Vibrio cholerae

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- Vibrios are part of what is called gram negative curved bacilli.
- They are among the most common bacteria in surface water world wide

	oxidase	Sugar fermentation
V.cholerae	positive	Glucose,sucrose,maltose, mannite
Enteric bacilli	negative	Glucose,some are LF and other are NLF
pseudomonas	positive	Non-fermentitive

Classification

	Disease	Diagnosis
V.chleraea	Cholera(vomiting, watery diarrhea)	Stool examination
Non-cholerae Vibrios (v.mimicus, v.vulnificus)	wound, ear, and soft tissue infections	Wound smear, and stool examination(in case of diarrhea)
V.parahemolyticus	Gastroenteritis (diarrhea)	Stool examination

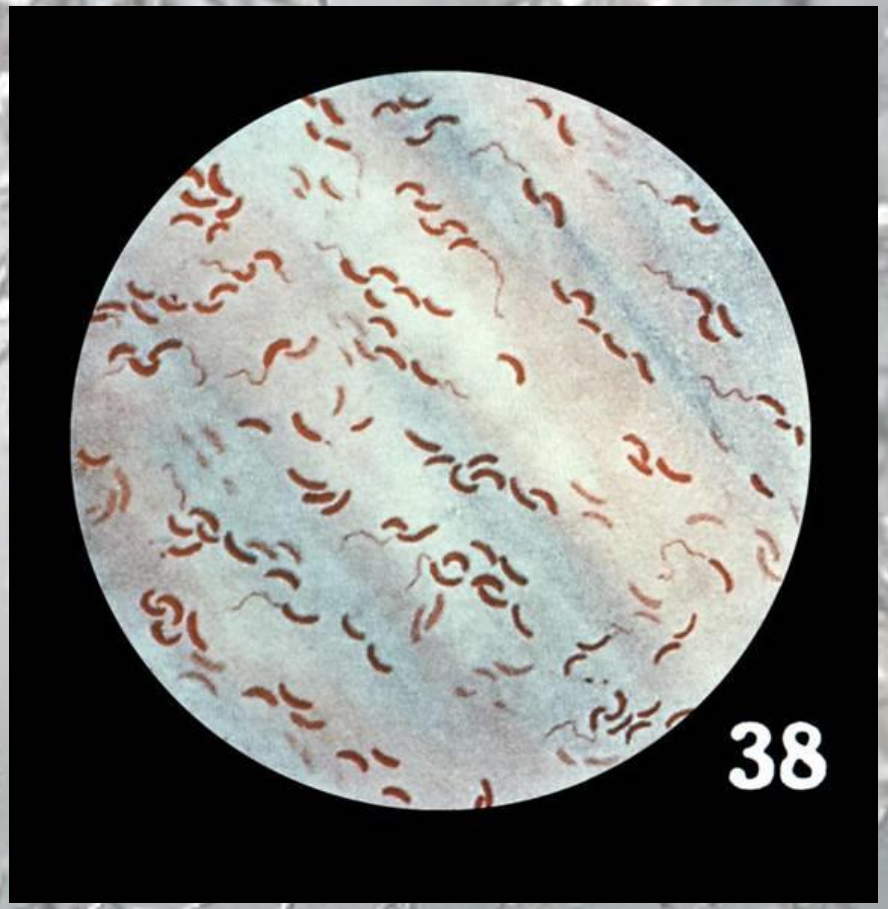
v.cholerae

- Vibrios have 2 important antigens; H (shared), and O (specific) which is lipopolysaccharides. There are at least 139 O - antigen groups.
- Vibrio cholerae of O group 1 (o1) and 139 (O139) cause the classical disease cholera.
- Both O1 and O 139 V.cholerae can be of two biotypes:

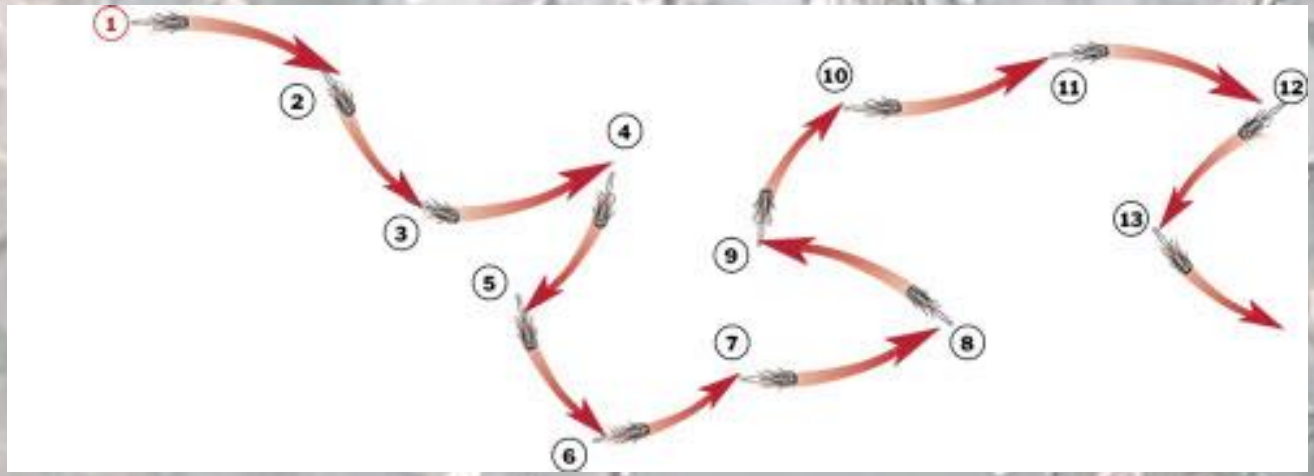
  1. Classical
  2. El-Tor

Microscopical appearance

- Upon first isolation, v.cholera is comma shaped gram (-ve) bacilli, curved rod 2-4 µm long.
- On prolonged cultivation they become straight rods.



- V.cholerae is highly motile, its motility is described as darting or shooting star.



Biochemical characteristics

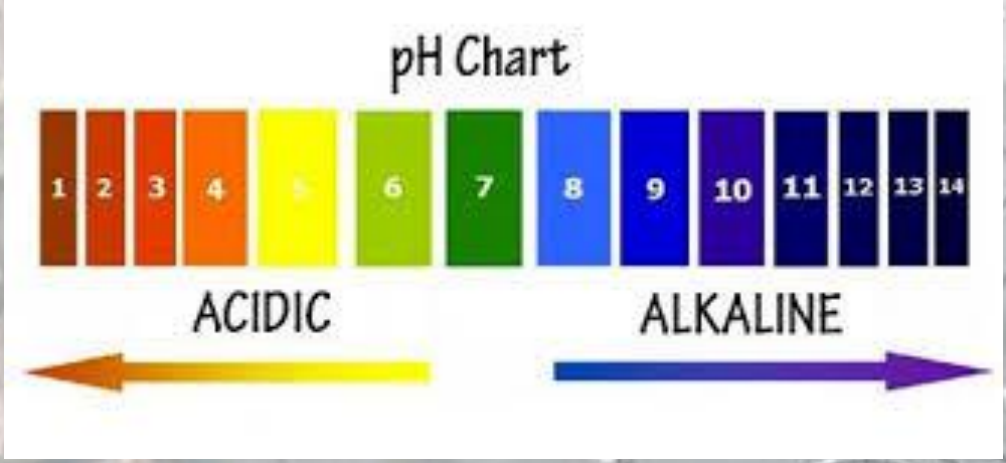
1. They ferment glucose,sucrose,maltose,and mannite with acid production only
2. Oxidase ⟶ positive
3. Catalase ⟶ positive
4. Indole ⟶ positive
5. Nitrate reduction ⟶ positive

Cholera red reaction

a test for Cholera vibrio whereby the addition of 3-4 drops of sulfuric acid (concentrated, chemically pure) to an 18-hour-old peptone culture of the organism produces a rose-pink to claret color.

- V.cholerae reduce nitrate to nitrite, and produce indol (+ve) on tryptophan medium,on addition of H_2SO_4 red color is produced due to nitroso-indol.

- The optimum ph for growth is 7.0 but they can tolerate 8.5-9.0 (pseudomonas can also tolerate 8.5).



TSI

- They give A/A

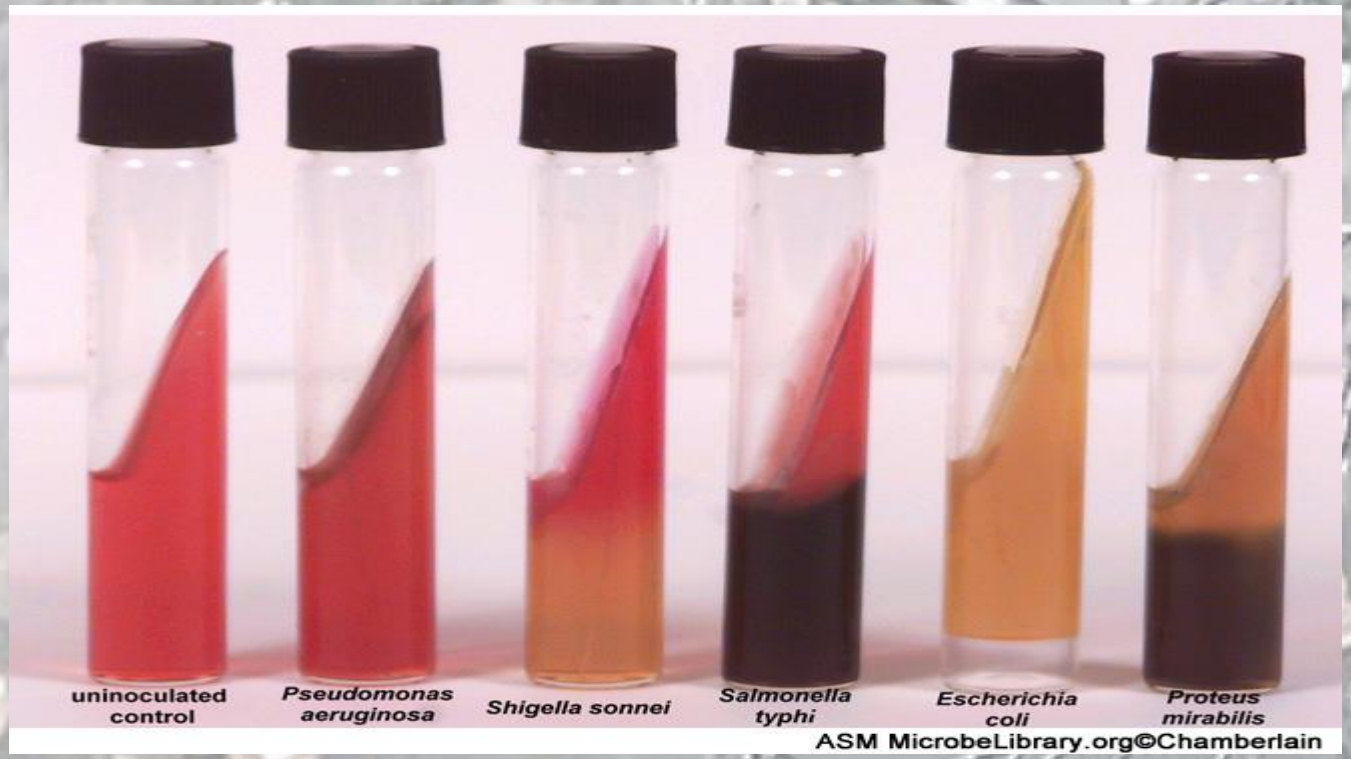


Table IV-2. Differential characteristics of selected members of *Vibrionaceae* and *Enterobacteriaceae*.

TEST	ORGANISM						
	Vibrio cholerae	*Vibrio mimicus*	*Halophilic vibrios*	*Aeromonas hydrophila*	*Aeromonas veronii*	*Plesiomonas shigelloides*	*Enterobacteriaceae*
KIA	K/A	K/A	V	V	K/AG	K/A	V
TSI	A/A	K/A	V	V	A/AG	K/A	V
String	+	+	+[a]	-	-	-	-
Oxidase	+	+	+	+	+	+	-
Gas from glucose	-	-	-[b]	+	+	-	V
Sucrose	+	-	V	V	+	-	V
Lysine	+	+	V	V	+	+	V
Arginine	-	-	V	+	-	+	V
Ornithine	+	+	V	-	+	+	V
VP	V	-	V	V	+	-	V
Growth in 0% NaCl[c]	+	+	-	+	+	+	+
Growth in 1% NaCl[c]	+	+	+	+	+	+	+

Note: V=variable reaction
[a] *V. parahaemolyticus*, *V. cincinnatiensis*, and *V. damsel* give variable reactions.
[b] *V. furnissii* and *V. damsel* are variable for gas from glucose.
[c] Nutrient broth base (Difco Laboratories, Detroit, MI)

Culture of v.cholerae

Culture of v.cholerae

1. Alkaline peptone water:

Alkaline Peptone Water is generally used as an enrichment medium in the isolation of Vibrio spp. from faeces. The high pH of the medium inhibits most enteric organisms for at least 24 hours.

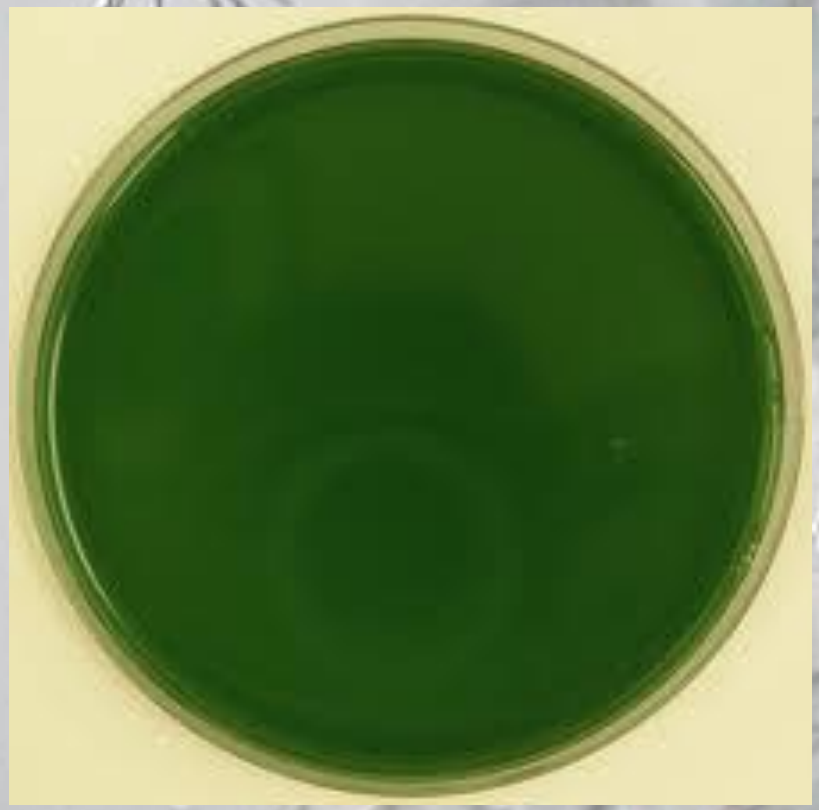
Alkaline peptone water

after not more than 8 hours incubation a loopful from the top of the medium is sub cultured onto TCBS Agar. This enrichment medium is also used for food and water testing.

2. Thiosulfate citrate bile salt sucrose agar(TCBS):

- Components:
- Sodium thiosulfate and Sodium citrate to inhibit the growth of enteric bacilli and serves as a sulfur source.
- Sucrose for metabolism of V.cholerae.

- Medium has bromo-thymol blue as indicator
- Before inoculatoin ⟶ olive green
- After inoculation ⟶ since it is sucrose fermenter, there will be acid production and changing the color into yellow

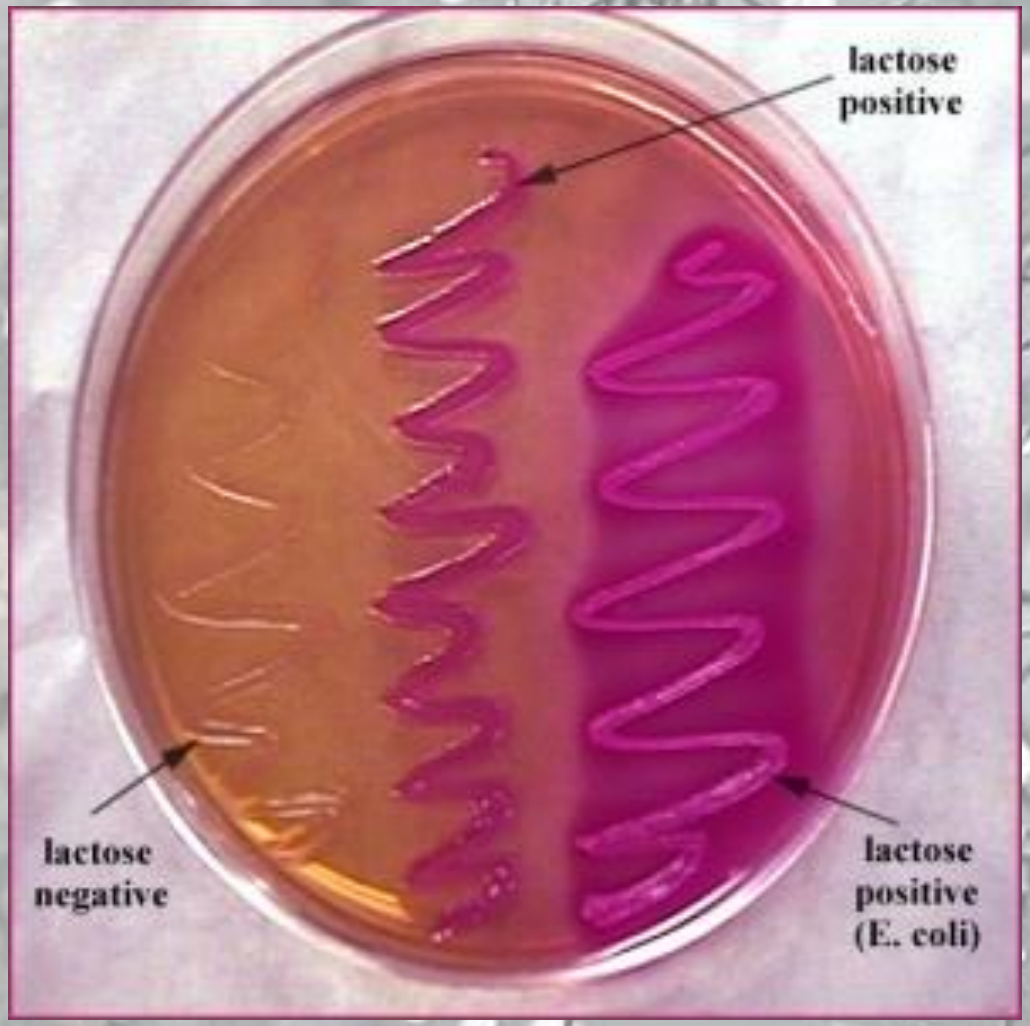


3. MacConkey's agar:

   Non-lactose fermenter ⟶ pale colonies

4. Blood agar:

- Only El-Tor ⟶ β-hemolysis
- Both(classical, El-Tor) appear as convex,smooth,granular.



V.cholerae on MacConkey’s agar


Thank you