



Proteus & Pseudomonas

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Proteus

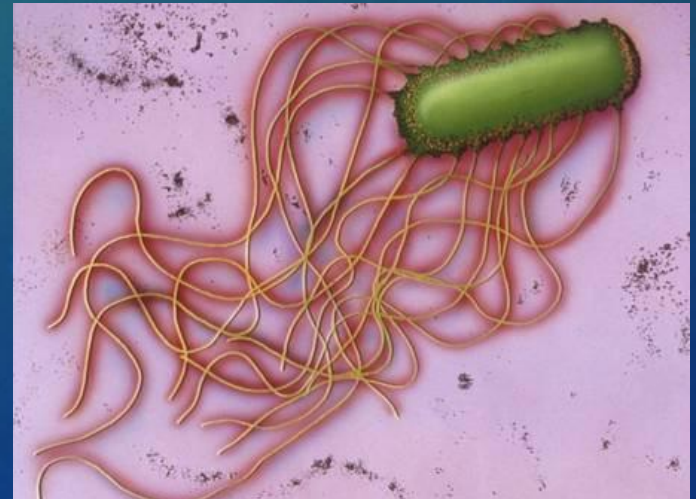
Proteus is a genus of Gram-negative *Proteobacteria* of family *Enterobacteriaceae* (Gram-negative stains, Oxidase negative , facultative anaerobes, Glucose fermenters , reduce nitrate to nitrite).

This genus include many species :

- ▶ *P. vulgaris*
- ▶ *P. mirabilis*
- ▶ *P. hauseri*
- ▶ *P. myxofaciens*
- ▶ *P. penneri*

Morphology

- ▶ Gram negative bacilli
- ▶ Very pleomorphic
- ▶ Highly motile
- ▶ Non spore forming



Cultural charecteristics

- ▶ Facultative anaerobes, Growth temperature is 37c
- ▶ Grow on all ordinary media producing fishy odor
- ▶ Hemolytic on blood agar
- ▶ Swarming phenomena due to their High motility with peritrichous flagella
“noticed on non-inhibitory media like blood agar and nutrient agar; increasing the agar content can inhibit swarming”



- ▶ They grow on Macconkeys agar as non-lactose fermenters **without swarming**

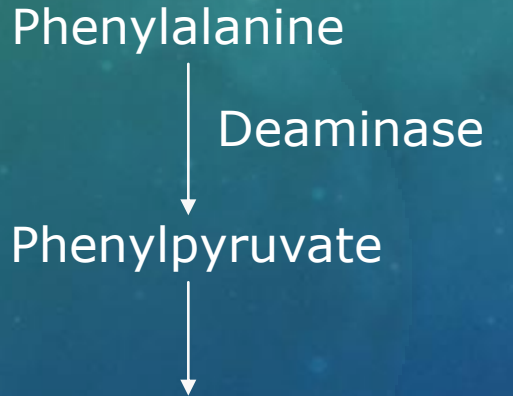


Lactose fermenters

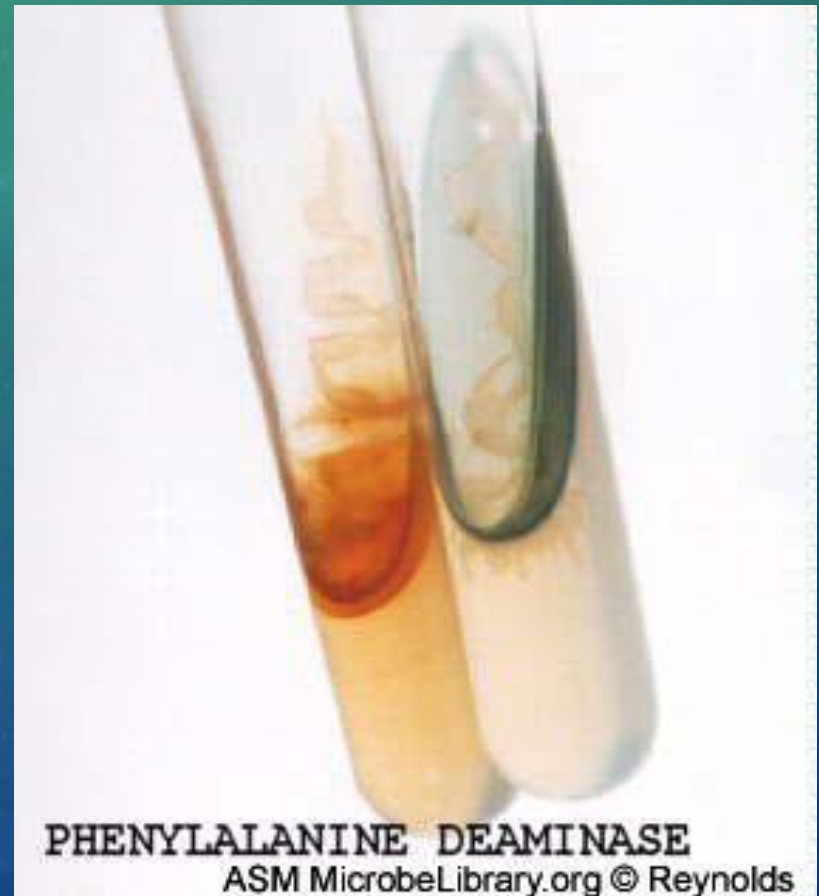
Non-lactose fermenters

Biochemical reactions

- ▶ **Phenylalanine deaminase +ve**
(similar to *Morganella* & *Providencia*)



Ferric Chloride → Green

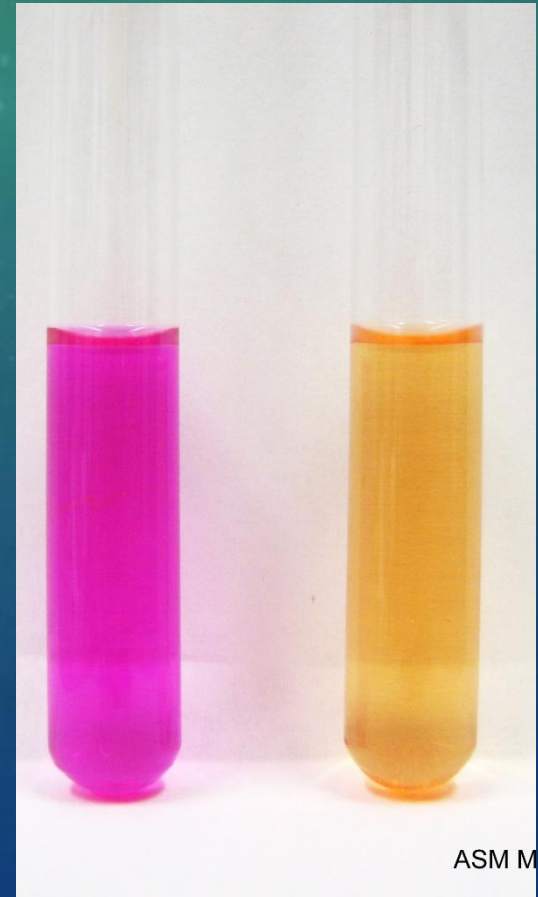
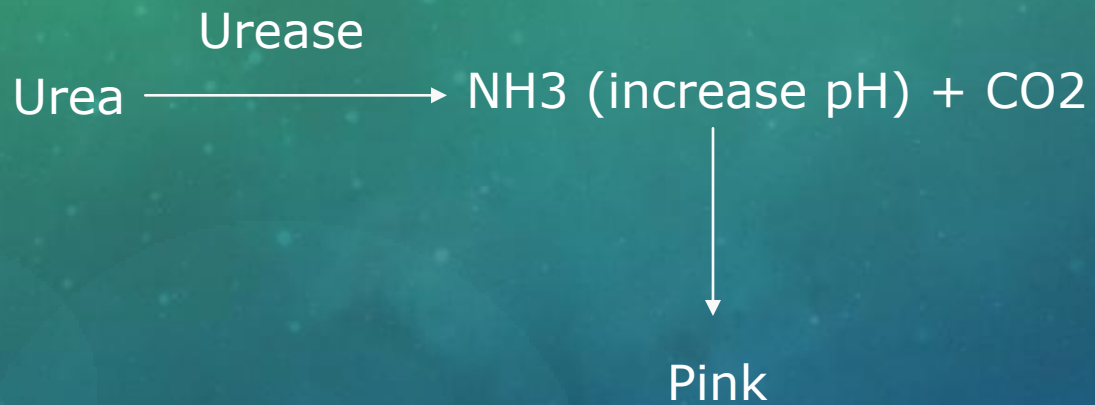


-ve

+ve



▶ Urase +ve

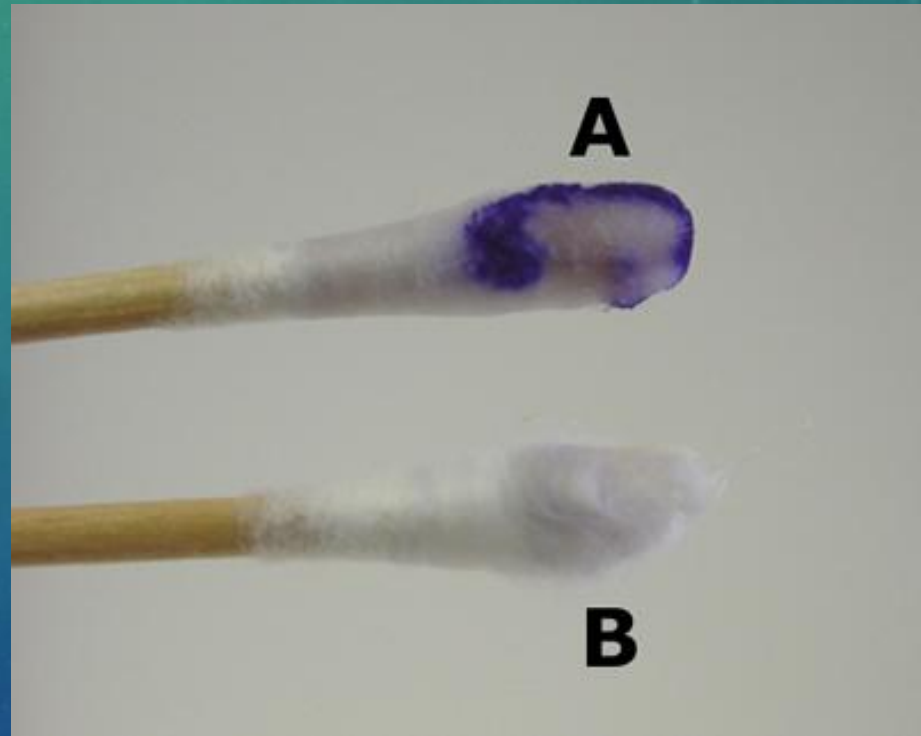


ASM M

+ve

-ve

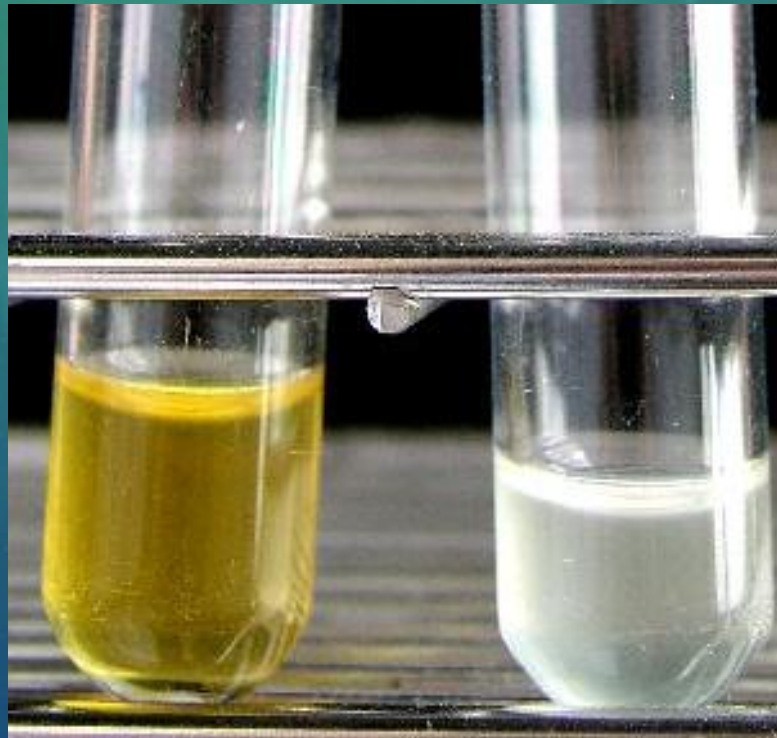
▶ Oxidase -ve



+ve

-ve

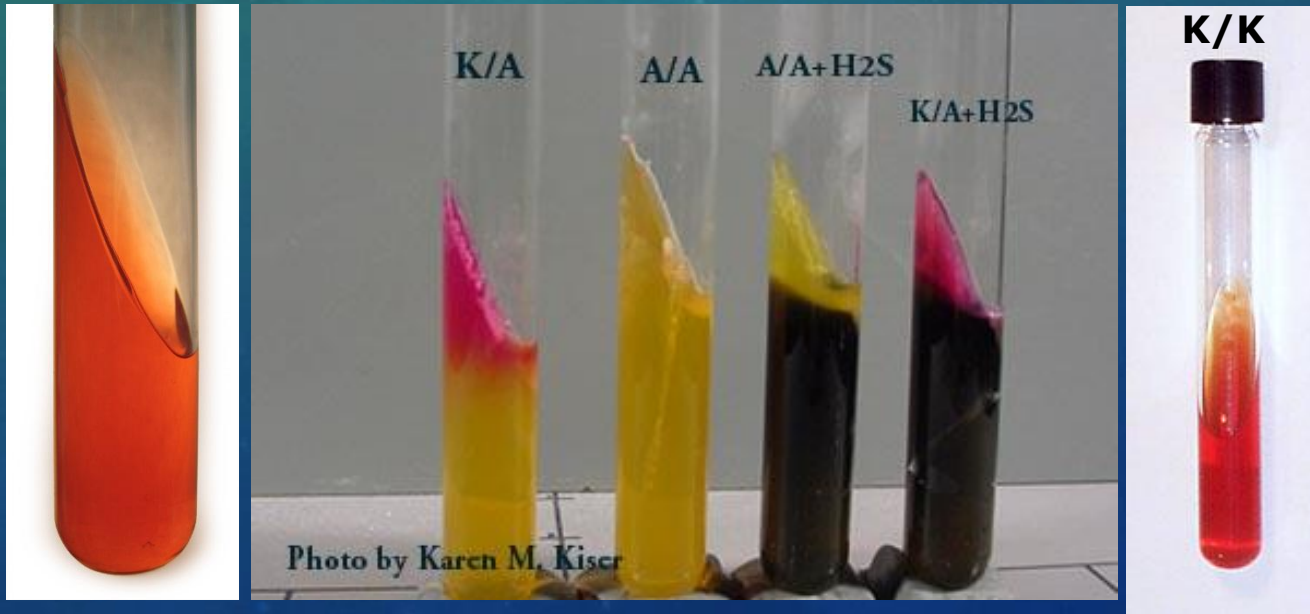
- ▶ O-nitrophenyl- β -D-galactoside (ONPG) –ve



+ve
Yellow

-ve
Colorless

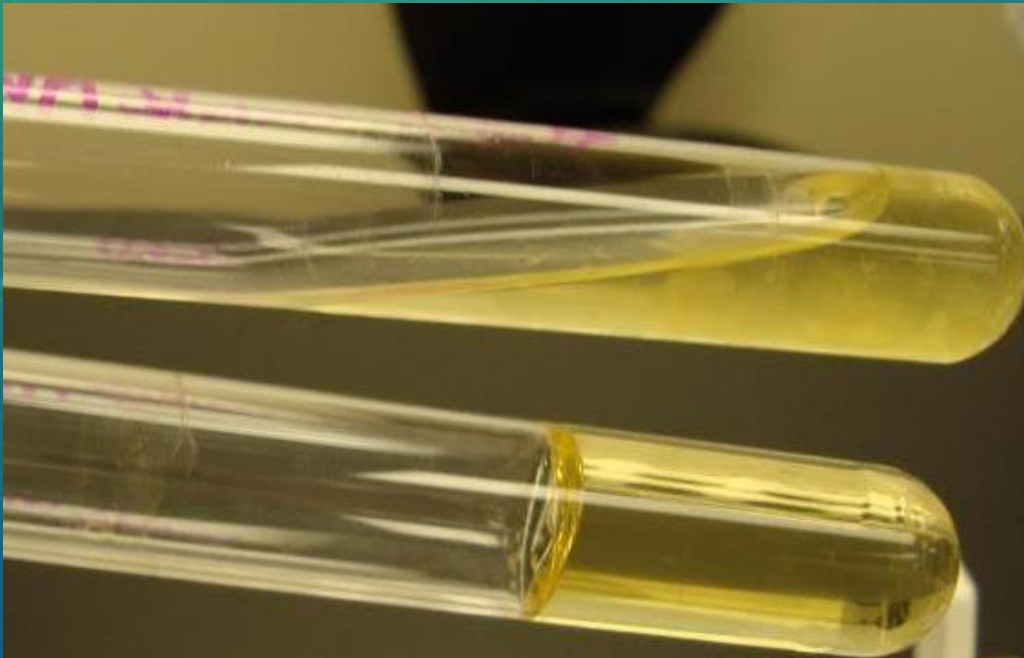
- ▶ **TSI (Tri Sugar Iron agar) :**
TSI K/A H2S +ve



Non-inoculated



▶ **Gelatin Hydrolysis Test : +ve**



+ve

-ve

IMViC profile

Species	Indol	Methyl Red	Voges Proskauer	Citrate utilization	Ornithine decarboxylase
<i>P. vulgaris</i>	+	+	-	-	-
<i>P. mirabilis</i>	-	+	-	+	+



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Non-fermenters

Gram –Ve Bacilli

Non-fermenters Gram –Ve Bacilli (NFGN)

Opportunistic Pathogens of Human, Plants and Animals.

They are :

- ▶ Oxidase positive
- ▶ Lack of evidence of fermentation of glucose
- ▶ No evidence of growth on MacConkey's agar





These include :

- ▶ *Pseudomonas*
- ▶ *Acinetobacter*
- ▶ *Bordetella*
- ▶ *Burkholderia*
- ▶ *Legionella*
- ▶ *Moraxella*
- ▶ *Stenotrophomonas*

Pseudomonas

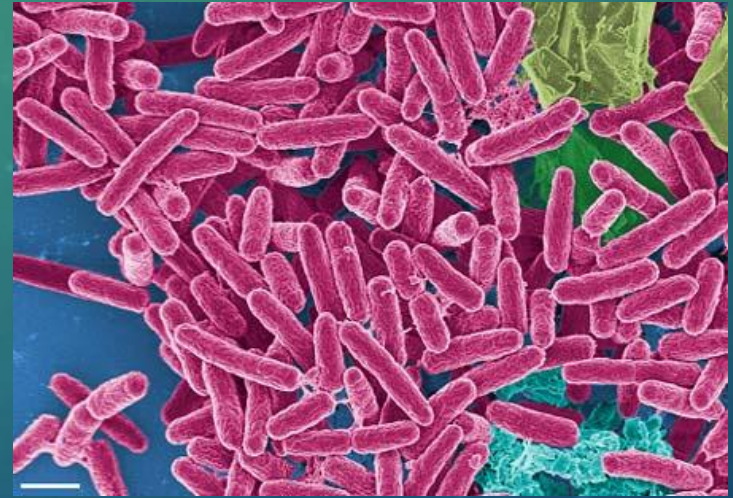
Pseudomonas is a genus of Gram-negative aerobic bacilli belonging to the family *Pseudomonaceae*, containing **191 species**.

Most important species are :

- ▶ *P. aeruginosa*
- ▶ *P. fluorescens*
- ▶ *P. putida*
- ▶ *P. stutzeri*

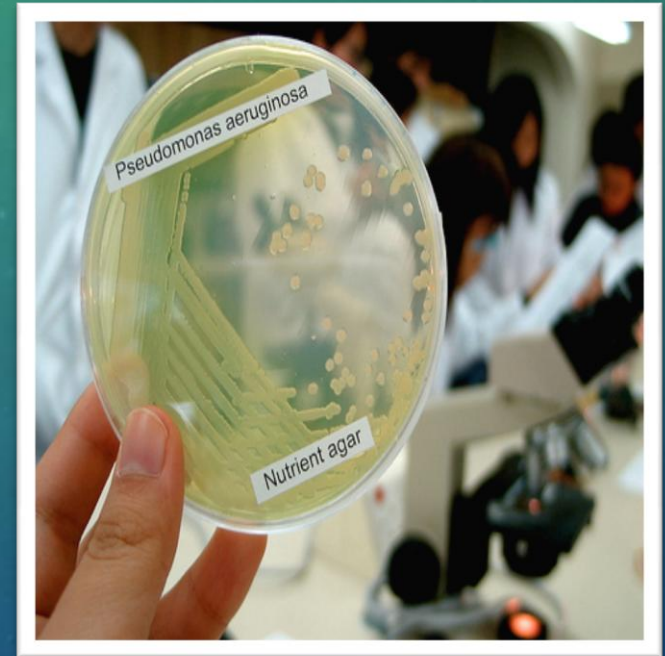
Morphology

- ▶ Gram-negative
- ▶ Motile with a single or multiple polar flagella
- ▶ Non-spore forming



Cultural Characteristics

- ▶ Obligate aerobe .
- ▶ Grow at optimum temperature of **37C** , but can tolerate **42C** .
- ▶ It can tolerate alkaline pH (**8.5**)
- ▶ Grow on ordinary media producing large opaque irregular colonies with sweetish aromatic “Grape-like” odor.
- ▶ Iridescent patches with metallic sheen are seen in cultures on nutrient agar.



- ▶ It produces pigments :
- ▶ As part of pathogenicity
- ▶ Seen on Nutrient agar (not on blood agar)



Pyocyanin- bluish pigment



Pyoverdinin- greenish pigment



Pyomelanin- black or brown

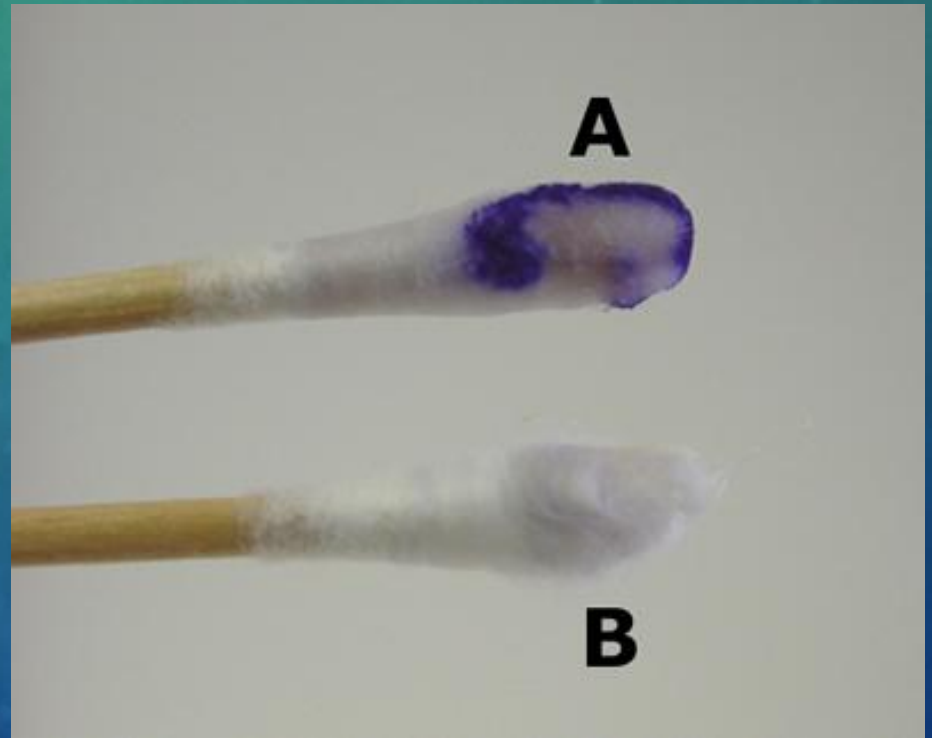
*There is also Pyorubin - Red



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Biochemical Tests

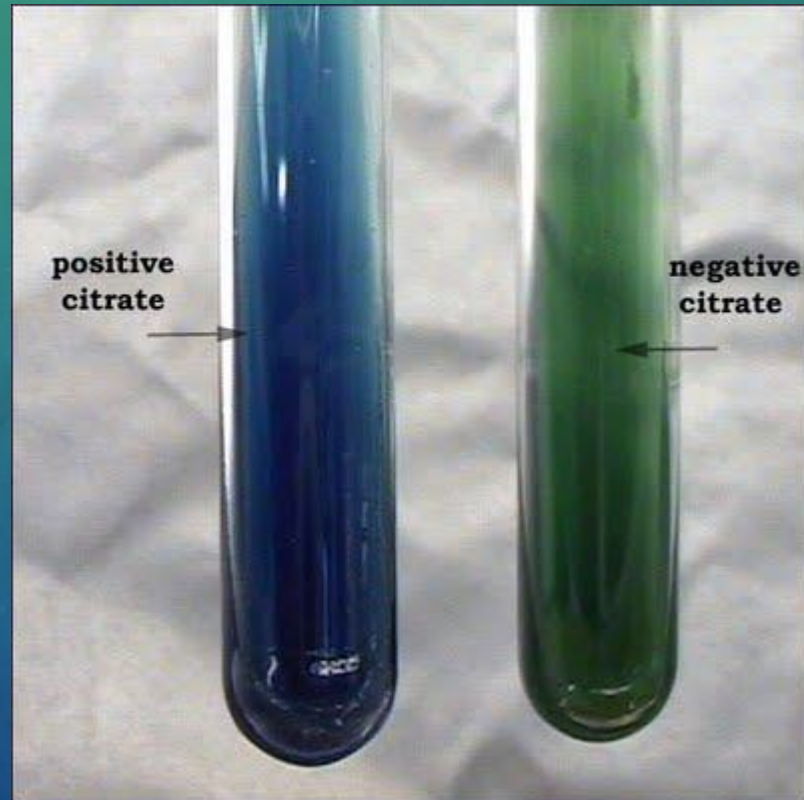
- ▶ Oxidase +ve



▶ Catalase +ve



▶ Citrate utilization +ve



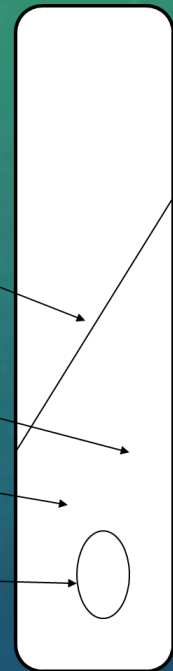
▶ **TSI (Tri Sugar Iron agar) :**
K/K H₂S -ve

Oxidative decarboxylation=ammonia
Alkaline reaction= red slant

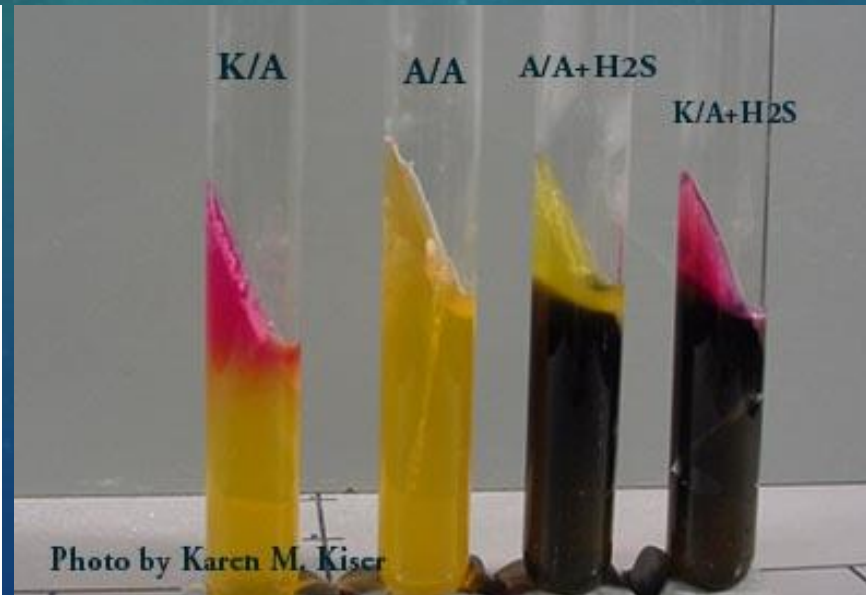
H₂S production= black color

Fermentation of the sugar =acid formation
Acidic reaction=yellow butt

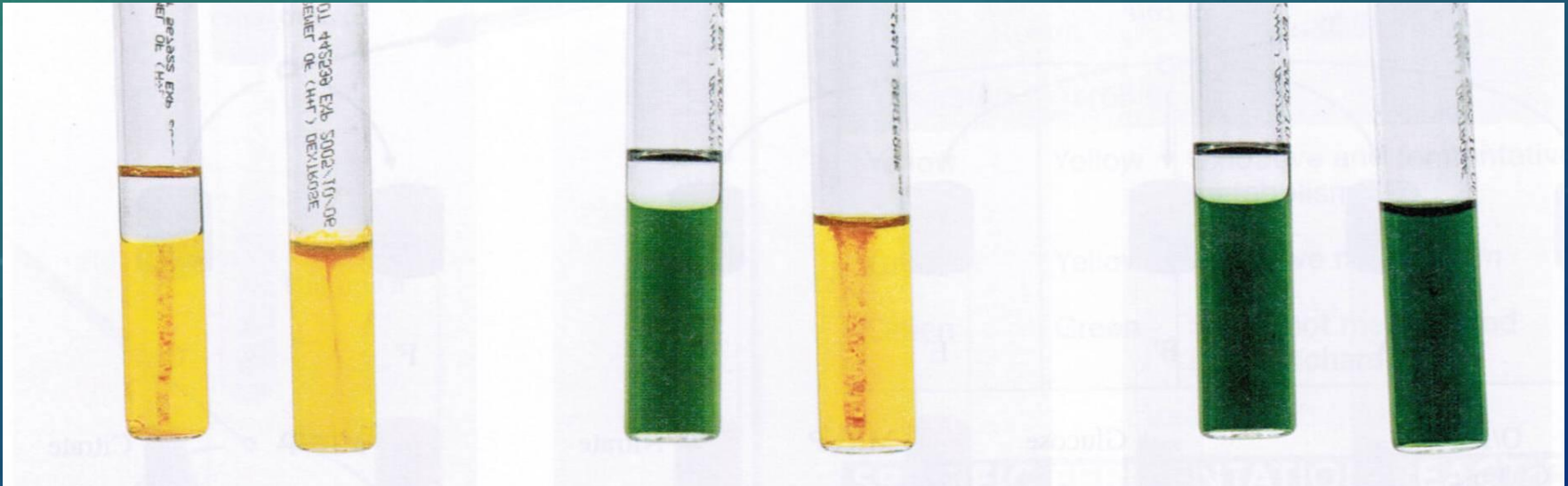
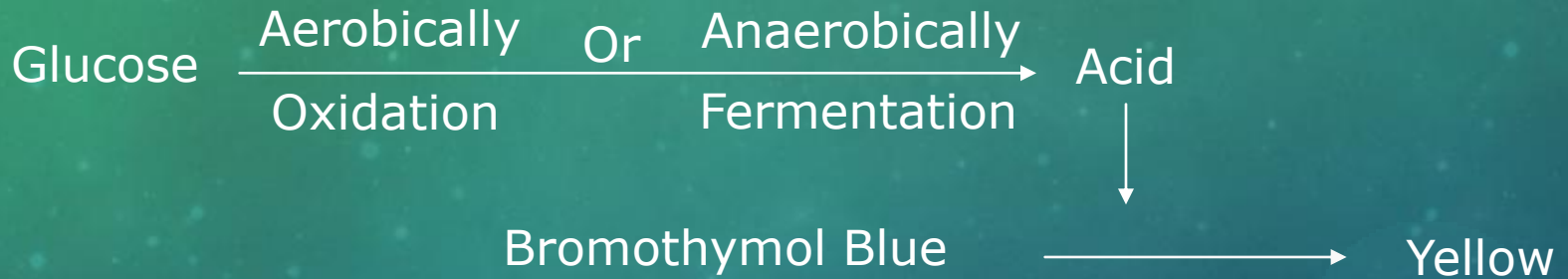
Gas = air bubble or crack in the medium



Non-inoculated



► Oxidative / Fermentative (O/F) : Oxidative & non fermentative



Fermentative & Oxidative

Non fermentative & Oxidative


Non fermentative & non oxidative
(Asaccharolytic)



Motility can be detected as “ Inverted Tree”



Inverted Tree



Note : Identification of *P. aeruginosa* is usually based on oxidase test and its colonial morphology: b-hemolysis, the presence of characteristic pigments and sweet odor, and tolerance of growth up to 42 °C.

Thank You