1

THE Enterobacteriaceae

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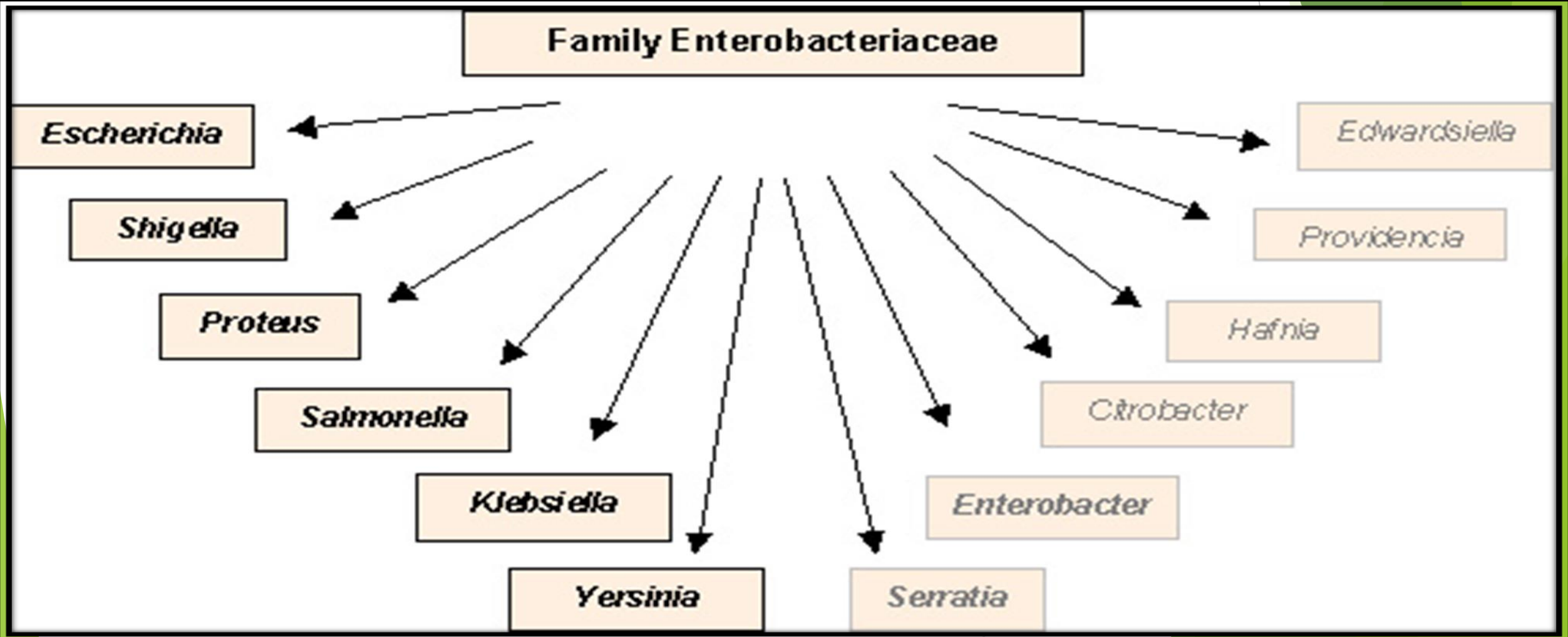

General Characteristics

- 1. Gram negative bacilli
- 2. Facultative anaerobes (grow with or without oxygen).
- 3. Glucose fermenters.
- 4. Oxidase negative
- 5. Nitrate positive

Shape and structure

- Gram-negative rods
- Motile or nonmotile
- Pili
- Capsule (some)
- Non-spore-forming

Pathogenic Determinants

- 1. Endotoxin: It is a lipopolysaccharide in structure and is derived from bacterial cell wall during lysis which may produce the following conditions:
- A. Fever
- B. Lethal shock
- C. Diarrhea
- D. Abortion

- 2. Colicins: Bacteriostacins with antibiotic like substance produced by certain strains of E. coli and other related members resulting in the death and lysis of other sensitive cells releasing the endotoxin.
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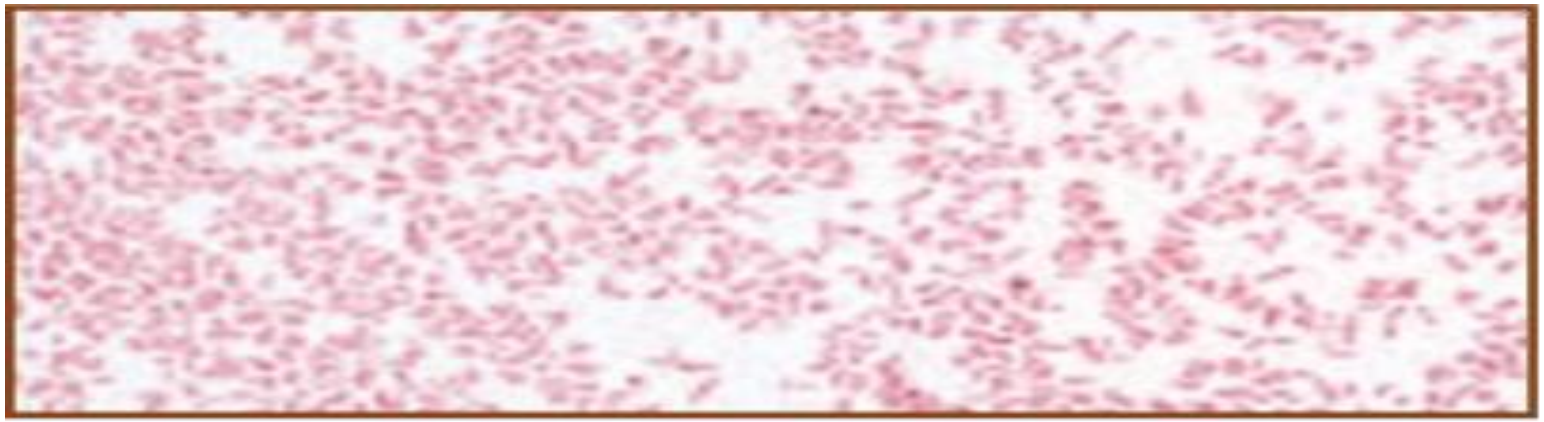
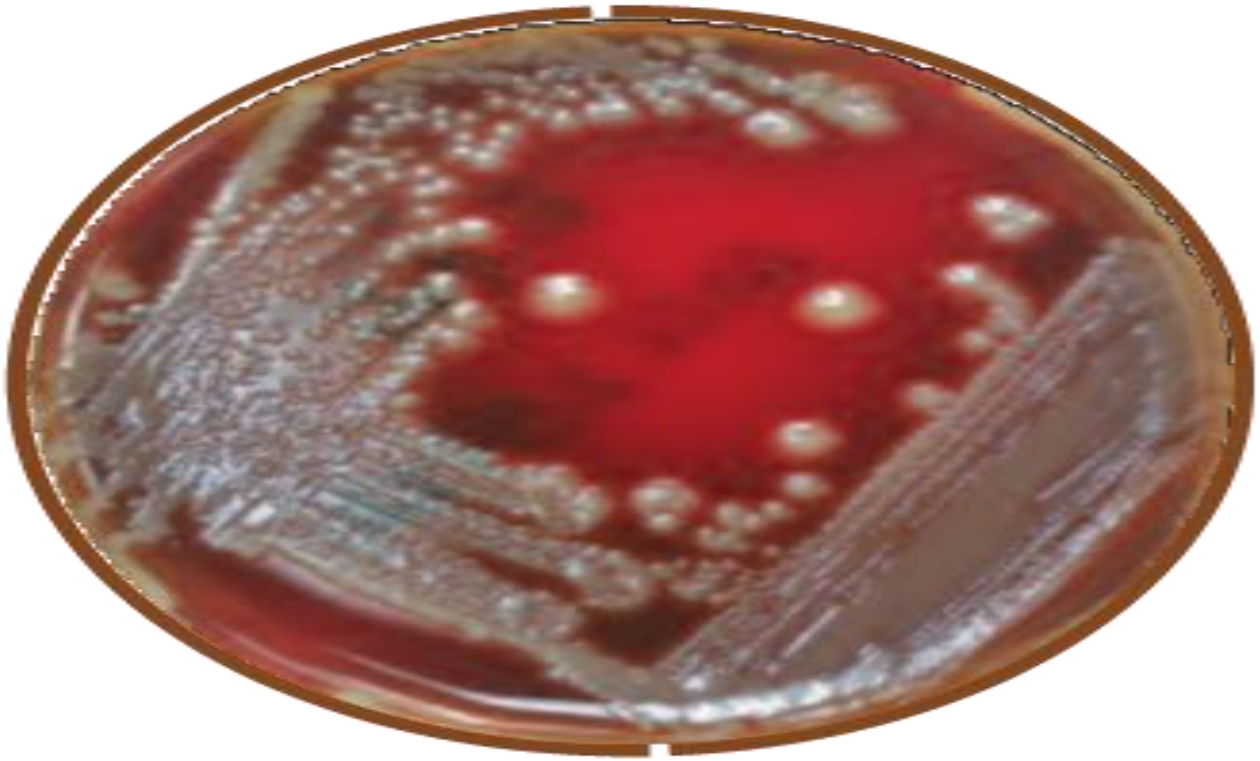
Escherichia coli

- is a member of the large family Enterobacteriaceae, the “Enterics.” It inhabits the intestinal tract of humans and many other animals.
- Human E. coli is an opportunistic pathogen and in the right place at the right time may cause any- thing from mild stomach upset to diarrhea, urinary tract infections, sepsis, and meningitis. Strains ofE. coli carried in cattle and contaminated beef are differentiated and named according to their virulence properties.
- These are: enteropathogenic E. coli (EPEC)that causes diarrhea in infants
- enterotoxigenic E. coli (ETEC) that is responsible for infant diarrhea and traveler’s diarrhea
- enterohemorrhagic E. coli (EHEC) that is associated with hemorrhagic colitis and hemolytic uremic syndromes
- entero- invasive E. coli (EIEC) that produces a shigellosis-like disease,
- and enteroaggregative E. coli (EAEC) that causes acute and chronic diarrhea.

1-1GRAM STAIN OF AN ESCHERICHIA COLI STOCK CULTURE The straight rods are usually arranged singly or in pairs. Cell sizes range from 1–1.5 μm wide to 2–6 μm long



1-2 ESCHERICHIA COLI ON SHEEP BLOOD AGAR



1-3 **MacConkey Agar inoculated with (clockwise from top) Escherichia coli,, and Proteus mirabilis. E. coli produce pink color from acid-producing lactose fermentation. P. mirabilis, lactose non-fermenters, remain their normal color.**

Klebsiella

- Klebsiella pneumoniae is found in soil, water, fruits, vegetables, and the intestinal tracts of a variety of animals including humans.
- It is harbored in the nasopharynx and oropharynx of humans and is frequently transmitted as aerosol droplets from person to person.
- K. pneumoniae is a very common nosocomial pathogen, but also causes community-acquired primary lobar pneumonia—a severe (frequently fatal) necrotizing infection.
- K. pneumoniae are pneumonia, urinary tract infections, bronchitis, surgical wound infections, biliary tract infections, and hospital associated bacteremia.
- K. pneumoniae infections are common in hospitals where they cause pneumonia (characterized by emission of bloody sputum) and urinary tract infections in catheterized patients.

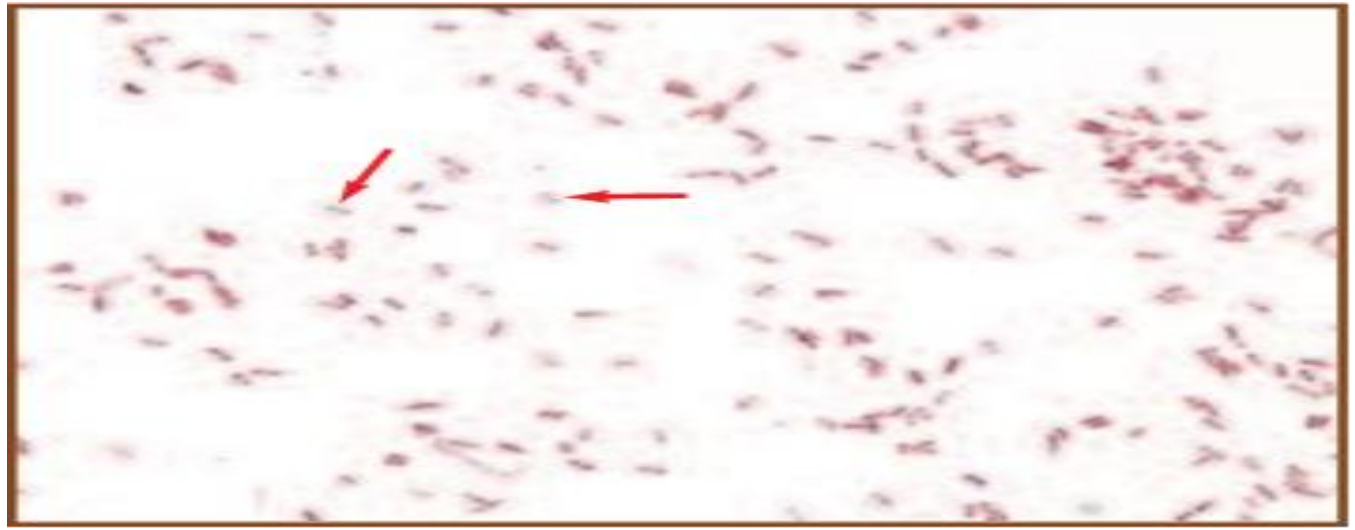
- K. pneumoniae is second only to E. coli as a urinary tract pathogen. Klebsiella infections are encountered far more often now than in the past.

- Morphology and Staining:
- - Gram-negative Bacillus
- - Encapsulated (the capsule is greater in size than the cell itself).
- - Non-motile
- - Non-spore former

Pathogenicity

- Primary community-acquired pneumonia
- Nosocomial pneumonia
- Urinary tract infection
- Wound infection
- Bacteremia
- Meningitis.

1-4 GRAM STAIN OF A KLEBSIELLA PNEUMONIAE STOCK CULTURE Cells range in size from 0.3–1.0 μm wide by 0.6–6.0 μm long.



1-5 KLEBSIELLA PNEUMONIAE ON SHEEP BLOOD AGAR Note the mucoid appearance due to large polysaccharide capsules.