

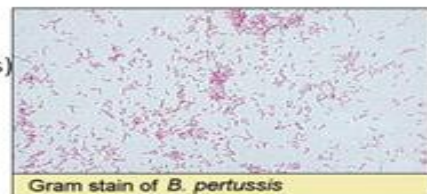


General features

- 1-Short, gram negative bacilli (coccobacilli). ✓
- 2- Aerobic, non-spore forming ✓
- 3-Non motile,. ✓
- 4-Specific to humans. ✓
- 5-Complex, enriched media is required for isolation (Bordet-Gengou agar)or (Regan-Lowe Charcoal Agar) (charcoal act as adsorbents of toxic fatty acids, radicals and peroxides). ✓
- 6-urease negative, nitrate negative. ✓
- 7- Pertussis is highly contagious

Bordetella (Microbiology)

- Clinically important species:
 - *B. pertussis* (whooping cough/pertussis)
 - *B. parapertussis* (severe cough)
 - *B. bronchiseptica* (kennel cough in animals)
- Gram negative
- Small cocco-bacilli
- Difficult to grow ("Bordet- Gengou" or "Regan-Lowe Charcoal" media)
- Diagnosis → Nasopharyngeal swab for culture and Polymerase Chain Reaction (PCR) and/or Serologies
- Epidemiology → Humans only known reservoir for *B. pertussis*
Spread person to person via aerosol route



Toxins

- Pertussis Toxin •
- Adenylate Cyclase Toxin •
- Tracheal cytotoxin •
- Dermonecrotic toxin •
- Heat-labile toxin •

RESISTANCE

- Killed by heat at 55°C for 30 mt
- Drying and disinfectants kill the organism
- Survive outside for 5 days
- 3 days on cloths
- Few hours on paper

WHAT IS WHOOPING COUGH

- Whooping Cough (Pertussis) is a bacterial infection of the lungs which is caused by a bacterium *Bordetella pertussis*. It is a very contagious disease which causes coughing with little or no fever. The coughing may be so severe that it leads to vomiting and aspiration.

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Disease: whooping cough (Pertussis)

- Pertussis = Transmitted by the respiratory tract route from early case and possibly via carriers. •
- The organism adheres to and multiplies rapidly on the surface of the epithelium in the trachea and bronchi and interferes with ciliary action. •
- Disintegrating organisms liberate a toxin that irritates surface cells, giving rise to catarrhal symptoms

An acute respiratory disease with three stages:

- **A catarrhal stage** with an irritating cough, lasts 1 to 2 weeks. •
- **A paroxysmal stage** characterized by violent coughs followed by a high respiratory whoop, lasts 2 to 6 weeks. •
- **A convalescent stage** where the cough gradually decreases in frequency and severity, lasts several weeks. •

Note : 75% of deaths are among infants.

Diagnosis

- 1- Isolation by culture •
- 2- PCR •
- 3- Direct fluorescent antibody •
- 4- Serological testing •

Identification

- Laboratory diagnosis of *Bordetella pertussis* by culture:
 - 2 specimens, one through each nostril, collected from the posterior nasopharynx with a Dacron or calcium alginate swab
 - Transport in Amies or Regan-Lowe transport medium
 - Inoculate on Regan-Lowe agar (35°C, ambient air, moist chamber)
 - Hold for 7 days
 - Identify suspicious colonies with a Gram-stain and fluorescein-labeled antisera or agglutinating antisera
 - No routine susceptibility testing is performed



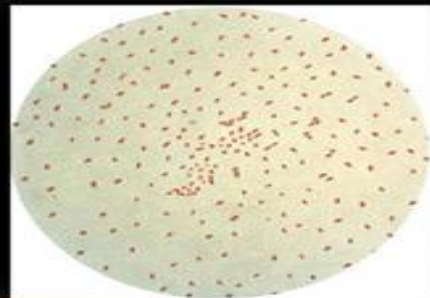
<http://www.stanford.edu/med/medschool/virology.html>

Laboratory Diagnosis:

- Nasopharyngeal swabs or cough droplets, expelled onto "Cough plates" held in front of the mouth of the patient during a paroxysms.
- Incubate (Bordet-gengou plates) at 35 oC for 2-5 days.
- Typical colonies resemble a 1mm droplets of mercury surrounded by a zone of hemolysis.
- Colonies are confirmed with specific antiserum
- Direct immunofluorescent staining of smears made from nasopharyngeal swabs may give a rapid positive test.

CULTURE CHARACTERS

- Aerobic Not anaerobic
- Grows optimally at 35^o to 37^o c
- Preferred medium – Bordet Gengou glycerin potato blood agar
- Blood for neutralizing inhibitory substances formed during bacterial growth.
- Charcoal also serves the same purpose.

**MERCURY DROP COLONIES ON BORDET-GENGOU MEDIUM**

- Growth takes longer up to 48 – 72 hours
- On blood agar appear as small dome shaped opaque viscid grayish white retractile
- Resembles bisected pearly or mercury drops



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B. pertussis

Small, transparent hemolytic colonies on Bordet-Gengou medium

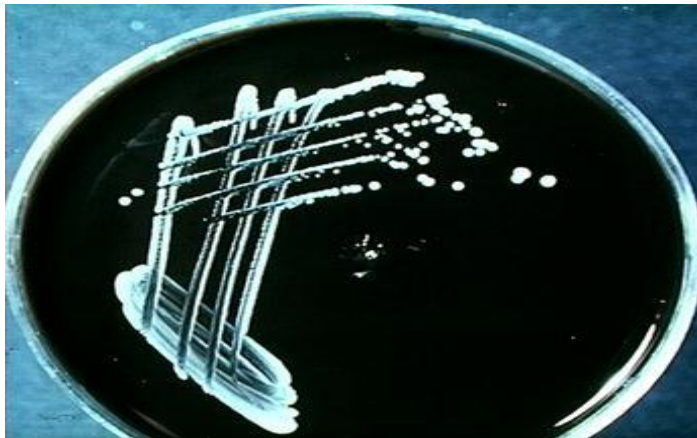


Culture Characteristics

- Aerobic Gram-negative coccobacilli
- Fastidious
- Regan Lowe Media (Charcoal Blood Agar)
 - Selective for *Bordetella* sp.
- Incubate at 35°C, moist chamber, ambient air
- Growth at 2 days
- Appearance on Regan-Lowe:
 - -Small, domed, glistening, white/gray colonies



https://catalog.hardydiagnostics.com/cp_prod/content/Hugo/Regan-LoweCharcBlidAgar.htm



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DIFFERENTIATION OF *BORDETELLA* SPECIES

	Growth on common lab media (SBA, MacConkey)	Growth on Bordet-Gengou agar	Urease	Oxidase	Motility
<i>B. pertussis</i>	-	+	-	+	-
<i>B. parapertussis</i>	+		+	-	-
<i>B. bronchiseptica</i>	+		+	+	+

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