StARE

Stopping Antibiotic Resistance Evolution

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Water JPI
Pilot Call Kick-off meeting
11th of March 2015, Brussels

Why StARE?

- European COST Action DARE (Detecting evolutionary hotspots of antibiotic resistance in Europe, TD 0803; http://www.cost-dare.eu/) - 2009 - 2013.
- Interdisciplinary group - 20 European countries and 123 scientists (e.g. engineers, microbiologists, chemists, veterinarians, and physicians, working at universities, research institutes, and national health and veterinary agencies).
- Overview of the problem: major gaps of knowledge and possible solutions

Why StARE?

- Urban wastewater treatment plants (UWTP) are major reservoirs and environmental suppliers of antibiotic residues (A) and antibiotic resistant bacteria (ARB) and genes (ARG)

- The inexistence of recommendations regarding the use of standardized methods to measure A, ARB and ARG in the environment is a major obstacle for any attempt of environmental surveillance

- The inexistence of organized databases of A, ARB and ARG occurrence in wastewater across different EU regions, as exists for clinical ARB, limits the evaluation of factors promoting AR dissemination, identification of critical control points and reliable risk assessment procedures

- Need of technological solutions that can prevent the environmental contamination with A, ARB and ARG – evaluated based on efficiency and cost-effectiveness

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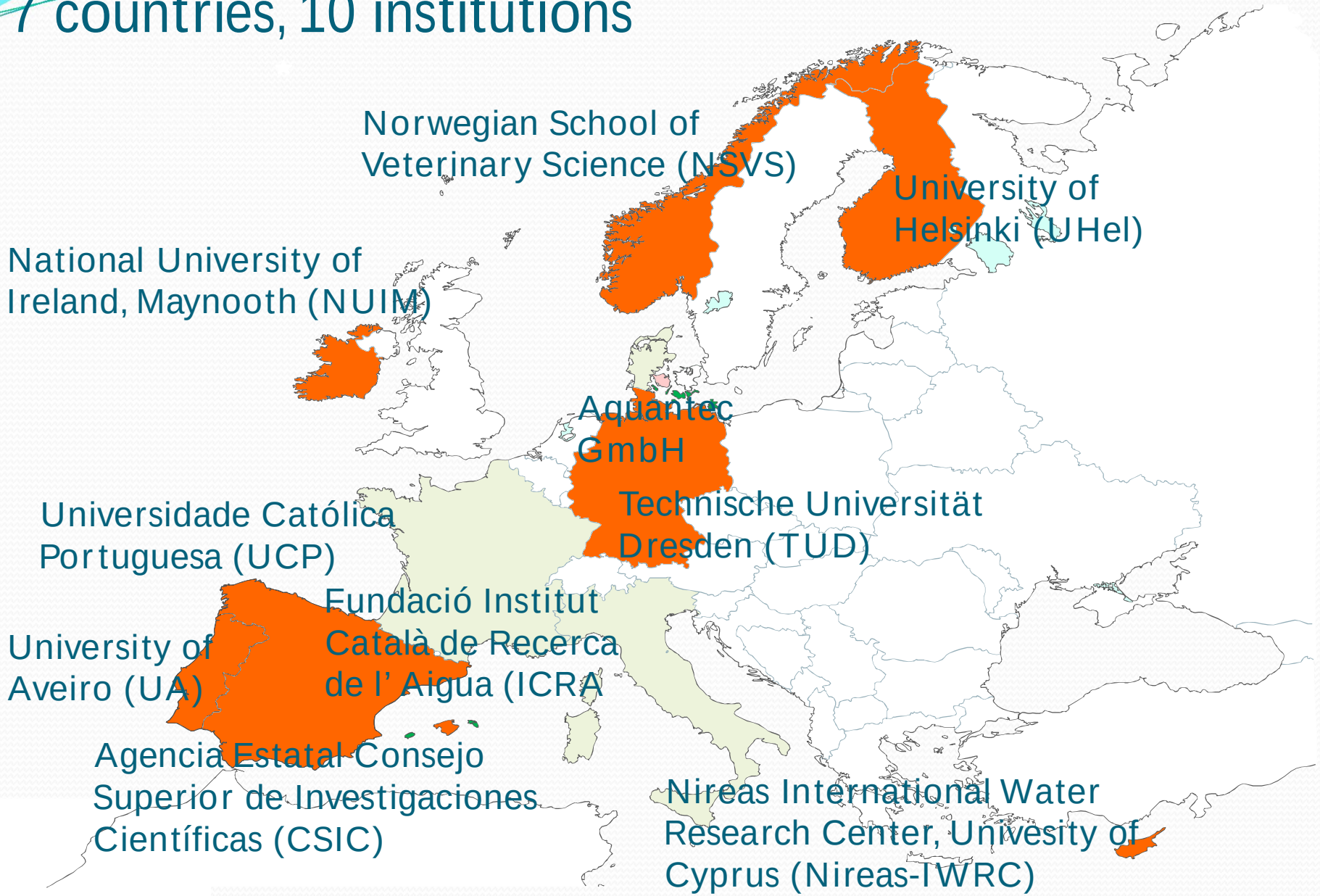
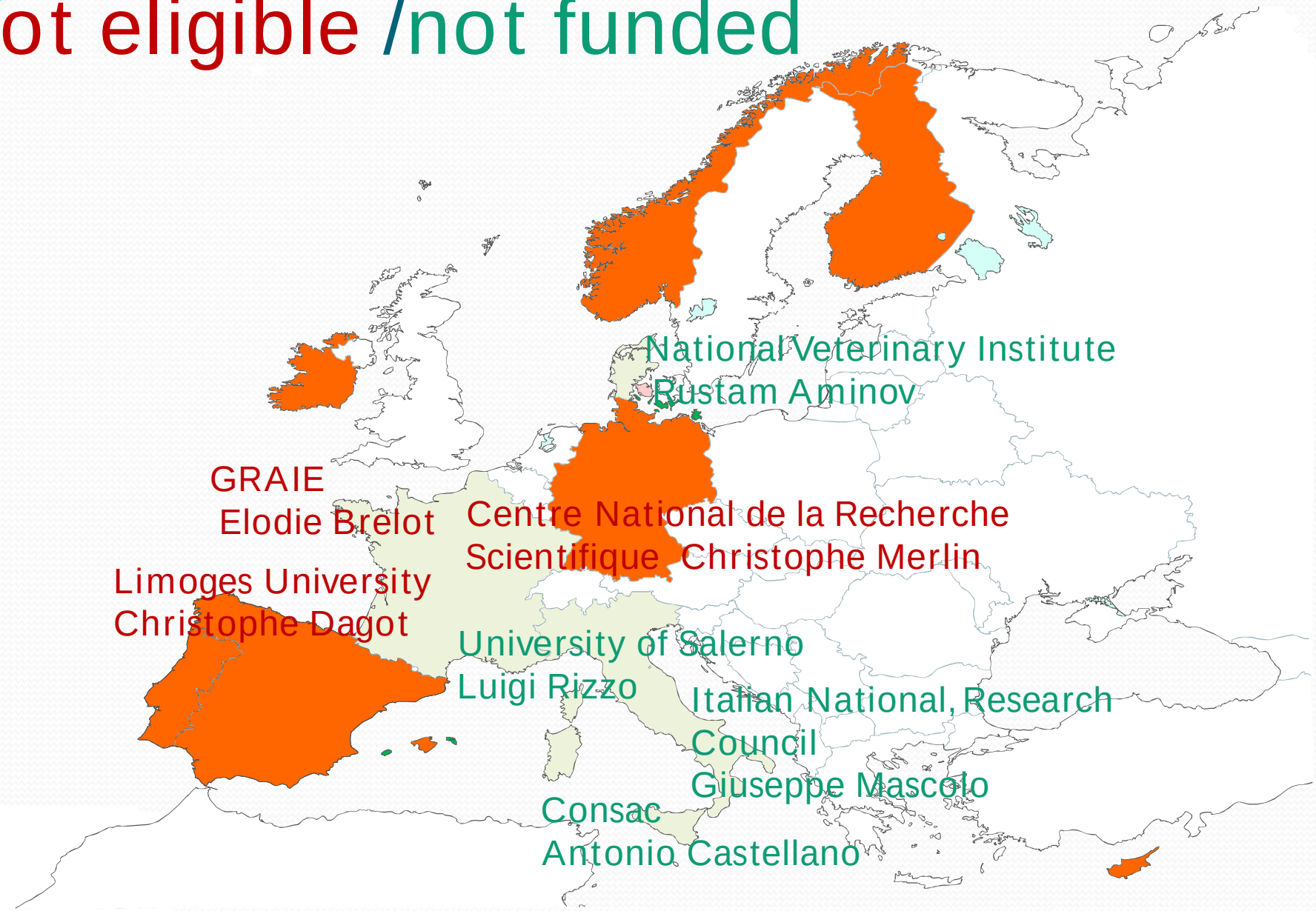
Partners
7 countries, 10 institutions



Not eligible /not funded



Who StAREs?
Multi-disciplinary team

Microbiology * Molecular Biology * Bioinformatics
Analytical Chemistry * Wastewater Treatment Engineering
ANTIBIOTIC RESISTANCE EVOLUTION

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Javier Tamames

UNISA
Luigi Rizzo

NORMAN
Network of reference laboratories, research centres and related organisations for monitoring of emerging environmental substances

Valeria Dúlio
Jaroslav Slobodnik

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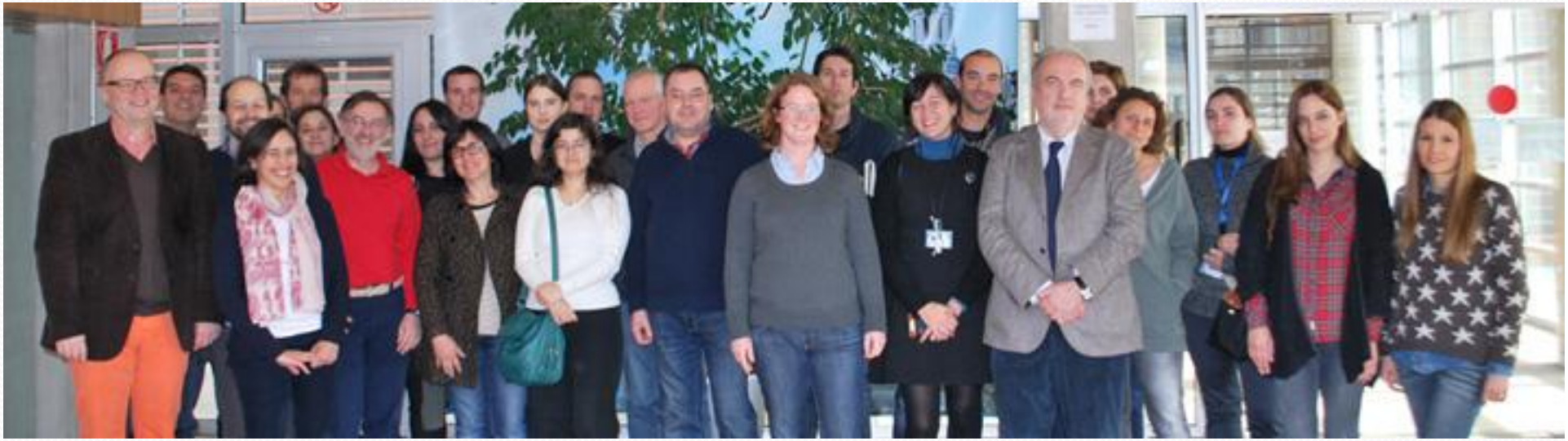

ICRA
Girona, Spain, kickoff meeting, 28-29 January 2015

Josep Mas-Pla - PERSIST
Carles Borrego -TRACE

StAREing for what?

- Harmonized (advanced) protocols
  - Develop simplified and cost-effective protocols
- Database: Antibiotics&Resistant Bacteria &Genes
  - Relationship with patterns of antibiotic consumption
  - Relationship with clinical ARB&ARG
- Critical sources/conditions for ARB&ARG spread
  - Improvement of conventional WW treatment
  - Advanced WW treatment technologies

StARE structure

- WP1 - Management
- WP2 - Antibiotics and Resistance in European Wastewater
- WP3 - Advanced Treatment Technologies for the Removal of Antibiotics, Antibiotic Resistant Bacteria and Resistance Genes from Wastewater
- WP4 - Effects of Wastewater Treatments on the Microbiome and Resistome
- WP5 - Communication and Dissemination and Guideline Development

SOURCES

MITIGATION

RISK

IMPACT

WP1: Management

European WWTPs – indicators monitoring

Different treatment combinations

CAS

- + UV + H_2O_2
- +Solar Fenton ± AC
- + Ozonation ± H_2O_2

MBR

- alone
- +Solar Fenton

WP2: Antibiotics and Resistance in WW

- Database of AR in WW around Europe
- Relationship antibiotics contamination – resistance prevalence

Standardized methods

Selection of indicators of AR in WW

WP3: Advanced Treatment Technologies

Selection of the most efficient treatments for resistance/antibiotics removal

WP4: Effects of WW Treatment on the Microbiome and Resistome

Effects on:

- bacterial community
- bacterial cell (physiology, stress response)
- gene (mutation, transfer)

Efficiency also to remove :

- Pathogenic bacteria
- other contaminants of concern

WP5: Communication, Dissemination and Guidelines Development

- Stakeholders
- General public
- Guideline development
- Scientific community
- Policy makers

Biological risk control of AR and WW technology

Scientific and societal relevance of StARE

- Start a DATABASE on A&ARG occurrence in wastewater treatment plants across EU
  - Relationship with environmental contamination with antibiotics?
  - Relationship with health care associated ARB&ARG?
- Improve WASTEWATER TREATMENT PROCESSES and identify CRITICAL CONTROL POINTS
  - Wastewater management
  - Contribution for policy making

StARE and stakeholders

- > 12 UWTP will be involved

- NORMAN is associated with the project (ARG database; WG5 Wastewater reuse)

- Stakeholders per StARE participating country (contact person, email)
- Flyer / newsletter to be sent to stakeholders, networks, relevant online magazines
- Info days/ workshops also in the framework of other projects (e.g. NEREUS COST Action ES1403)

Dissemination and exploitation of the results

- StARE website (under construction)
- Printed communication material
- Twitter, social media
- Members of StARE are leading national and European projects so other consortia and groups will be informed as well --- synergies will be exploited
- NEREUS COST Action ES1403 already includes 220 members from 29 EU countries, Jordan, Tunisia, USA, Australia, Singapore, Korea
- NORMAN network
- SETAC 2015; FEMS 2015
- Scientific publications
- Local dissemination: radio, TV, press, high schools, other

Mobility and collaborative research

- Mobility within the Consortium
  - UCP → CSIC (Bioinformatics and metagenome mining)
  - NIREAS → KIT (Molecular and physiology stress mechanisms)
  - ICRA → UCP (Antibiotic residues/ARG relationship)
  - TUD → NIREAS (Advanced wastewater treatment)
  - CSIC→ TUD (Modelling of the fate of ARG)
- Collaborative research and innovation during the project life and beyond
  - Center for Microbial Ecology, Michigan State University, East Lansing, MI, USA
  - Institute of Soil, Water and Environmental Sciences, Volcani Center, Agricultural Research Organization, Israel
  - Centre National de la Recherche Scientifique, France
  - Other ongoing projects

Encourage fundamental and/or applied research beyond the life of StARE

StARE combines applied and fundamental research (WP2, WP3, WP4)

- Database on A and ARG in wastewater
  - SURVEILLANCE (WHERE, WHEN, HOW?)
  - AR FROM THE ENVIRONMENT TO HUMANS?
- Improve wastewater treatment processes and identifify critical control points
  - WASTEWATER TREATMENT IMPROVEMENT
  - WASTEWATER POLICY/MANAGEMENT

Acknowledgements

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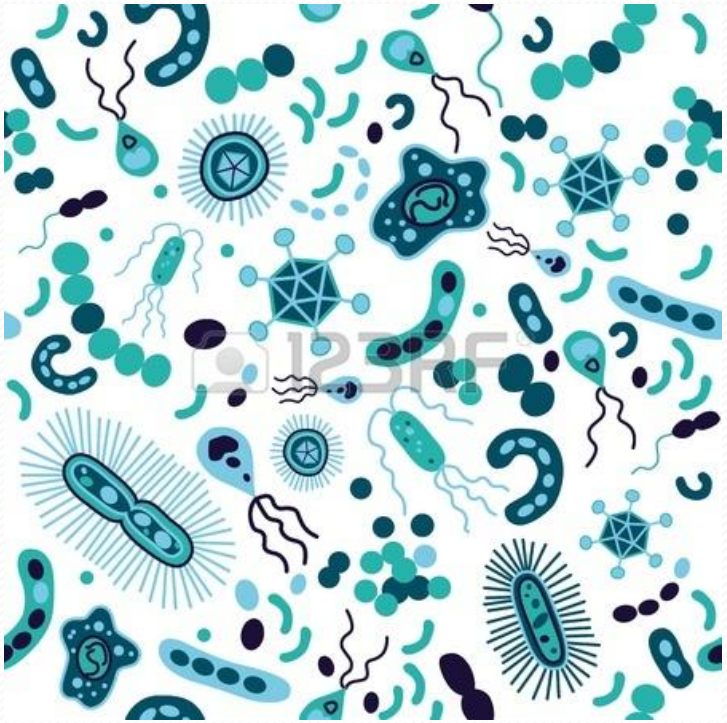
National Funding Agencies
Portugal
Spain
Cyprus
Germany
Ireland
Norway
Finland



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