European Parliament
Science and Technology Options Assessment

Antibiotic resistance: strategy and activities of the Institut Pasteur

Philippe Glaser

STOA working breakfast

Solving Antibiotic Resistance

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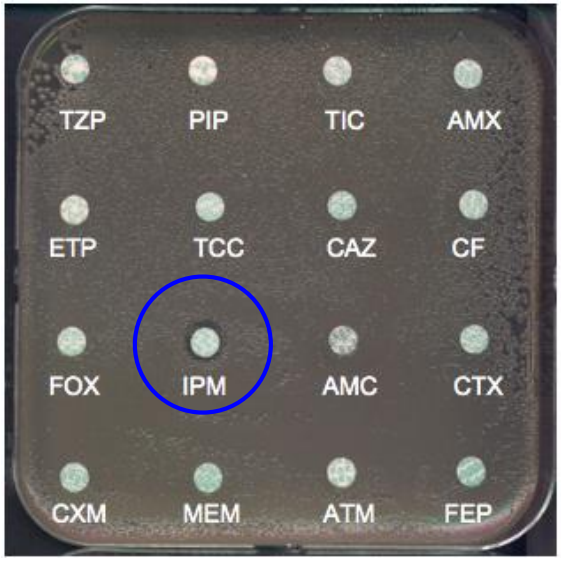
Antibiotic resistance (AMR) towards a dangerous situation

70 Years ago

Today



⇒ Some microbial infections are resistant to all currently used antibiotics

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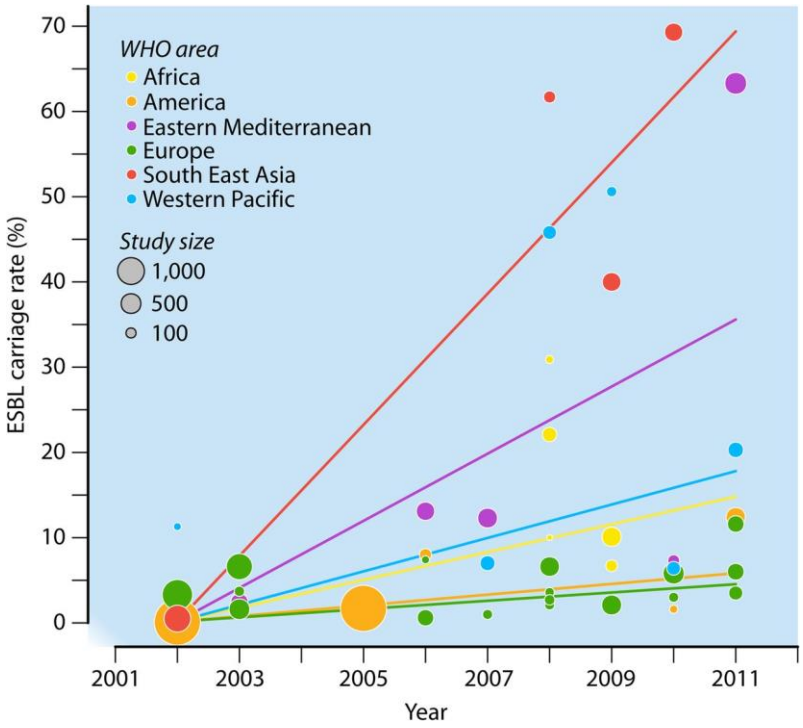
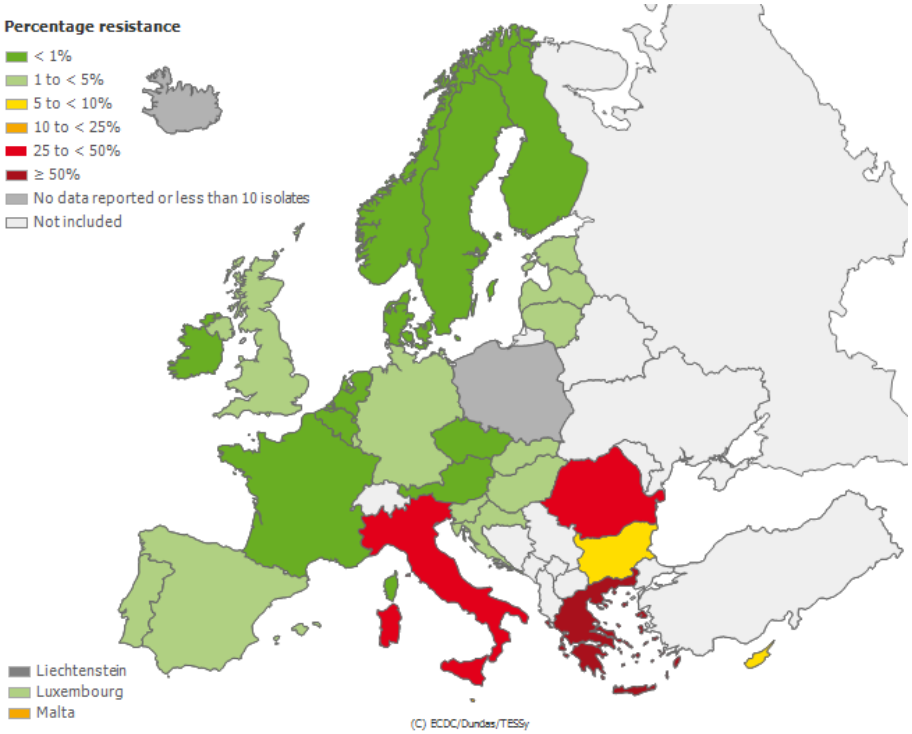
AMR is a global issue

Digestive carriage of ESBL Producing *Enterobacteriaceae*



Rate of bacteraemia with carbapenem resistant *Enterobacteriaceae*



⇒ Increased risk of AMR infections or colonisations acquired overseas

Needs for research on antibiotics

- <u>Policy to slow the development and spread of AMR</u>
  - Reduce consumption in humans and in animals
  - Use the right Ab combination

⇒ Understanding the evolution, the dynamic and the ecology of antibiotic resistance

⇒ Smart surveillance in the hospital, the community

⇒ Improving diagnostic

- <u>New antibiotics</u>

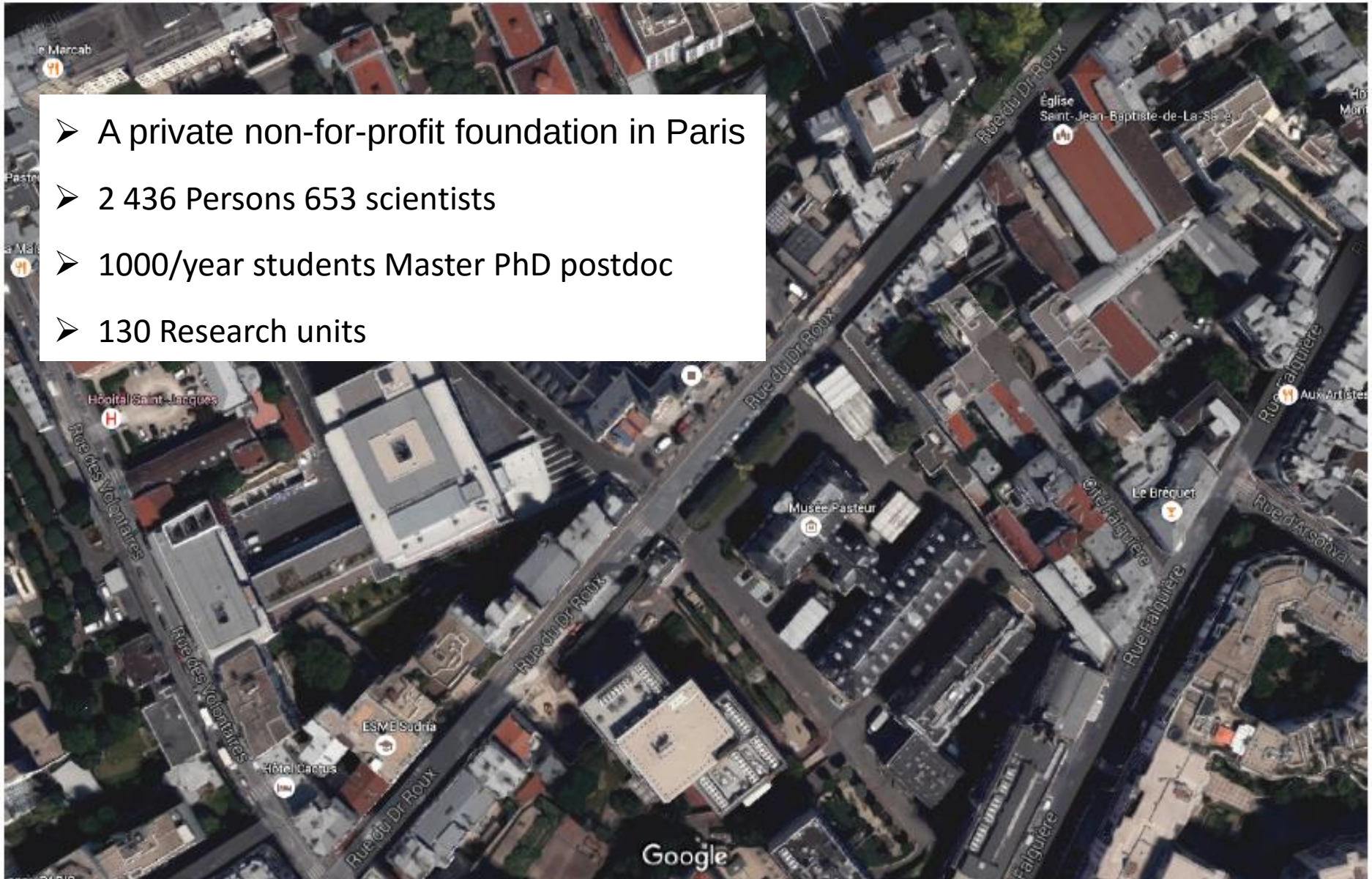
⇒ Identification and characterisation of new targets

⇒ Identification and synthesis of active molecules

⇒ Testing promising candidates

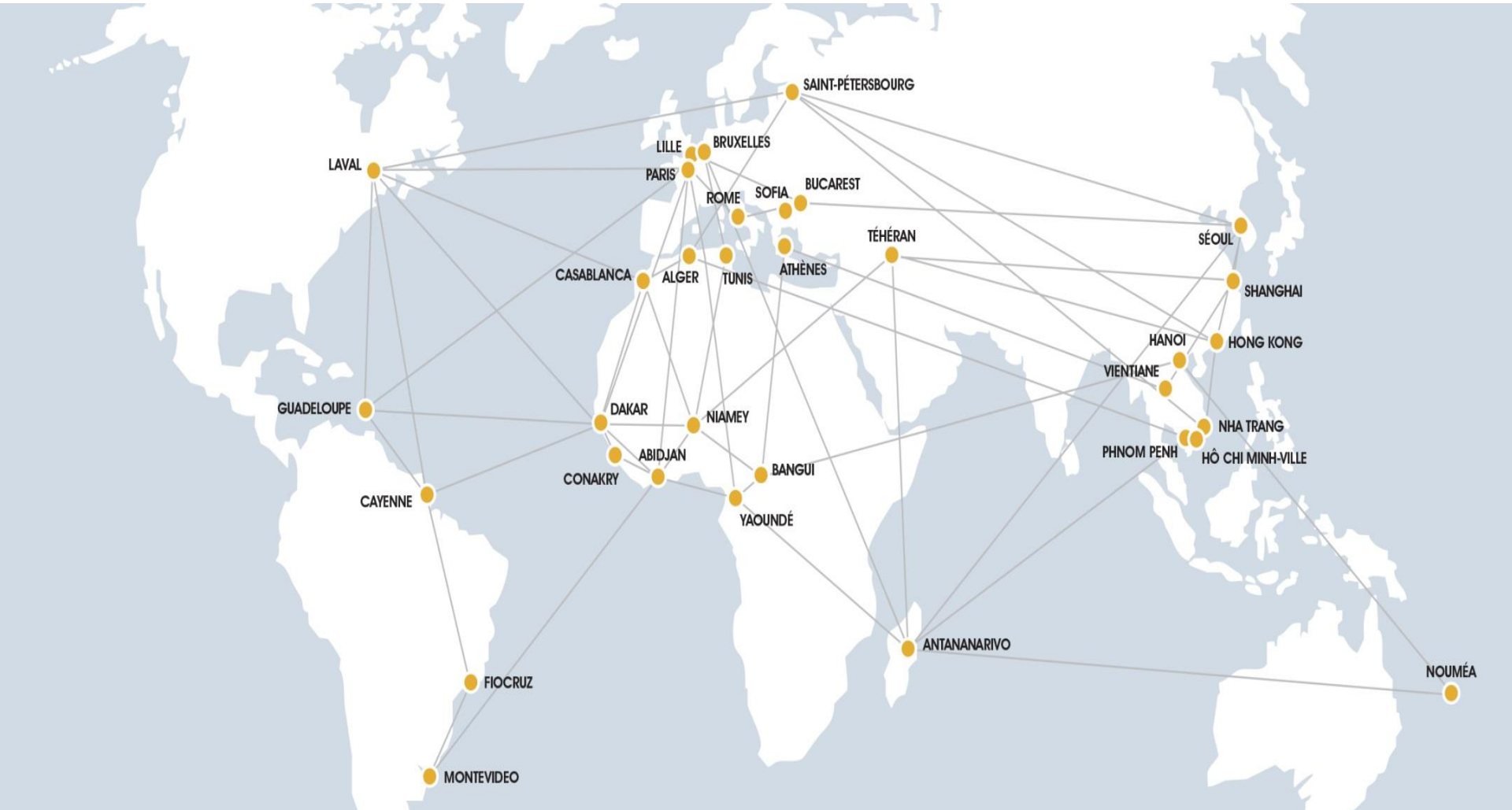
⇒ Vaccines and alternative strategies

The Institut Pasteur in Paris



- A private non-for-profit foundation in Paris
- 2 436 Persons 653 scientists
- 1000/year students Master PhD postdoc
- 130 Research units

Institut Pasteur International Network
33 Institutes in 26 countries



Four core missions of public interest

- Research
  - Fundamental and clinical research
- Education
  - Courses
  - Student training
- Public health
  - Epidemiology
  - National reference centres
- Valorisation of scientific research
  - technology transfer and industrial partnerships
  - Creation of start-up

=> The four missions contribute to the research on antibiotics

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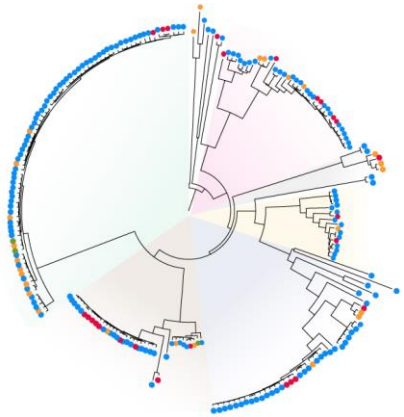
Understanding the emergence of antibiotic resistance

- Dissemination of antibiotic resistance results of
  - Dissemination of clones
  - Dissemination of antibiotic resistance genes



Emergence of GBS neonatal infection

Mobile genetic elements

- U. Bacterial Genomic Plasticity
- U. Ecology and Evolution of Antibiotic Resistance
- U. Microbial Evolutionary Genomics

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Public health and clinical research

- National reference centres: *Salmonella*, *Escherichia coli, Neisseria …* (also WHO centres)
- Implementing new technologies for molecular epidemiology and surveillance
- Partnership with APHP (Assistance Publique – Hopitaux de Paris): from bed to bench
  - Carbapenem resistant *Enterobacteriaceae* (NRC)
  - Antibiotic locks on catheters
- Epidemiological studies with the International Network
- A one health approach of AMR

Pasteur International Bioresources network

Center for Global Health

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New antimicrobial strategies and new antibiotics

- Characterization of new targets and design of new antibiotics
  - Structural biology units
  - Research on the bacterial cell wall:
    - U. Microbial Morphogenesis and Growth
    - U. Biology and Genetics of Bacterial Cell Wall
- Development of alternative strategies
  - Vaccines
  - Phagotherapy
  - CRISPR-cas9 targeting MDR strains

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Teaching and training

- Long lasting tradition in teaching fundamental and clinical microbiology
- Two courses on antibiotics:
  - Pasteur-Mérieux Course: Advanced Course on Antibiotics.
  - Résistance bactérienne aux antibiotiques
- Epidemiology and public health courses

First Pasteur course, 1889
« microbie technique »

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Institut Pasteur as a *Centre for antimicrobial research*

international network Institut Pasteur

Courses and training

Fundamental microbiology, Immunology

Public health clinics and epidemiology

Technology transfers

National and international collaborations, industrial partnerships

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