

Family: Vibrionaceae

Phylum: Proteobacteria

Class: Gammaproteobacteria

Order: Vibrionales

Family: Vibrionaceae

Genus: *Vibrio*

- *V. cholerae*
- *V. parahaemolyticus*

General Characteristics : *V. cholerae* is a comma-shaped, curved rod. It is actively motile by means of a polar flagellum. On prolonged cultivation, vibrios may become straight rods that resemble the gram-negative enteric bacteria. Vibrios are among the most common bacteria in surface waters worldwide. They are curved aerobic rods and are motile, possessing a polar flagellum. *V. cholerae* serogroups O1 and O139 cause cholera in humans, while other vibrios may cause sepsis or enteritis. *V. cholerae* regularly ferments sucrose and mannose but not arabinose. Vibrios are oxidase-positive, which differentiates them from enteric gram-negative bacteria. Characteristically, vibrios grow at a very high pH (8.5–9.5) and are rapidly killed by acid. Most *Vibrio* species are halotolerant, and NaCl often stimulates their growth. Some vibrios are halophilic, requiring the presence of NaCl to grow.

Culture and Growth Characteristics: Growth is rapid in peptone agar, on blood agar with a pH near 9.0, or on TCBS agar, and typical colonies can be picked in 18 hours. For enrichment, a few drops of stool can be incubated for 6–8 hours in taurocholate-peptone broth (pH 8.0–9.0); organisms from this culture can be stained or subcultured. *V. cholerae* produces convex, smooth, round colonies that are opaque and granular in transmitted light. *V. cholerae* and most other vibrios grow well at 37 °C on many kinds of media, including defined media containing mineral salts and asparagine as sources of carbon and nitrogen. *V. cholerae* grows well on **thiosulfate-citrate-bile-sucrose (TCBS)** agar, on which it produces yellow colonies that are readily visible against the dark-green background of the agar.

Antigenic Structure & Biologic Classification:

- *V. cholerae* has O lipopolysaccharides that confer serologic specificity. There are at least 139 O antigen groups. *V. cholerae* strains of O group 1 and O group 139 cause classic cholera; occasionally, non-O1/non-O139 *V. cholerae* causes cholera-like disease.
- The *V. cholerae* serogroup O1 antigen has determinants that make possible further typing. Two biotypes of epidemic *V. cholerae* have been defined, **classical** and **El Tor**.

El Tor	Classical
Haemolytic	Non-Haemolytic
Resistant to polymyxin B.	Sensitive
Cause haemoagglutination of SRBCs	Dose not

- Molecular techniques can also be used to type *V. cholerae*.

Pathogenesis:

The Medically Important Vibrios.	
Organism	Human Disease
<i>V. cholerae</i> serogroups O1 and O139 <i>V. cholerae</i> serogroups non-O1/non-O139	Epidemic and pandemic cholera Cholera-like diarrhea; mild diarrhea; rarely, extraintestinal infection
<i>V. parahaemolyticus</i>	Gastroenteritis, perhaps extraintestinal infection
Others <i>V. mimicus</i> , <i>V. vulnificus</i> , <i>V. hollisae</i> , <i>V. fluvialis</i> , <i>V. damsela</i> , <i>V. anginolyticus</i> , <i>V. metschnikovii</i>	Ear, wound, soft tissue, and other extraintestinal infections, all uncommon

Vibrio parahaemolyticus: is a halophilic bacterium that causes acute gastroenteritis following ingestion of contaminated seafood such as raw fish or shellfish. After an incubation period of 12–24 hours, nausea and vomiting, abdominal cramps, fever, and watery to bloody diarrhea occur. Fecal leukocytes are often observed. The enteritis tends to subside spontaneously in 1–4 days with no treatment other than restoration of water and electrolyte balance. The disease occurs worldwide, with highest incidence in areas where people eat raw seafood. *V. parahaemolyticus* does grow well on blood agar. It also grows well on TCBS, where it yields green colonies.

Specimens: Specimens for culture consist of mucus flecks from stools.

Treatment: The most important part of therapy consists of water and electrolyte replacement to correct the severe dehydration and salt depletion. Many antimicrobial agents are effective against *V. cholerae*. Oral tetracycline tends to reduce stool output in cholera and shortens the period of excretion of vibrios.

Laboratory diagnostic tests:

1. **Gram stain** (Gram-negative comma-shaped, curved rod).
2. **Culture on blood agar**
3. **Culture on Selective and Differential media like TCBS agar.**
4. *V. cholerae* organisms are identified by slide agglutination tests using anti-O group 1 or group 139 antisera
5. **TSI**
6. **IMViC test**
7. **Nitrate reduction test**
8. **Gelatin liquefaction test.**
9. **Peptone water pH= 9, NaCl= 7%**
10. **Cholera Red Reaction (Nitroso endol test):** to test the bacteria ability to produce deaminase enzyme

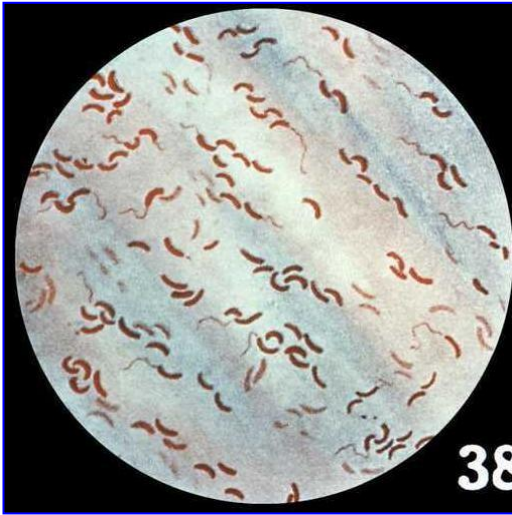
Tryptophane + H₂SO₄ (4 drops) → Nitrosoindol (red color)

Tryptophane $\xrightarrow{\text{Deaminase}}$ **NH₃**

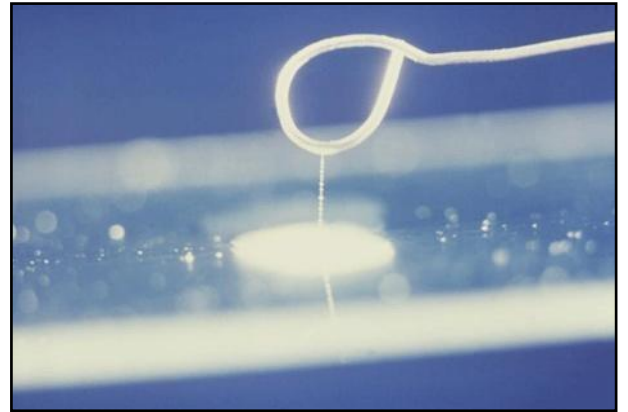
NH₃ + H₂SO₄ → Nitrosoindol (red color)

- 1. String test: add 0.5% Na-deoxycholate solution to 1 drop of culture, the culture convert to thread like when draws by loop disappear after 45-60 sec.**

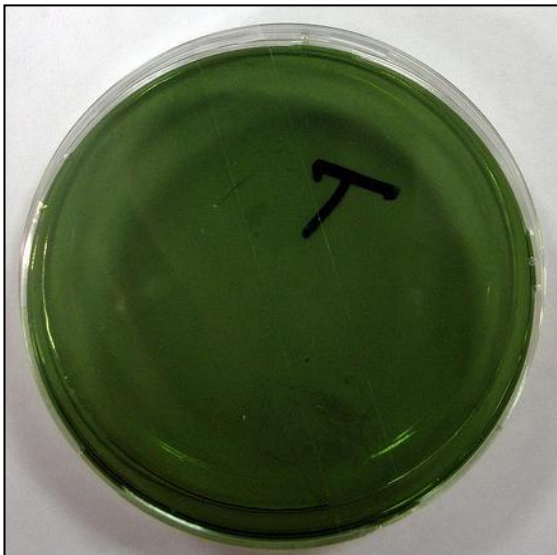
Test	<i>V. cholerae</i>	<i>V. parahaemolyticus</i>
Catalase	+	+
Oxidase	+	+
NO₃ reduction	+	+
Indole	+	+
MR	+ weak	-
VP	-	-
Citrate	+/-	+/-
Peptone water + 7% NaCl	-	+
Peptone water + 0% NaCl	+	-
TSI	A/A - -	K/A - -
Motility	+	+
Cholera red	+	-
Mannitol	+ weak	+ weak
String test	+	+
OF medium	Oxidation-fermentation	Oxidation-fermentation
TCBS medium	Yellow colonies	Green colonies



Vibrio cholerae



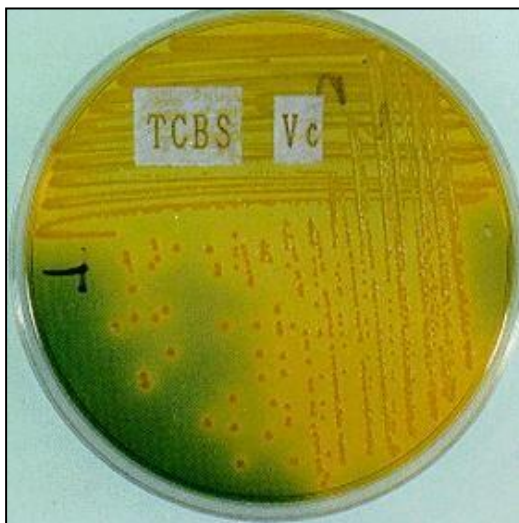
The String Test



TCBS medium



Vibrio parahaemolyticus on TCBS medium



Vibrio cholerae on TCBS medium

