
PARASITOLOGY
MICROBIOLOGY LECTURE

DEFINITION OF TERMS

- Parasitology

-Science that deals with organisms that takes up their abode temporarily or permanently for the purpose of procuring food and the relationship of this organism to the host.

- Parasite

-Living organism which for the purpose of procuring food and shelter take up their abode temporarily or permanently on another living organism.

-An organism that relies on another species.

DEFINITION OF TERMS

- Parasitism

-Any reciprocal association in which a species depends upon another for its existence

-The HOST is always harmed.

- Commensalism

-A kind of association between two living organisms of different species in which one of the member is benefitted but the other member is neither harmed nor destroyed.

DEFINITION OF TERMS

- Mutualism

-Association between two living organisms of different species in which both members are dependent upon each other that life apart is impossible.

- Predation

-A bigger animal attacks a smaller or weaker animal.

DEFINITION OF TERMS

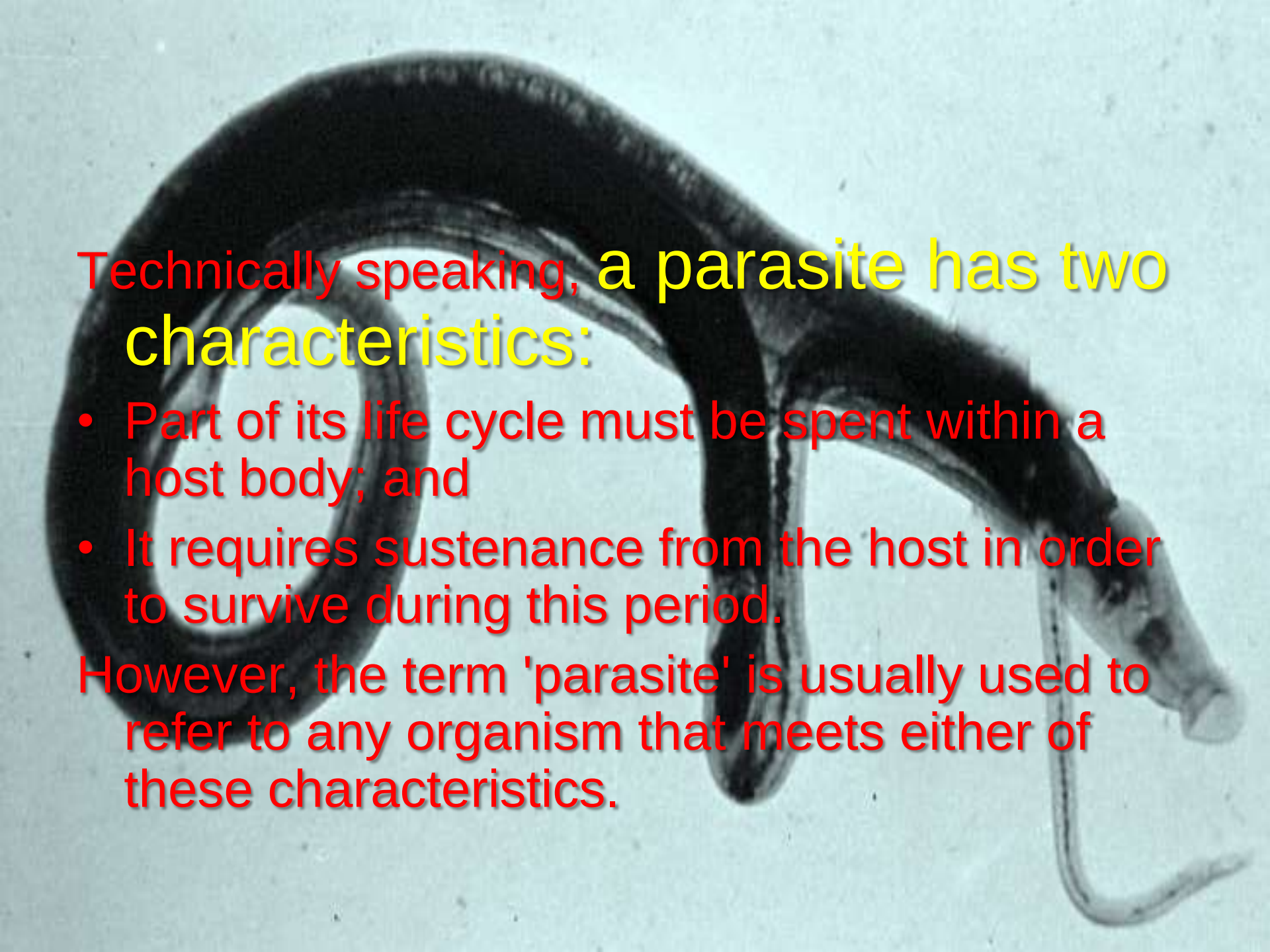
- Predator

-The bigger animal

- Prey

-The smaller or weaker animal

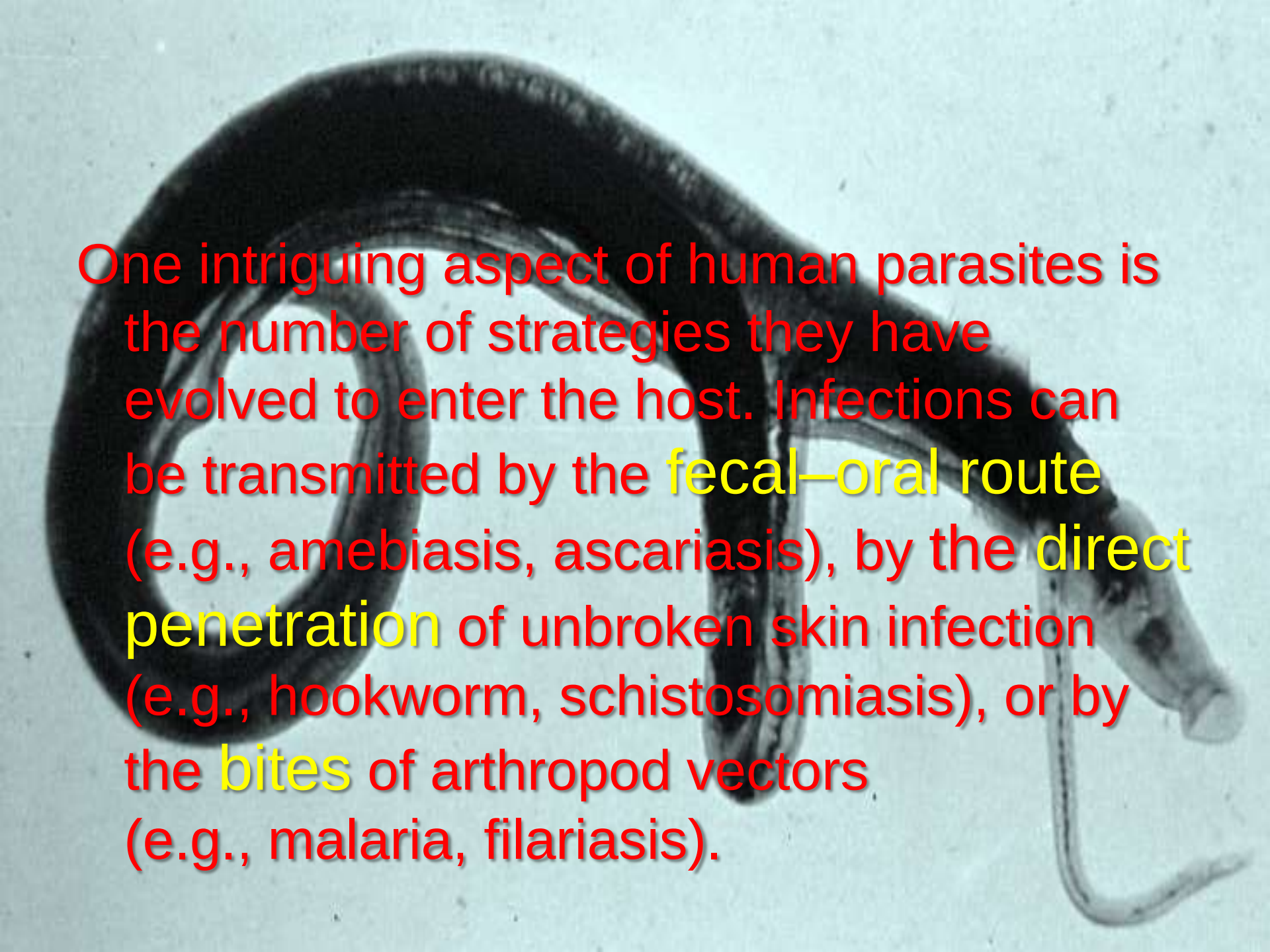
Parasites describe a number of multi-cellular organisms that are able to survive on or within the human body, but have side effects that are harmful to human health.



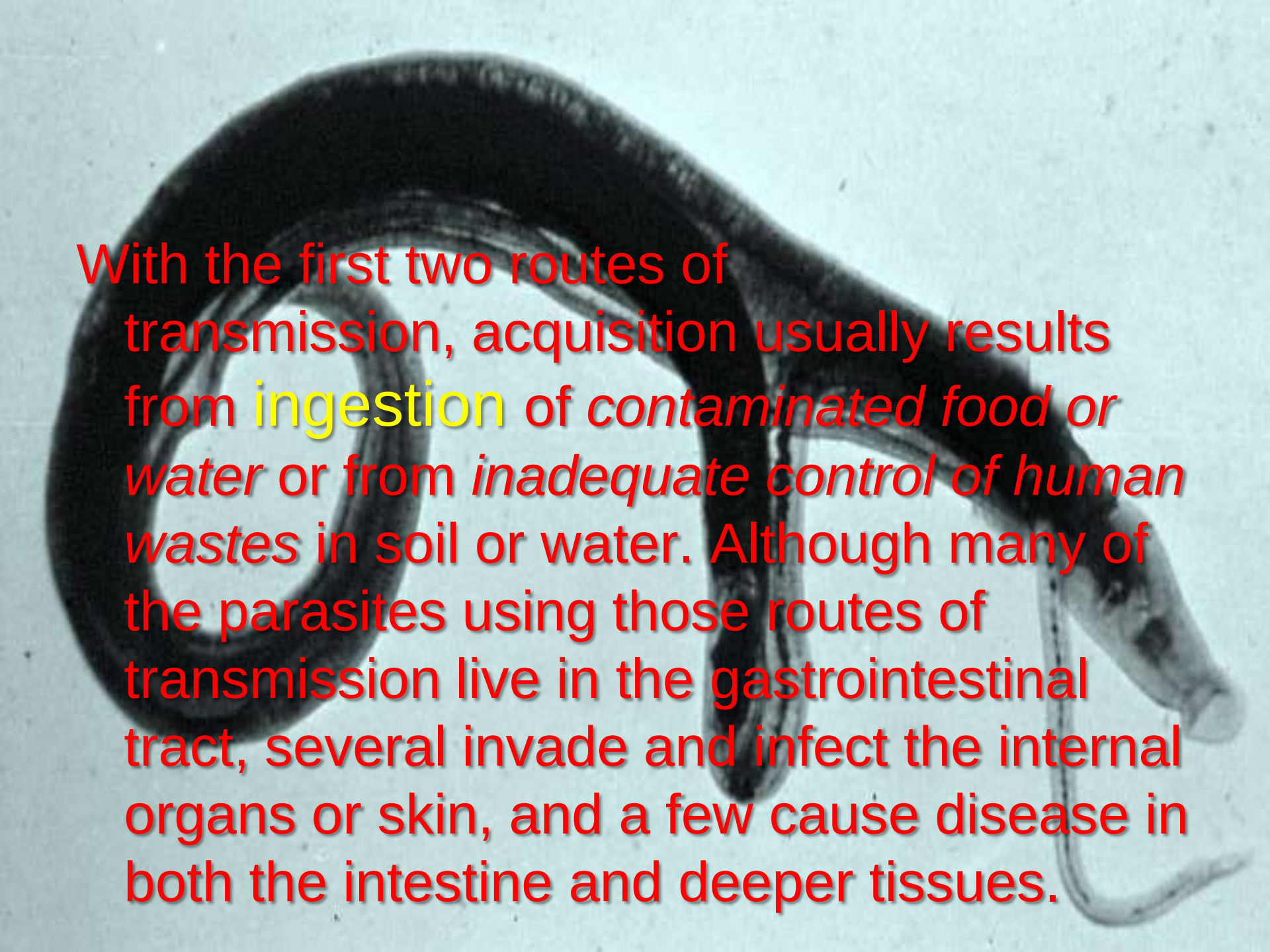
Technically speaking, a parasite has two characteristics:

- Part of its life cycle must be spent within a host body; and
- It requires sustenance from the host in order to survive during this period.

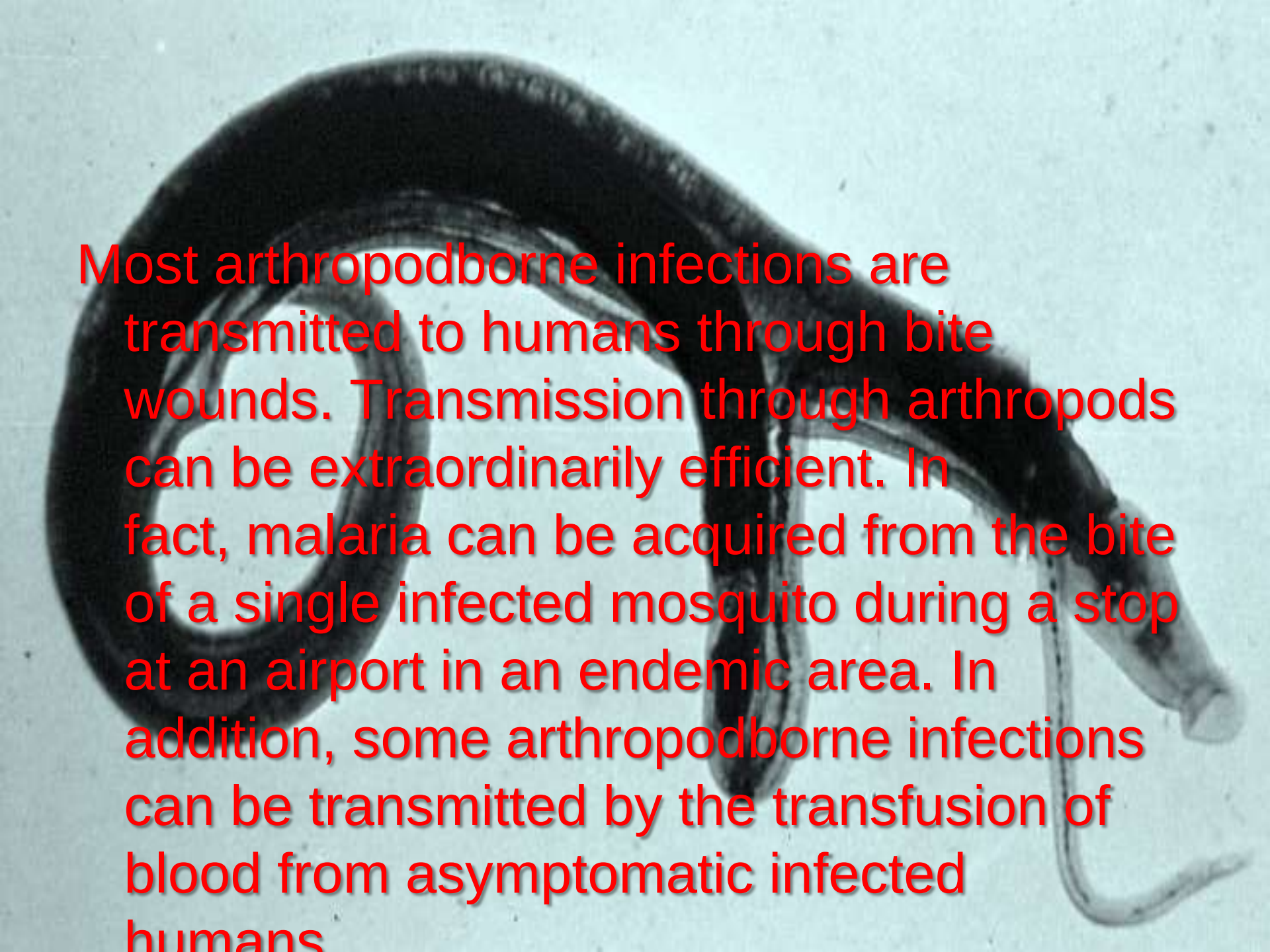
However, the term 'parasite' is usually used to refer to any organism that meets either of these characteristics.



One intriguing aspect of human parasites is the number of strategies they have evolved to enter the host. Infections can be transmitted by the fecal–oral route (e.g., amebiasis, ascariasis), by the direct penetration of unbroken skin infection (e.g., hookworm, schistosomiasis), or by the bites of arthropod vectors (e.g., malaria, filariasis).

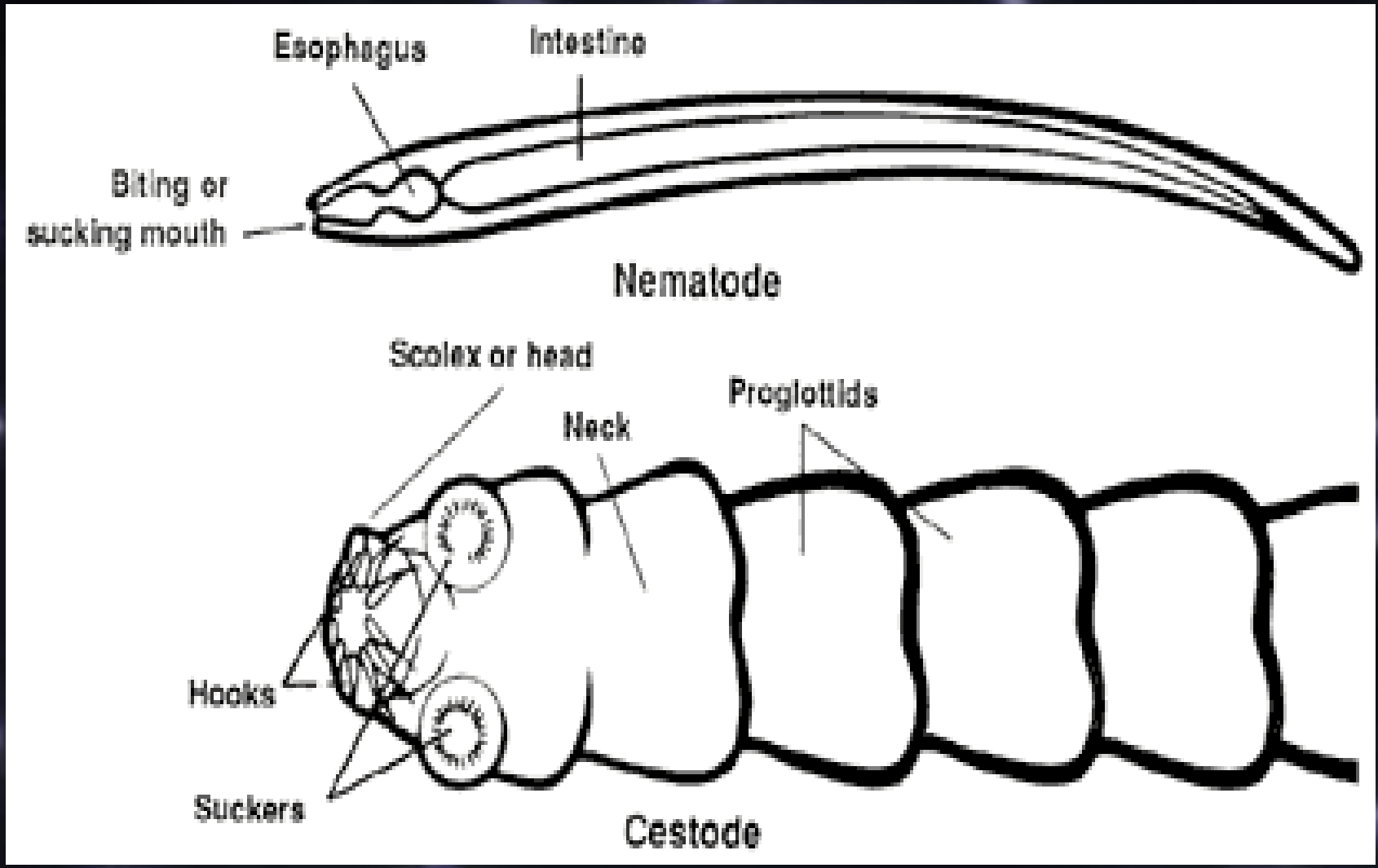


With the first two routes of transmission, acquisition usually results from ingestion of *contaminated food or water* or from *inadequate control of human wastes* in soil or water. Although many of the parasites using those routes of transmission live in the gastrointestinal tract, several invade and infect the internal organs or skin, and a few cause disease in both the intestine and deeper tissues.

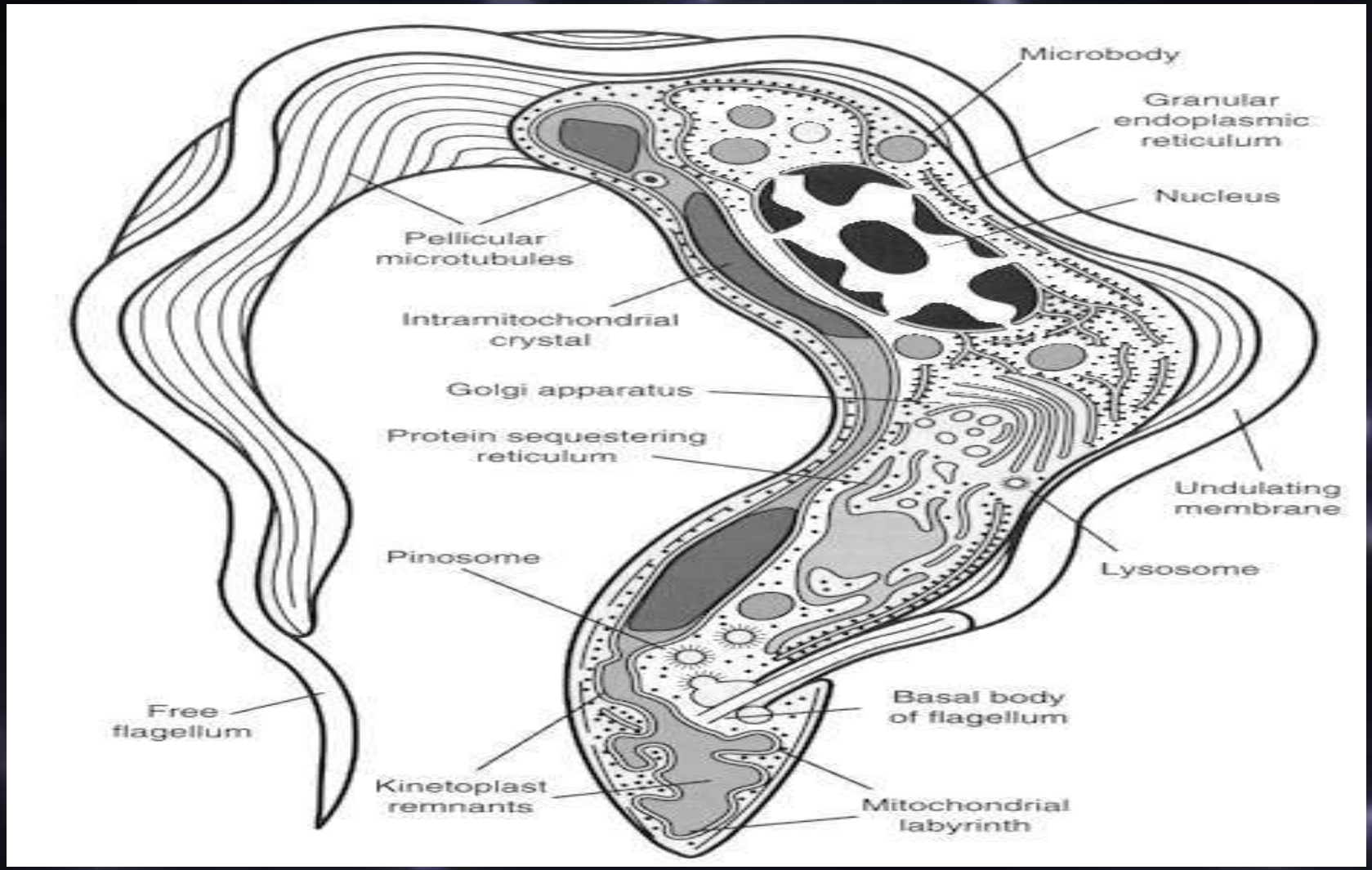


Most arthropodborne infections are transmitted to humans through bite wounds. Transmission through arthropods can be extraordinarily efficient. In fact, malaria can be acquired from the bite of a single infected mosquito during a stop at an airport in an endemic area. In addition, some arthropodborne infections can be transmitted by the transfusion of blood from asymptomatic infected humans

Parasitic Structure



Parasitic Structure



Spread and Multiplication

Inoculum Size

- The effective inoculum size has been determined for a few parasites by experimental infections in human volunteers and animals, usually in conjunction with quantitative epidemiologic studies.

Spread and Multiplication

Parasite Survival Mechanisms in Immunologically Normal Hosts

- Like other microorganisms, parasites elicit both antibody- and cell-mediated responses. However, they are adept at circumventing those host defenses.

Spread and Mulitiplication

Species and Tissue Tropisms

- The life cycles of parasites are determined by species and tissue **tropisms**, which define the hosts that parasites can infect and the organs and tissues in which they can survive.
- Temperature also plays an important role in the ability of parasites to infect humans and cause disease.
- Temperature changes also induce stage-specific transitions in many parasites.

Environmental Constraints on Transmission

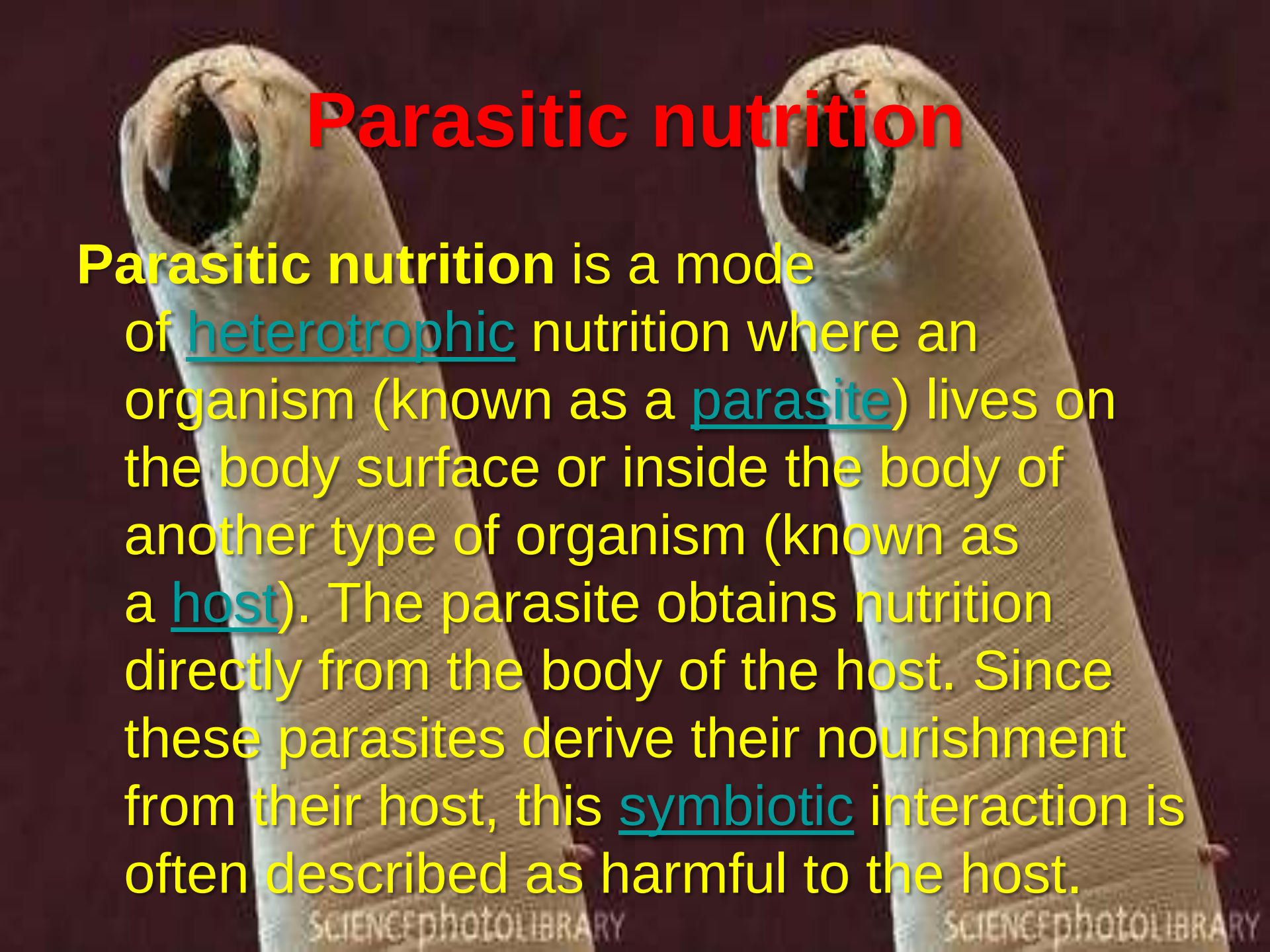
Examination of the parasitic life cycle often explains why a given parasitic disease is found in one area of the world and not another. For example, the transmission of schistosomiasis depends on an intermediate snail host that is not present in North America or Europe.

Environmental Constraints on Transmission

Thus, viable eggs in the stool or urine of infected persons cannot produce the forms infective for humans (**cercariae**) because there are no intermediate snail hosts in which the parasite can mature. For that reason, human schistosomiasis is not endemic in the United States and will not be, unless an intermediate snail host becomes established.

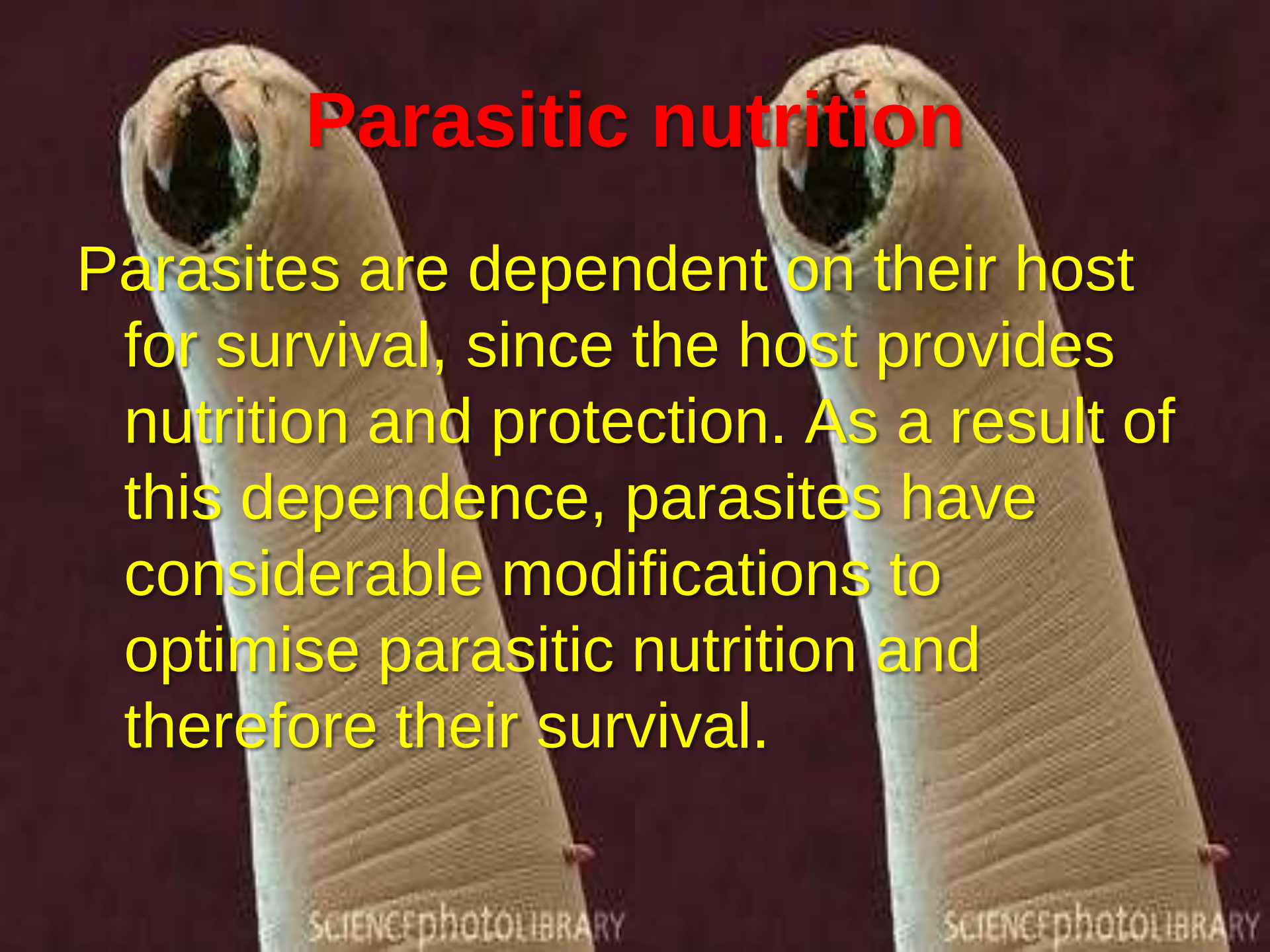
Parasitic nutrition

Parasitic nutrition is a mode of heterotrophic nutrition where an organism (known as a parasite) lives on the body surface or inside the body of another type of organism (known as a host). The parasite obtains nutrition directly from the body of the host. Since these parasites derive their nourishment from their host, this symbiotic interaction is often described as harmful to the host.



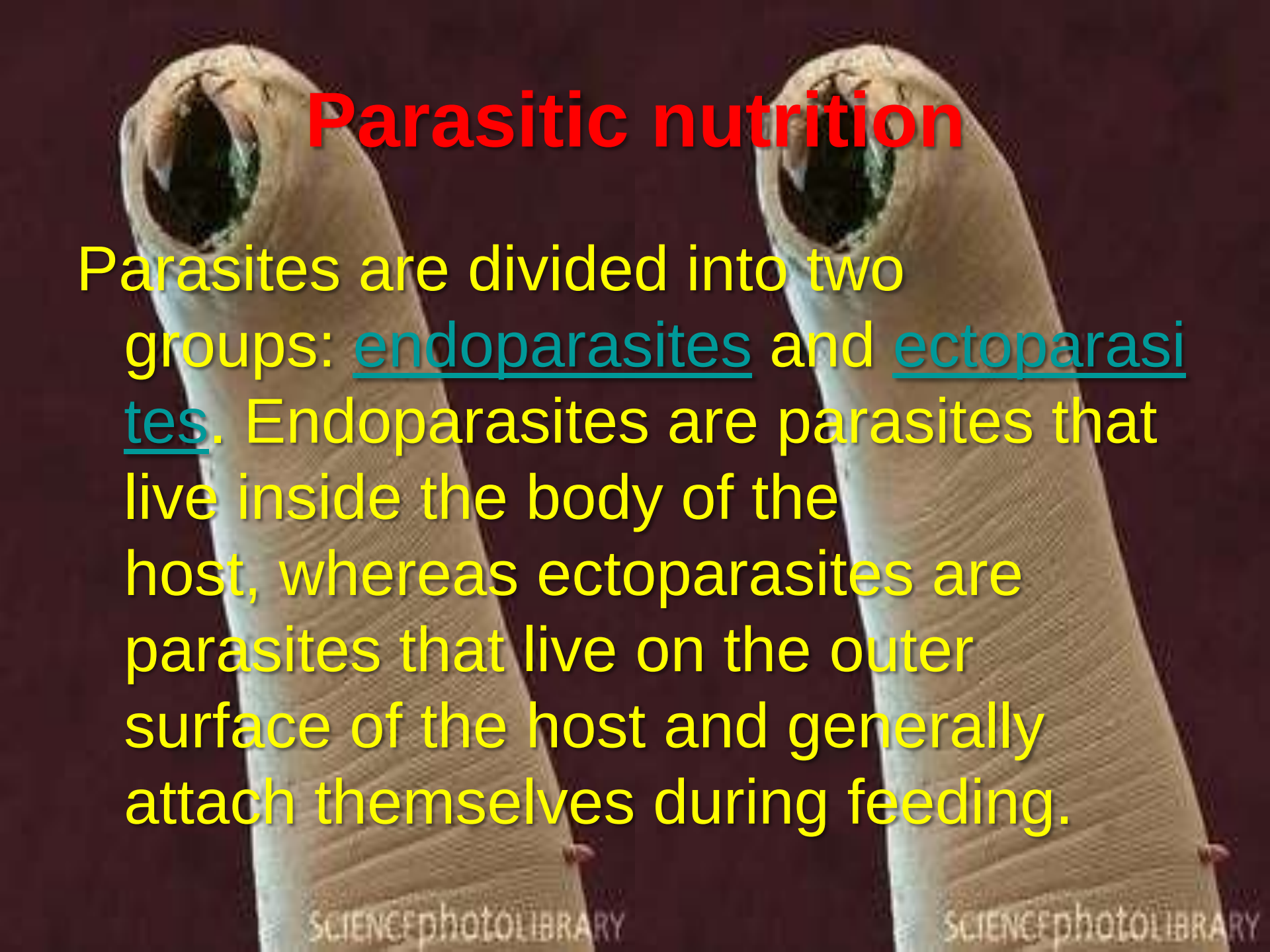
Parasitic nutrition

Parasites are dependent on their host for survival, since the host provides nutrition and protection. As a result of this dependence, parasites have considerable modifications to optimise parasitic nutrition and therefore their survival.



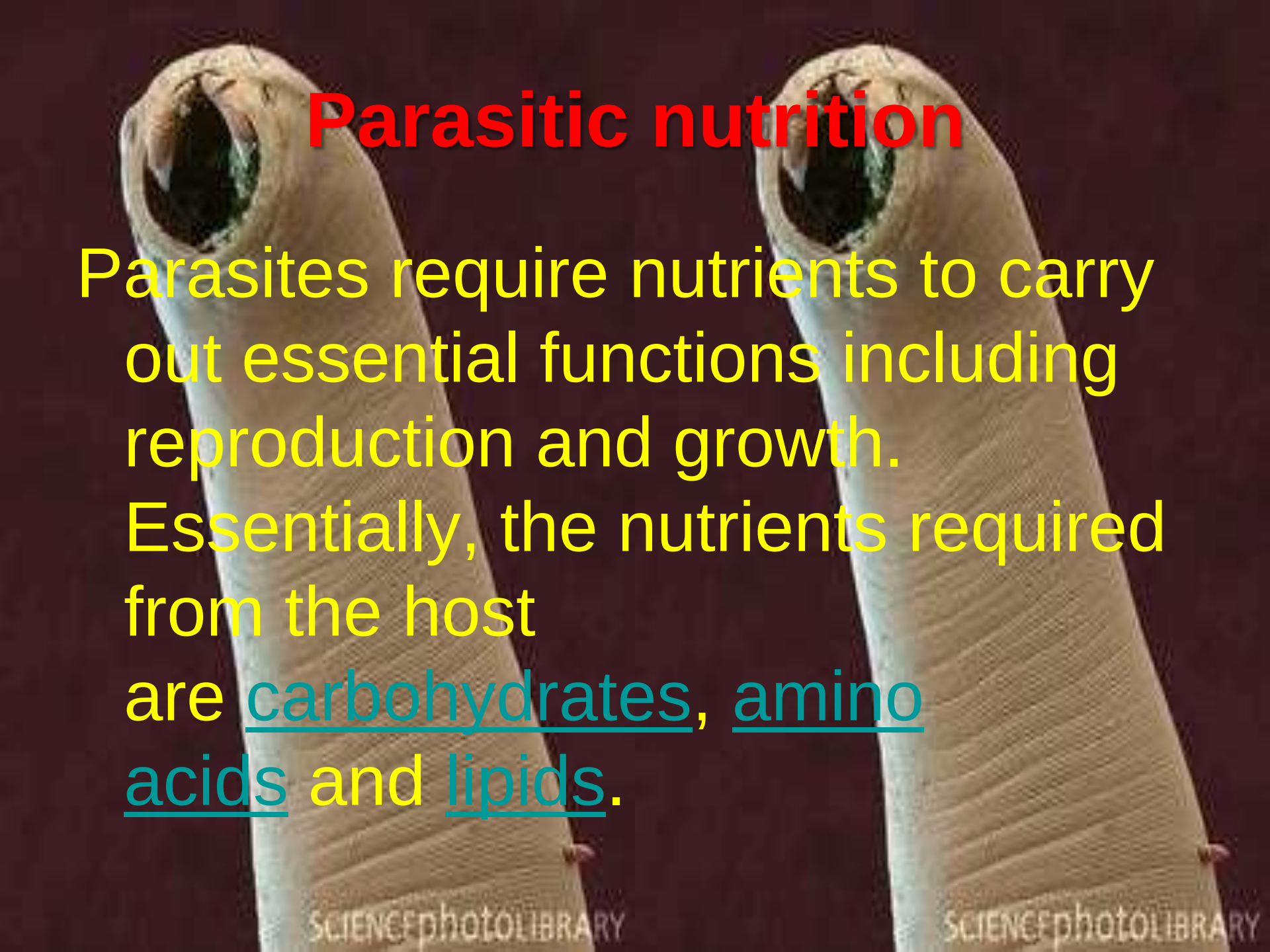
Parasitic nutrition

Parasites are divided into two groups: endoparasites and ectoparasites. Endoparasites are parasites that live inside the body of the host, whereas ectoparasites are parasites that live on the outer surface of the host and generally attach themselves during feeding.



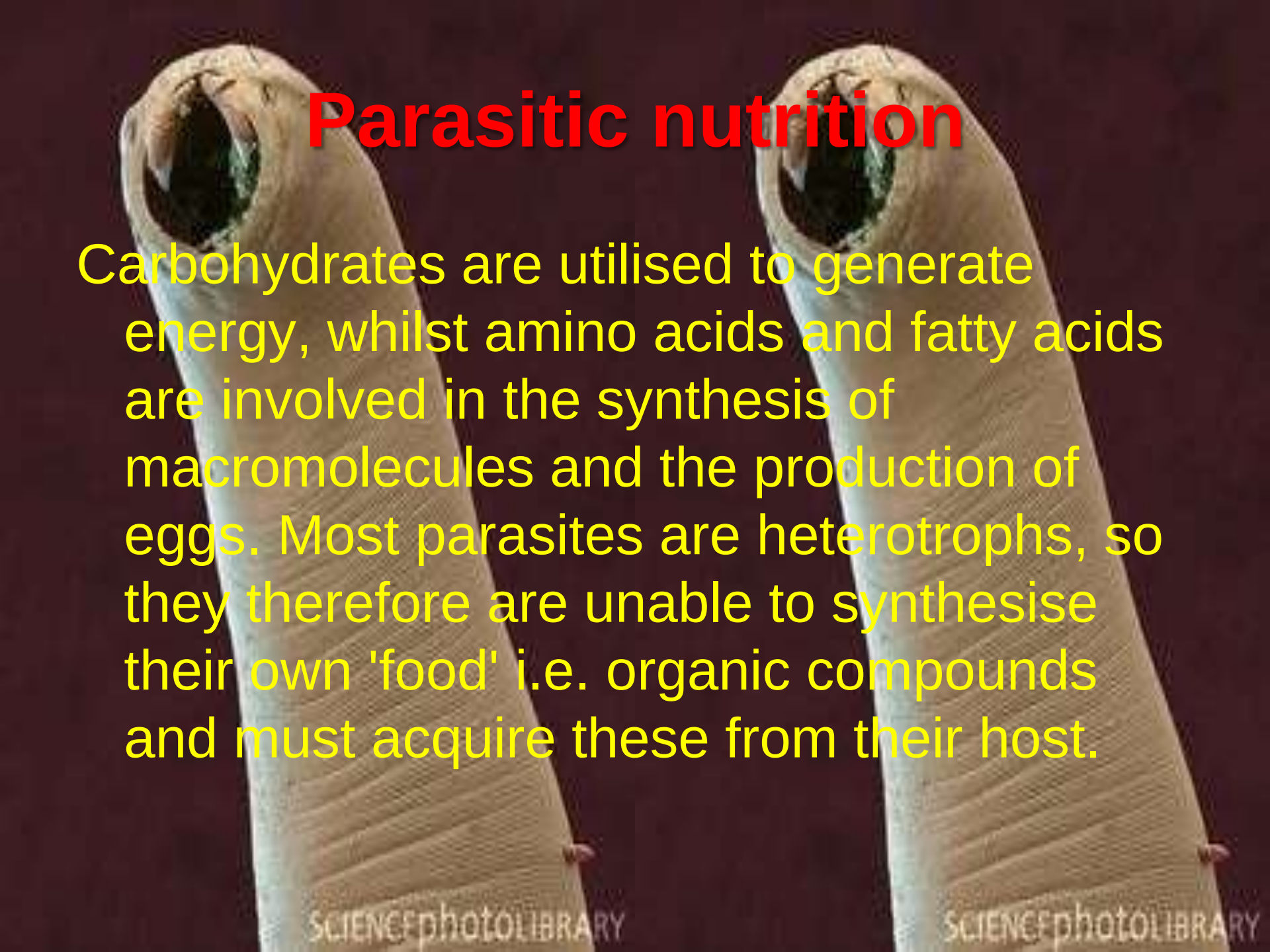
Parasitic nutrition

Parasites require nutrients to carry out essential functions including reproduction and growth. Essentially, the nutrients required from the host are carbohydrates, amino acids and lipids.



Parasitic nutrition

Carbohydrates are utilised to generate energy, whilst amino acids and fatty acids are involved in the synthesis of macromolecules and the production of eggs. Most parasites are heterotrophs, so they therefore are unable to synthesise their own 'food' i.e. organic compounds and must acquire these from their host.



Parasitic nutrition

Endoparasites Endoparasitism are parasites which live inside the body of the host. This group includes helminths, trematodes and cestodes. Endoparasites are two groups of parasites: intercellular andintracellular parasites

Parasitic nutrition

Intercellular parasites live in spaces within the host e.g. the alimentary canal, whereas intracellular parasites live in cells within the host e.g. erythrocytes. Intracellular parasites typically rely on a third organism, a vector, to transmit the parasite between hosts.

Parasitic nutrition

- Ectoparasitism

Ectoparasites live on the outer surface of the host. Ectoparasites do not have a readily available source of nutrients available on the outer surface of the host so they therefore require adaptations which enable them to gain access to host nutrients. This requires penetrative features which can insert into the host, as well as the ability to secrete digestive enzymes and the presence of a gut to digest host-derived nutrients

Prevention and Treatment

A combination of pumpkin seed, garlic, cramp bark, capsicum and thyme, can chase away tapeworms. An herbal mixture of black walnut leaves, wormwood, quassia, cloves and male fern, helps eliminate roundworms. Three parts capsicum, two parts wormwood and one part sage is an effective combination against worms. Black walnut, sassafras and pine needles also works

Prevention and Treatment

Preventing Re-infection:

- Periodically consume curry meals (highly anti-parasitic) followed by probiotics treatment (to re-establish healthy intestinal flora).
- It is a realistic approach to EXPECT to become infected by destructive parasites and to undergo a periodic (i.e. annual) parasitic cleanse, as most fresh waters globally located near human habitation ARE polluted.

Prevention and Treatment

Preventing Re-infection:

- Be sure that all meat, chicken and fish is cooked thoroughly.
- Don't use a microwave to cook meat, chicken or fish. Microwaves often don't heat foods completely.
- Wash all fruits and vegetables in clean water before eating (to prevent roundworm and whipworm infection)

Prevention and Treatment

Preventing Re-infection:

- Always wash your hands, kitchen counters and utensils with hot soapy water after cutting or handling raw meat, chicken or fish.
- Be sure that all meat, chicken and fish is cooked thoroughly.
- Don't use a microwave to cook meat, chicken or fish. Microwaves often don't heat foods completely.

Prevention and Treatment

Preventing Re-infection:

- Always wear shoes or slippers (to prevent hookworm infection)
- Do not use water from septic tanks or other potentially contaminated sources for watering vegetables
- Contain all fecal matter (e.g. by using a toilet or latrine, rather than "as nature intended" outside)
- Teach children proper hygiene i.e. washing hands after going to the toilet, playing outside and before preparing or eating

Prevention and Treatment

Preventing Re-infection:

- If you have parasites, you can reduce the likelihood of passing them on to others by carefully washing your hands after having bowel movements and cleaning the genital area before having sex.
- Wear gloves when changing the cat box. Deworm pets periodically.
- Avoid swallowing river, stream or lake water when swimming in them. Better yet, avoid swimming in them altogether.

Prevention and Treatment

Preventing Re-infection:

- Eat high-fiber foods and avoid sugar and other refined carbohydrates.
- Keep your body slightly acidic by including pumpkin seeds, calmyrna figs, garlic, apple cider vinegar, cranberry juice and pomegranates in your diet.
- Avoid eating water chestnuts and watercress.