

Order: Actinomycetales

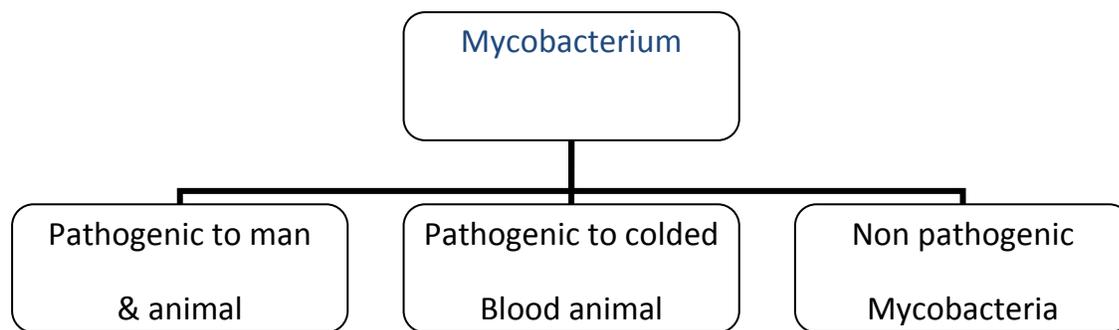
Family: Mycobacteriaceae

They are widely distributed in nature.

Few no is pathogenic for man & animal.

Some are parasitic to cold blooded animal, others are saprophytic in nature.

They are classified into .....



### Pathogenic to man and animal:

- 1- *Mycobacterium tuberculosis* belongs to human affected man & animal.
- 2- *Mycobacterium bovis* affected mainly cattle & man.
- 3- *Mycobacterium avium* the 3 types are transmissible to man.
- 4- *Mycobacterium paratuberculosis* (John's disease) or chronic bacillary dysentery in adult cattle & adult sheep in old age & not transmitted to man.
- 5- *Mycobacterium leprae* (cause leprosy disease) to man only.

### Pathogenic to cold-blooded animals.

### Saprophytic mycobacterium:

It is also, called atypical or anomymous mycobacterium.

They are found in the soil-water-dust-milk.

## **Mycobacterium tuberculosis**

Include 3 spp. which is human TB - bovine TB (mammalian TB)-avian TB.

### **Morphology:**

1- Slender rods.

2- Size = 2.5 - 3.5 x 0.4 – 0.6 u in thickness.

Human TB long – thin and beaded.

Bovine TB short, thick and plump (length = width).

Avian TB pleomorphic ..... some are short, thick & plump while other is long, thin & beaded but majority appear filamentous.

3- They are non-motile, non-sporulated, non- capsulated.

4- Acid fast resist decolourization with 3% HCl in absolute alcohol or 20% H<sub>2</sub>SO<sub>4</sub> in water.

5- Stained by Ziehl Neelson stain within 10 min.

6- The organism is gram + ve bacteria but very difficult to be stained by gram stain, as stain must left on preparation for about 24 hr.

### **Culture characteristic:**

1- Aerobic MO so, most of infection in lung.

2- Optimum temp. of mammalian type = 37 °c & Avian type = 40 °c.

3- Bovine type is more difficult to grow than the human type therefore bovine TB is termed dysgenic bacteria (difficult growth) and Eugenic term is given to human TB (easily growth).

4- Avian TB is faster in growth than both human & bovine TB and given more eugenic term.

5- Doesn't grow on ordinary nutrient agar media it required specific media for its growth such as:

Dorset egg media

Lowenstein Jensen media

Petreganani's media

6- Addition of 5% glycerin to media, enhances the growth of human & avian type, but has no such effect on the bovine TB.

7- Colonies appear usually within 2-4 weeks, according to type.

Avian type ..... After 2 weeks

Human type ..... After 3 weeks

Bovine type ..... After 4 weeks

## 8- Growth of TB...

### The growth of human TB

The colonies appear as large in number Eugonic, dry, tough, irregular, wrinkled and appears red brick brown pigmentation in old age.

### The growth of bovine TB

Colonies appear less in number, moist, granular & easily to broken up colonies.

### The growth of avian TB

Colonies appear large in no., large colonies, convex, smooth, glistening or shiny colony with different pigmentation varies from yellow to orange pigmentation.

## Biochemical reaction:

- 1- TB MO inactive to enzymatic action (poor enzymatic activity).
- 2- Give slight acidic without gases in fermentation of glucose

2- Catalase + ve

3- Niacine + ve

### Typing of bacterium TB:

It is based on morphology & culture character.

Isn't accurate in distinguishing or in differentiation of 3 spp. Of TB.

The most accurate method is by animal inoculation test.

	G.pig	Rabbit	Chicken
Bovine TB	+++	+++	- - -
Human TB	+++	+	- - -
Avian TB	- - -	++	+++

### Diagnosis:

1- Direct microscopically examination:

Films are prepared from caseous purulent portion of sputum or affected lesion & stain by ziehl neelsons stain.

The morphological appearance of the organism is described.

In TB urinary tract: first 3 voided (post urine) urine

Urine → centrifuge 3000 rpm/30 min. & take deposit.

In TB meningitis → CSF.

### TTT of the sample...

1- Antiformin method:

If MO is scanty (few in no.) or combined with other MO or if a pure culture is required, the antiformin method is used.

Antiformin is composed of equal parts of Na chlorinate + 15% Na hydroxide.

Antiformin is diluted to 1:6 then added to the sample with ratio 1:4 or 1:3 then wait 1hr at 37c giving chance or antiformin to kill all MO in sample leaving TB after 1hr.

## 2- Petroffs method:

**Tuberculin test:** (delayed type of hypersensitivity)

Tuberculin is preparation containing specific protein extract of tubercle bacilli which on injection into an infected animals, allergic symptoms are set up making a reaction.

## **Immunization against TB:**

1- Using B.C.G. vaccine (Bacille Calmette Guerin).

2- Diaplyte vaccine:

Human type which fat has been extracted with formaline.

3- Spahlinger vaccine:

Dead vaccine prepared by growing TB on media enriched with body fluids & left naturally to die the immunization power is very weak & not commonly used.

4- Vole bacillus:

Mycobacterium murius when injected into G.pig produces resistance against both human or bovine tubercle bacilli.

Immunization power is similar to that produced by BCG.