

Escherichia coli-I

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Family *Enterobacteriaceae*

- Enteric organisms Gram-negative rods
- Fermentative metabolism -number of sugars
- Catalase-positive and Oxidase-negative
- Nonspore- forming
- Facultative anaerobes
- Grow well on MacConkey agar

Family *Enterobacteriaceae*

- **Habitat:** have a worldwide distribution, inhabit the intestinal tract of animals and man.
- Gram-negative rods, oxidase-negative, facultative anaerobes and grow on MacConkey agar, are presumed to be members of the *Enterobacteriaceae*

Genus

- E. coli
- Salmonella
- Yersinia
- Klebsiella
- Enterobacter
- Proteus
- Shigella
- Serratia
- Citrobacter
- Providentia
- Hafnia
- Morganella

Family *Enterobacteriaceae*

- **Reduce** nitrates to nitrites
- They are motile by peritrichous flagella
- More than 28 genera and over 80 species
- Major animal pathogens
 - *E. coli*,
 - *Salmonella* species, and
 - *Yersinia* species
- Opportunistic pathogens: Proteus, Klebsiella, Enterobacter

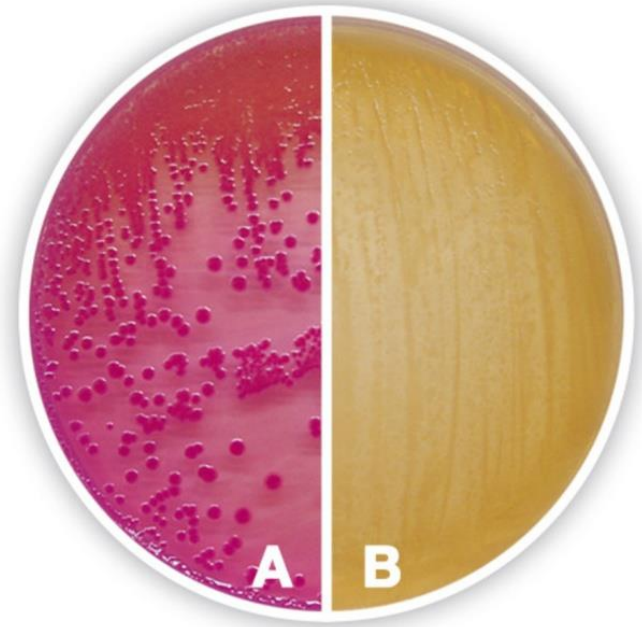
MacConkey agar

- A selective, differential medium
 - Peptone
 - Sodium chloride
 - Agar
 - **Bile salts** (*Inhibits other contaminants*)
 - **Lactose** (*Differentiation of LF/NLF*)
 - Neutral red

(appears *Pink in acidic* whereas *Pale in alkaline* condition)

MacConkey agar

- The colonies of lactose fermenters (LF) are pink
(due to acid production from lactose)
- The colonies of non-lactose fermenters (NLF) have a pale appearance



Xylose-lysine-deoxycholate (XLD) agar

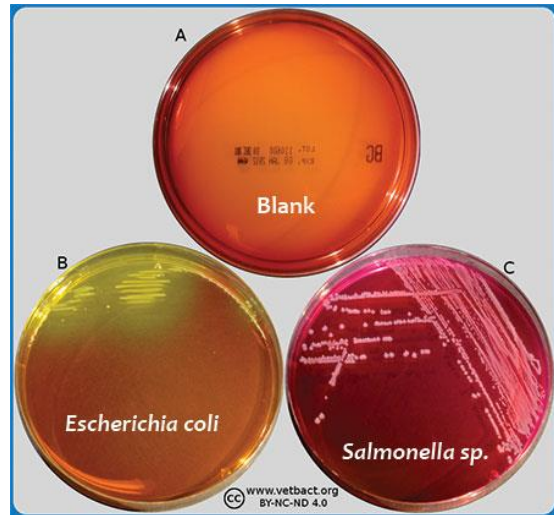
Salmonella - Red colonies with black centres

Brilliant Green Agar (BGA)

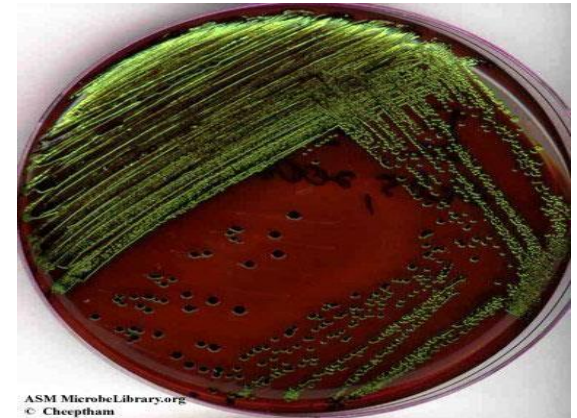
Salmonella- Red Colonies

Eosin-methylene blue (EMB) agar

Metallic Sheen



Brilliant Green Agar



Colonial morphology:

<i>Klebsiella</i> and <i>Enterobacter</i> species	Mucoid colonies
Rare <i>E. coli</i> isolates	Mucoid
<i>Proteus</i> species	Swarming growth
<i>Serratia marcescens</i>	produce red pigment

Tests for motility allow differentiation of *Klebsiella* species (non-motile) from *Enterobacter* species (motile).

IMViC

Genus	Indol	Methyl Red	VP	Citrate
E. coli	+	+	-	-
Klebsiella	-	-	+	+
Salmonella	-	+	-	+
Enterobacter	-	-	+	+

Reactions in triple sugar iron (TSI) :

- Triple sugar iron agar contains **0.1% glucose, 1% lactose and 1% sucrose** and ferrous sulphate-sodium thiosulphate
- Phenol red is used as an indicator for pH change (**red** at pH 8.2, **yellow** at pH 6.4).
- A black precipitate of ferrous sulphide is indicative of **H₂S** production.
- The loosely capped tube is incubated for 18 hours at **37°C**.
- **E. coli**- Yellow butt/Yellow slant
- **Salmonella**- Yellow butt/ Red slant
- **Proteus**- Yellow butt/ Red slant



Other important test

- ***Lysine decarboxylase*** : to distinguish ***Proteus*** species from ***Salmonella*** species
- *Proteus* species are negative in the test, whereas ***Salmonella*** species invariably produce the enzyme.
- ***Urease production*** distinguishes ***Proteus*** species from ***Salmonella*** species.
- ***Proteus*** species produce urease whereas ***Salmonella*** species do not.