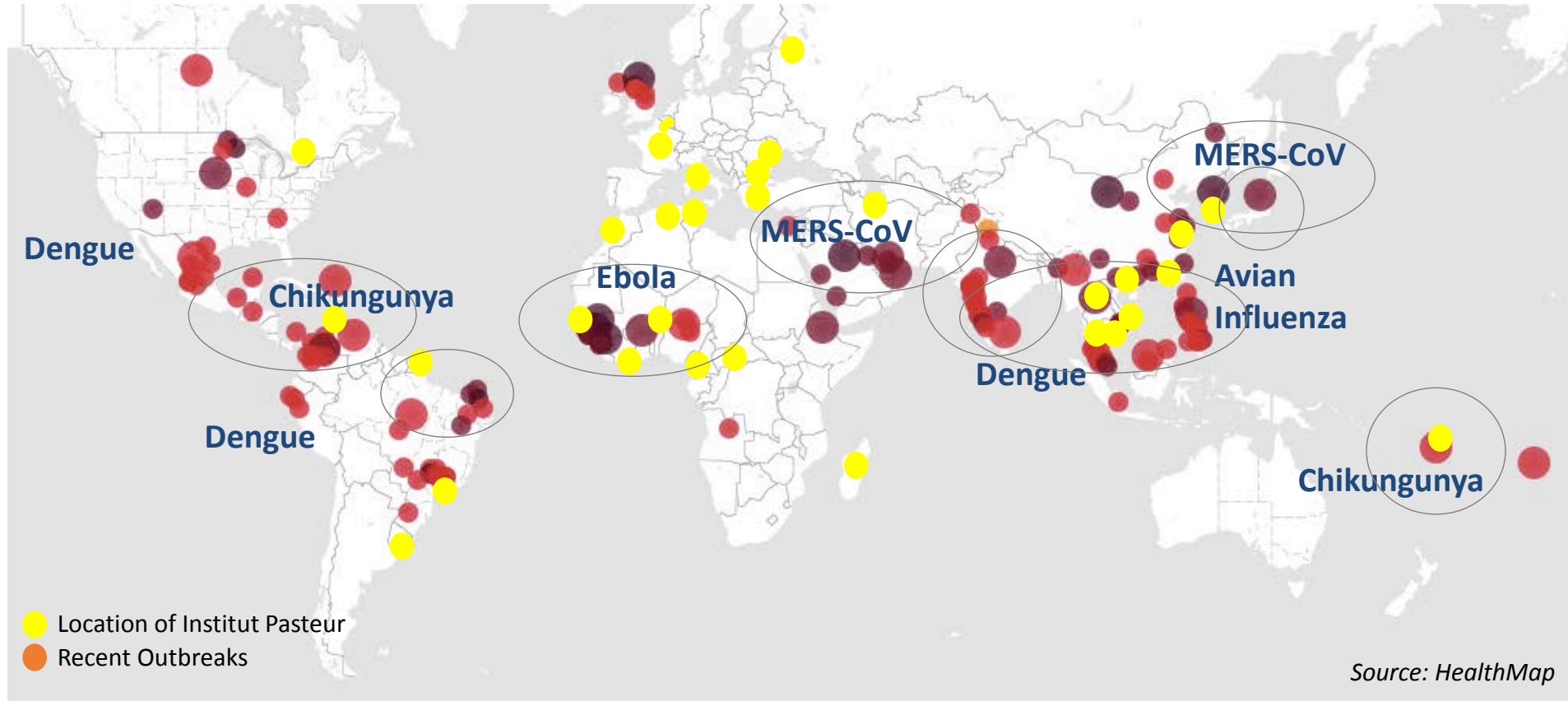
Novembre 2014 : Un laboratoire à Macenta.



Novembre 2016 : Une première pierre pour l'Institut Pasteur de Guinée.



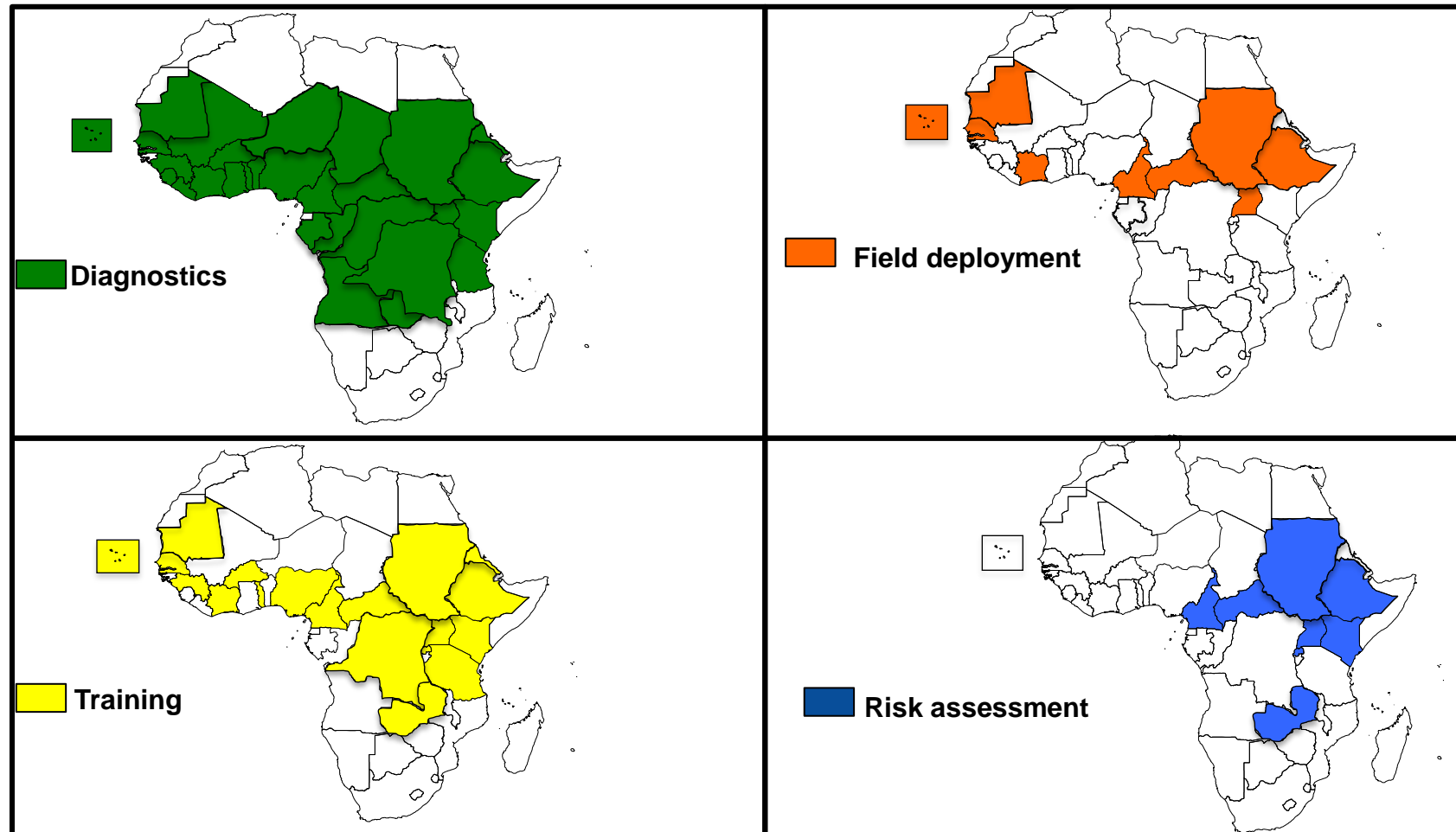
Novembre 2015 : Signature du protocole d'accord du futur Institut Pasteur de Guinée.

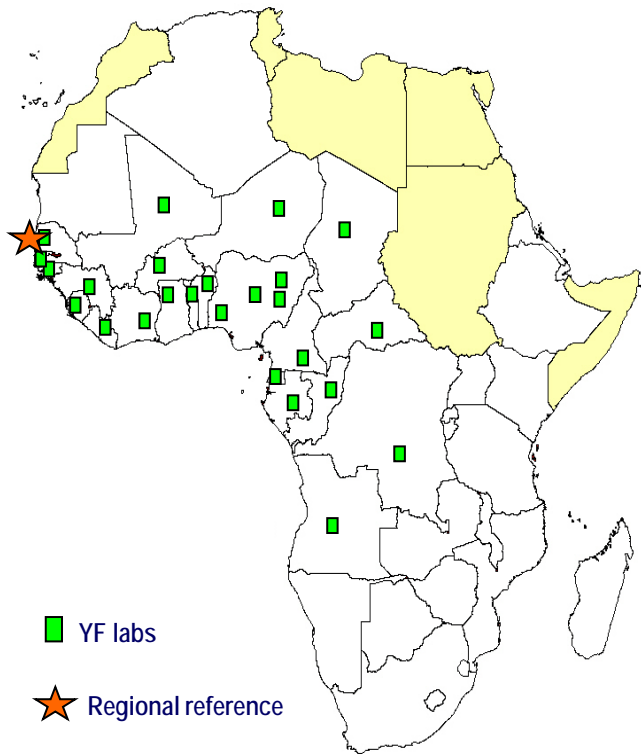


Solid foundation in the field • Established relationships with local governments • Recognized partner for outbreak response

International Institut Pasteur Network, a land opportunity...

- Unique and leadership position in various areas





1% Yellow fever and 99% unknown etiologies



Case study in Senegal

- Plasmodium falciparum
- Borrelia Crocidurae
- Hepatitis A, B, C, D, E, G
- Salmonella enterica, Typhimurium
- New Virus

WHO surveillance labs network
7000 suspected cases/ year
Acute jaundice & Fever
from 20 countries

International Institut Pasteur Network, a land opportunity...

• New emerging and re-emerging pathogens

• Rift Valley fever virus

- Mauritania en 2012
- Senegal in 2013

• Dengue virus in 2013

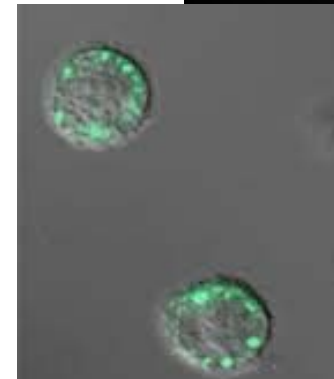
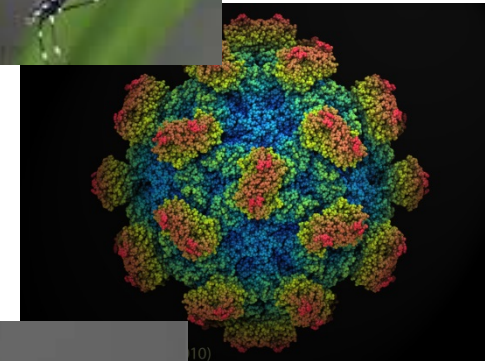
- Dengue 1 in Angola and Cape verde
- Dengue 2 in Ethiopia
- Dengue 3 in Burkina Faso

• Hepatitis E virus in Senegal in 2014

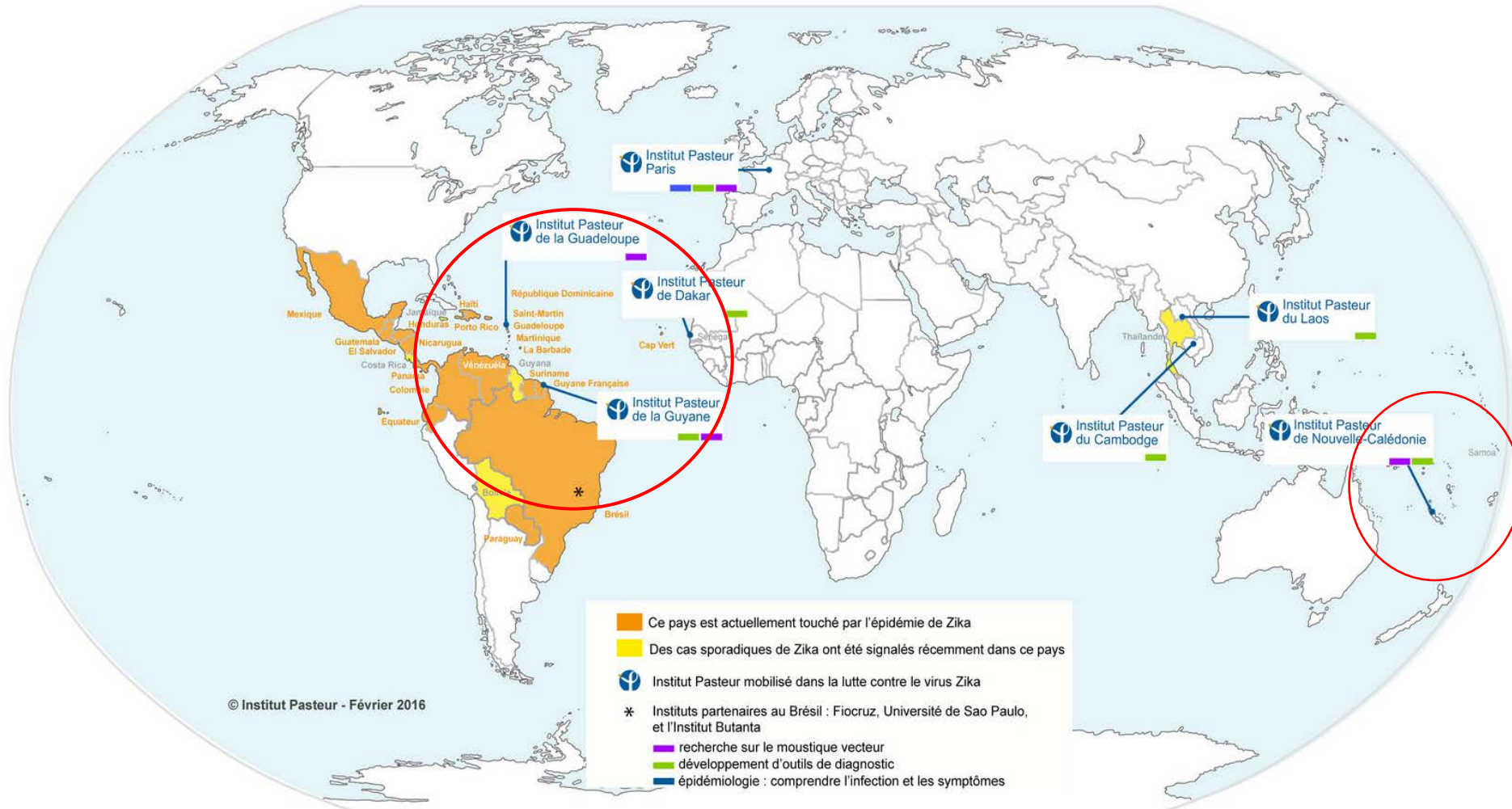
• Zika Fever in french polynesia and Brazil, Caraibeian area

• Ebola virus in Guinea

• Yellow fever



The Institut Pasteur International network mobilized against ZIKA



International partnerships

ASIA

- China CHINESE ACADEMY OF SCIENCES
- Japan RIKEN, IMSUT Institute of Medical Science, University of Tokyo, NIID National Institute of Infectious Diseases, JICA-JST
- Korea, ASIP

USA

- DHHS/ASPR Dep. of Health and Social Services
- NIH National Institutes for Health
- CDC American Center for Disease Control
- USAID US Agency for International Development
- GEIS Global Emerging Infectious System
- PEPFAR President's Emergency Plan for AIDS Relief

CENTRAL AND SOUTH AMERICA

- Mexico, CONACYT Mexican National Council for Science and Technology
- Peru, Ministry of HEALTH OF PERU
- Colombia, in process
- Argentina, in process

EUROPA

- WHO (Switzerland)
- WELLCOME TRUST (UK)

Pasteur International Network Association becomes an NGO in official relations with WHO

During its 138th session on January 30, 2016, the Executive Board of WHO admitted the Pasteur International Network Association as an institution "in official relations with WHO".

The Association gathers all the 33 institutes of the Network.

It is a great step for the recognition of the Association and the Institut Pasteur International Network as an important non-state actor in favour of global public health.

This status will allow the Association, representing the Pasteur Network, to:

- ▶ participate (without right of vote) to WHO's meetings and especially to the General Assembly
- ▶ submit a memorandum to the WHO Director-General.



Scientific Consortia



Leishmaniasis

SEA Encephalitis



Emergent viruses surveillance



One Health surveillance



Mother/Child and AMR



Environmental impact



Malnutrition/microbiome

Karma Project: K-13 Artemisinin Resistance Multicentre rapid Assessment



Context

Malaria control & elimination

Major threaten

Emergence of artemisinin resistant parasites in South east Asia and spread to Africa

ARTICLE

doi:10.1038/nature12876

A molecular marker of artemisinin-resistant *Plasmodium falciparum* malaria

Frédéric Arie^{1,2†}, Benoit Witkowski³, Chanaki Amaratunga⁴, Johann Beghain^{1,2†}, Anne-Claire Langlois^{1,2}, Nimol Khim³, Saorin Kim³, Valentine Duru³, Christiane Bouchier⁵, Laurence Ma⁵, Pharath Lim^{3,4,6}, Rithea Leang⁶, Socheat Duong⁶, Sokunthea Sreng⁶, Seila Suon⁶, Char Meng Chuor⁶, Denis Mey Bout⁷, Sandie Ménard^{8†}, William O. Rogers⁹, Blaise Genton¹⁰, Thierry Fandeur^{1,3}, Olivo Miotto^{11,12,13}, Pascal Ringwald¹⁴, Jacques Le Bras¹⁵, Antoine Berry^{8†}, Jean-Christophe Barale^{1,2†}, Rick M. Fairhurst^{4*}, Françoise Benoit-Vical^{16,17*}, Odile Mercereau-Puijalon^{1,2*} & Didier Ménard^{3*}

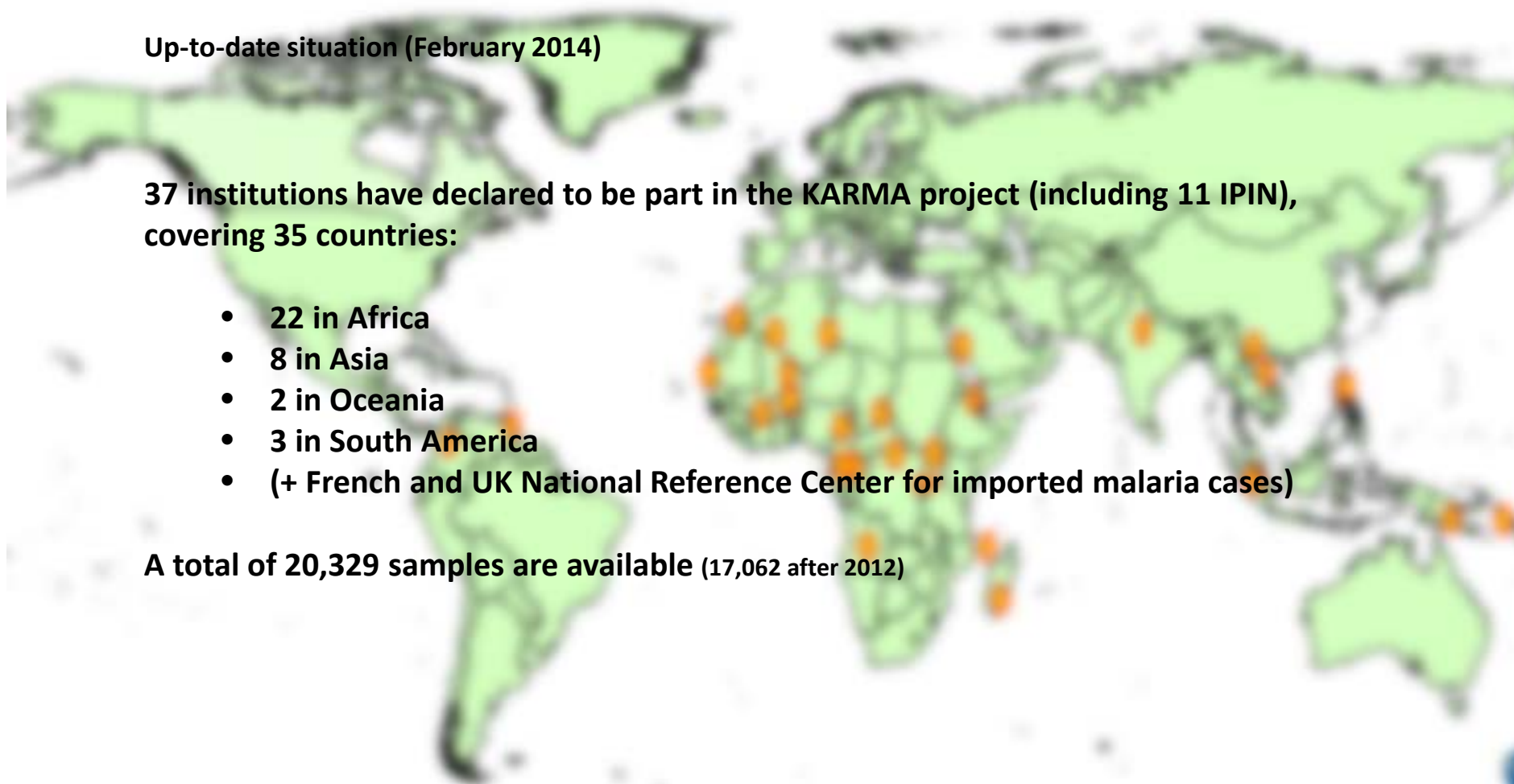
Leadership in the discovery of a genetic marker of *P. falciparum* resistance to artemisinin (K13) (Arie et al, Nature 2014)



Support of WHO for playing a key role in using this marker for a global tracking and monitoring of artemisinin-resistance

RIIP/IP have a privileged position for deciphering the molecular and immunological mechanisms underlying the emergence of artemisinin resistant parasites.

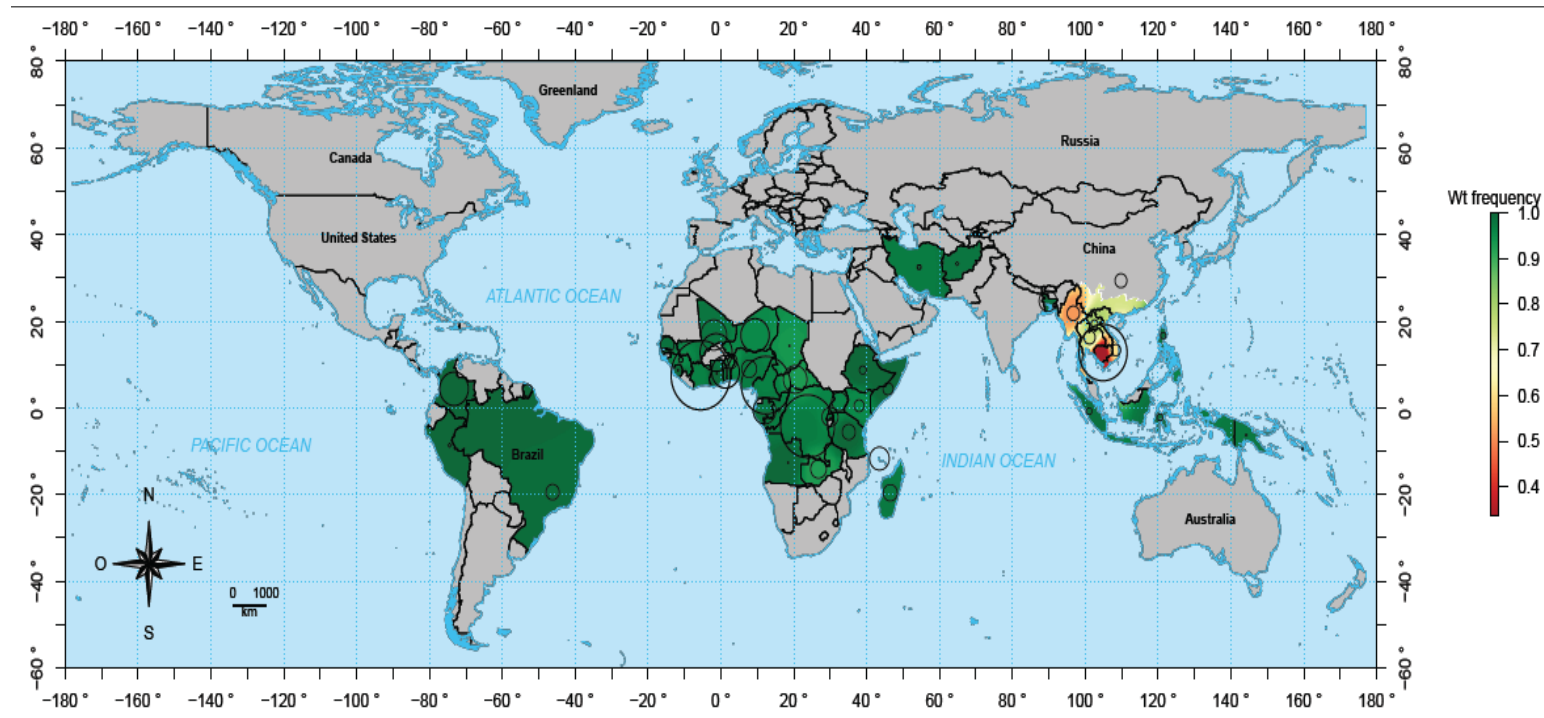
Karma Project: K-13 Artemisinin Resistance Multicentre rapid Assessment



Plasmodium falciparum artemisinin resistance

KARMA: K13 Artemisinin Resistance Multicenter Rapid Assessment

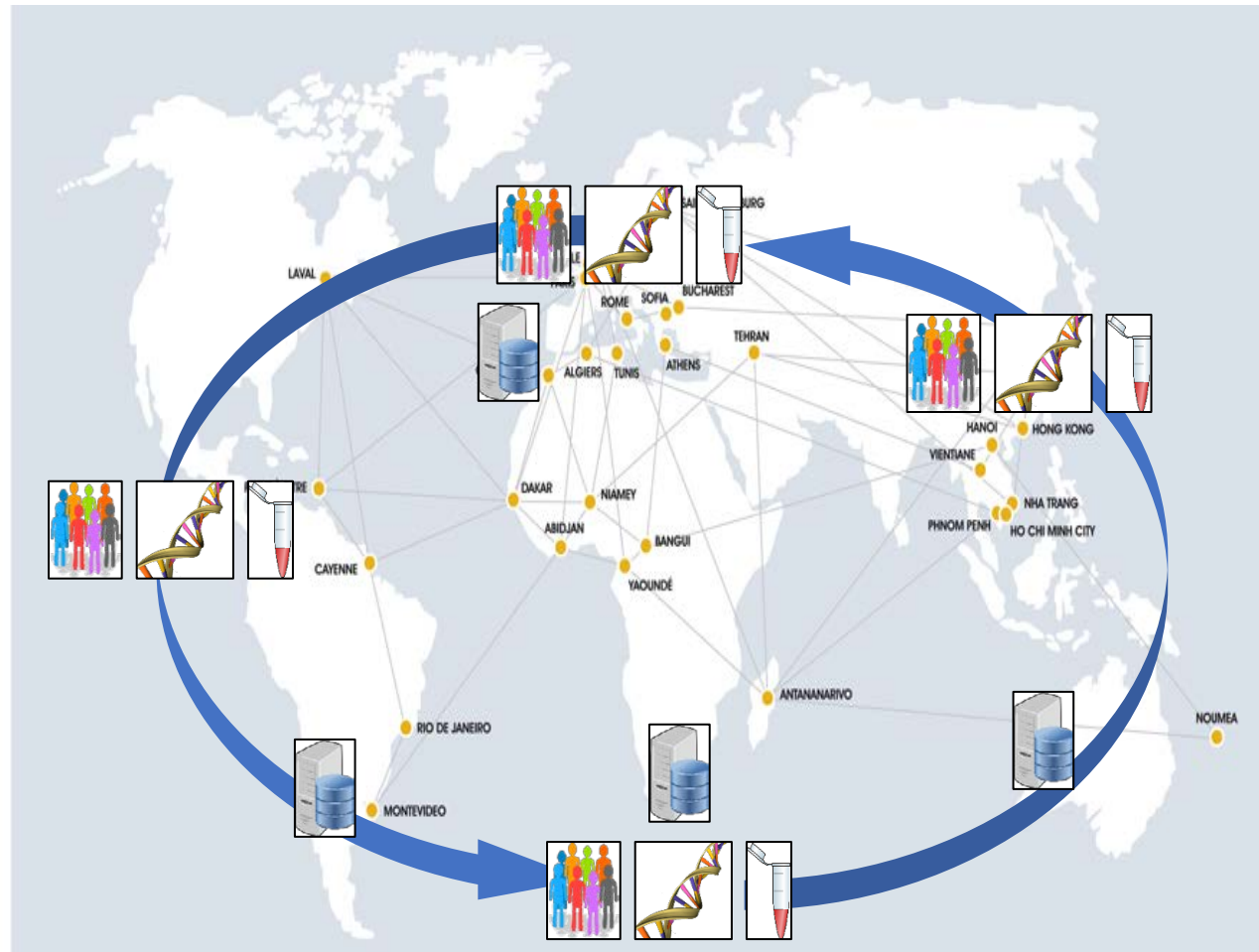
- Asia: high prevalence of Artemisinin resistance mutants (36.5% of the parasites with K13 non-synonymous mutation) and distinct dominant originating from multiple independent events (Cambodia-Vietnam-Lao PDR and Thailand-Myanmar-China)
- Africa: Africa is free of Artemisinin resistance-associated Asian alleles



ORIGINAL ARTICLE

A Worldwide Map of *Plasmodium falciparum* K13-Propeller Polymorphisms

D. Ménard, N. Khim, J. Beghain, A.A. Adegnika, M. Shafiul-Alam, O. Amodu, G. Rahim-Awab, C. Barnadas, A. Berry, Y. Boum, M.D. Bustos, J. Cao, J.-H. Chen, L. Collet, L. Cui, G.-D. Thakur, A. Dieye, D. Djallé, M.A. Dorkenoo, C.E. Eboumbou-Moukoko, F.-E.-C.J. Espino, T. Fandeur, M.-.-F. Ferreira-da-Cruz, A.A. Fola, H.-P. Fuehrer, A.M. Hassan, S. Herrera, B. Hongvanthong, S. Houzé, M.L. Ibrahim, M. Jahirul-Karim, L. Jiang, S. Kano, W. Ali-Khan, M. Khanthavong, P.G. Kremsner, M. Lacerda, R. Leang, M. Leelawong, M. Li, K. Lin, J.-B. Mazarati, S. Ménard, I. Morlais, H. Muhindo-Mavoko, L. Musset, K. Na-Bangchang, M. Nambozi, K. Niaré, H. Noedl, J.-B. Ouédraogo, D.R. Pillai, B. Pradines, B. Quang-Phuc, M. Ramharter, M. Randrianarivelosia, J. Sattabongkot, A. Sheikh-Omar, K.D. Silué, S.B. Sirima, C. Sutherland, D. Syafruddin, R. Tahar, L.-H. Tang, O.A. Touré, P. Tshibangu-wa-Tshibangu, I. Vigan-Womas, M. Warsame, L. Wini, S. Zakeri, S. Kim, R. Eam, L. Berne, C. Khean, S. Chy, M. Ken, K. Loch, L. Canier, V. Duru, E. Legrand, J.-C. Barale, B. Stokes, J. Straimer, B. Witkowski, D.A. Fidock, C. Rogier, P. Ringwald, F. Ariey, and O. Mercereau-Puijalon, for the KARMA Consortium*



The Institut Pasteur is moving to establish a global framework for reproducible research with **unified bio-banking, data storage, management and analysis.**

Resources will be connected and shared through the **IP cloud for data analysis.**

Open Health
Resource HUBs

Global Health Genomics Center

A coordinated network of resource hubs covering all continents and providing bio-banking, data generation (sequencing, spectrometry, cytometry, etc.), data storage and high performance computing resources for the Global Health Genomics Center

