

L2

Module "Agents Infectieux, Hygiène"

Infections à mycobactéries

Michel DRANCOURT

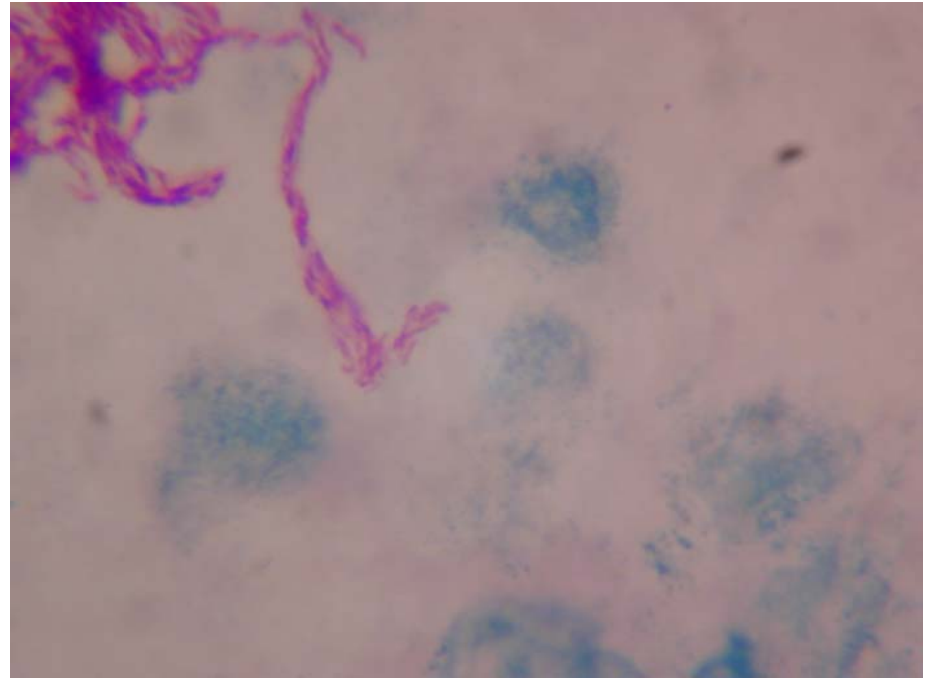
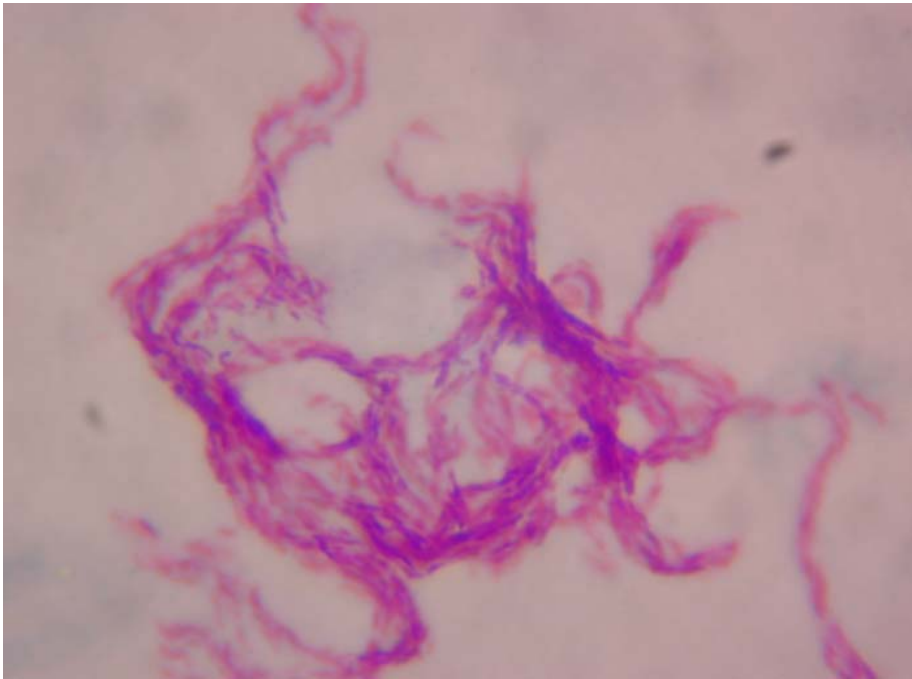
Aix Marseille Université – IHU Méditerranée Infection

MEPHI

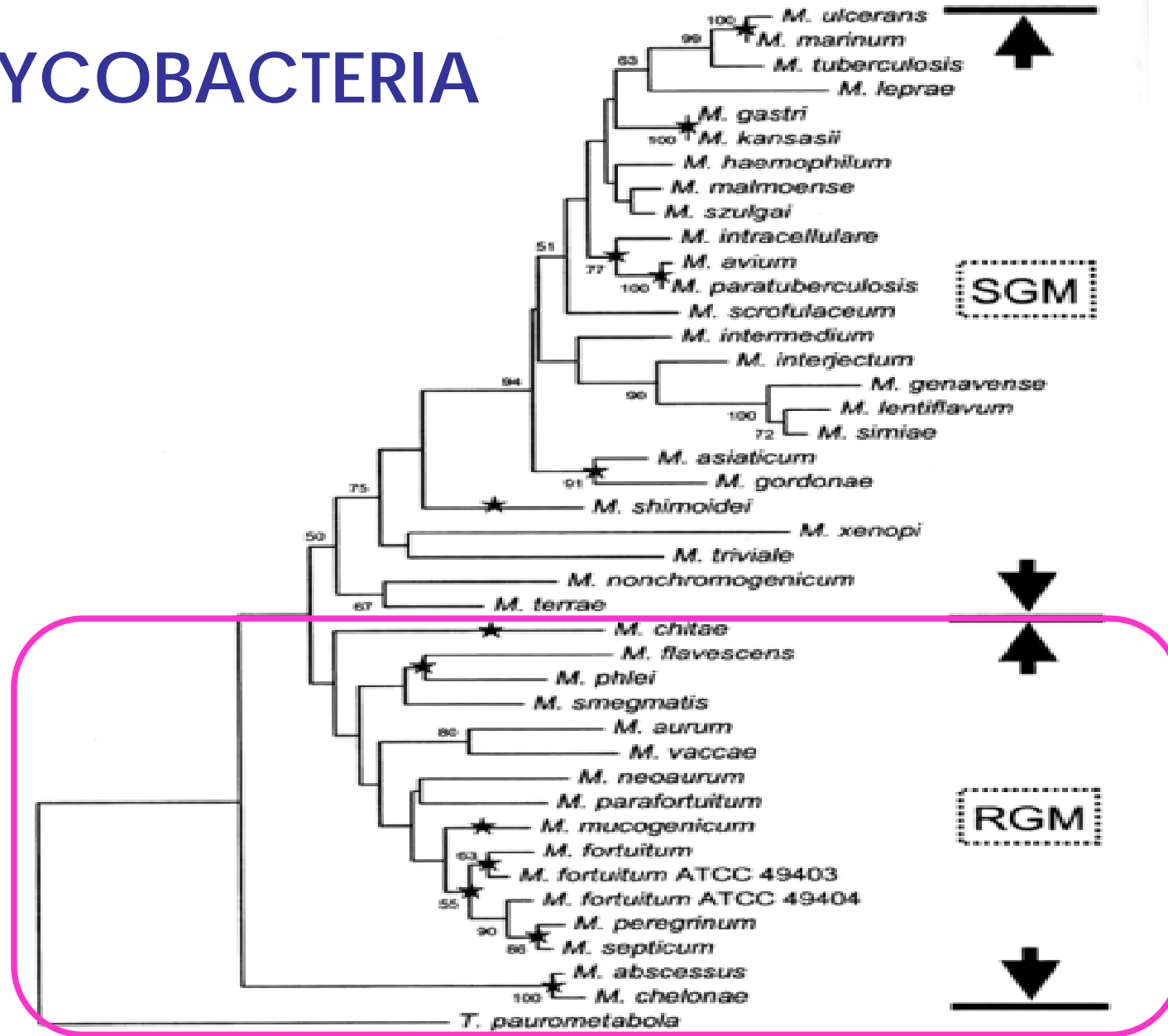
Les Mycobactéries

- **Bactéries colorées par la coloration de Ziehl**
- **Leur paroi contient des acides mycoliques**
- **Leur chromosome est caractérisé par un haut contenu GC de 62 - 70%**

M. tuberculosis : shell-vial technique



MYCOBACTERIA



(Kim et al. 2005)

Mycobactéries pathogènes

- Pathogènes obligatoires:
 - *M. tuberculosis* : tuberculose
 - *M. leprae* : lèpre
- Pathogènes opportunistes:
 - M. ulcerans* : ulcère de Buruli
 - Toutes les autres espèces

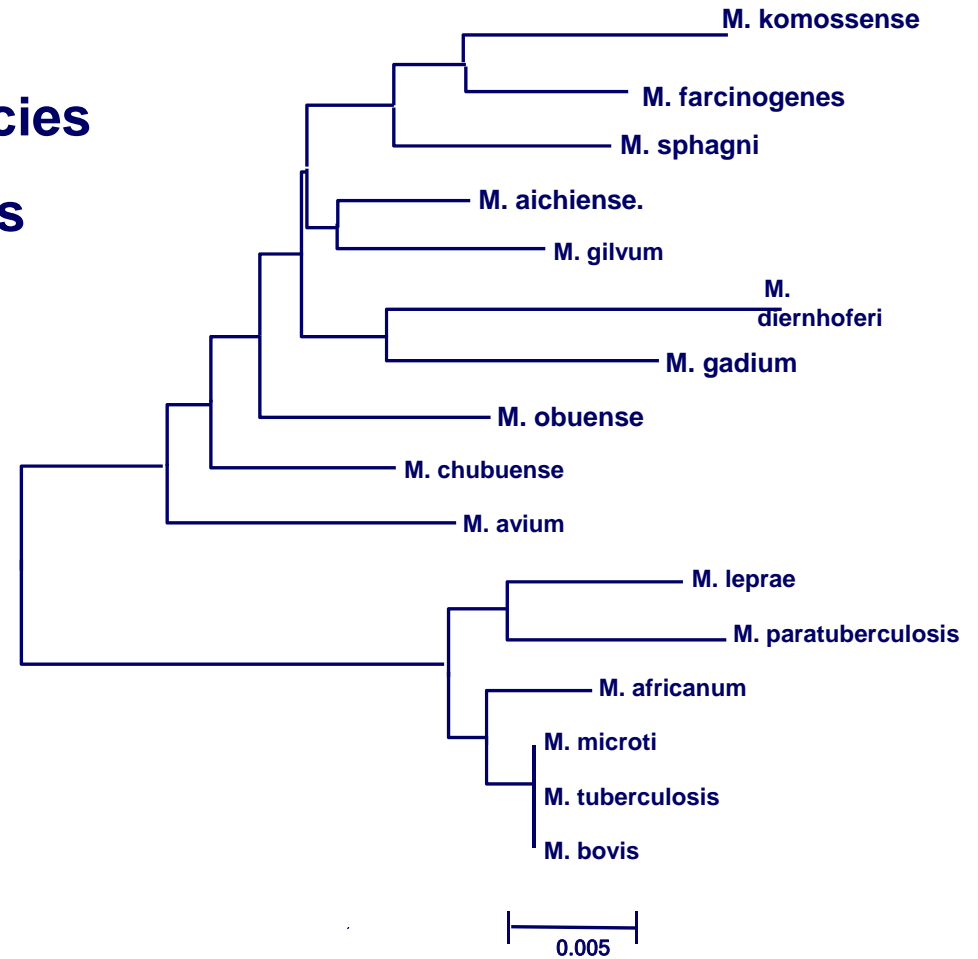
Tuberculose

M. tuberculosis

- Belongs to Actinobacteria

(high GC% gram positive bacteria)

- *M. tuberculosis* complex of 6 species
- Two complete genome sequences available
- Acid fast bacilli
- Grown on cultured cells



Tuberculosis

Strictly human disease

- Transmission through air
- Reactivation (Immunodepression)

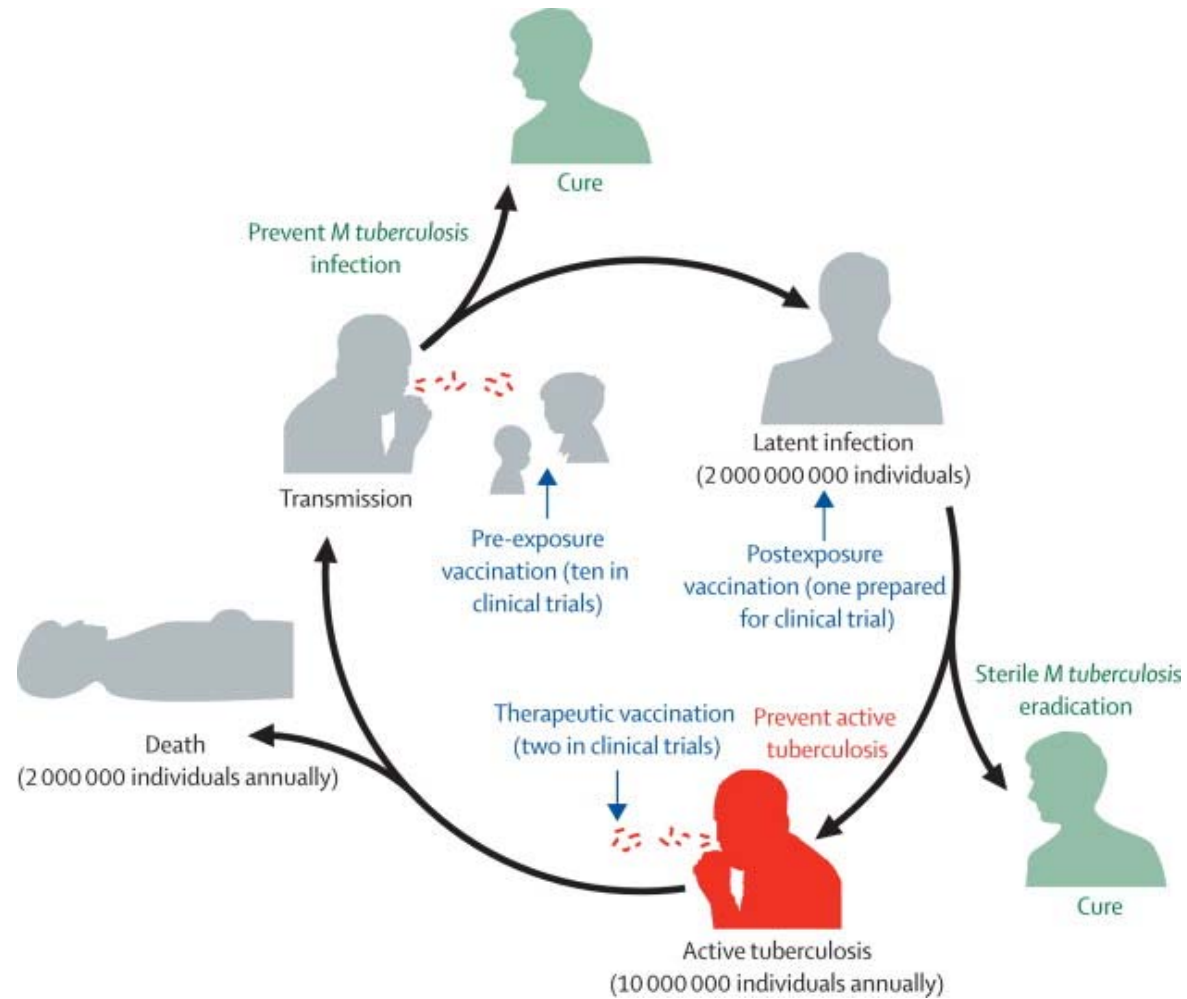
Prevalence unchanged

- Families regroupement
- Student group
- Hospital / Laboratory
- Homeless and prison
- Immunocompromized

Promiscuity

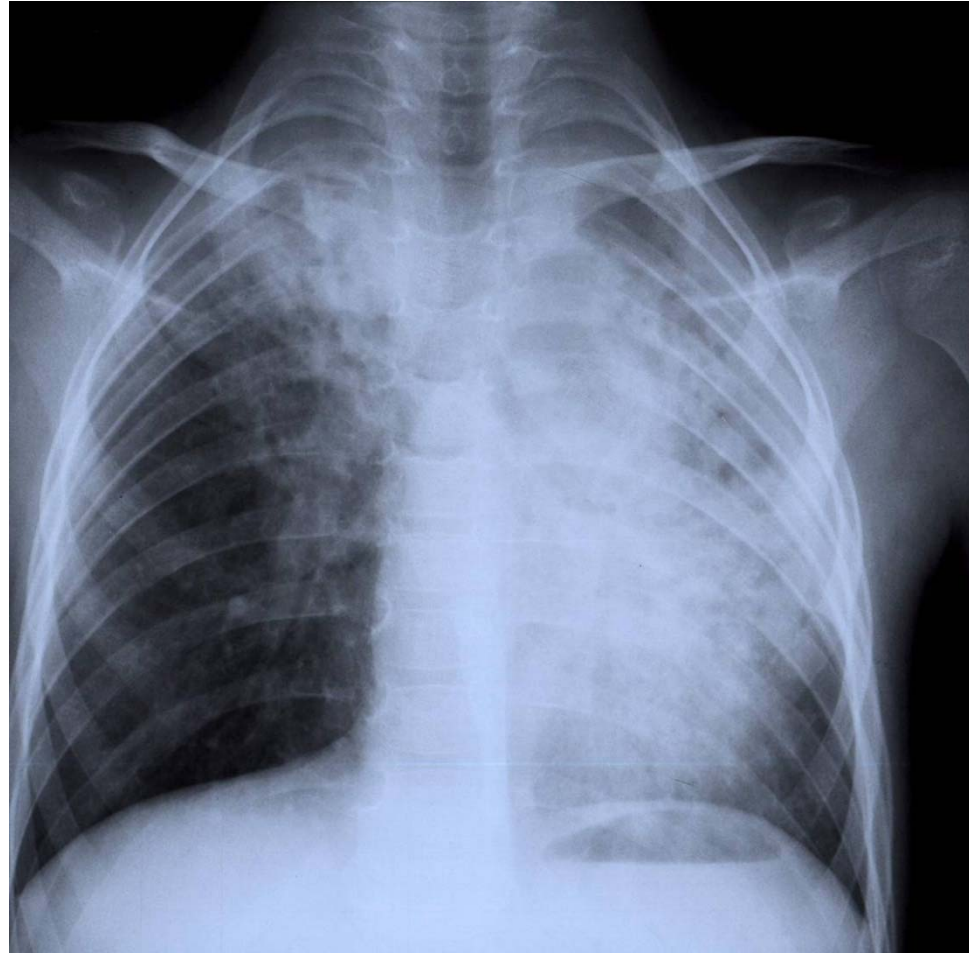
The life-cycle of Mycobacterium tuberculosis and different vaccination measures

Vaccines in clinical trials are aimed at prevention of active tuberculosis. Future vaccines should aim to prevent or eradicate *M. tuberculosis* infection.



Tuberculose pulmonaire

Radiographie du thorax du face



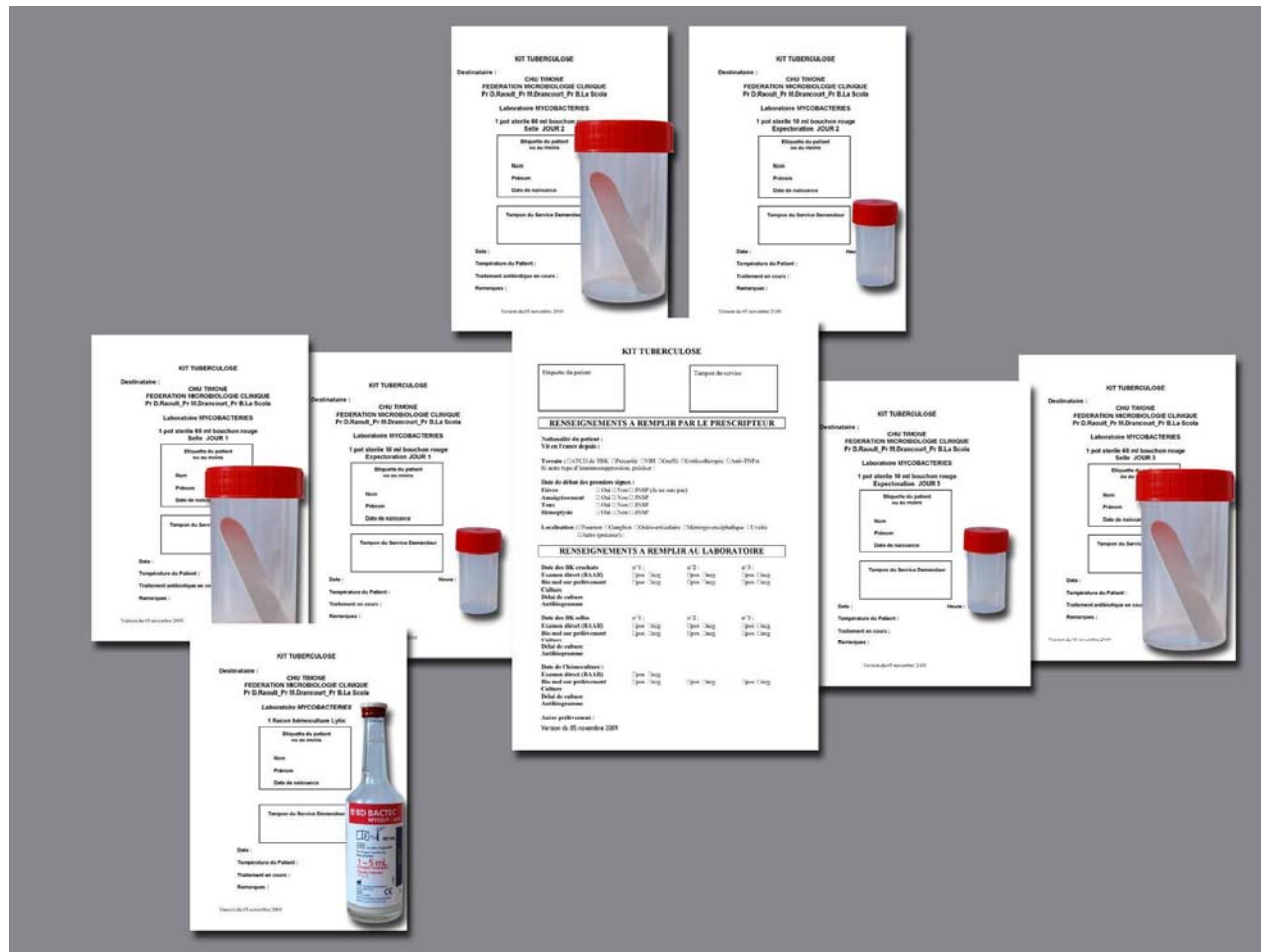
Ecrouelles : tuberculose ganglionnaire



Ecrouelles : tuberculose ganglionnaire



Tuberculose: diagnostic direct par culture



Mycobacterium tuberculosis : diagnostic microbiologique

- **Prélèvements**
- **Examen direct : coloration de Ziehl**
- **Détection moléculaire**
- **Isolement et culture**
- **Antibiogramme**

Diagnostic direct par PCR en temps réel



M. tuberculosis : Isolement et culture

➤ **Prélèvements : classe 2**

➤ **Souches : classe 3**

Automate de culture pour mycobactéries (BACTEC)



Isolement et culture de *Mycobacterium tuberculosis* sur gélose au sang

- ***M. tuberculosis* cultive sur milieux à l'œuf**
- **Mise en évidence fortuite de la croissance sur gélose au sang**
- **Etude systématique de la croissance sur gélose au sang**

M. tuberculosis: colonies
bactériennes sur gélose au sang



Mycobacterium tuberculosis complex

	Source	Infections humaines
<i>M. tuberculosis</i>	Homme	+++
<i>M. canettii</i>	Homme	++
<i>M. africanum</i> ++	Homme	
<i>M. bovis</i> BCG	Vaccin	++
<i>M. bovis</i>	Bovins	+
<i>M. microti</i>	Rongeurs	+
<i>M. caprae</i>	Caprins	-
<i>M. pinnipedii</i>	Phoques	-
<i>M. mungi</i>	Mangouste	-
<i>M. suricattae</i>		



Tuberculose: maladie à
déclaration obligatoire

Lèpre

Lèpre: lésions cutanées



Ulcère de Buruli



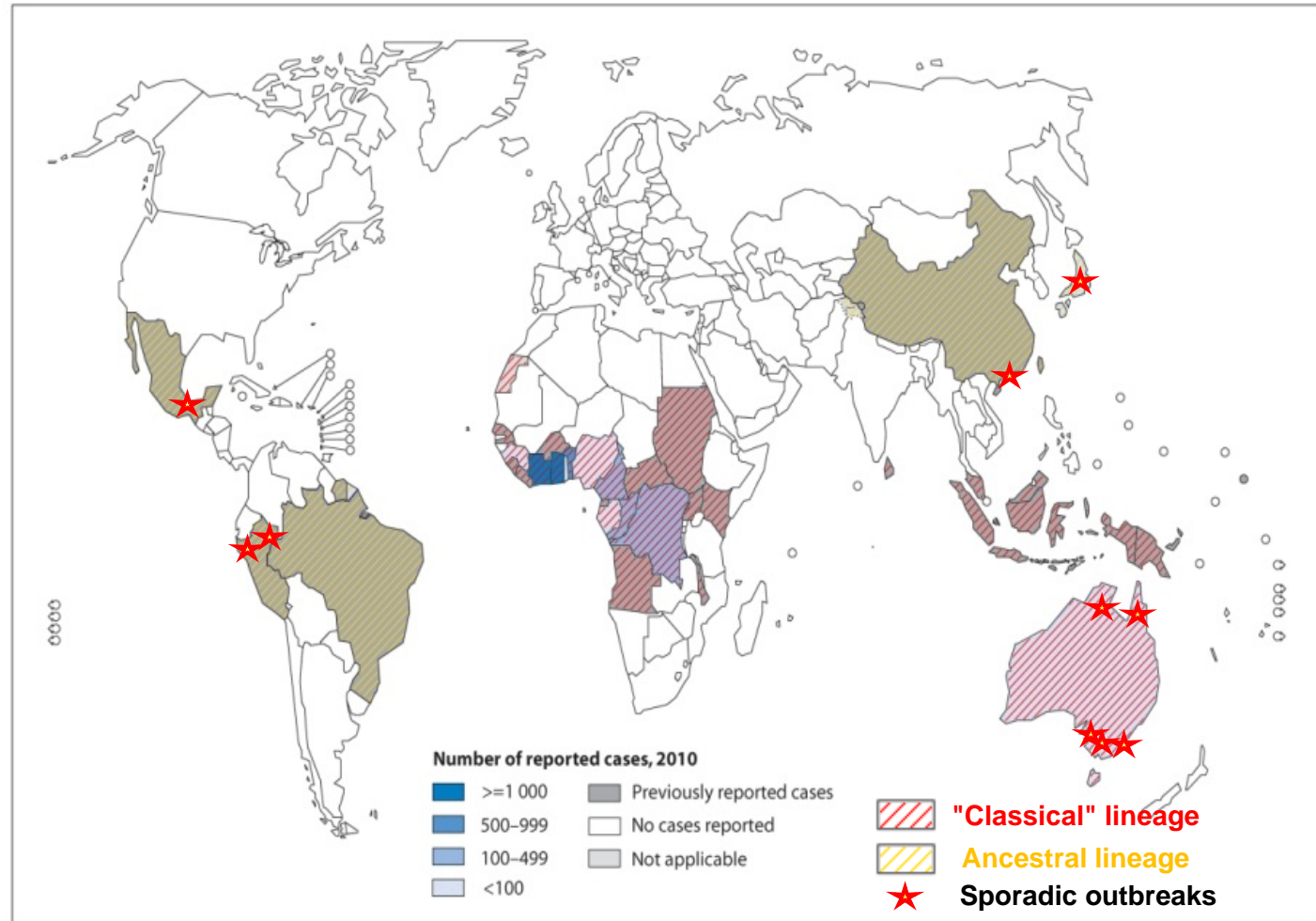
WHO 2009



Am J Trop Med Hyg. 2008



Emerg Infect Dis. 2007



Adapted from WHO 2011



UGMB, Institut Pasteur

M. ulcerans is the
causative agent of
Buruli Ulcer Disease

Reservoir of *M. ulcerans* is uncertain



Is *Mu* a waterborne mycobacteria ?

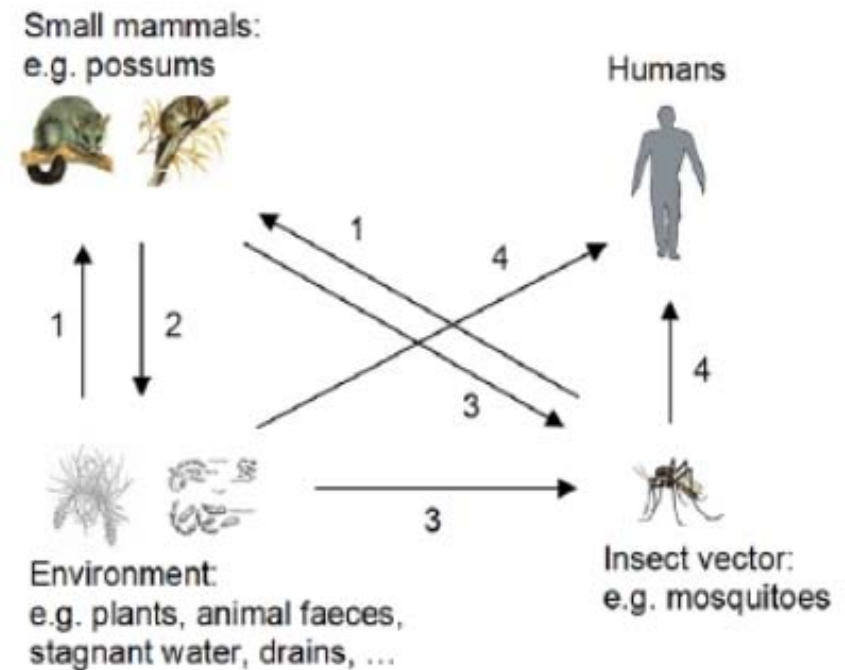
Portaels et al., *Clin Dermatol* 2009
Williamson et al., *PLoS Negl Trop Dis.* 2008
Merritt et al., *Front Ecol Environ* 2005



Possible specific trophic chain ?

Fyfe et al., *PLoS Negl Trop Dis* 2010
Marion et al., *PLoS Negl Trop Dis.* 2010
Wallace et al., *Appl Environ Microbiol.* 2010

Transmission unclear
→ impossible effective prevention



A NEW MYCOBACTERIAL INFECTION IN MAN

I. CLINICAL ASPECTS

P. MACCALLUM

**II. EXPERIMENTAL INVESTIGATIONS IN LABORATORY
ANIMALS**

JEAN C. TOLHURST and GLEN BUCKLE

**III. PATHOLOGY OF THE EXPERIMENTAL LESIONS
IN THE RAT**

H. A. SISSONS

IV. CULTIVATION OF THE NEW MYCOBACTERIUM

GLEN BUCKLE and JEAN C. TOLHURST

*From the Pathology Departments of the Melbourne University
and Alfred Hospital, Melbourne*

(PLATES XXII-XXIX)

I. CLINICAL ASPECTS

P. MACCALLUM

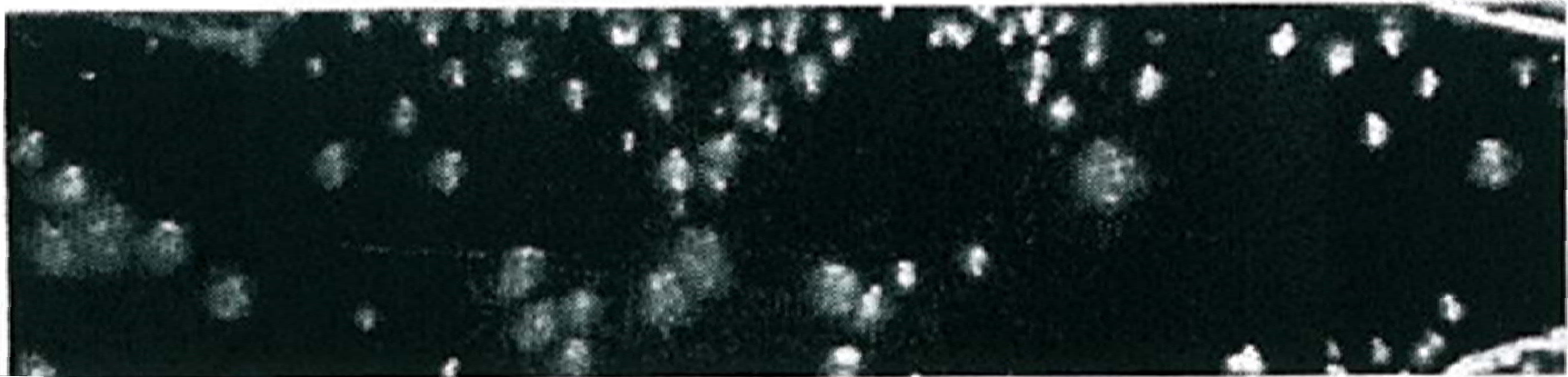
A NEW MYCOBACTERIAL INFECTION IN MAN



Ulcer on the forearm of case 6 (K.R.) photographed the day before excision.

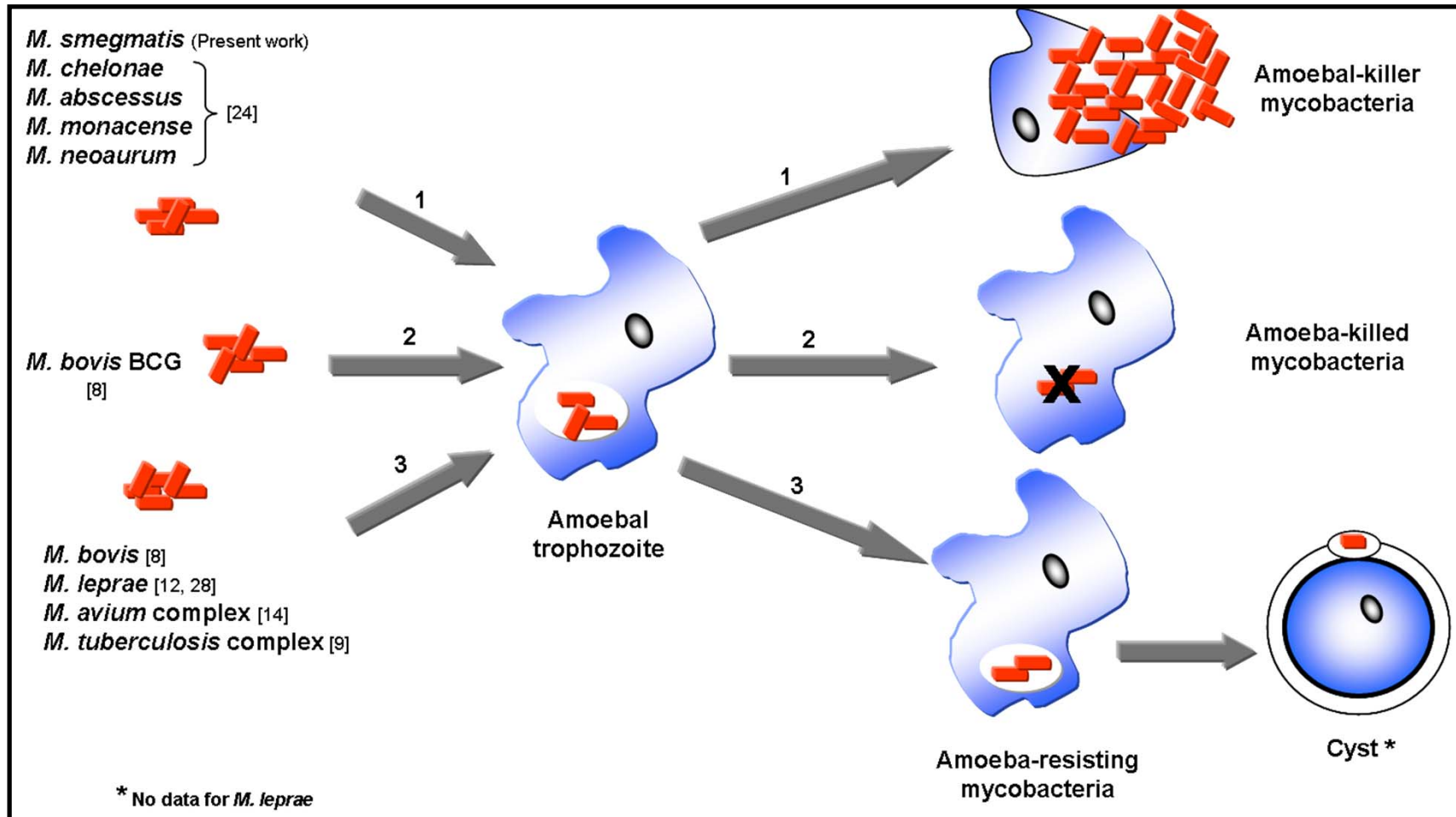
I. Clinical aspects. P. MacCallum. J. Path. Bact – Vol LX. 1948

A NEW MYCOBACTERIAL INFECTION IN MAN



Colonies of strain K.R. on Petraghani's medium : primary culture 9 weeks old. X 1 .3.

I. Clinical aspects. P. MacCallum. J. Path. Bact – Vol LX. 1948



Amoebal Coculture of “*Mycobacterium massiliense*” sp. nov. from the Sputum of a Patient with Hemoptoic Pneumonia

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Mycobactéries: bactéries intraamibiennes

