

Viruses and Parasites

Viruses : introduction

- Viruses, like bacteria, are everywhere.
- but unlike bacteria they cannot survive alone – they can only live and multiply in specific host cells
- Most viruses don't survive for long outside a cell
- Transmission routes generally involve :
 - direct contact
 - droplet infection (the virus is contained in a droplet, perhaps exhaled by an infected host) by:
 - Coughing
 - Sneezing

Viruses transmission to food

- someone infected with or carrying (i.e. harboring the virus without showing any symptoms) a virus transfers the virus in **droplets** by many ways :
 - virus land on food
 - by touching the food with virus contaminated hands
 - Vomiting

Food borne viruses

- There are only two major food-borne viruses:
 - norovirus
 - hepatitis A.

Norovirus

- Also called Norwalk-like virus (town in Ohio where first outbreak recognized)
- the most common form of food-borne gastroenteritis worldwide
- the disease is relatively mild and short-lived and so most sufferers do not visit their doctors
 - so the disease statistics are not complete because not all cases are recorded
- In a random study in USA, 60% of US population has been exposed to the virus (antibodies)

Norovirus

- is an unusual virus in that it survives for long periods outside its host.
- Norovirus-infected food stored refrigerated or frozen can **remain infectious for several years!!!!**
- Norovirus will survive reasonably high temperatures (e.g. 60°C for 30 minutes)
- is not deactivated by pasteurization.
- Cooking almost always destroys the virus providing the temperature reaches **at least 90°C for 90 seconds**.
- Foods that are not thoroughly cooked, eaten raw or contaminated after cooking are those most commonly associated with transmission.

Foods associated with norovirus

- Almost any food can result in norovirus food-borne illness if it is contaminated after cooking (or is eaten raw) by a food handler infected with norovirus and practising poor personal hygiene.
- It can take as little as 10 viruses to result in infection and a human sufferer can shed 10,000,000 viruses/g faeces at the peak of infection → spread very quickly !!!!!
- Most foods are mussels and oysters (if they contaminated with human sewage!)
- If contaminated oysters are eaten raw or not completely cooked (90 C) →infection occur

Norovirus gastroenteritis

- **Recognizing symptoms :**

- Severe nausea
 - projectile vomiting
 - violent diarrhea
-
- most patients recover fully within 3 days
 - but on rare occasions the dehydration resulting from diarrhea can be fatal in the very old or very young

Hepatitis

- from the Greek *hepatikos* meaning liver
- is a group of liver diseases caused by five different viruses: hepatitis A, B, C, D and E.
- **Only hepatitis A is food-borne.**
 - hepatitis A is not a serious disease.
 - not only is food-borne but also can be contracted from water and person to person.

Hepatitis A – transmission to food

- Attaches to epithelial cells in throat → blood stream → hepatocytes → where internalized → production of new viruses (tens of thousands) → excreted in bile via bile duct → intestine → feces → can infect someone else
- Poor personal hygiene is responsible for this route of transmission

Hepatitis A

- **Some** people produce antibodies against the virus to their hepatitis infection, do not develop any symptoms.
- Others have fairly mild symptoms including fever, headache and aches – these symptoms are sometimes confused with influenza (flu)
- Very small mortality rate

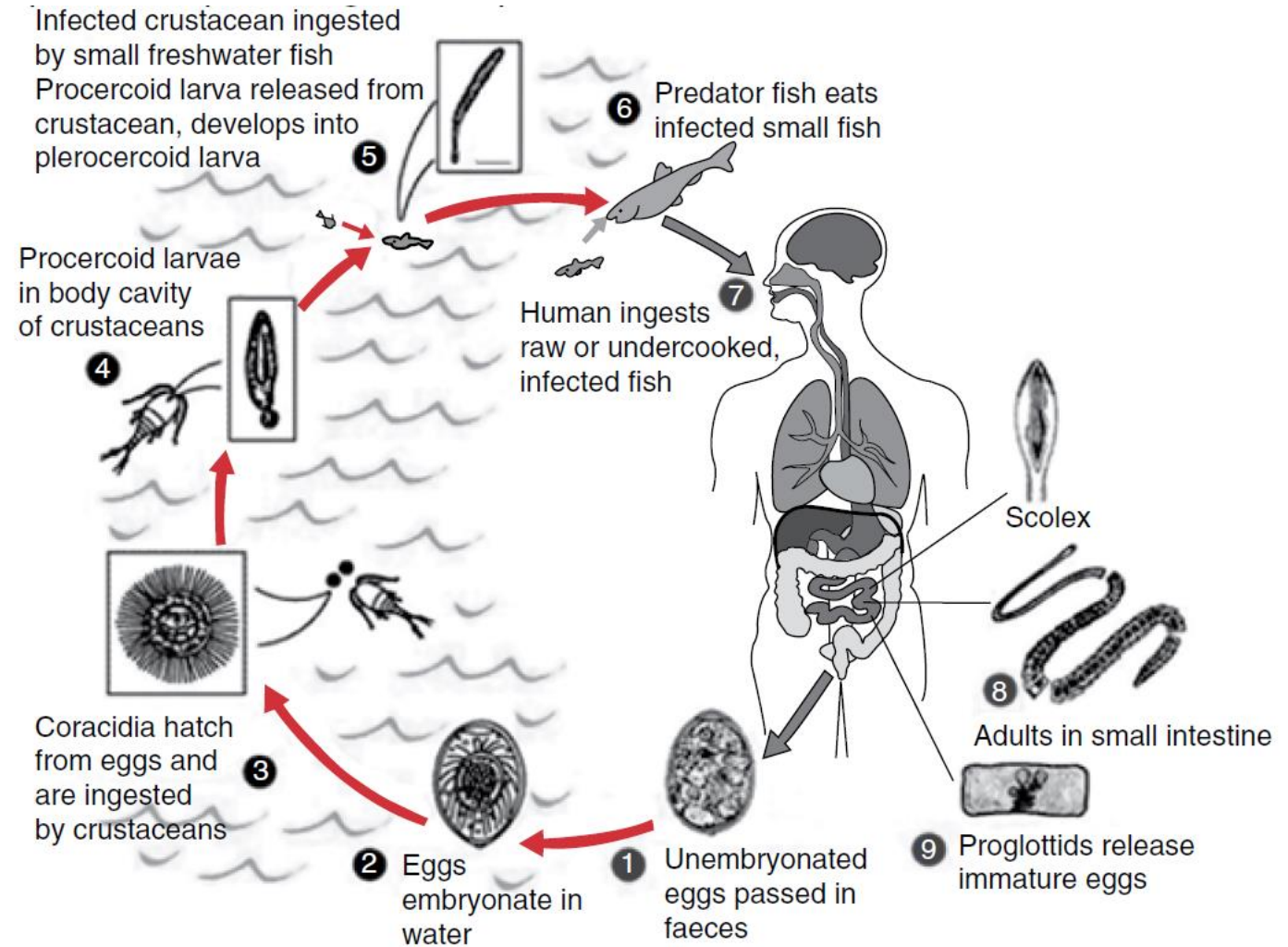
Foods associated with Hepatitis A

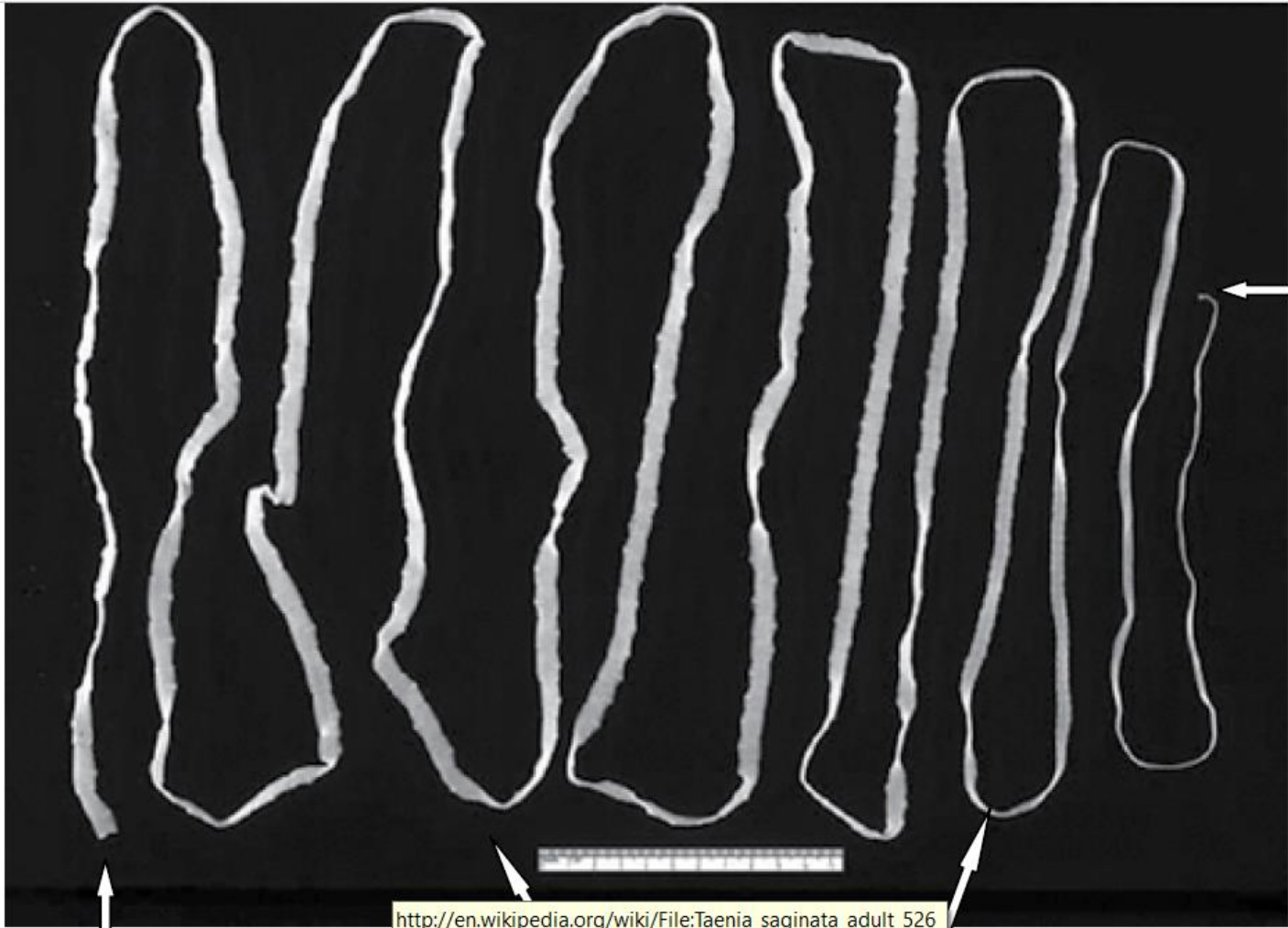
- There are no particular foods associated with hepatitis A
- because HAV is excreted in feces and due to poor personal hygiene contaminates the hand which then contaminate any **food that is handled**
- The virus is destroyed by heat
- therefore foods eaten raw (e.g. fruit) or cooked foods handled after cooking are the most likely routes of transmission.

Parasites

- A parasite (from the Greek *parasitos* meaning a person who eats at the table of another) is an animal or plant that lives off a host animal or plant giving the host nothing in return
- They are all destroyed by cooking and so are only a problem in undercooked food (e.g. pork) or food eaten raw (e.g. fish sashimi)

TAPEWORMS





Scolex (Head)

http://en.wikipedia.org/wiki/File:Taenia_saginata_adult_5260_lores.jpg

Egg-containing segments ready to break off

Long segmented body

BEEF TAPEWORM

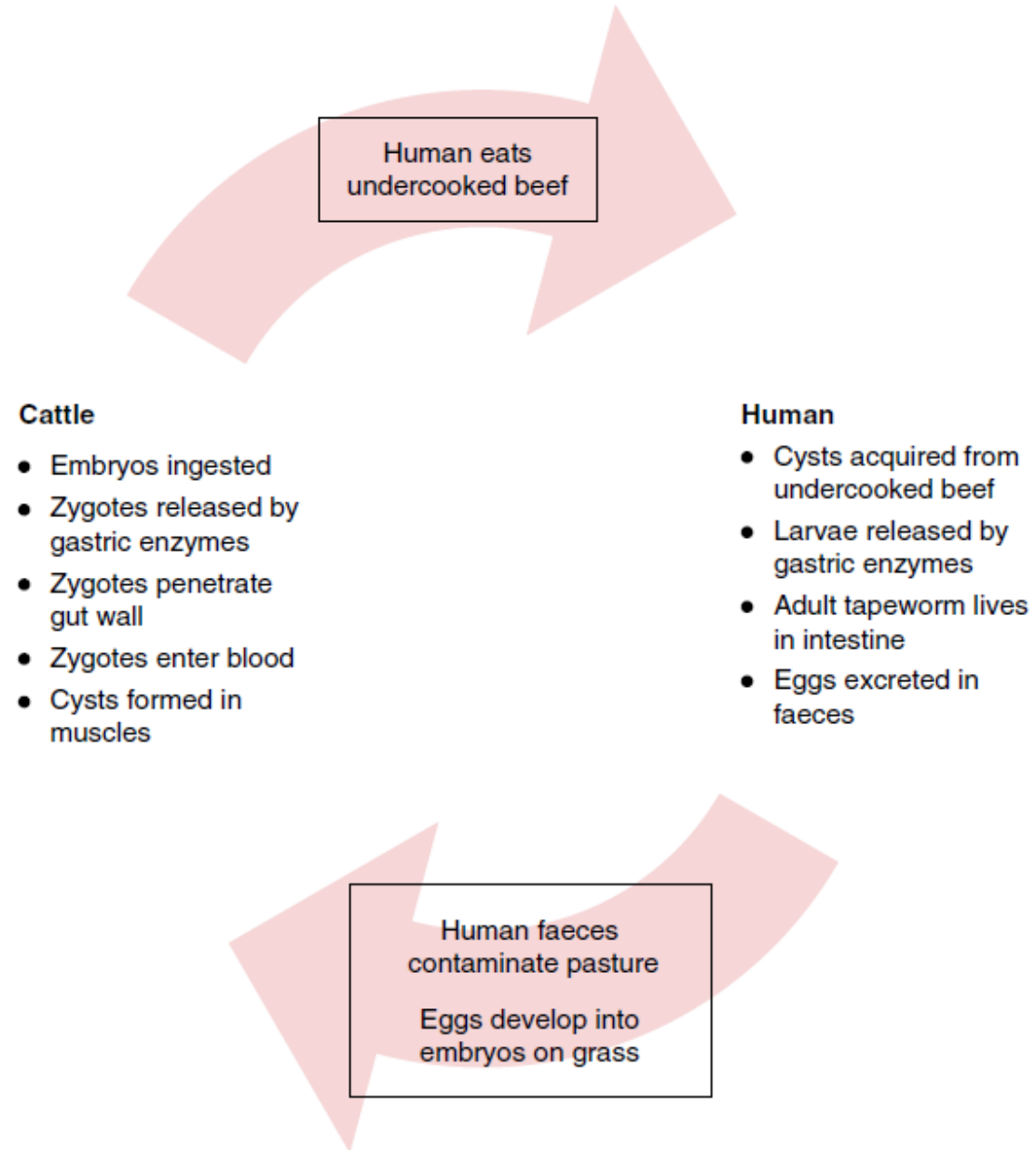


Figure 5.3 The lifecycle of *Taenia sagitata*.

Other parasites

CAUSATIVE AGENT	TYPE OF ILLNESS	SYMPTOMS ONSET	COMMON FOODS	PREVENTION
<i>Anisakis spp.</i>	Parasitic infection	Coughing, vomiting (1 hour to 2 weeks)	Raw or undercooked seafood; especially bottom-feeding fish	Cook fish to the proper temperature throughout; freeze to meet <i>FDA Food Code</i> specifications

CAUSATIVE AGENT	TYPE OF ILLNESS	SYMPTOMS ONSET	COMMON FOODS	PREVENTION
<i>Cyclospora cayetanensis</i>	Parasitic infection	Watery and explosive diarrhea, loss of appetite, bloating (1 week)	Water, strawberries, raspberries, and raw vegetables	Good sanitation, reputable supplier

CAUSATIVE AGENT	TYPE OF ILLNESS	SYMPTOMS ONSET	COMMON FOODS	PREVENTION
<i>Cryptosporidium parvum</i>	Parasitic infection	Severe watery diarrhea within 1 week of ingestion	Contaminated water; food contaminated by infected food workers	Use potable water supply; practice good personal hygiene and handwashing
<i>Giardia lamblia</i>	Parasitic infection	Diarrhea within 1 week of contact	Contaminated water	Potable water supply; good personal hygiene and handwashing