

ATYPICAL MYCOBACTERIA



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Introduction

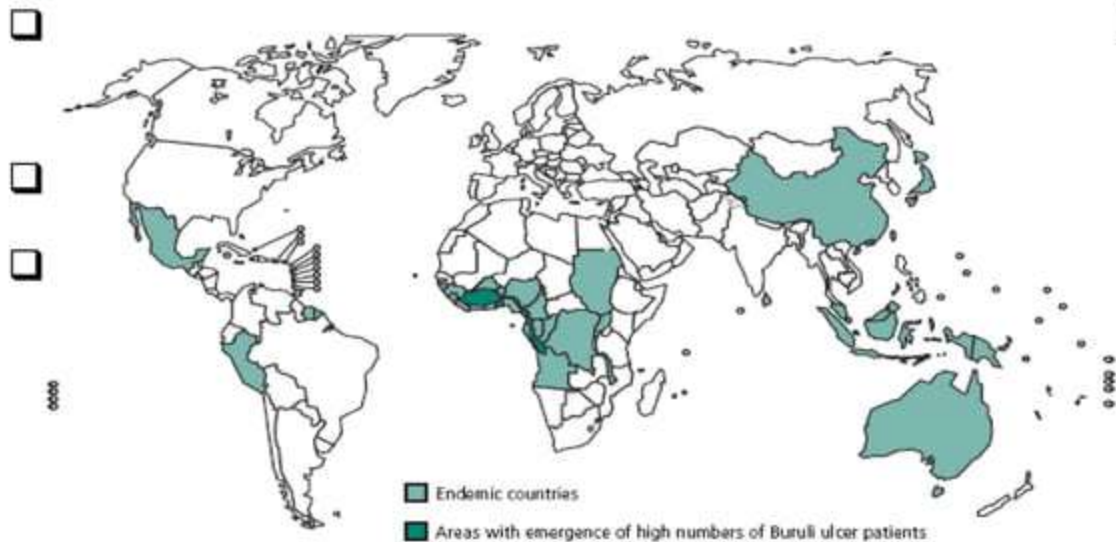
- ❑ Known by several terms-
 - Non tuberculous mycobacteria (NTM)
 - Atypical mycobacteria
 - Mycobacteria other than tuberculosis (MOTT)

- ❑ Environmental mycobacteria –
 - refer to mycobacteria other than *Mycobacterium tuberculosis*, its close relatives (*M. bovis*, *M. caprae*, *M. africanum*), and *M. leprae*.

- ❑ The number of known species currently exceeds 150. NTM are highly adaptable and can adapt hostile environments.

Epidemiology

Fig. 1. Countries where Buruli Ulcer has been reported



Buruli ulcer has been reported from many countries, but most cases in the last two decades have been identified in a strip of riverine areas in a number of countries in the western part of the African continent; underreporting is believed to be common.

Source: WHO; <http://www.who.int/gtb-buruli/>

Epidemiology

- ❑ Human-to-human transmission of NTM is not known.
- ❑ Disseminated disease denotes significant immune dysfunction (e.g., advanced HIV infection)
- ❑ Pulmonary disease
 - more common
 - highly associated with pulmonary epithelial defects.

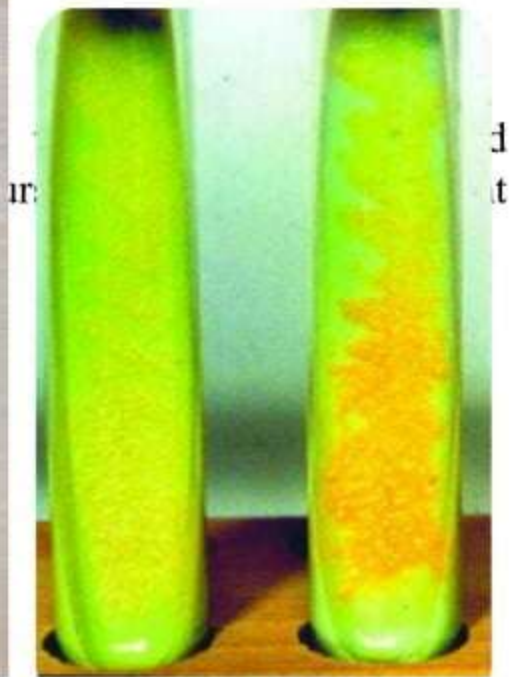
Pathophysiology

- ❑ Normal host defenses against these organisms are strong.
- ❑ Healthy individuals in whom significant disease develops are highly likely to have specific susceptibility factors that permit NTM to become established, multiply, and cause disease.
 - HIV infection
 - CD4+ T lymphocytopenia.
 - Potent inhibitors of tumor necrosis factor (TNF), such as infliximab, adalimumab, and etanercept

RUNYON CLASSIFICATION

GROUP	PIGMENT GROWTH	ORGANISMS
Group 1	Photochromogens	M.Marinum M.Kansassi M.simiae
Group 2	Scotochromogens	M.Scrofulaceum M.szulgai
Group 3	Non-chromogens	M.avium-intracellulare M.ulcerans
Group 4	Rapidly-growing	M.Fortuitum M.Chelonae M.abscessus

Group I - Photochromogens



Group II Scotochromogens

- Pigmented colonies
- M. scrofulaceium*
 - causes scrofula ()
- M. gordonae*
- Present in tap water



Group III- Non Photochromogens

- ❑ Do not form pigment even on exposure to light.

M.avium

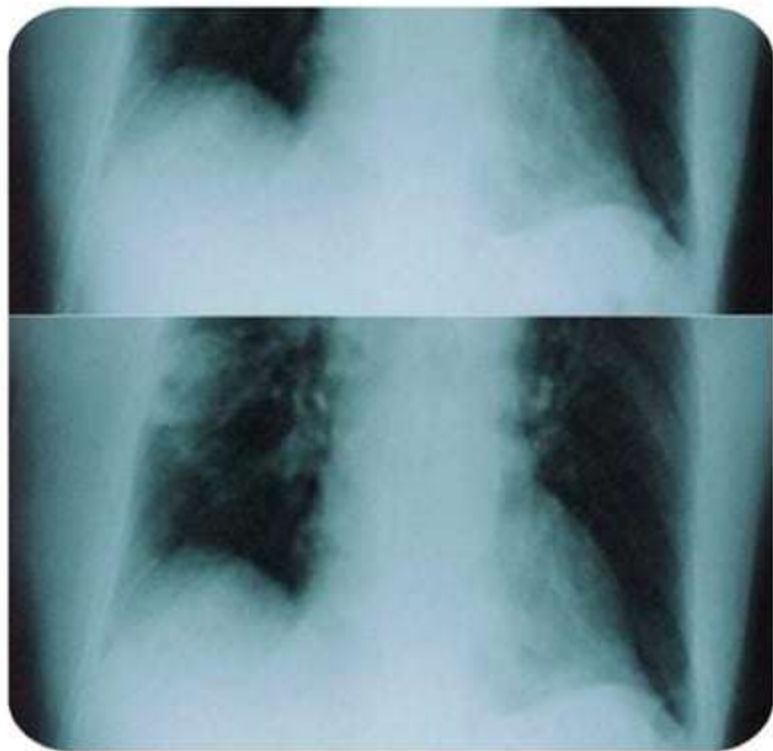
M.xenopi

- ❑ Mostly occurs as opportunistic infection

- ❑ Called MAI(*Mycobacterium avium-intracellulare*)complex

- frequently affects AIDS patients
- causes lung disease

Mycobacterium avium-intracellulare (x-ray findings)



Mycobacterium avium-intracellulare(skin lesions)



- ❑ Skin lesions
 - multiple nodules
 - ulcerated nodules
 - abscesses
 - painless nodules and plaques

Mycobacterium avium-intracellulare(skin lesions)



Figure showing ulcer and nodules

Type IV- Rapid growers

- Grow
- Grow
- Few S
 - M
 - M
 - M

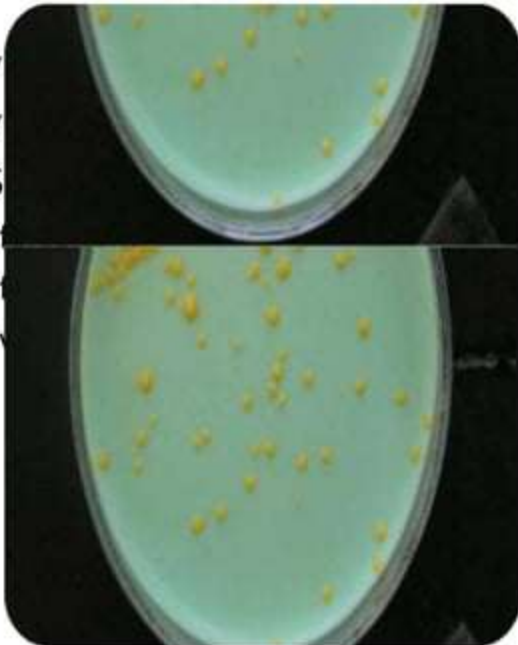


Fig : culture of *M. fortuitum* in LJ media

Mycobacterium chelonae lesion



Figure showing ulcer on thigh

Mycobacterium Marinum

- Usually causes disease in fish
- Normally found in salt water, fresh water, or water sources, such as swimming pools, rivers, lakes, oceans, and aquariums
- Cause human disease by penetration through impaired skin barrier : Traumas, such as abrasions and puncture wounds
- It is not transmittable from person to person
- Swimming pool granuloma or Fish tank granuloma**



Fig : lesions in the fish infected with *M.marinum*

Clinical features

- Incubation period : 2 weeks
- Sites :
 - Extremities
 - Fingers most common :
fish tank finger
 - back of hands
 - Elbows and knees of
swimmers.

Morphological variants

- Nodule
- Pustule
- Ulcer or abscess

CLINICAL TYPES	CLINICAL FEATURE
Type 1	Single or limited (1-3)
Type 2	Numerous(>3), Sporotrichoid spread
Type 3	Deep infection \pm skin involvement (arthritis, bursitis, osteomyelitis)
Type 4	Disseminated infection



Fig : nodules in the hands of pt. infected *Mycobacterium Marinum*



Fig : Plaque in hands of pt. infected with *Mycobacterium Marinum*



Fig : Ulcer and nodules in hands of pt. infected with Mycobacterium Marinum



Fig : Ulcer and nodules in hands of pt. infected with Mycobacterium Marinum

Diagnosis

- ❑ Sample: Tissue biopsy
- ❑ Culture media
 - ❑ Solid media: Lowenstein Jensen medium
 - ❑ Liquid media: Mycobacterial growth indicator tube media
- ❑ Temperature for optimal growth: 30 – 32 °c
- ❑ Colonies
 - ❑ smooth, shiny and creamy coloured
 - ❑ turns yellow on exposure to light
(Photochromogenic)

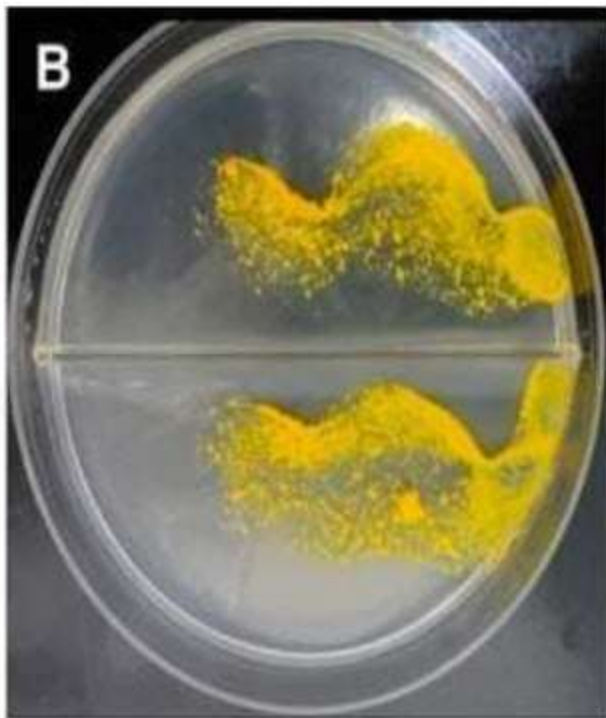
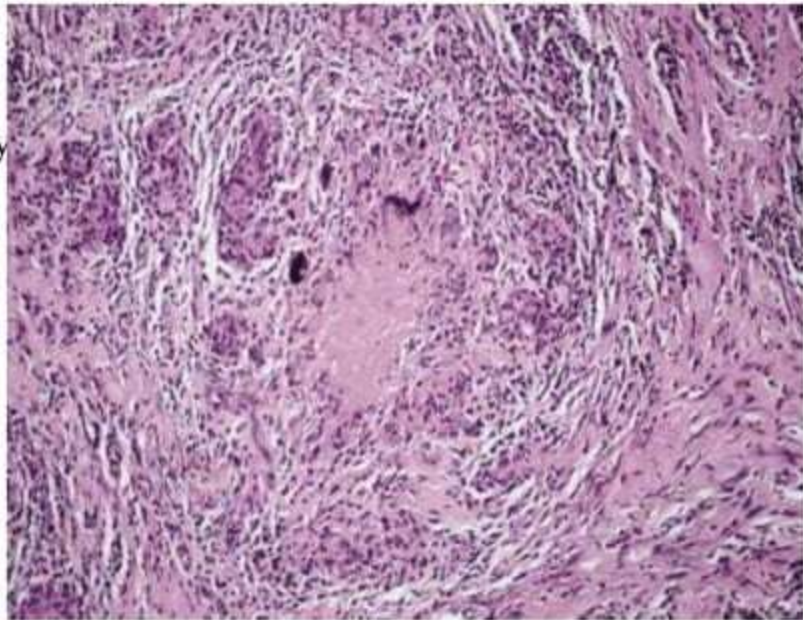


Figure A : LJ media with growth of *M. marinum* after exposing to sun light
Figure B : LJ media with growth of *M. marinum* after 24-48 hours after re-inoculation

Mycobacterium marinum histopathology

□ Mixed
histiocy



s, and

Treatment

Clinical types	Treatment
Type 1 (limited 1-3 lesions)	Minocycline 100mg BD/ Clarithromycin 500mg BD/ Doxycycline 100mg BD/ Cotrimoxazole 800mg BD (Monotherapy effective)
Type 2 / Type 3 / Type 4	<ul style="list-style-type: none">➤ Rifampicin 600mg/day + ethambutol 15 - 25mg/kg/day OR➤ Rifampicin + minocycline ± surgical excision.
Duration of treatment	Atleast 2 months after definite clinical resolution

Mycobacterium ulcerans

- ❑ Also known as Buruli ulcers
- ❑ Infection most common in Central and West Africa , Australia.
- ❑ Solitary, painless and sometimes itchy nodule of 1-2 cm develops about 7-14 days after infection through broken skin.
- ❑ Over one to two months the nodule may break down to form a shallow ulcer that spreads rapidly and may involve up to 15% of the patient's skin surface
- ❑ Severe infections may destroy blood vessels, nerves and invade bone

Buruli ulcer

- ❑ Buruli ulcer is a chronic ulcerative skin disease, caused by *M. ulcerans*, that mostly affects the limbs.
- ❑ The lack of acute inflammatory response is typical and is likely due to an immunosuppressive toxin called Mycolactone, which is produced by mycobacteria.
- ❑ Buruli ulcer mainly affects children living in humid areas of the tropical rain forest..



Fig. showing ulcer in hand

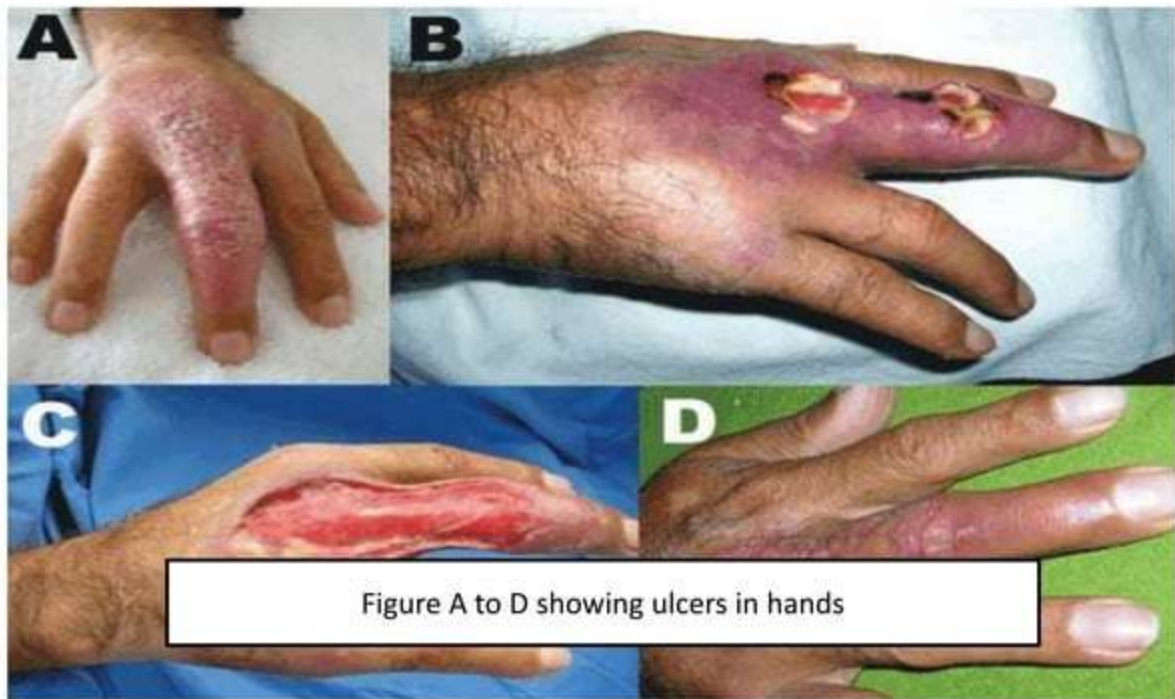




Figure showing ulcers in foot

Management of Buruli ulcer

- Treatment of Buruli ulcers relies on timely and accurate diagnoses.
- When treated early, antibiotics alone are adequate.
- If treatment is delayed, surgical debridement, skin grafts, extensive wound care, and physical therapy may be needed

M scrofulaceum

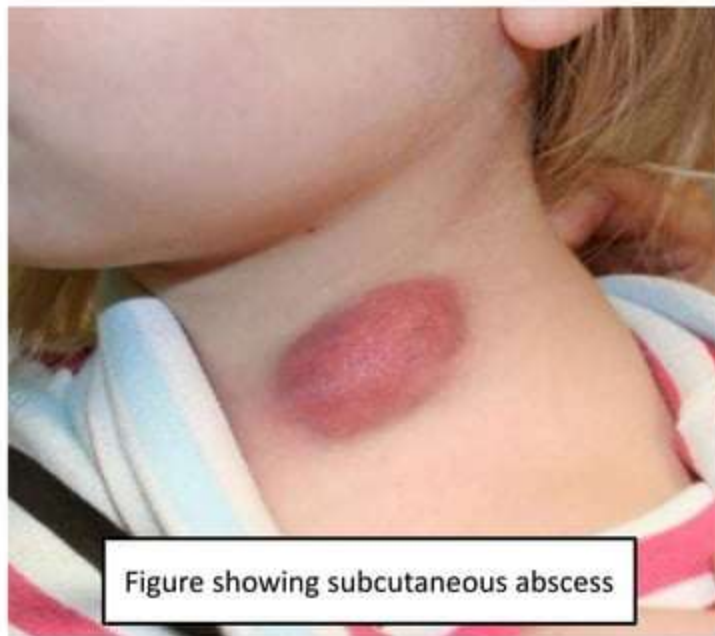


Figure showing subcutaneous abscess

- Cervical lymphadenitis in children
- Subcutaneous abscess.
- Disseminated infection in immunocompromised state

M. peregrinum



Fig. showing ulcer in hand

Differential Diagnosis

- Cat Scratch Disease (Cat Scratch Fever)
- Cutaneous Fungal Infections
- Cellulitis
- Cutaneous Tuberculosis
- Pyoderma Gangrenosum

References

- Andrew's Disease Of Skin , 13th Edition
- Illustrated synopsis of Dermatology and Sexually Transmitted Diseases by Neena Khanna, 5th edition
- Robins and Cotran Pathological Basis Of disease, 10th edition.
- Research Article by Daniel Marks (Univesity College London)
- WHO epidemiological data (on Buruli Ulcer)

