



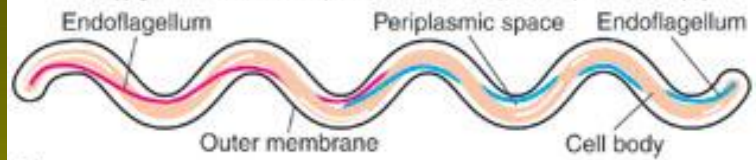
Miscellaneous Bacterial Agents of Disease

Chapter 21

spirochetes

Gram negative human pathogens

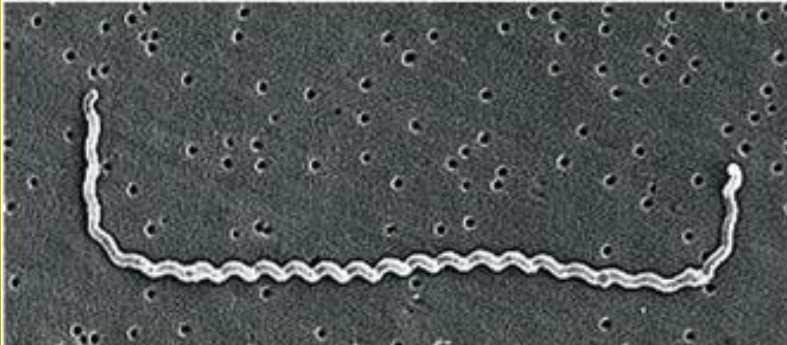
- *Treponema*
- *Leptospira*
- *Borrelia*



(a)



(b)



(c)



(d)

Treponema

- thin, regular, coiled cells
- live in the oral cavity, intestinal tract, & perigenital regions of humans & animals
- pathogens are strict parasites

Treponema pallidum

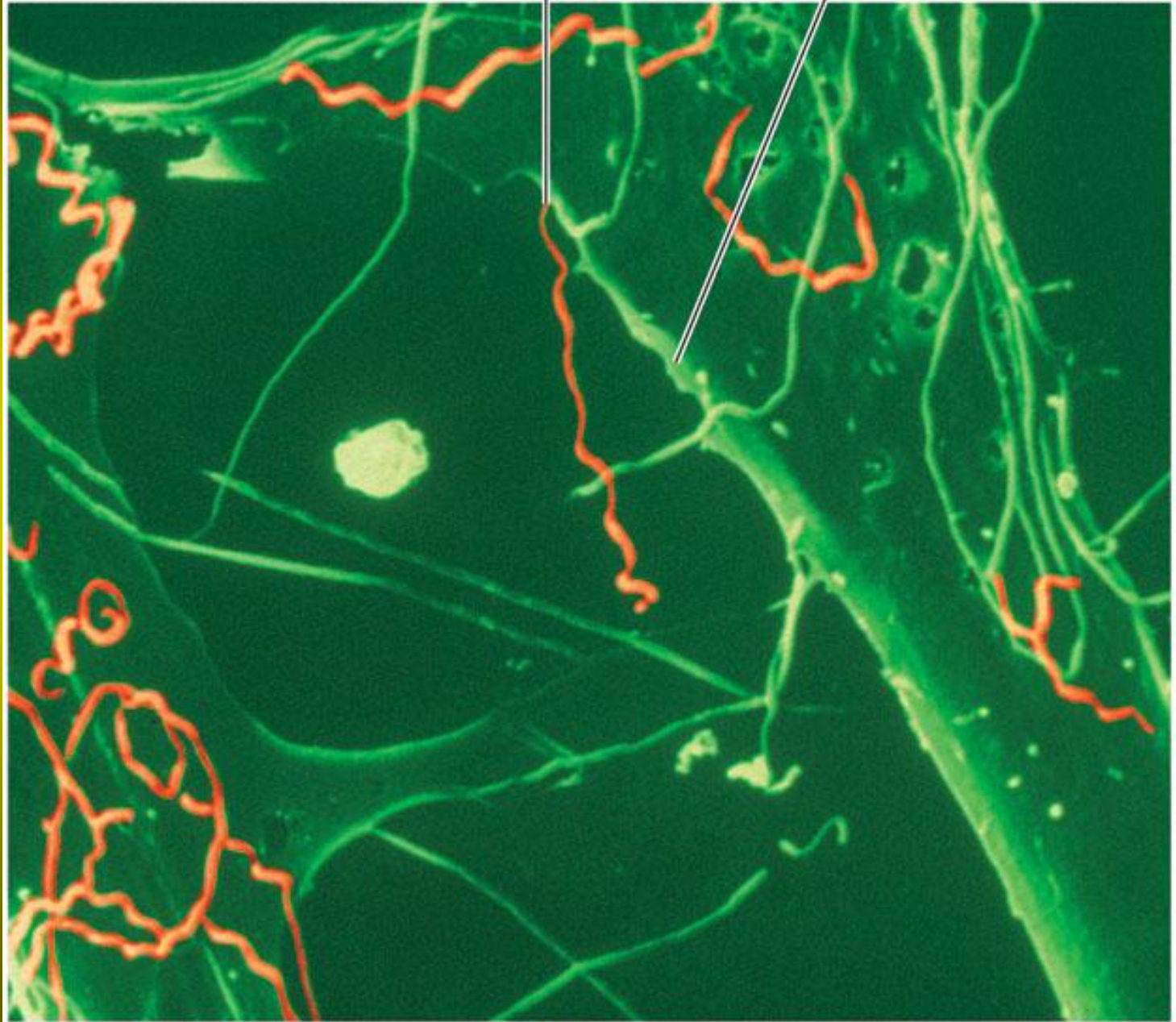
- human is the natural host
- extremely fastidious & sensitive, cannot survive long outside of the host
- causes syphilis
- infectious dose is 57 organisms
- Primary syphilis
- Secondary syphilis
- Tertiary syphilis
- Congenital syphilis – nasal discharge, skin eruptions, bone deformation, nervous system abnormalities
- treatment: **penicillin G**

TABLE 21.1**Syphilis: Stages, Symptoms, Diagnosis, and Control**

Stage	Average Duration	Clinical Setting	Diagnosis	Treatment
Incubation	3 weeks	No lesion; treponemes adhere and penetrate the epithelium; after multiplying, they disseminate	Asymptomatic phase	Not applicable
Primary	2–6 weeks	Initial appearance of chancre at inoculation site; intense treponemal activity in body; chancre later disappears	Dark-field microscopy; VDRL, FTA-ABS, MHA-TP testing	Benzathine penicillin G, 2×10^6 units; aqueous benzyl or procaine penicillin G, 4.8×10^6 units
Primary latency	2–8 weeks	Healed chancre; little scarring; treponemes in blood; few if any symptoms	Serological tests (+)	As above
Secondary	2–6 weeks after chancre leaves	Skin, mucous membrane lesions; hair loss; patient highly infectious; fever, lymphadenopathy; symptoms can persist for months	Dark-field testing of lesions; serological tests	Double doses of penicillins listed above
Latency	6 months to 8 or more years	Treponemes quiescent unless relapse occurs; lesions can reappear	Seropositive blood test	As above
Tertiary	Variable, up to 20 years	Neural, cardiovascular symptoms; gummas develop in organs; seropositivity	Treponeme may be demonstrated by DNA analysis of tissue	As above

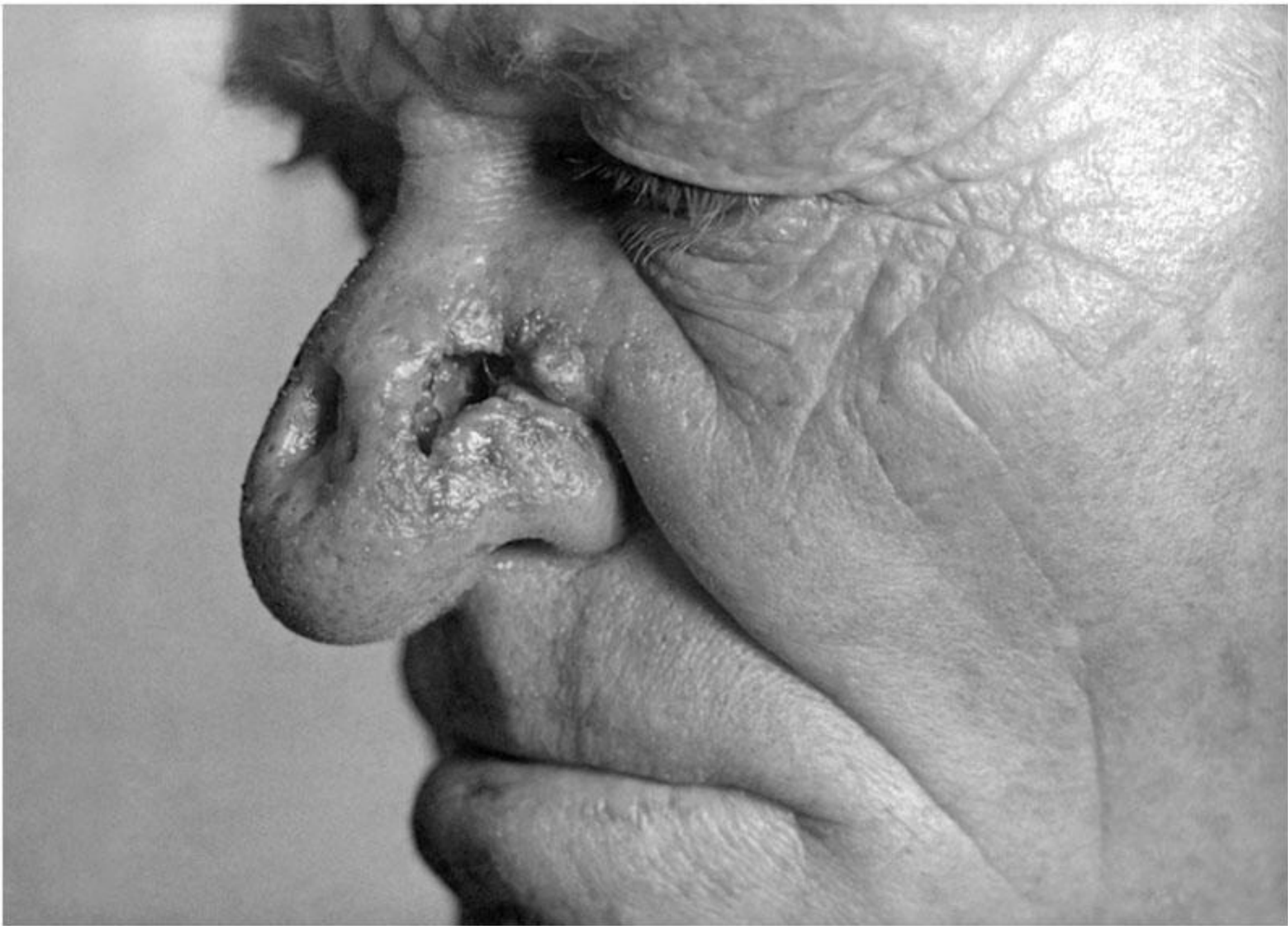
Tip of spirochete

Host cell









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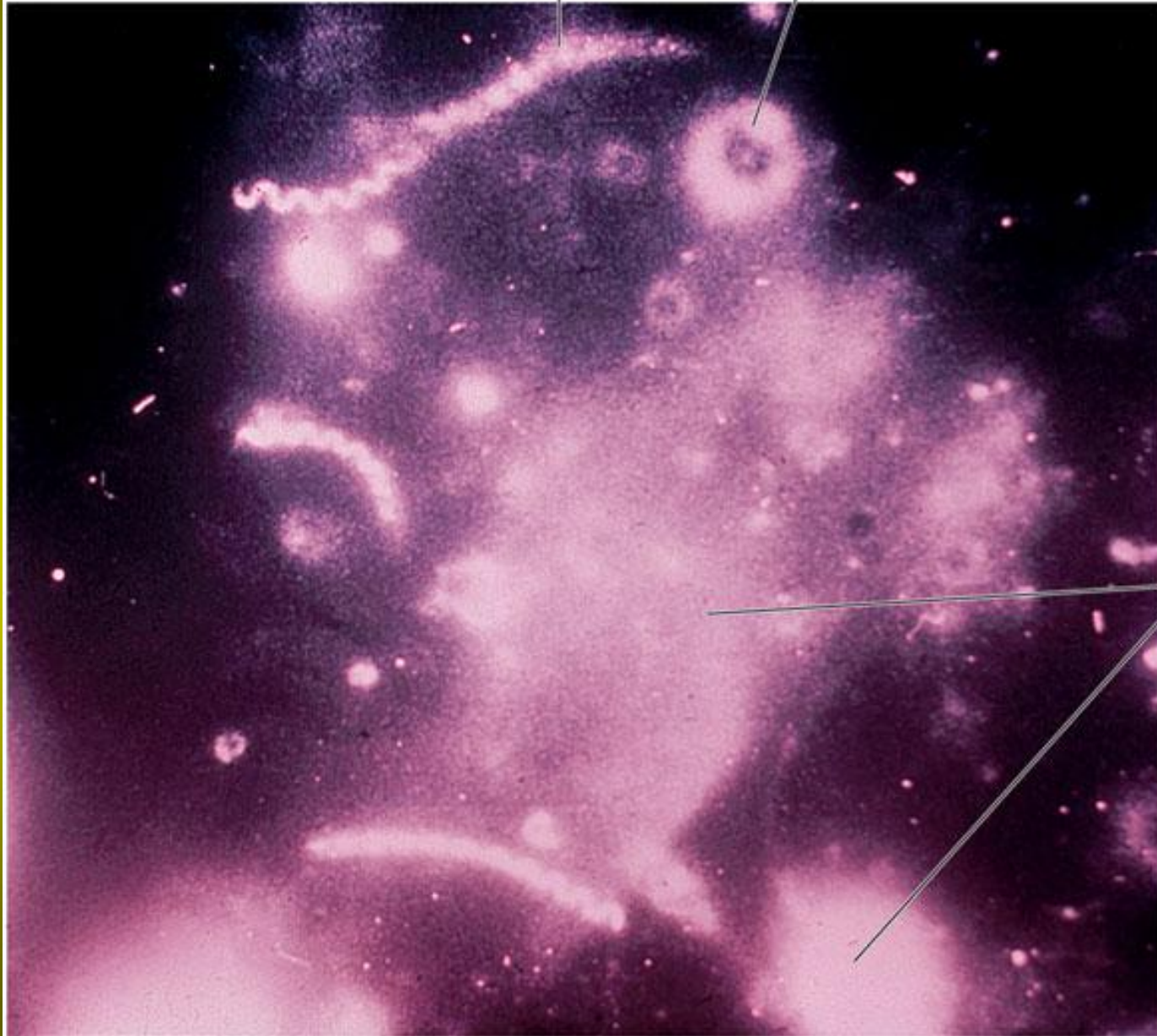
(a)



(b)

Spirochete

Red blood cell

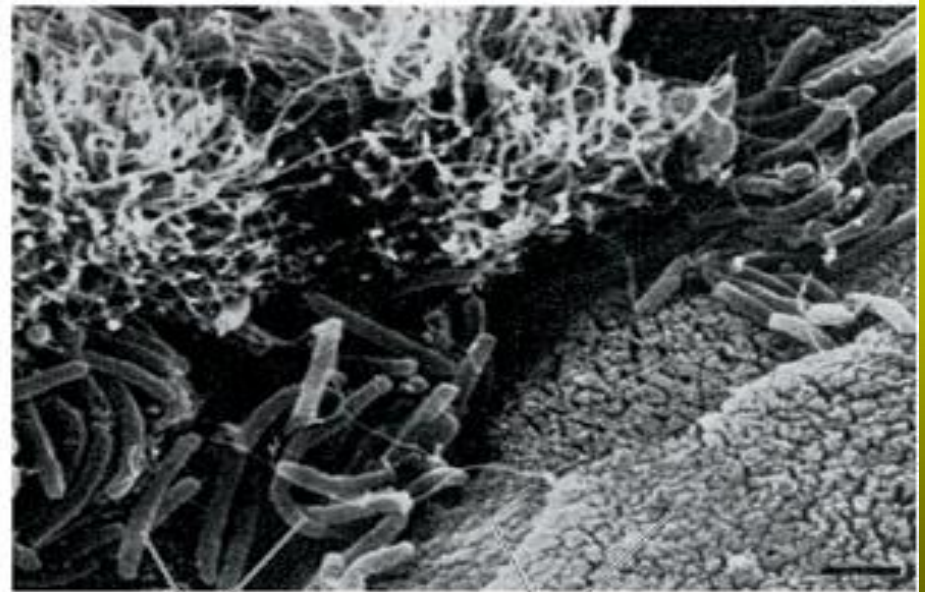


Tissue cells

Vibrio cholerae



(a)



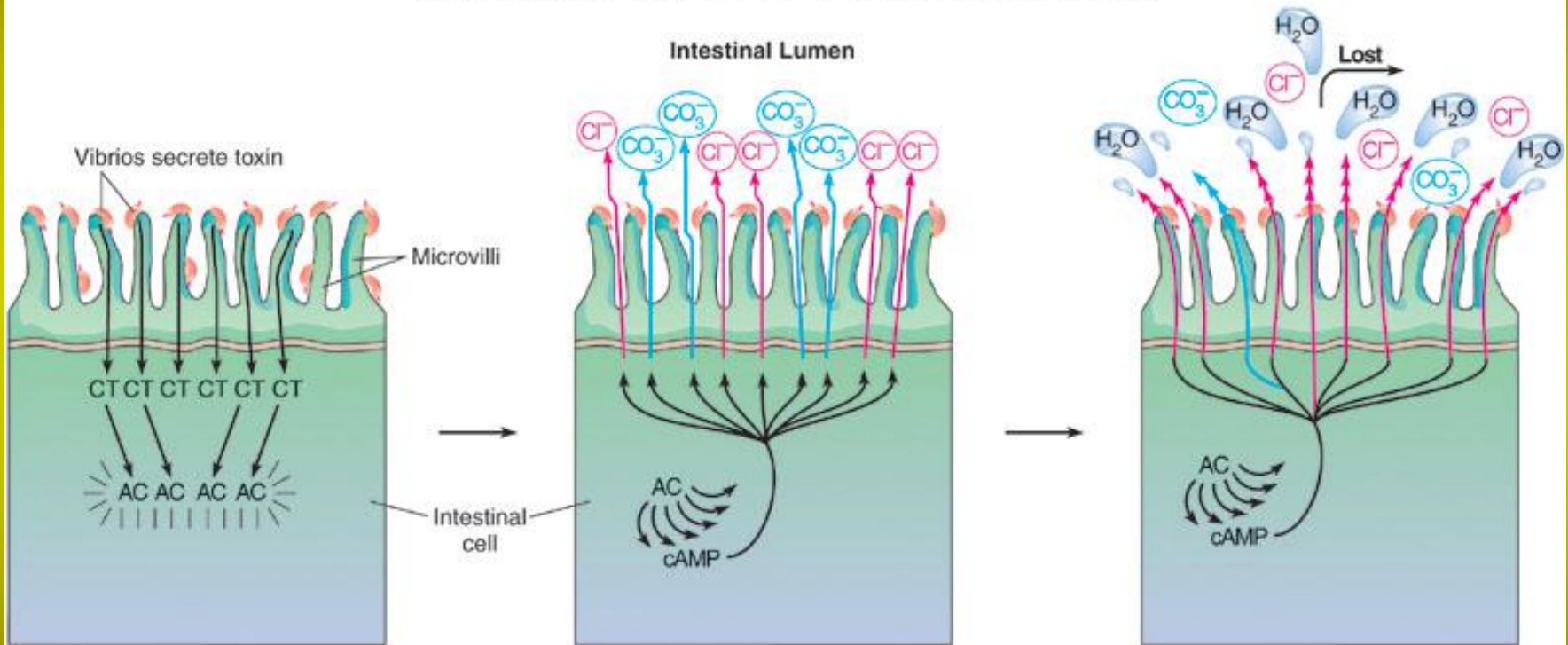
Vibrios

Villus surface

(b)

Pathogenesis of cholera

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(a) The specific action of cholera toxin (CT) upon the intestinal epithelial cells heightens the activity of an enzyme called adenylyl cyclase (AC).

(b) This enzyme stimulates abnormally high levels of cAMP (cyclic adenosine monophosphate), a chemical messenger that normally mediates the action of hormones on cells, but in higher concentrations promotes removal of anions (chloride and carbonate) by the cell membrane.

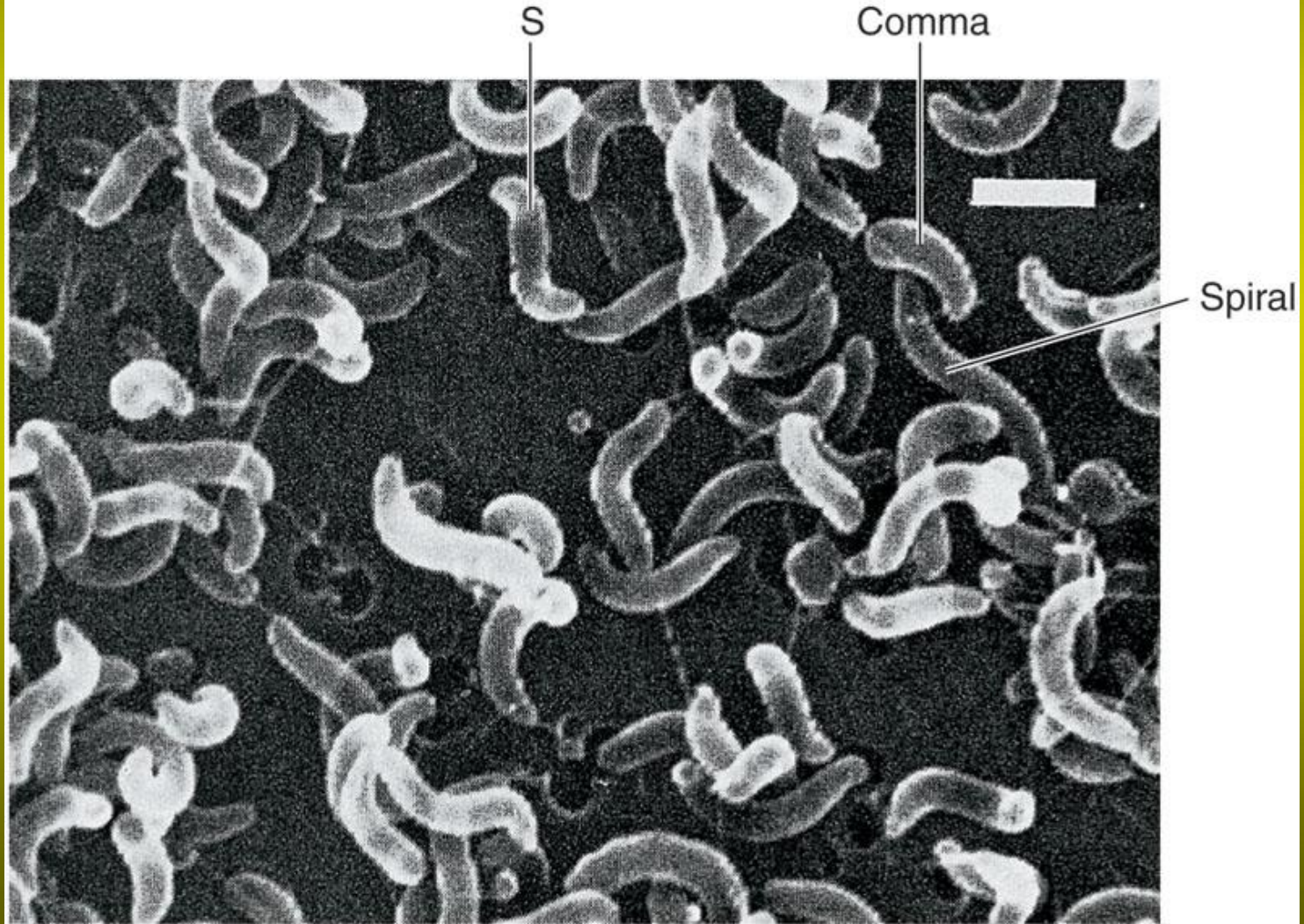
(c) Under the constant action of cAMP, the cells begin to secrete large quantities of chloride (Cl^-) and bicarbonate (CO_3^-) ions into the intestinal lumen. Electrolyte loss is followed by water loss from epithelial cells, which is what causes the major symptoms.

Campylobacter jejuni

- important cause of bacterial gastroenteritis
- transmitted by beverages & food
- reach mucosa at the last segment of small intestine near colon; adhere, burrow through mucus and multiply
- symptoms of headache, fever, abdominal pain, bloody or watery **diarrhea**
- heat-labile enterotoxin CJT

Campylobacter jejuni

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Helicobacter pylori

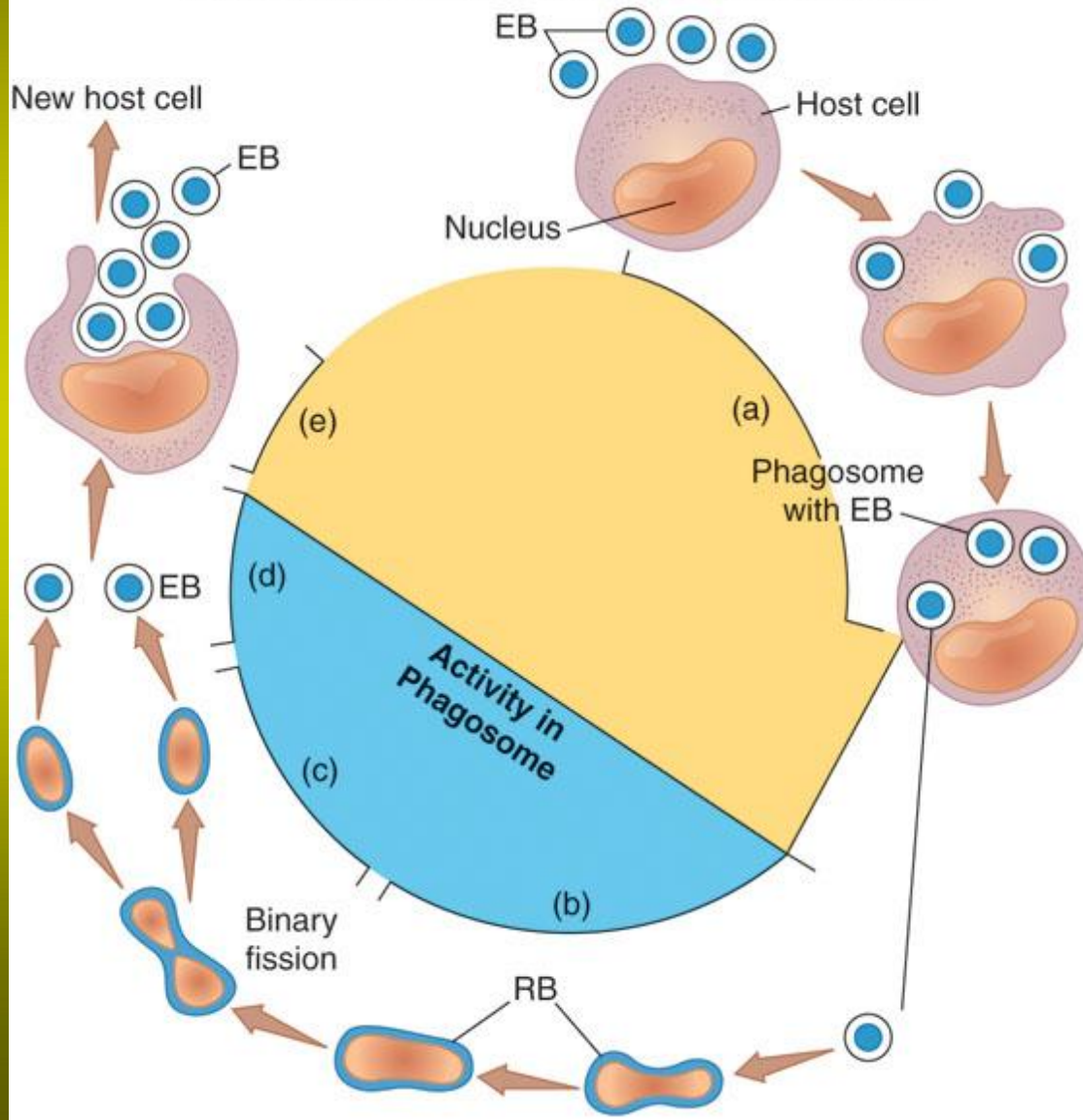
- curved cells discovered in 1979 in stomach biopsied specimens
- causes 90% of stomach & duodenal **ulcers**
- people with type O blood have a 1.5-2X higher rate of ulcers
- produces large amounts of urease

Chlamydia

- obligate intracellular parasites
- small gram-negative cell wall
- alternate between 2 stages
 - elementary body – small metabolically inactive, extracellular, infectious form
 - reticulate body – grows within host cell vacuoles

Chlamydia

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Chlamydia trachomatis

- human reservoir
- 2 strains
- trachoma – attacks the mucous membranes of the eyes, genitourinary tract & lungs
 - ocular trachoma – severe infection, deforms eyelid & cornea, may cause blindness
 - inclusion conjunctivitis – occurs as babies pass through birth canal; prevented by prophylaxis
 - **STD – urethritis, cervicitis, salpingitis (PID), infertility, scarring**
- lymphogranuloma venereum – disfiguring disease of the external genitalia & pelvic lymphatics

Chlamydia trachomatis

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(a)



(b)

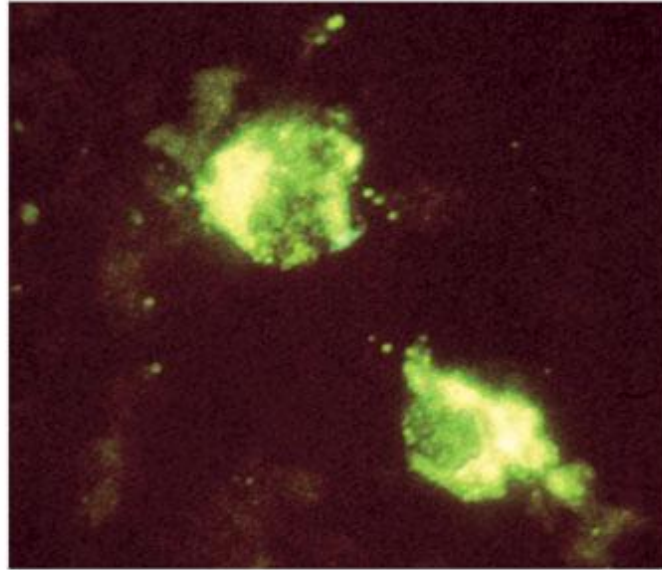
Chlamydia trachomatis

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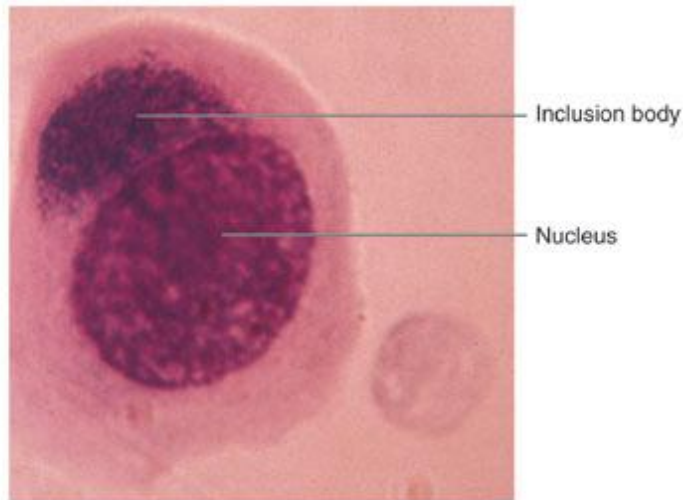


Chlamydia trachomatis

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(a)



(b)