

Summary- *Yersinia* , *Pasteurella* and *Francisella*

Y. pestis

- Morphology – Gram-negative coccobacilli, 1.5 x 0.7 µm, single, pairs, chains, non-sporing, non-motile, capsulated – exudates, cultures – 37°C
- Methylene blue; bipolar staining (safety pin appearance)
- Pleomorphism – 3% NaCl – unfavourable media – club-shaped, coccoid cells, filaments

CULTURAL CHARACTERS

- Aerobe/Facultative anaerobe
- pH 7.2, temperature 2–45°C
- NA – transparent, minute, pin point, opaque – 5 days
- BA – dark brown – absorption – hemin pigment
- MA – non-lactose fermentors

BIOCHEMICAL REACTIONS

- Catalase +ve, indole –ve, MR +ve, VP and citrate –ve, urease and gelatin liquefaction -ve

ANTIGENIC STRUCTURE

- Months – soil, rodent burrows
- Antigens – 20 antigens
- F1/Fraction 1 – heat labile (100°C) protein envelope Ag – cultures 37°C; function – inhibits phagocytosis, stimulates immunity protection/humans and mice
- V and W proteins – virulent strains –
Y. pestis 37°C/low calcium concentration
- Inhibit phagocytosis and intracellular killing

PATHOGENESIS

- Zoonotic disease, natural pathogen – rodents
- Mode of infection – *Xenopsylla cheopis* – rat flea (bite), droplet pneumonic plague

CLINICAL FEATURES

- Three forms
 - Bubonic plague
 - Septicemic plague:

- Pneumonic plague:
- Death rate – bubonic plague 50–75%, pneumonic plague 100%; with treatment 5–30%

LABORATORY DIAGNOSIS

- Specimen: Exudate bubo, sputum – pneumonia, blood – septicemia
- Bubonic plague: Bubo – punctured – hypodermic syringe
- Microscopy: Gram stain/methylene blue
- Isolation: BA – 27°C, biochemical tests
- Animal experiment – guinea pigs; animal death 2–5 days, postmortem – local inflammation, necrosis and edema, regional lymph nodes – enlarged and congested greyish white patches – tissues

Pasteurella multocida

- Zoonoses
- Non-motile, Gram negative – oxidase +ve , indole +ve
- Cannot grow on MacConkey's agar
- Commensal – human respiratory tract
- Mode of infection – animal bites/trauma
- Local suppuration – wound infection, cellulitis, abscess, osteomyelitis
- Meningitis (head injury)

Francisella tularensis (Pasteurella tularensis, Brucella tularensis)

- Tularemia – rabbits, rodents – Tulare County, California.
- Mode of infection – ticks, arthropod vectors
- Contact – infected rabbits; ingestion (meat or water)
- Inhalation – water borne – excreta infected rodents
- Clinically, local ulceration, lymphadenitis, typhoid-like fever – glandular enlargement, influenza-like respiratory infection
- Diagnosis – culture
 - animal inoculation – guinea pig/mice
 - serology – antibodies
- Prevention – attenuated vaccine, scarification – high-risk persons