Orientation to Gram Negative Bacteria of Medical Importance

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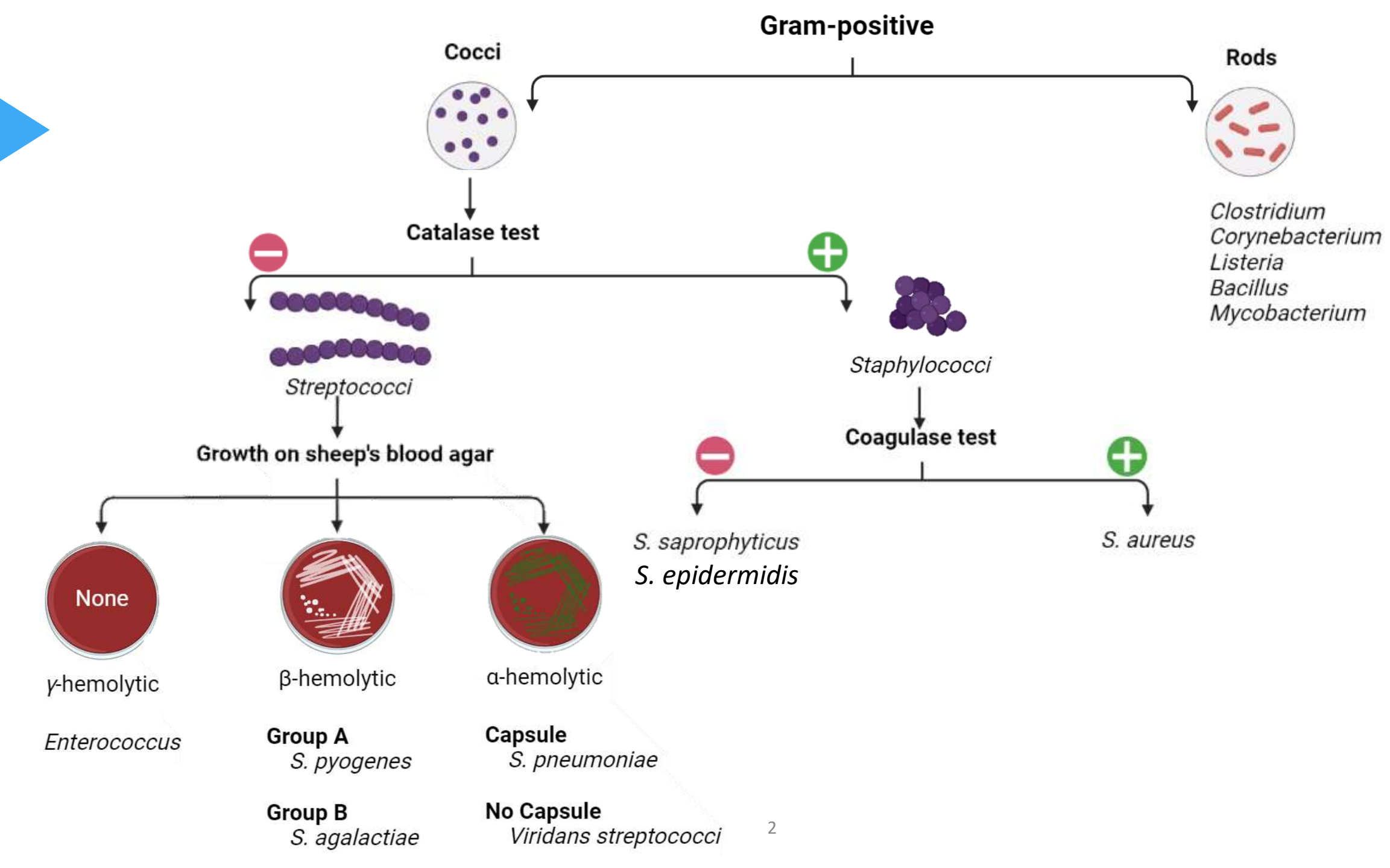
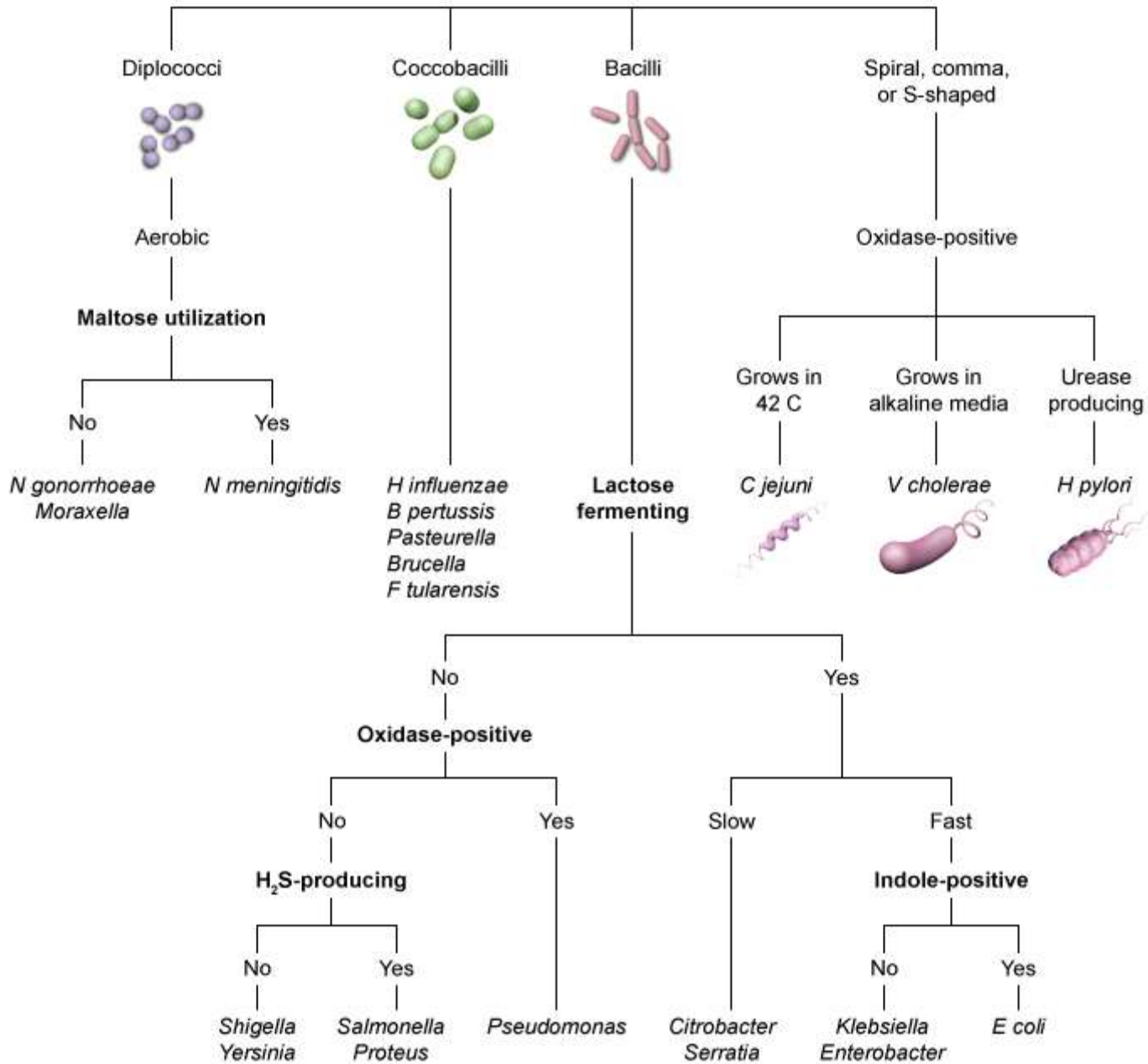

Gram-positive
Cocci
Rods
Clostridium
Corynebacterium
Listeria
Bacillus
Mycobacterium
Catalase test
Streptococci
Staphylococci
Growth on sheep's blood agar
Coagulase test
S. saprophyticus
S. epidermidis
S. aureus
None
γ-hemolytic
Enterococcus
β-hemolytic
Group A
S. pyogenes
Group B
S. agalactiae
α-hemolytic
Capsule
S. pneumoniae
No Capsule
Viridans streptococci

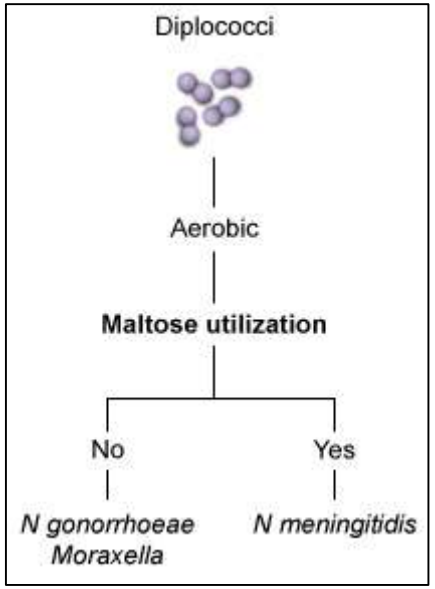
Gram-negative bacteria



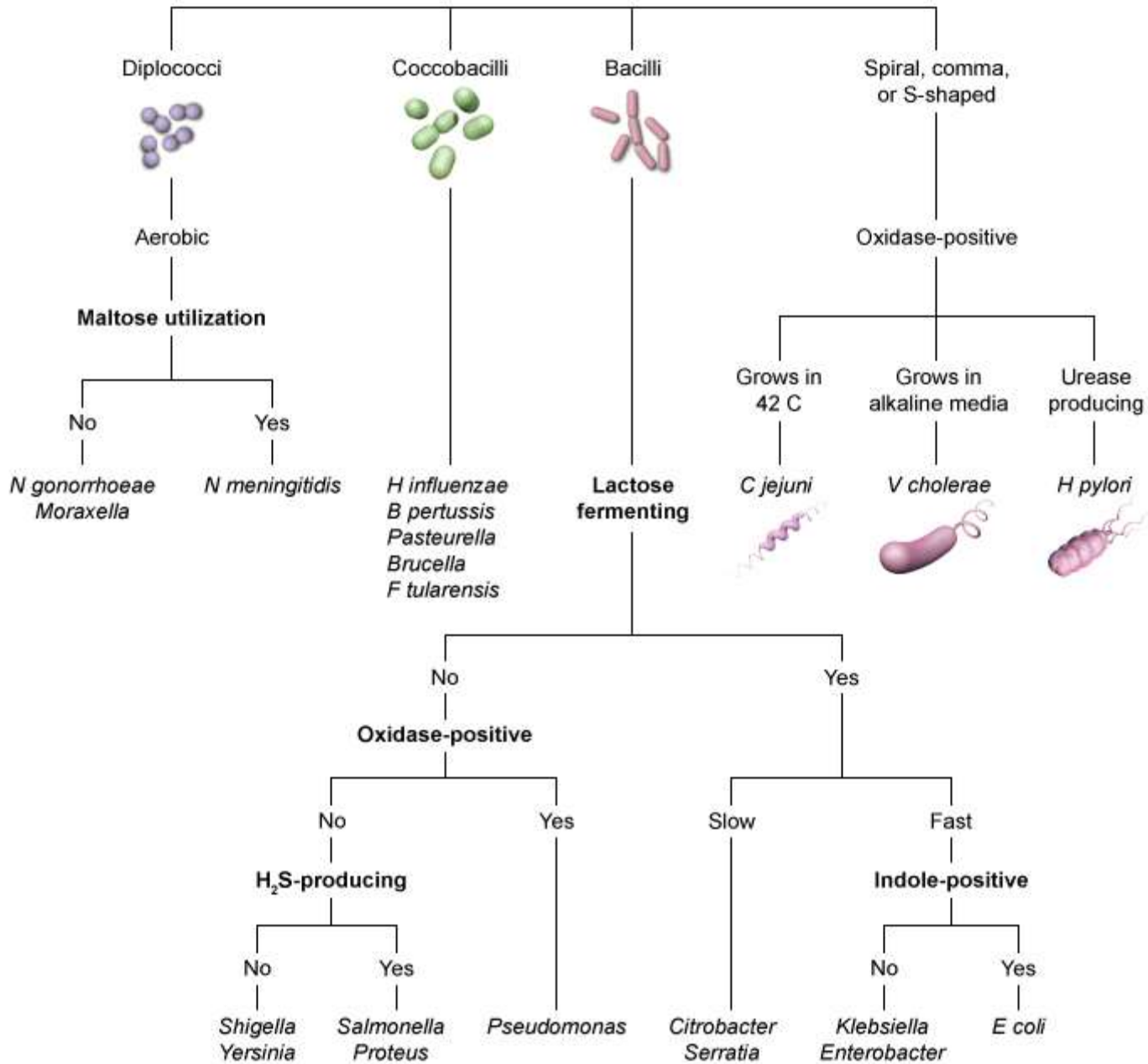
Medically Important Gram-negative diplococci

Neisseria

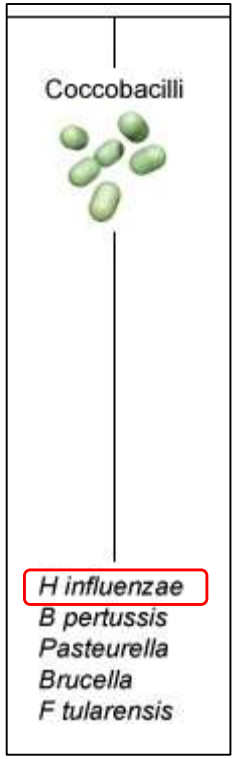
- Gram-negative intracellular diplococcus
- Two major pathogenic species
  - ***Neisseria gonorrhoeae:***
    - Associated with Sexually Transmitted Diseases(STDs).
  - ***Neisseria meningitidis:***
    - Associated with respiratory and CNS infections.



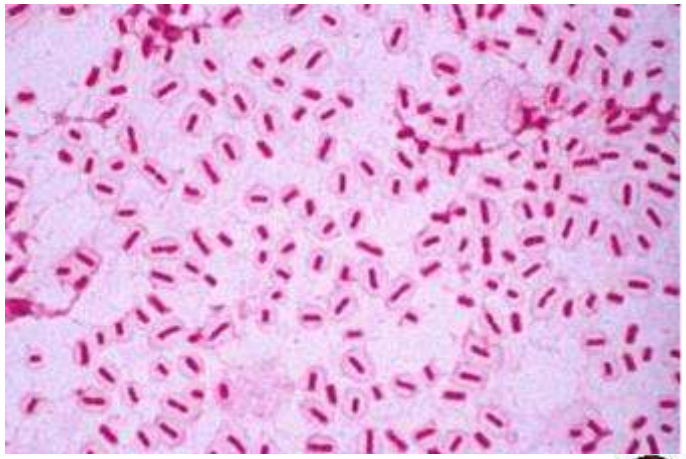
Gram-negative bacteria



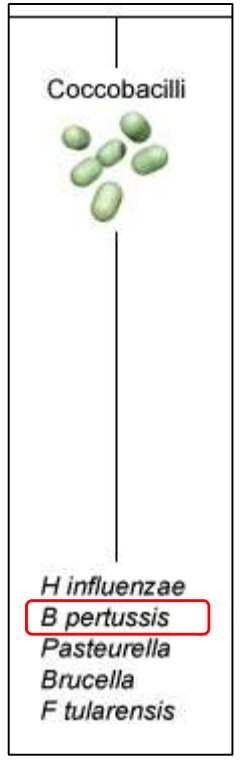
Medically Important Gram-negative coccobacilli
Haemophilus: Blood –Loving Bacilli



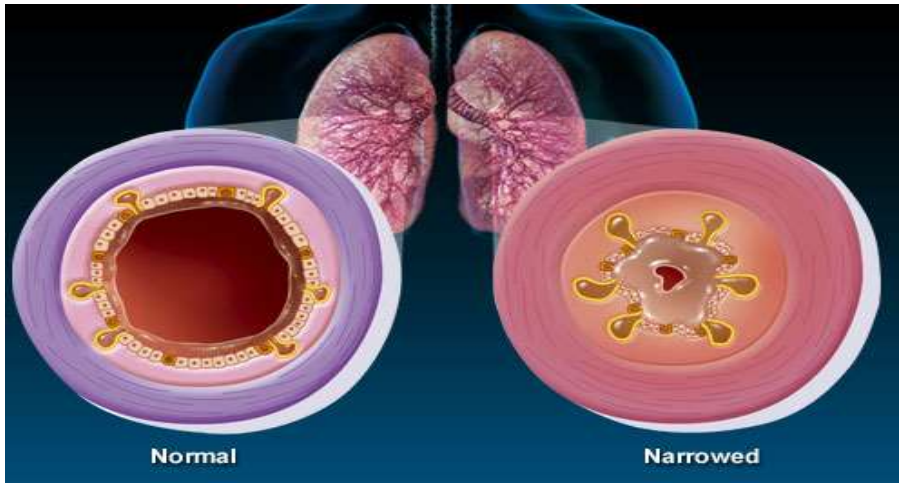
- **Fastidious:** require some chemicals from blood for their growth
- H. influenzae: bacterial meningitis: children 3 months to 5 years
- Most strains have a polysaccharide capsule that resists phagocytosis.
- Colonize the mucous membranes of humans and some animals.
- *H. influenzae* type b is the most significant
  - Was the most common form of meningitis in infants prior to the use of an effective vaccine
  - Use of the Hib vaccine has eliminated much of the disease caused by H. influenzae b



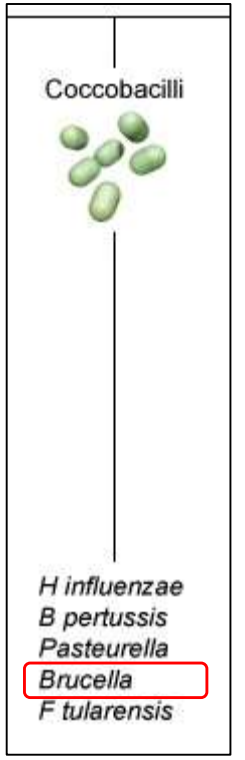
Medically Important Gram-negative coccobacilli
Bordetella



- Small, aerobic, nonmotile coccobacillus
- ***B. pertussis:***
  - Causes pertussis, also called whopping cough.
  - Most cases of disease are in children.
  - Bacteria are first inhaled in aerosols and multiply in epithelial cells.
  - a build-up of thick mucus – which causes the intense attacks of coughing as your body tries to expel it
  - swollen airways – which makes breathing more difficult and causing the "whoop" sound as you gasp for breath after coughing

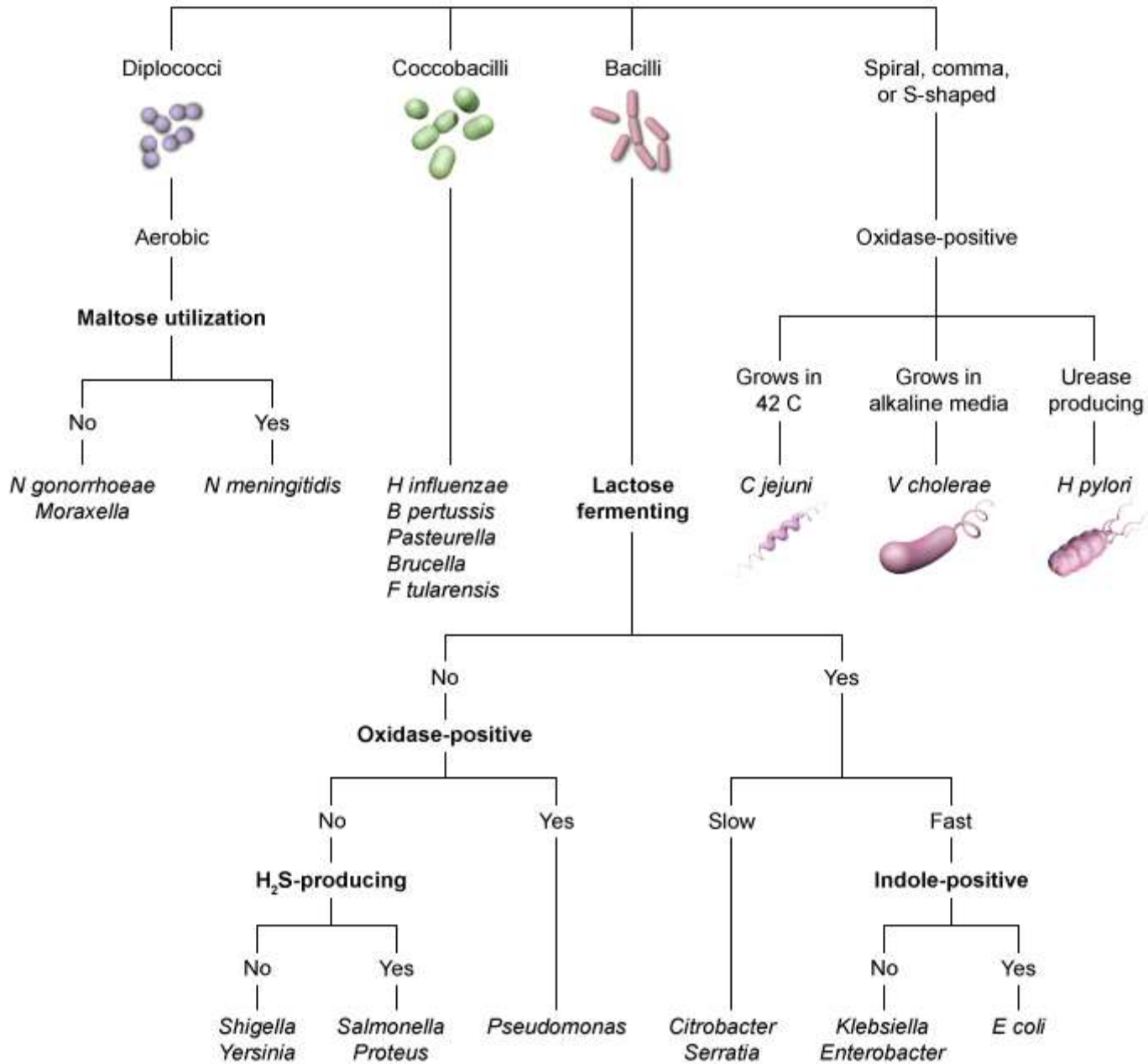


Medically Important Gram-negative coccobacilli
Brucella



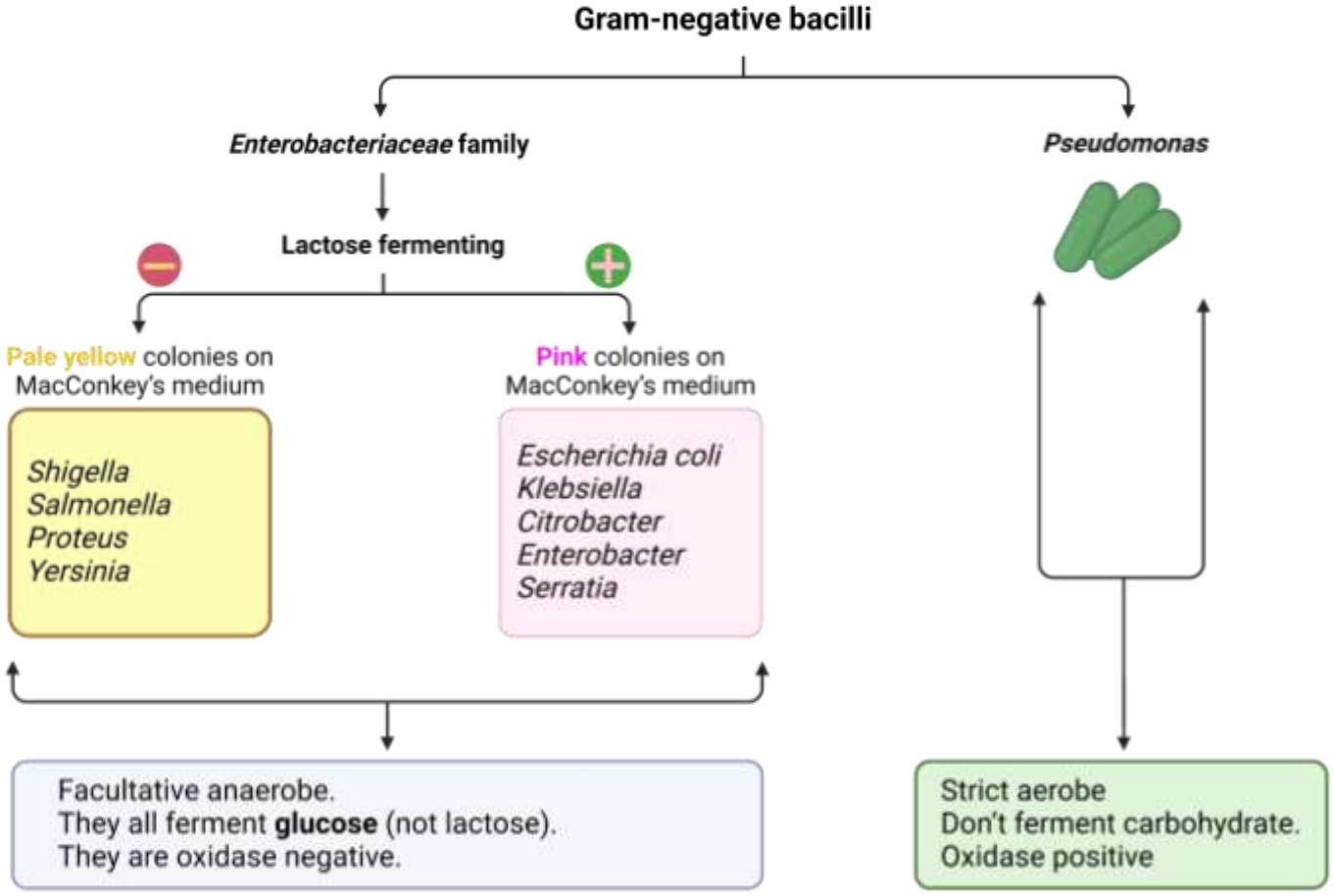
- Causes Brucellosis in humans following ingestion of contaminated milk or cheese from goats and cows.
- Clinical manifestations range from subclinical, to chronic with low grade symptoms of low fever and muscular stiffness, to acute with fever and chills.

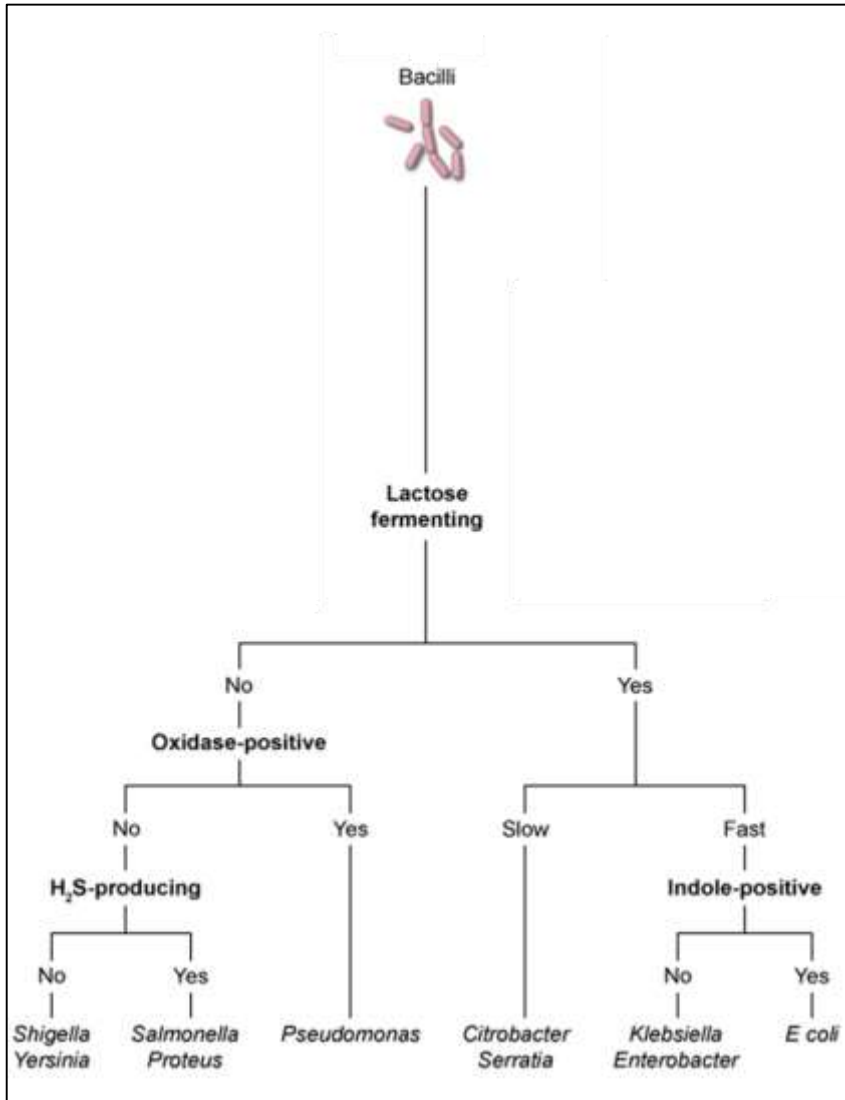
Gram-negative bacteria



Medically Important Gram-negative bacilli

Another classification





Medically Important Gram-negative bacilli

Another classification

LACTOSE FERMENTOR COLONIES / NON-LACTOSE FERMENTOR COLONIES

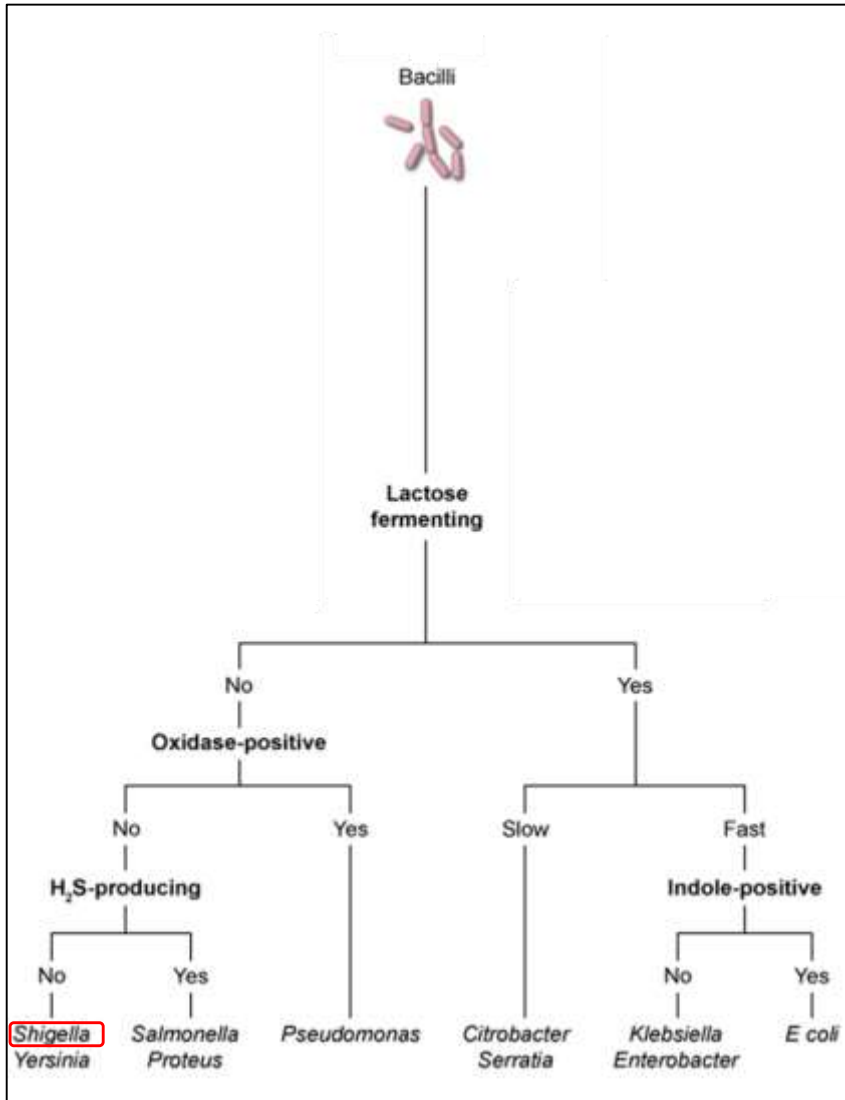
Medically Important Gram-negative bacilli
Enterobacteriaceae

- **Ubiquitous (they are everywhere)** - soil, water, vegetation, normal intestinal flora
  - ~40 genera, 150 species
- Members of family commonly associated with human disease:
  - *Escherichia*
  - *Salmonella*
  - *Shigella*
  - *Yersinia*
  - *Klebsiella*
  - *Serratia*
  - *Proteus*

Medically Important Gram-negative bacilli

Shigella

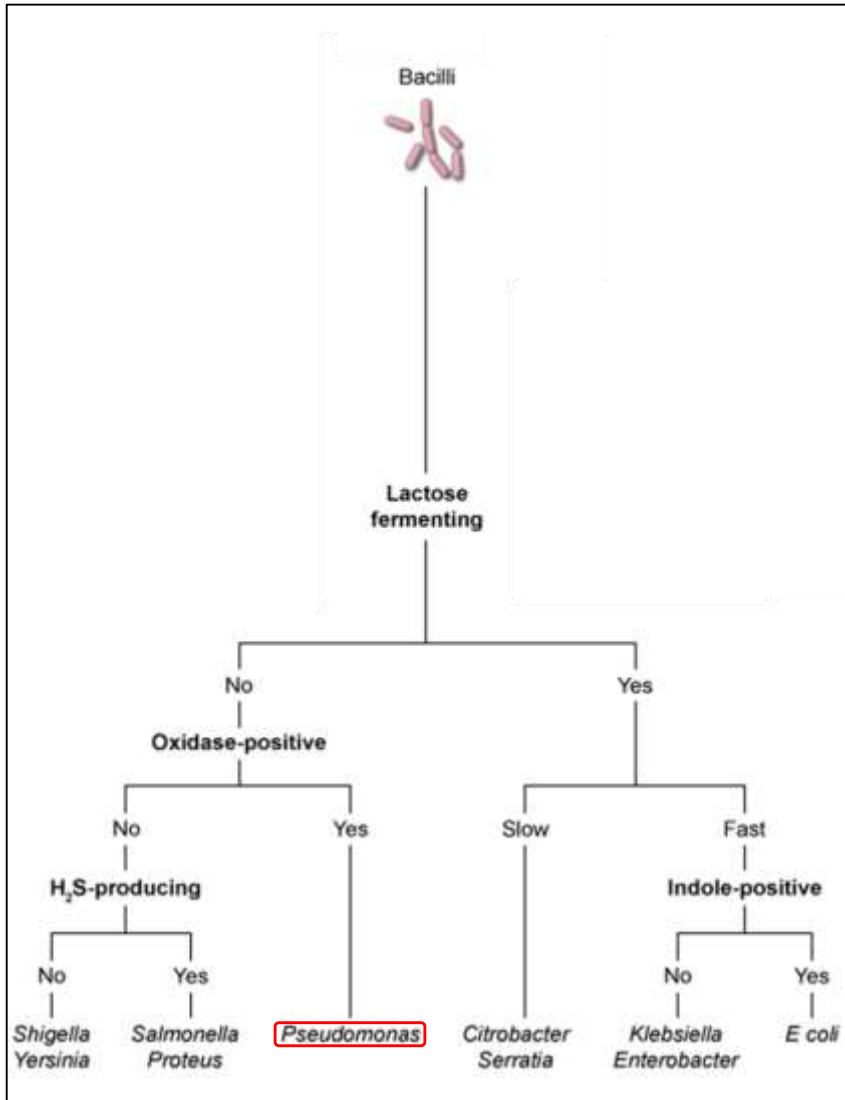
- *Shigella* a Highly Infectious Bacteria.
- One of the leading causes of diarrhea and bacillary dysentery.
- *Shigella* is one of the most infectious of bacteria and ingestion of as few as 100- 200 organisms will cause disease.
- Most individuals are infected with *shigella* when they ingest food or water contaminated with **human fecal material.**
- Outbreaks of *Shigella* infection are common in places where sanitation is poor.
- Shigella can survive up to 30 days in milk, eggs, cheese



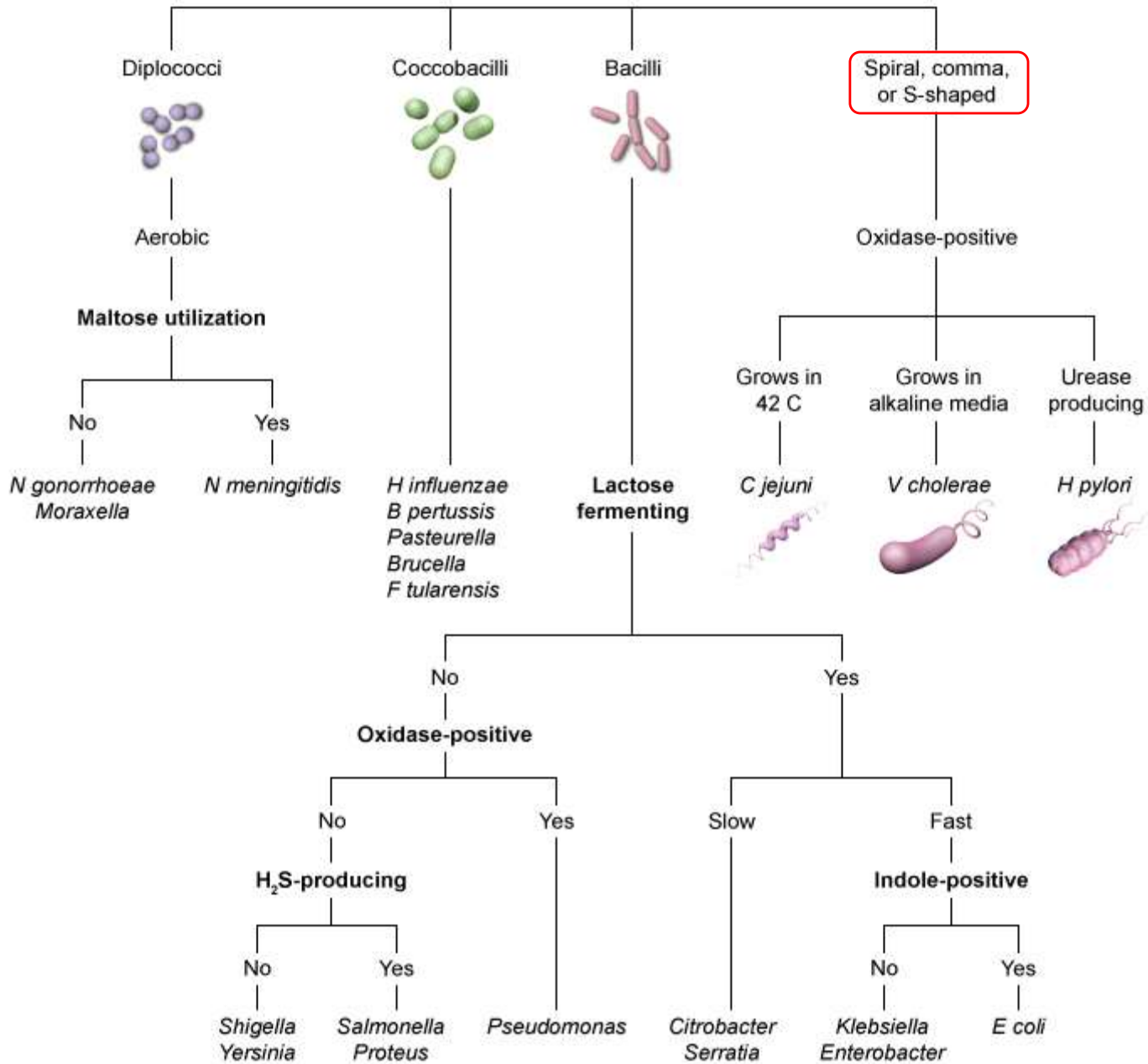
Medically Important Gram-negative bacilli

Pseudomonads

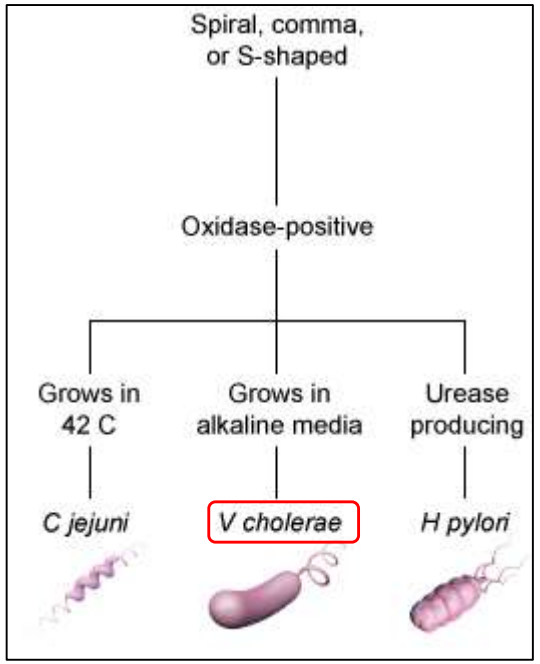
- Gram-negative, aerobic bacilli.
- Ubiquitous in soil, decaying organic matter, and almost every moist environment.
- Problematic in hospitals because they can be found in numerous locations.
- Opportunistic pathogens.



Gram-negative bacteria

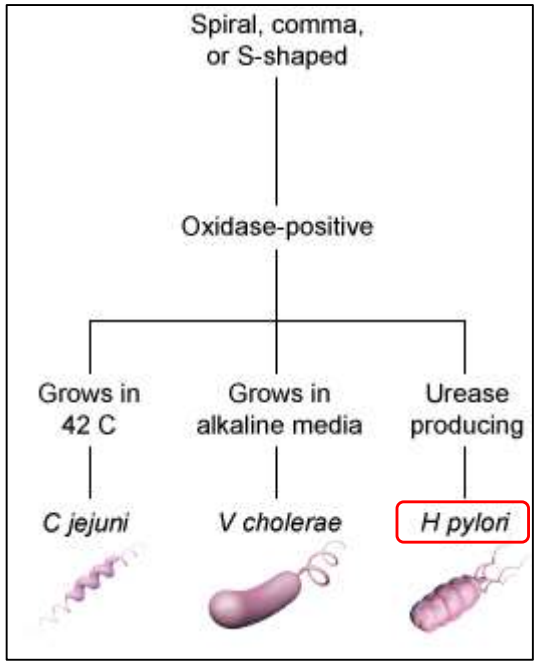


Medically Important Gram-negative comma *Vibrio*



- *Vibrio cholerae* is the most common species to infect humans:
  - Causes cholera.
  - Humans become infected with *V. cholerae* by ingesting contaminated food and water.
  - Found most often in communities with poor sewage and water treatment.

Medically Important Gram-negative comma *Helicobacter pylori*



- Slightly helical, highly motile bacterium that colonizes the stomach of its hosts.
- Causes most (if not all) peptic ulcers.
- *H. pylori* produces numerous virulence factors that enable it to colonize the stomach.
  - It is protected from gastric acid by endogenous urease production: **urease** converts urea to ammonia, which alkalinizes the surrounding pH but injures gastric epithelial cells.
- Coffee drinking, smoking, and drinking alcohol increase your risk for an ulcer.
- Simple blood, breath, and stool tests can determine if you are infected with H. pylori.
- The most accurate way to diagnose is through upper endoscopy.