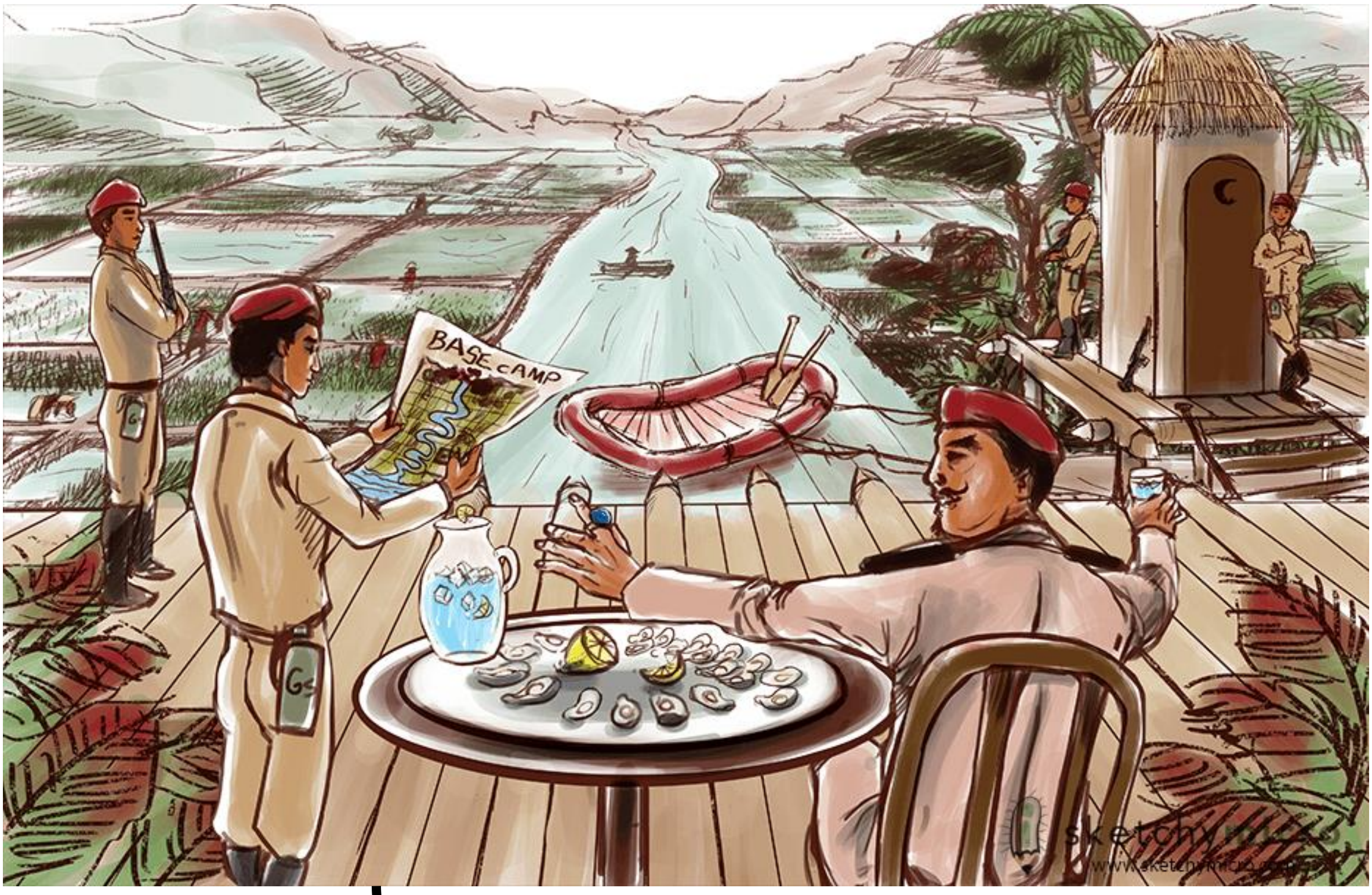
Annotation

This file contains the relevant SketchyMicro illustration and video for each bacterium, accompanied by all the additional information explained or emphasized by the doctor during the lecture (whether present in the original lecture slides or stated verbally). The goal of this compilation is to provide a complete, organized reference that integrates both Sketchy content and course-specific high-yield material.

Vibrio Cholera



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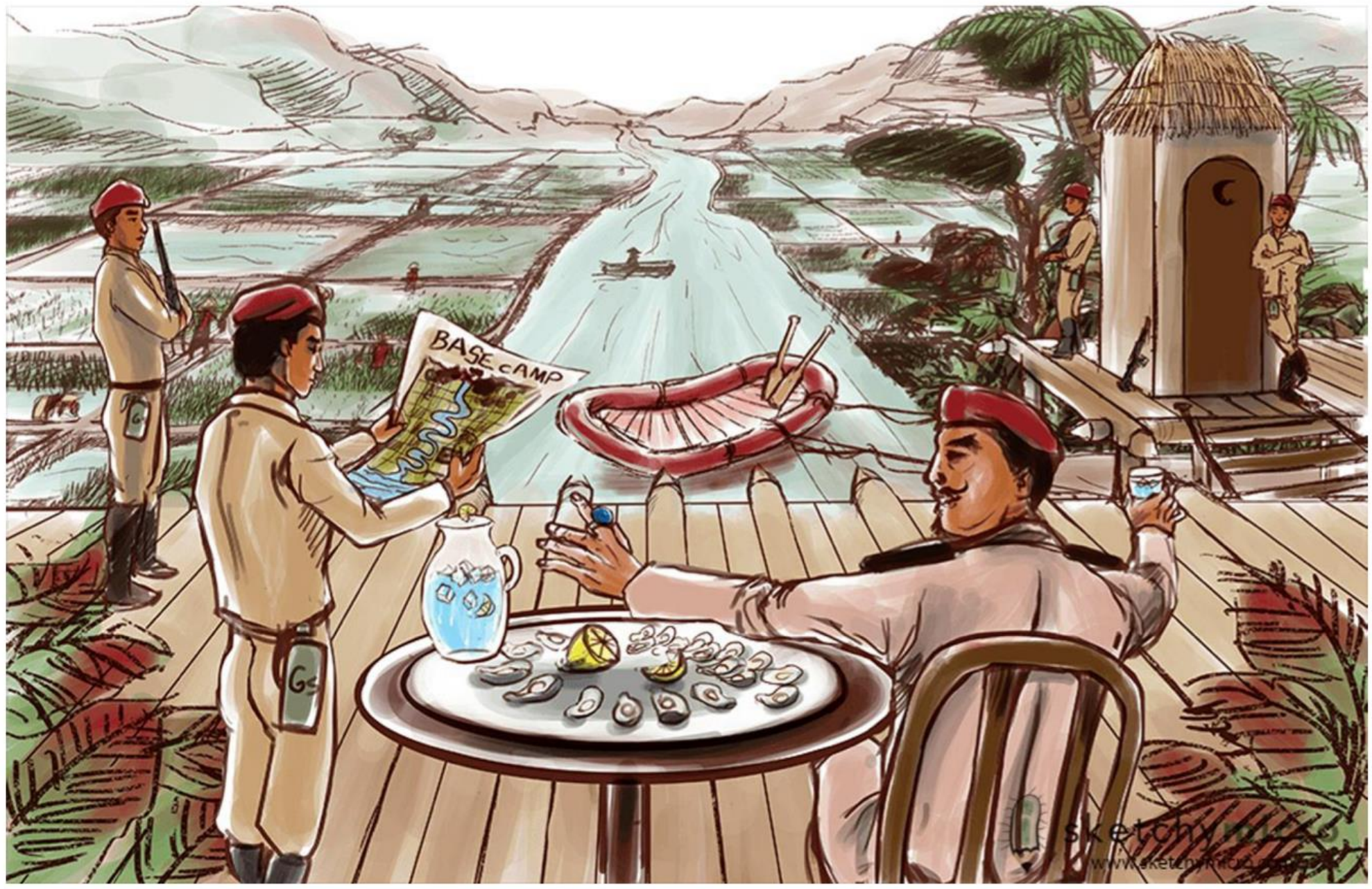
Bacteria – Gram Negative Bacilli

Vibrio Cholera



Vibrio Cholera - Colonel Cholera's Base Camp

1. Mustache - COMMA SHAPED Gram Negative Curved rod Enteric Tract Bacilli
2. BASE in BASE cAMP – Prefers to grow in alkaline media
3. Blue Ring - Oxidase Positive - Grows on TCBS agar
4. Lemon - Grows in alkaline environments, ACID LABILE - Dies with acid
5. Rice Patties - Causes Profuse watery diarrhea **"Rice Water"** stool
6. Outhouse dumping directly into the river - Cholera is transmitted fecal oral due to poor sanitation that gets into food and is not an invasive infection
7. River walls are mucosal wall and the water is the intestinal lumen - Found in the intestines and is found in the intestinal mucosae
8. Raft that is attached to the shore - Attaches to the mucosa by fimbriae that attach to ganglioside receptors in the intestinal wall.
9. Then releases **cholera toxin - Main Virulence Factor AB type toxin**
    a. BASE cAMP map - Upregulates production of Gαs cAMP by binding to and increasing activating adenylate cyclase.
    b. GS grenade - Then it will activate the GS pathway. Activates GS, upregulates cAMP, Produces watery diarrhea through an efflux if Cl and H2O
10. Treatment
    a. Drinking some water - Oral rehydration therapy with electrolytes
11. Vibrio Vulnificus and paraliticus
    a. Oysters - Can contaminate seafood, especially oysters.
    b. Vibrio V. Causes sepsis in patients with Liver Cirhosis + Causes Wound infections
    c. Vibrio P. The Most Common Cause of Sea-food borne Gastroenteritis

Doctor's Extra Information :

Basic Characteristics

- *Vibrio cholerae* (and Vibrios in general) are **oxidase-positive** and **catalase-positive**.
- *Vibrio cholerae* has a **flagellum** and exhibits **darting motility** (*shooting star motility*).
- *Vibrio cholerae* is **halotolerant** (*can tolerate high salt concentrations*), so it is found on the **ocean surface**. (Surface Water)
- *Vibrio vulnificus* and *Vibrio parahaemolyticus* are **halophilic** (*require high salt concentrations*), so they are found on the **ocean floor**, mainly in **sea animals**, especially **shellfish**. (Marine Water)

Serogroups and Human Infection

- The **serogroups of Vibrio cholerae that cause cholera in humans** are **O1** and **O139**.
- **Not all human-infecting V. cholerae strains produce cholera toxin.**
- **Cholera toxin is phage-transduced**.
- Other Vibrios **rarely infect humans**, and **if they do, they cause cholera-like disease**.

Pathogenicity and Clinical Disease

- *V. cholerae* causes **the most dramatic diarrhea** known in humans (*severe watery diarrhea that can reach 10–20 liters per day*).
- **Diagnosis** is usually based on **visualization of rice-water stool**.
- A **high inoculum** is generally required for infection, as *V. cholerae* prefers **alkaline environments**.
- However, a **lower inoculum** is needed when the source is **contaminated food**, as **food buffers gastric acidity**, compared to **contaminated water**.

Culture and Media

Selective Media for V. Cholera

- *Vibrio cholerae* grows on **TCBS agar (Thiosulfate-Citrate-Bile salts-Sucrose agar)**.
- Colonies turn **yellow** on TCBS agar due to **sucrose fermentation**.

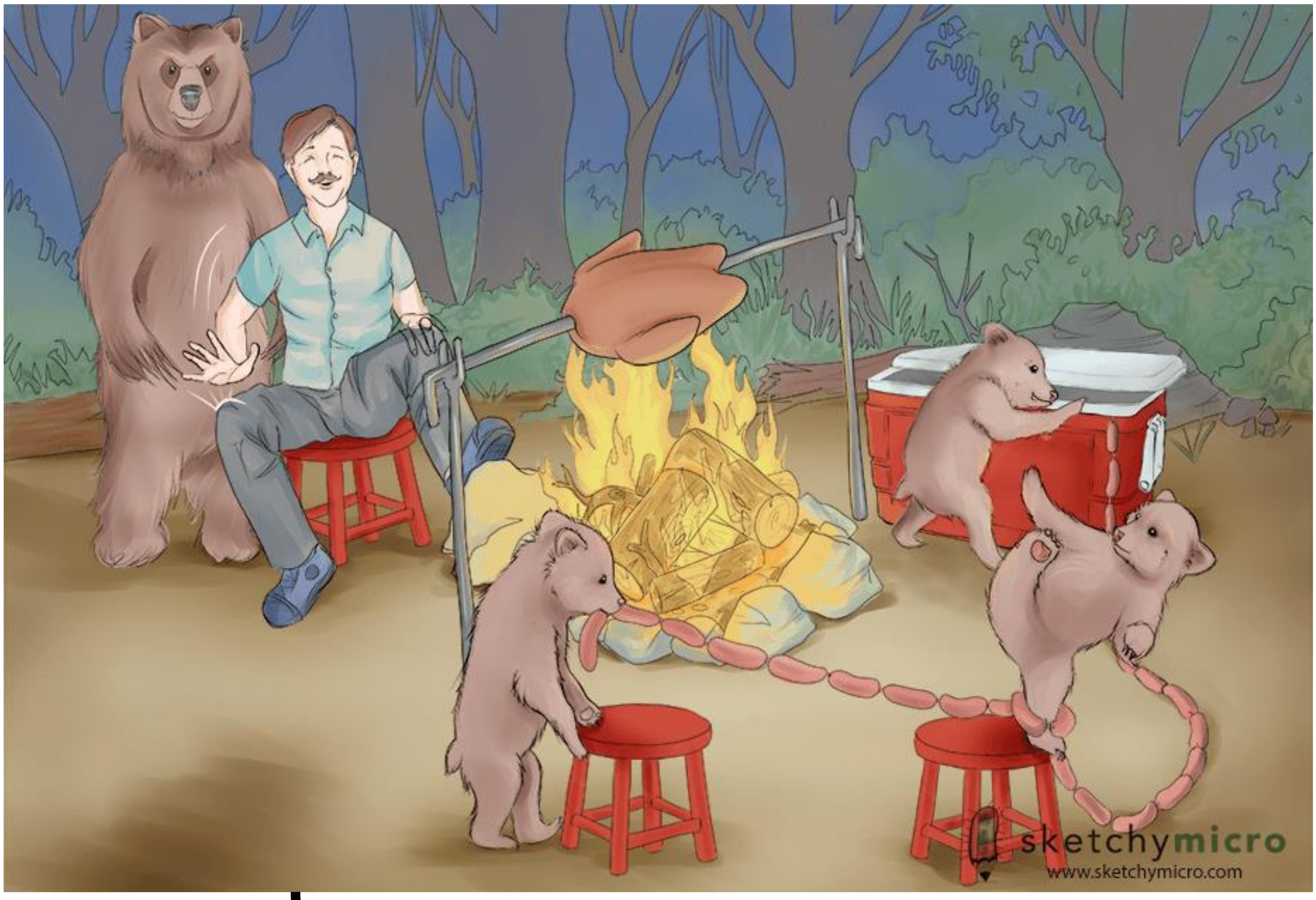
Treatment

- Mainstay of treatment is **fluid and electrolyte replacement**.
- **Antimicrobial agents play a secondary role**, used **only in severe cases**.
    - Effective antibiotics include: **tetracyclines** and **doxycycline**.

Immunity and Vaccination

- **Post-infection antibodies** last for **2–3 years**.
- There are **three vaccines** available for *Vibrio cholerae*:
    - **Two killed vaccines**
    - **One live attenuated vaccine**
- All three offer:
    - **Immunity for 2–3 years**
    - **~50% efficacy**

Campylobacter



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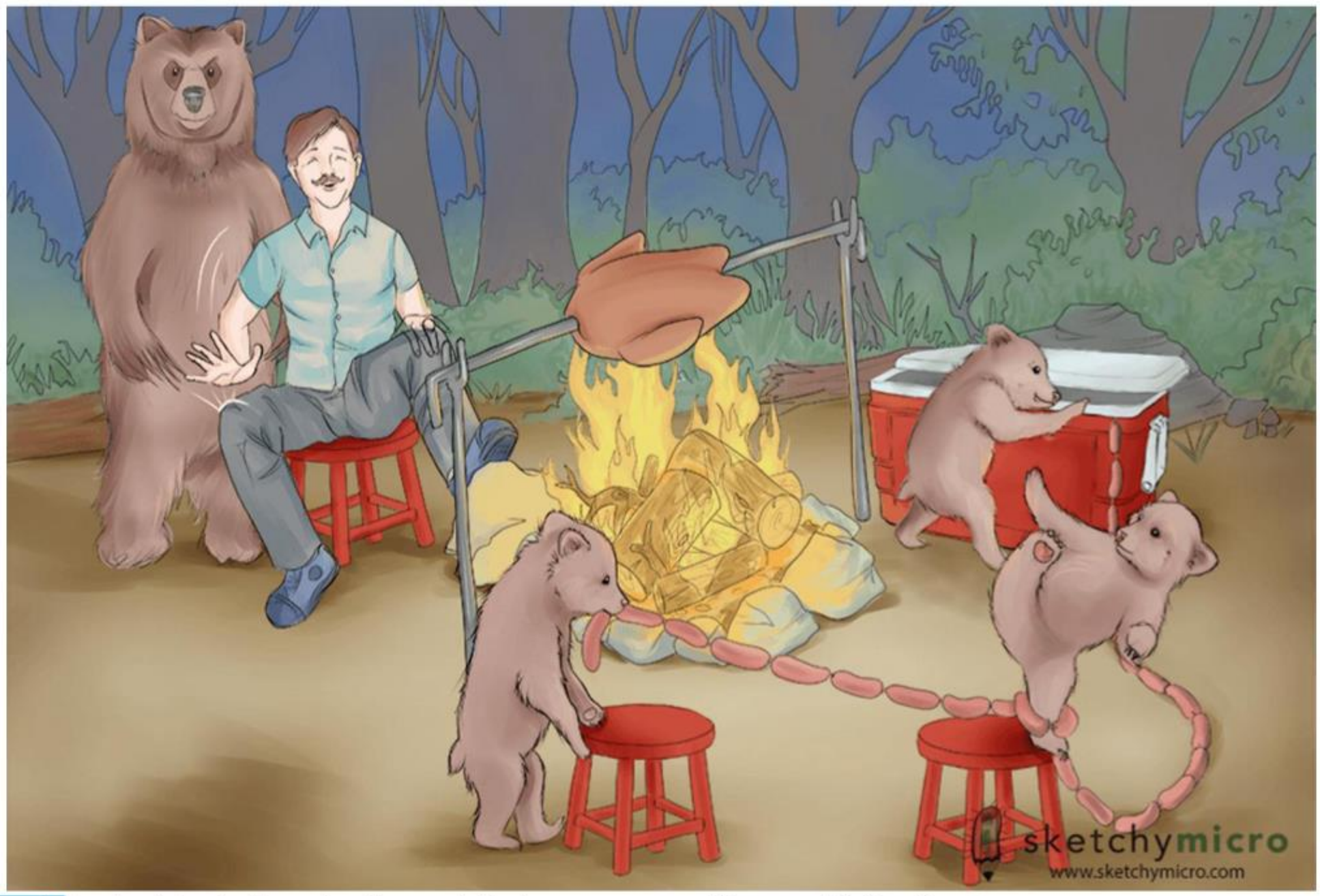
Bacteria – Gram Negative Bacilli

Campylobacter



Campylobacter Jejuni - Camping Guy and the bears – guy and bears = Guillen Barre

1. Mustache is curved or comma shaped - Gram Negative Spiral / Curved Rod Bacilli - Enteric
2. Campy medium or **Skirrow Agar**
3. Microaerophilic
4. Camp Fire - Prefers warm environments around 42 deg Celsius, thermophile (Special Incubator)
5. Chicken being cooked - Main reservoir is intestinal tract of poultry and transmission is fecal oral / also contaminated water supplies or ingestion of raw milk
6. Red Stools - Bloody Stools and diarrhea
7. Blue Ring - Oxidase Positive
8. Bear cub invading the cooler - Can get Bacteremia, INVASIVE
    a. Laughing and slapping his knee - Reactive arthritis, riders syndrome
9. Bears being tripped by the sausage links on his ankle - Can cause Guillen barre syndrome due to an autoimmune response damaging myelin of peripheral nerves leading to an ascending paralysis will start at the feet then ascend.
10. Pathogenesis
    a. Bacteria Colonize intestinal Mucosa and attach to epithelial cells then replicate intracellularly causing an acute PMN response, edema of the mucosa and ulcerations. Presenting with acute enteritis and diarrhea
11. Treatment
    a. Supportive Care

Doctor’s Extra Information :

Overview

- **Campylobacter** is an **invasive** bacterium (unlike *Vibrio*, which is **non-invasive**).
- Occasionally, **Campylobacter can spread systemically via the bloodstream**, leading to **post-diarrheal complications**, such as:
  - **Reactive arthritis**
  - **Guillain-Barré syndrome**

Species Classification

1. Enteric Campylobacter species:

- **Campylobacter jejuni** — primarily infects the **jejunum**
- **Campylobacter coli** — primarily infects the **colon**

> Both typically cause **bloody diarrhea** and may **occasionally lead to systemic infections**.

2. Systemic/Nosocomial Campylobacter species:

- **Campylobacter fetus**
- **Campylobacter venerealis**

> These are associated with **nosocomial systemic infections**, mainly in **immunocompromised patients**.

Morphology & Physiology

- **Campylobacter jejuni** has a distinctive **S-shape** or **gull-wing appearance** under the microscope.
- **Motility:** Exhibits **corkscrew motility**
- **Growth requirements:**
  - **Thermophilic** (prefers elevated temperatures)
  - **Microaerophilic** (*requires a low oxygen environment*)

Treatment

- **Mainstay of therapy: Fluid and electrolyte replacement**
- **In severe cases** (e.g., prolonged bloody diarrhea or systemic infection):
  - **Erythromycin** is the **antibiotic of choice**

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