
بسم الله الرحمن الرحیم

Cholera Etiology

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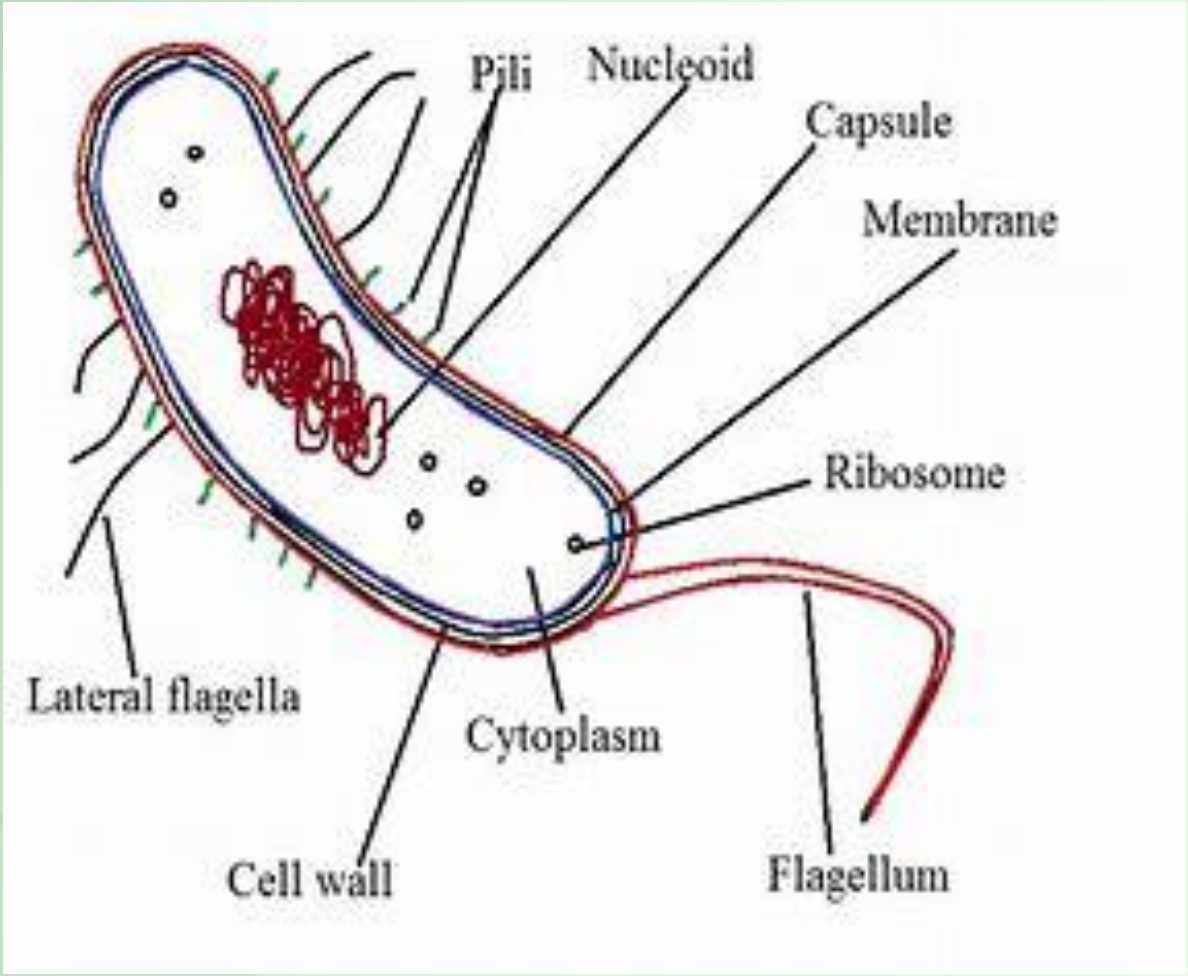
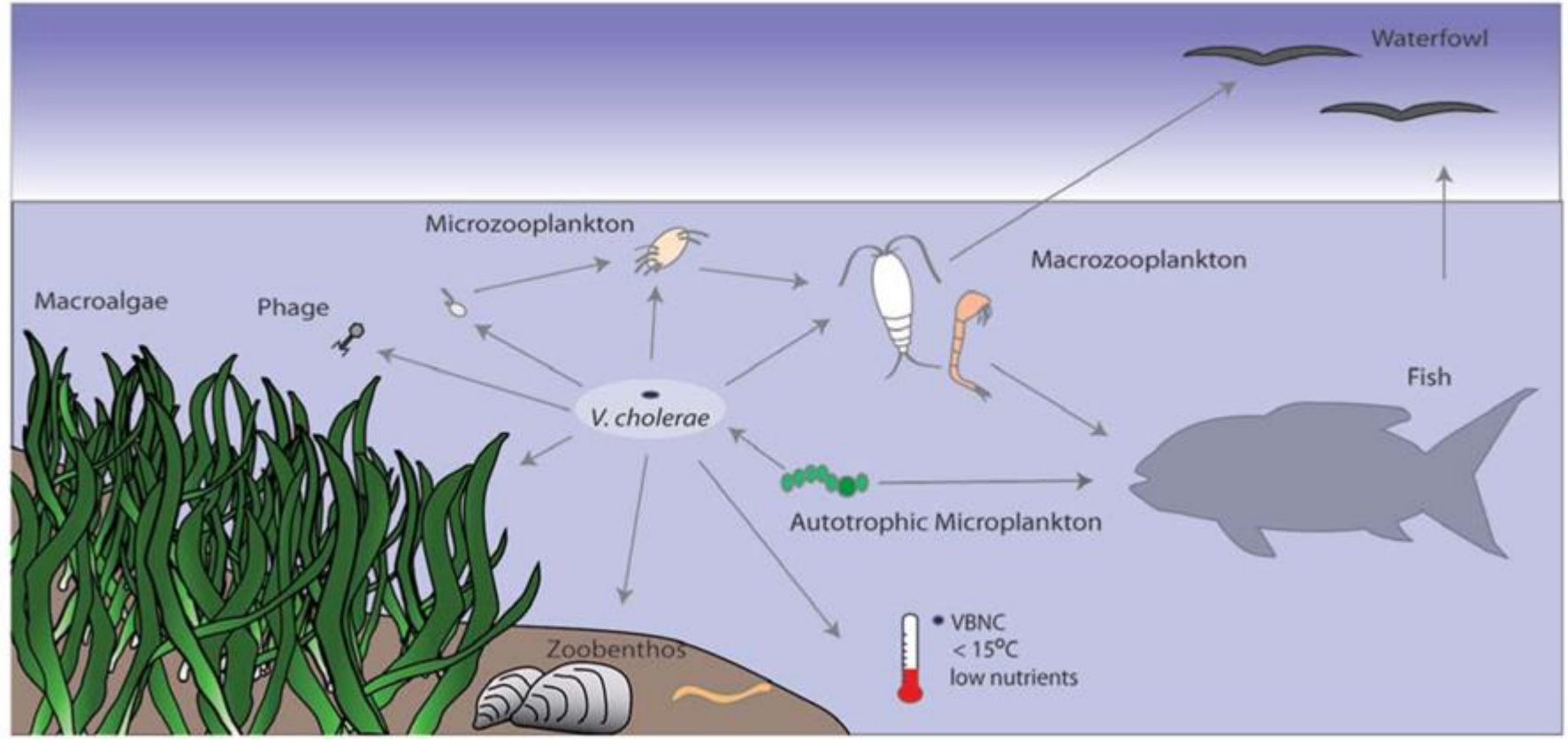
Vibrio Cholera:

- *V. cholerae* is a **curved gram-negative rod, Strongly aerobic, motile** in intestine not in growth media
- It belongs to the family Vibrionaceae of Proteobacteria, which differs from the related family Enterobacteriaceae in being **oxidase-positive and motile** with a single flagellum.



Environmental life:

The bacteria naturally live **in brackish or saltwater** where they attach themselves easily to the **chitin-containing shells of crabs, shrimps, and other shellfish**.



salt-tolerant, requiring NaCl for growth (halophilic) and exists naturally in aquatic environments.

VBNC=Viable but nonculturable

Vibriocholera serogroups:

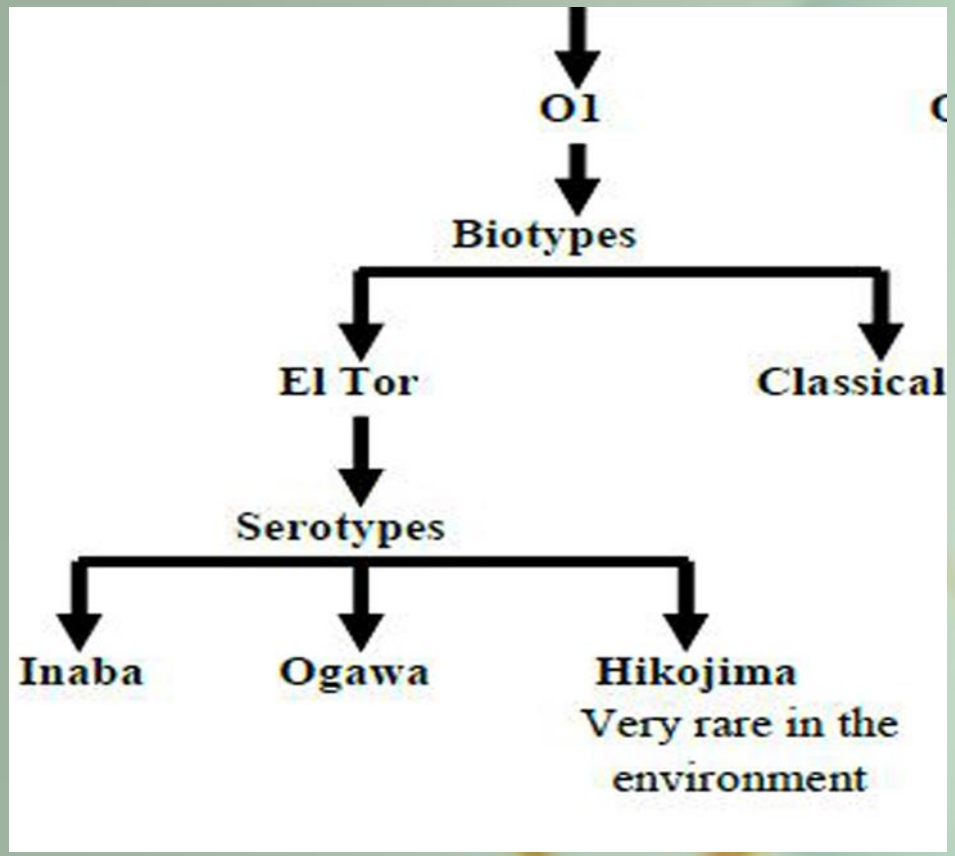
“O1” and “O139”

- *V. cholerae* spp. includes more than 200 serogroups classified according to the antigenic characteristics of the **lipopolysaccharide O antigen**
- To date, **only *V. cholerae* organisms carrying the somatic O antigens O1 and O139 are associated with epidemic disease.**

"non-O1”, “non-O139"

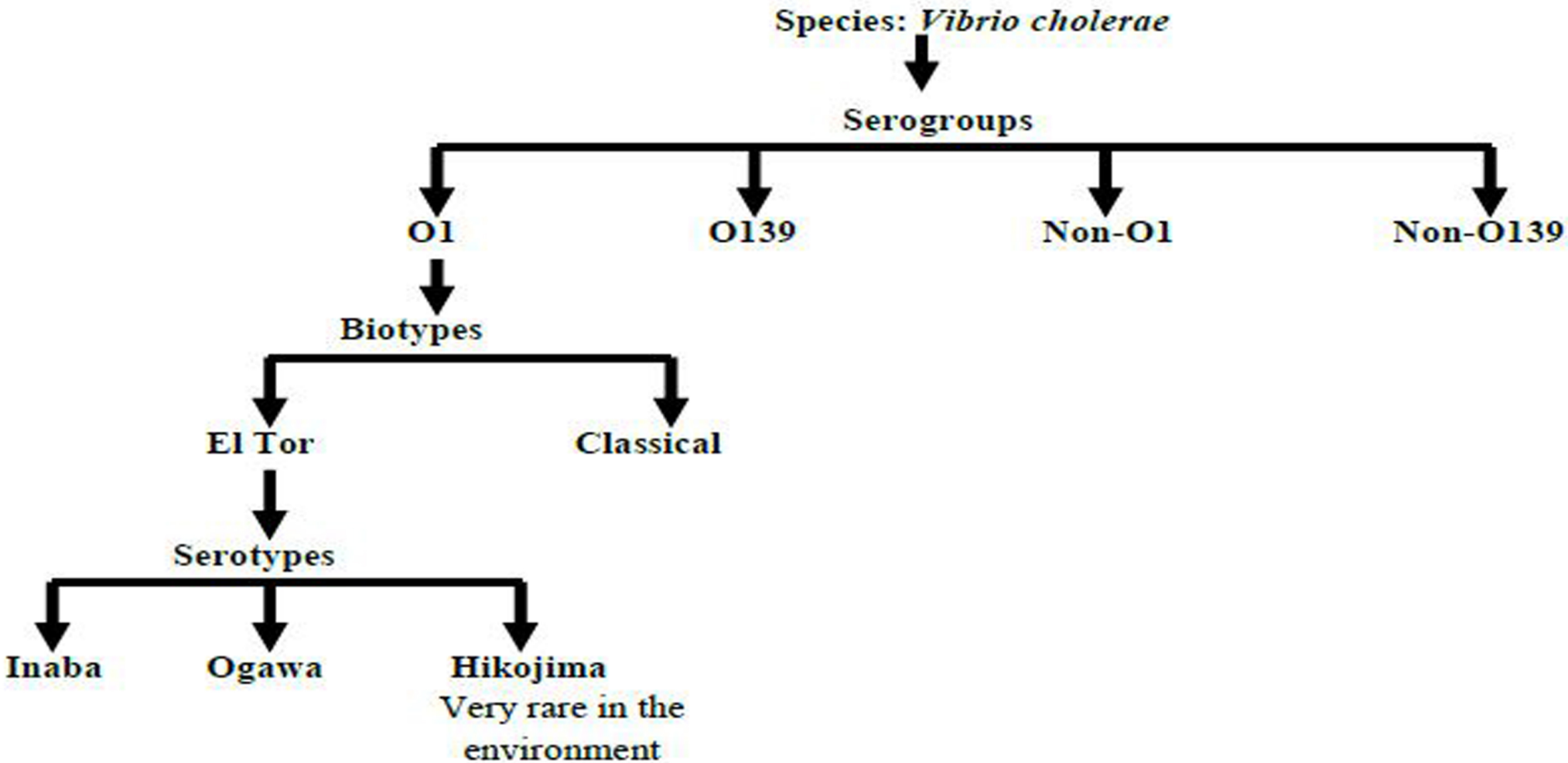
- Other serogroups are generally grouped as *V. cholerae* **"non-O1”, “non-O139."**
- **Toxin-producing** non-O1/O139 *V. cholerae* =small outbreaks of dehydrating diarrhea
- **Non-toxin-producing** non-O1/O139 strains have been =sporadic gastroenteritis and sepsis

Vibrio cholera Biotypes:



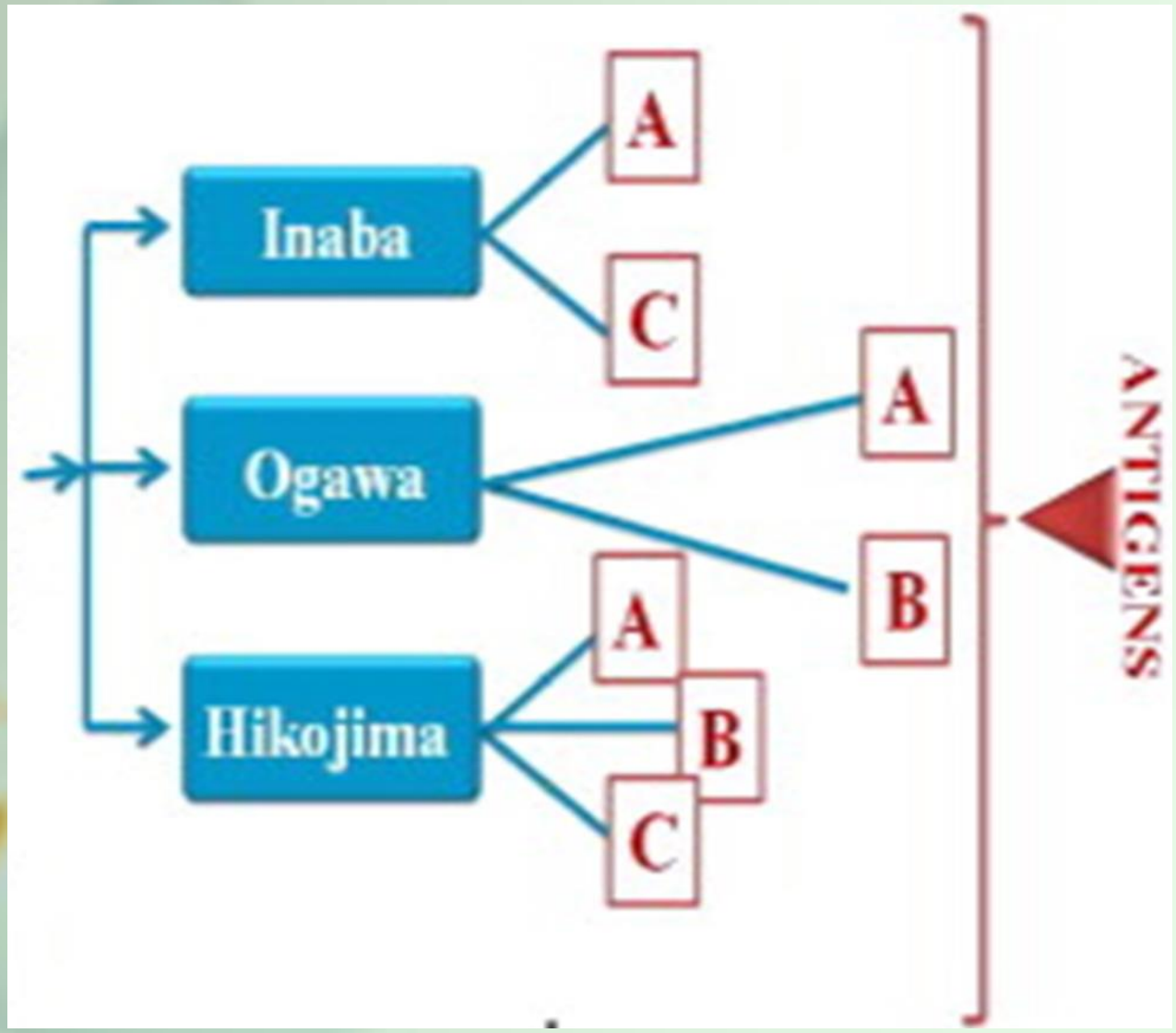
Serogroup O1 Biotypes:

- *V. cholerae* O1 is also divided into two biotypes, **El Tor and classical**, which are differentiated by biochemical distinctions and susceptibility to specific bacteriophages.
- Previous *V. cholerae* pandemics were caused by the **classical biotype**

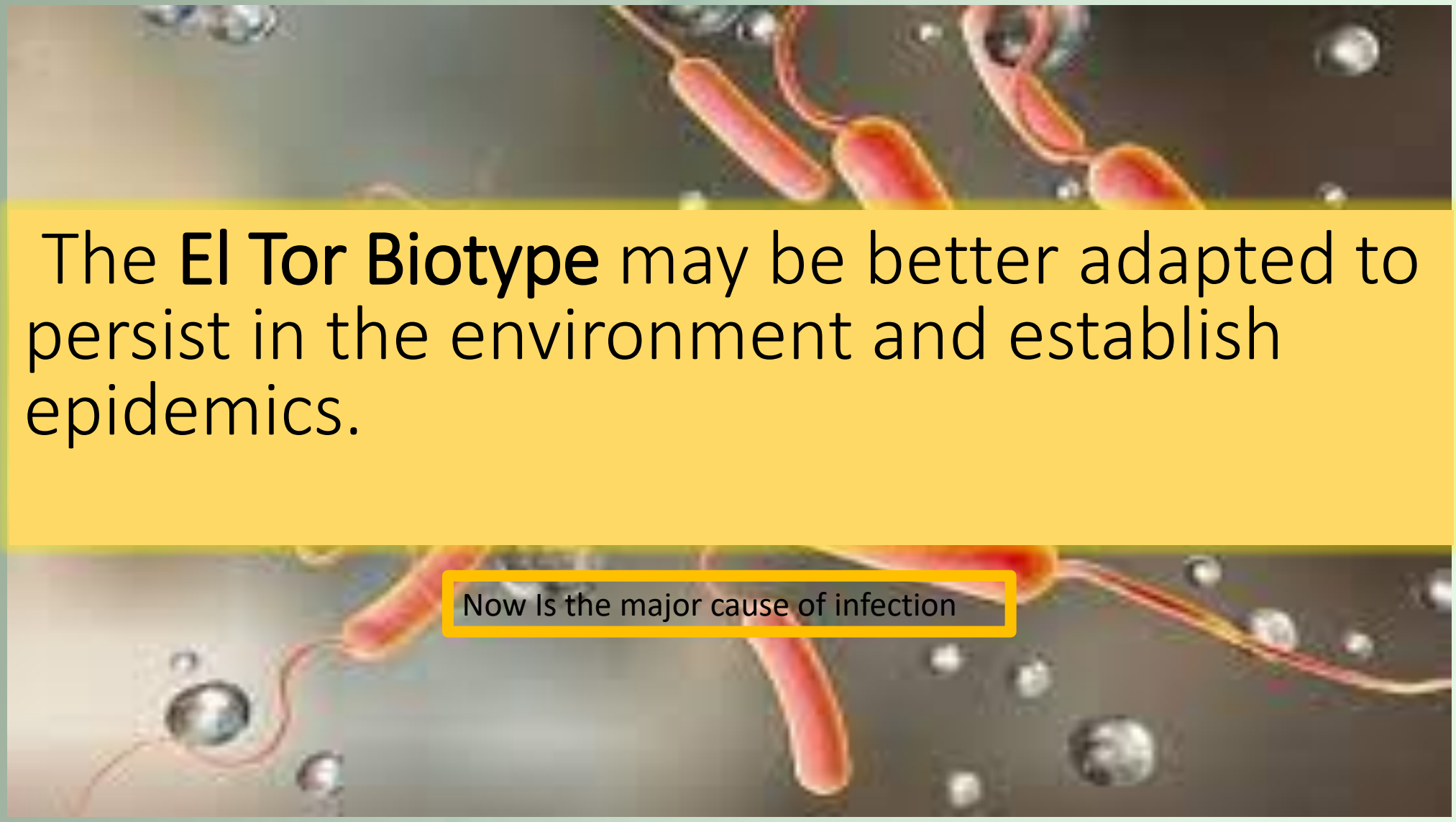

Species: Vibrio cholerae
Serogroups
O1
O139
Non-O1
Non-O139
Biotypes
El Tor
Classical
Serotypes
Inaba
Ogawa
Hikojima
Very rare in the environment

EL tor or Classic Serotypes:

- **EL Tor or Classic Biotype** is divided in to three serotypes
- **Inaba and Ogawa, Hikojima** which differ by the presence of O-specific polysaccharide antigen.



Serogroup O139 : *V. cholerae* O139 emerged in 1992 and was a major cause of epidemic cholera for a decade, but is no longer a major cause of cholera.



The **El Tor Biotype** may be better adapted to persist in the environment and establish epidemics.

Now Is the major cause of infection

New Microbes and New Infections
Volume 31, September 2019, 100577

Original Article

In silico characteristics for re-emerging possibility of *Vibrio cholerae* genotypes in Iran

M. Hajia [1], Amir Sohrabi [2]

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https://doi.org/10.1016/j.nmni.2019.100577

Abstract

Epidemic cholera has been registered several times within recent years in Iran. The dominant genotype was Ogawa until 2011, but this gradually changed to Inaba. However, in 2015, the re-appearance of a previous Ogawa genotype was detected by the Iranian CDC. This raised worries because no evidence was found for its origin abroad. The aim of the present study was to identify clearly the source of this

Vibrio Cholera Characteristic in IRAN

IJM Iranian Journal of Microbiology

Volume 12 Number 4 (August 2020) 273-280

Identification of cholix toxin gene in *Vibrio cholerae* non-O1/non-O139 isolated from diarrhea patients in Bushehr, Iran

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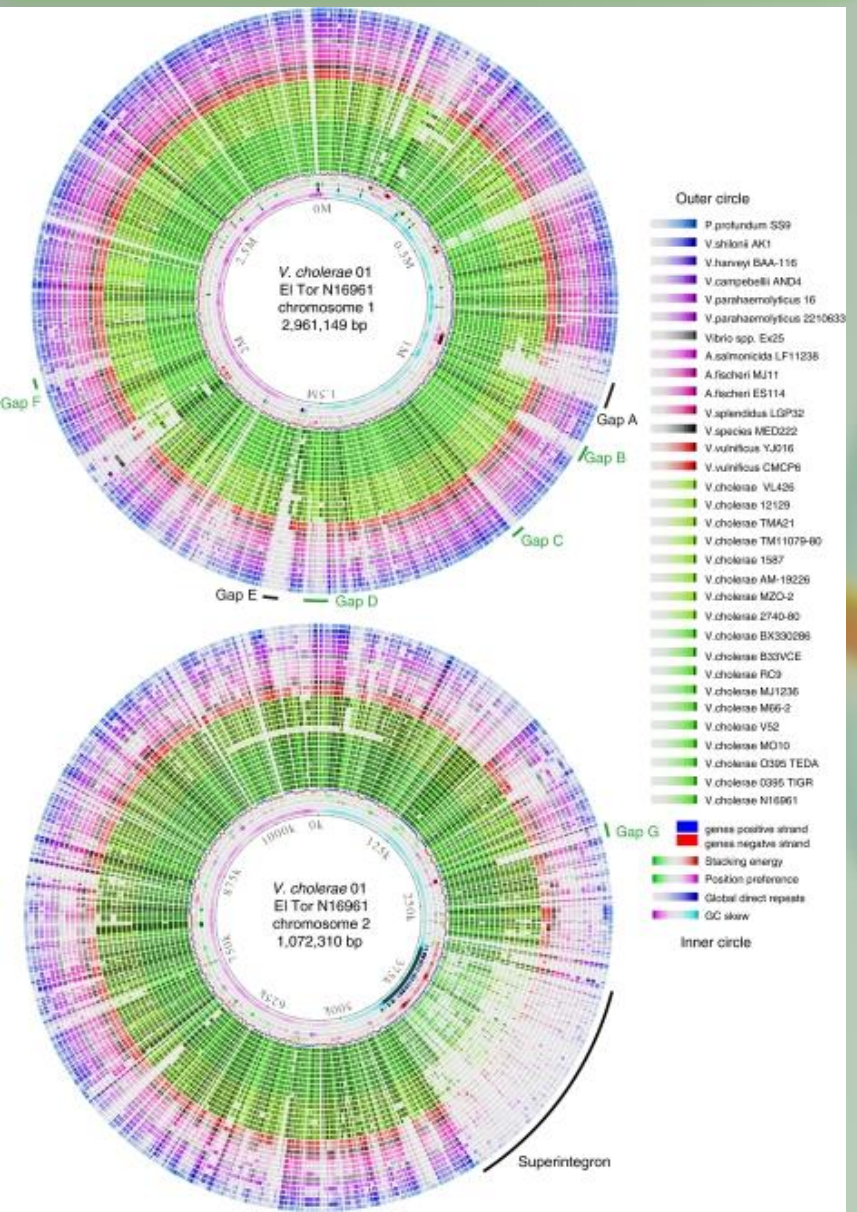
Genomic features:



CTXΦ: Toxin-producing strains of *V. cholerae* contain the bacteriophage CTXΦ

VPI : The *Vibrio* Pathogenicity Island (VPI). contains the genes that encode the **toxin coregulated pilus (TCP)**, a specialized bacterial structure in pathogenic strains that **allows colonization of the human intestine. <u>The production of TCP is coordinated with production of cholera toxin</u>**

SXT/R391 ICE : The **SXT/R391 integrative and conjugative element (ICE)** is an important part of the genome that allows *V. cholerae* to acquire certain types of foreign DNA and has allowed the **bacteria to acquire antibiotic resistance phenotypes**

Vibrio cholera Characteristics in current Pandemic:

First Wave

The current cholera pandemic began **with the emergence of *V. cholerae* O1 biotype El Tor**, which replaced the previously circulating classical biotype

Second Wave

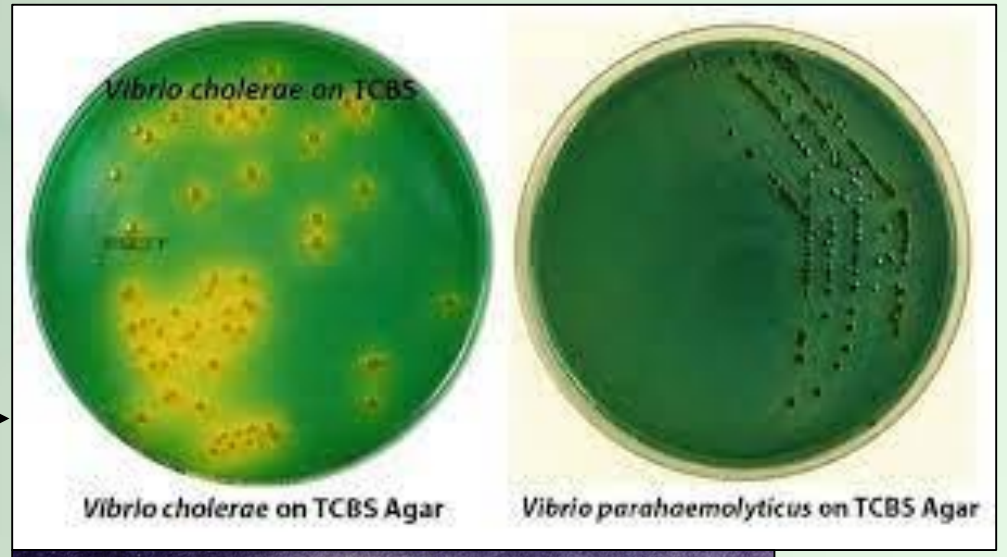
A second wave occurred when the original pandemic *V. cholerae* O1 El Tor strains were replaced by ***V. cholerae* O1 isolates** containing the SXT/R391 antibiotic resistance element. ***V. cholerae* O139 strains** arose from and are included in this second wave.

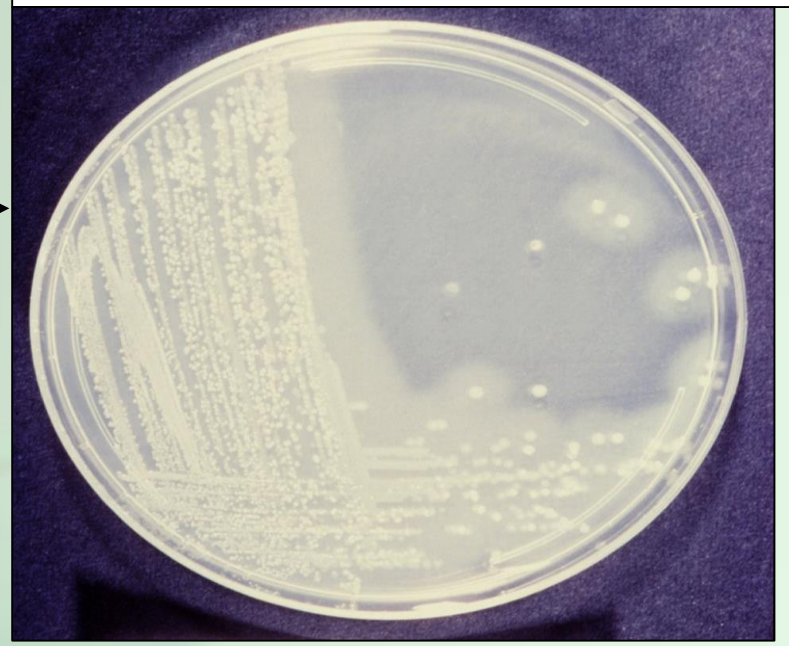
Third Wave

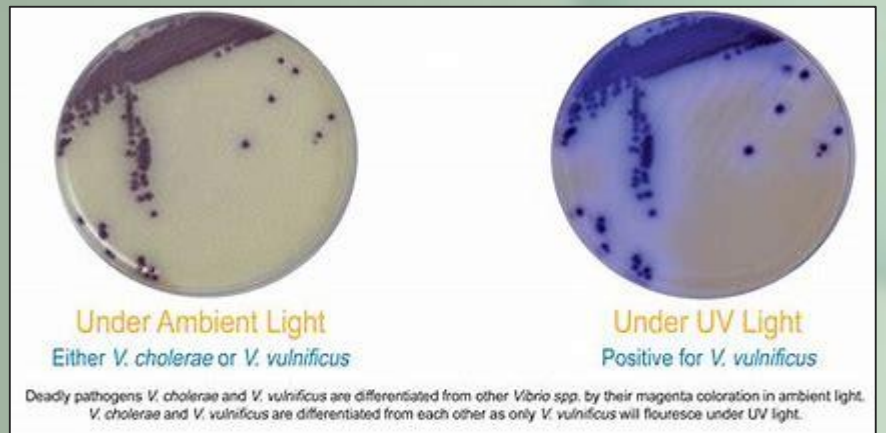
The third wave, in which the most recent common ancestral clone is estimated to have originated in 1988, was associated with **acquisition of a cholera toxin variant** that shared characteristics of a cholera toxin sequence previously observed in the now extinct classical biotype

Which media is used for Vibrio cholerae?

- Three commonly used selective media for V. cholerae isolation are
- **Thiosulfate citrate bile-salts sucrose (TCBS) agar,**
- **Tellurite taurocholate gelatin agar (TTGA), also known as Monsur medium (Monsur 1961),**
- **and CHROMagar™ Vibrio** (CHROMagar, Paris, France). V.



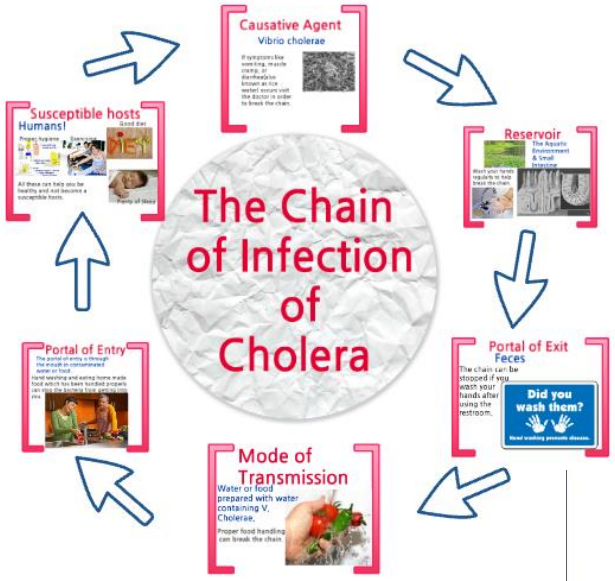




Transmission:

A person can get cholera **by drinking water or eating food contaminated** with cholera bacteria.

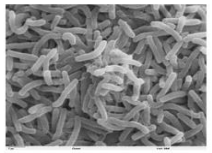
In an epidemic, **the source of the contamination is usually the feces of an infected person that contaminates water or food.** The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water.



Causative Agent

Vibrio cholerae

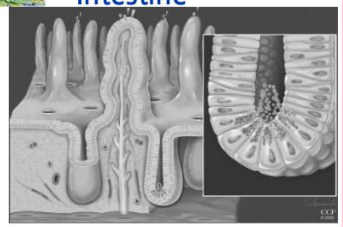
If symptoms like vomiting, muscle cramp, or diarrhea(also known as rice water) occurs visit the doctor in order to break the chain.



Reservoir

The Aquatic Environment & Small Intestine

Wash your hands regularly to help break the chain.



Portal of Exit

Feces

The chain can be stopped if you wash your hands after using the restroom.

Mode of Transmission

Water or food prepared with water containing V. Cholerae.

Proper food handling can break the chain.

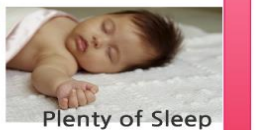
Susceptible hosts

Humans!

Proper hygiene

Exercising

Good diet



Plenty of Sleep

All these can help you be healthy and not become a susceptible hosts.

Portal of Entry

The portal of entry is through the mouth in contaminated water or food.

Hand washing and eating home made food which has been handled properly can stop the bacteria from getting into you.


Thank You