Yersinia pestis

**Colony Morphology**
- Grey-white translucent colonies in 24 h on Blood Agar (BA) and Chocolate Agar (CA) at ambient and 35/37°C (growth faster at 28°C)
- 1-2 mm colonies in 48 h that may be opaque and yellow
- “Fried egg” or “hammered copper” appearance on BA in older cultures
- Clear or white colonies on MacConkey (MAC) agar at 48 h

**Gram Stain**
- Gram-negative rods (0.5 - 0.8 x 1-3 μm)
- Giemsa stain: Bipolar staining
- Gram stain: Bipolar staining may be poor

**Biochemical/Test Reactions**
- Flocculent or “stalactite” growth in broth (35/37°C)
- Non-Motile at 25°C - 35°C
- Catalase: Positive
- Oxidase, Urease, and Indole: Negative

**Additional Information**
- Can be misidentified as: Shigella spp., H₂S(-) Salmonella spp., Acinetobacter spp., or Yersinia pseudotuberculosis by automated ID systems
- Biosafety Level 2 agent (Use BSL3 for large volume or high titer culture)
- Infective Dose: <100 colony forming units
- Transmission: Inhalation, flea bite
- Contagious: Yes (only pneumonic form)

**Acceptable Specimen Types**
- Bronchial wash/tracheal aspirate (≥ 1 ml)
- Whole blood: 5-10 ml blood in EDTA, and/or Inoculated blood culture bottle
- Aspirate or biopsy of liver, spleen, bone marrow, lung, or bubo
Sentinel Laboratory Rule-Out of *Yersinia pestis*

Grey-white translucent, non-hemolytic colonies on BA or CA (24 h)
Yellow and opaque (48 h) raised, irregular, “fried egg” or “hammered copper” shiny appearance (48-72 h)
Small, non-lactose fermenters on MAC (≥ 48 h)
Slow growing at 35/37°C (prefers 28°C)
Growth in broth culture at 48 h: Clumped, flocculent, or stalactite

Gram-negative rods
Bipolar staining (resembling closed safety pin) may be evident with Gram stain but more apparent with Giemsa or Wayson stain

Perform all additional work in a certified Class II Biosafety Cabinet
* Catalase: Positive
  * Motility: Non-Motile at 25°C and 35/37°C
    (use semi-solid media rather than wet mount;
    2,3,5-triphenyltetrazolium chloride indicator)
  * Urease: Negative
  * Oxidase: Negative
  * Indole:  Negative

*Catalase, Motility, Urease, and Oxidase:  Appearances of test results are not agent-specific.  Photos represent typical reactions

48 h Broth
- *Y.pestis*
- *Y.pseudo.*

Oxidase
- Positive
- Weak Positive
- Negative

Urease
- Positive
- Negative

Motility
- Non-Motile
- Motile

Catalase
- Positive
- Weak Positive
- Negative

No
- Continue laboratory identification procedures

Yes
- Immediately notify Wadsworth Center Biodefense/Bacteriology Laboratories
  if within the 5 boroughs of NYC, please call (212) 447-1091