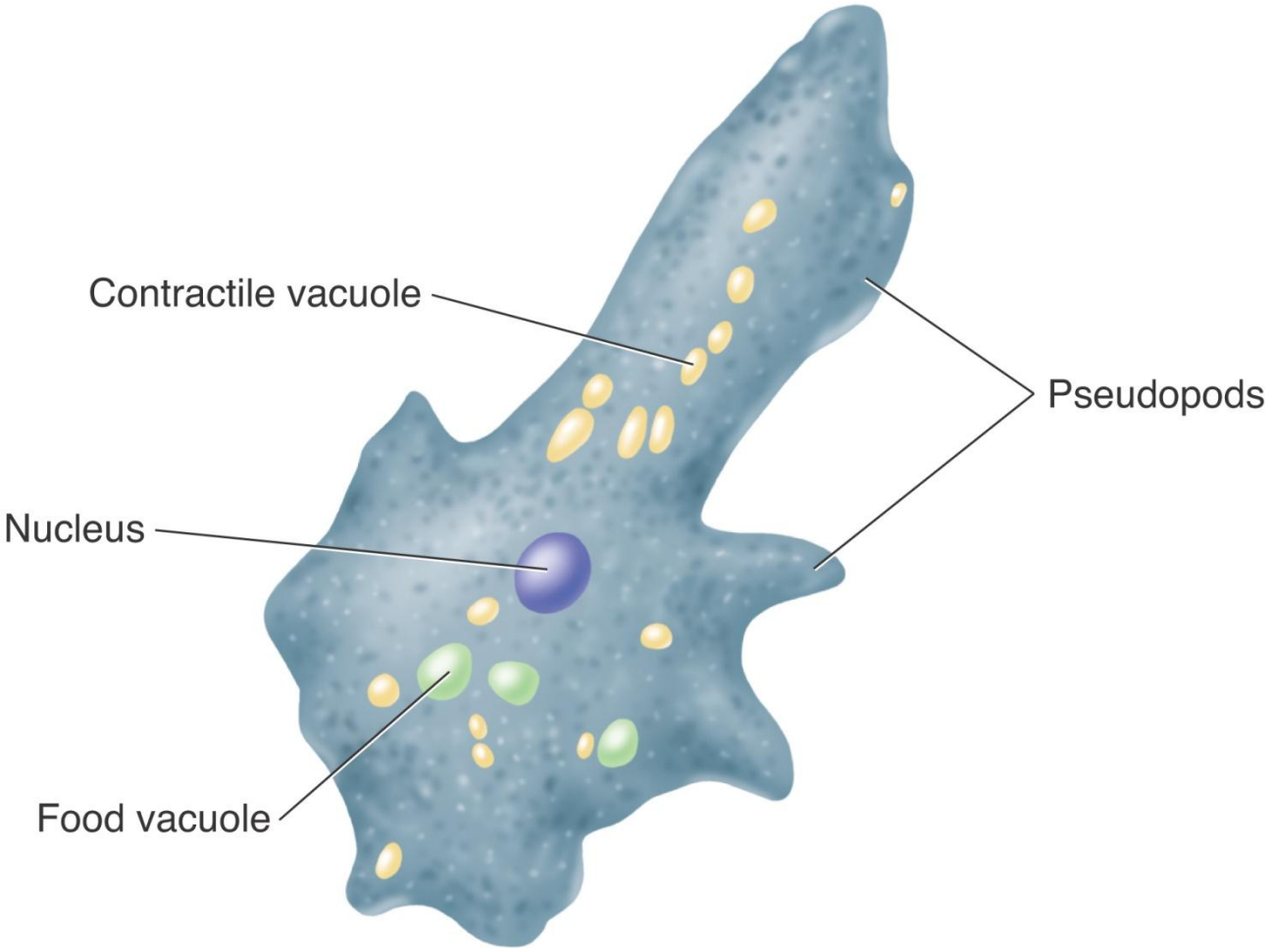
20–2 Animal-like Protists: Protozoans



20–2 Animal-like Protists: Protozoans

There are four phyla of animal-like protists:

- zooflagellates
- sarcodines
- ciliates
- sporozoans

Animal-like protists are classified by their means of movement.

Zooflagellates

What are the distinguishing features of the zooflagellates?

Animal-like protists that swim using flagella are called zooflagellates.

Flagella are long, whiplike projections that allow a cell to move.

Most zooflagellates have one or two flagella, although a few species have many.

Most zooflagellates reproduce asexually by mitosis and cytokinesis.

Some zooflagellates may reproduce sexually.

Sarcodines

What are the distinguishing features of the sarcodines?

Sarcodines are animal-like protists that have pseudopods.

Pseudopods are temporary cytoplasmic projections used for feeding or movement.

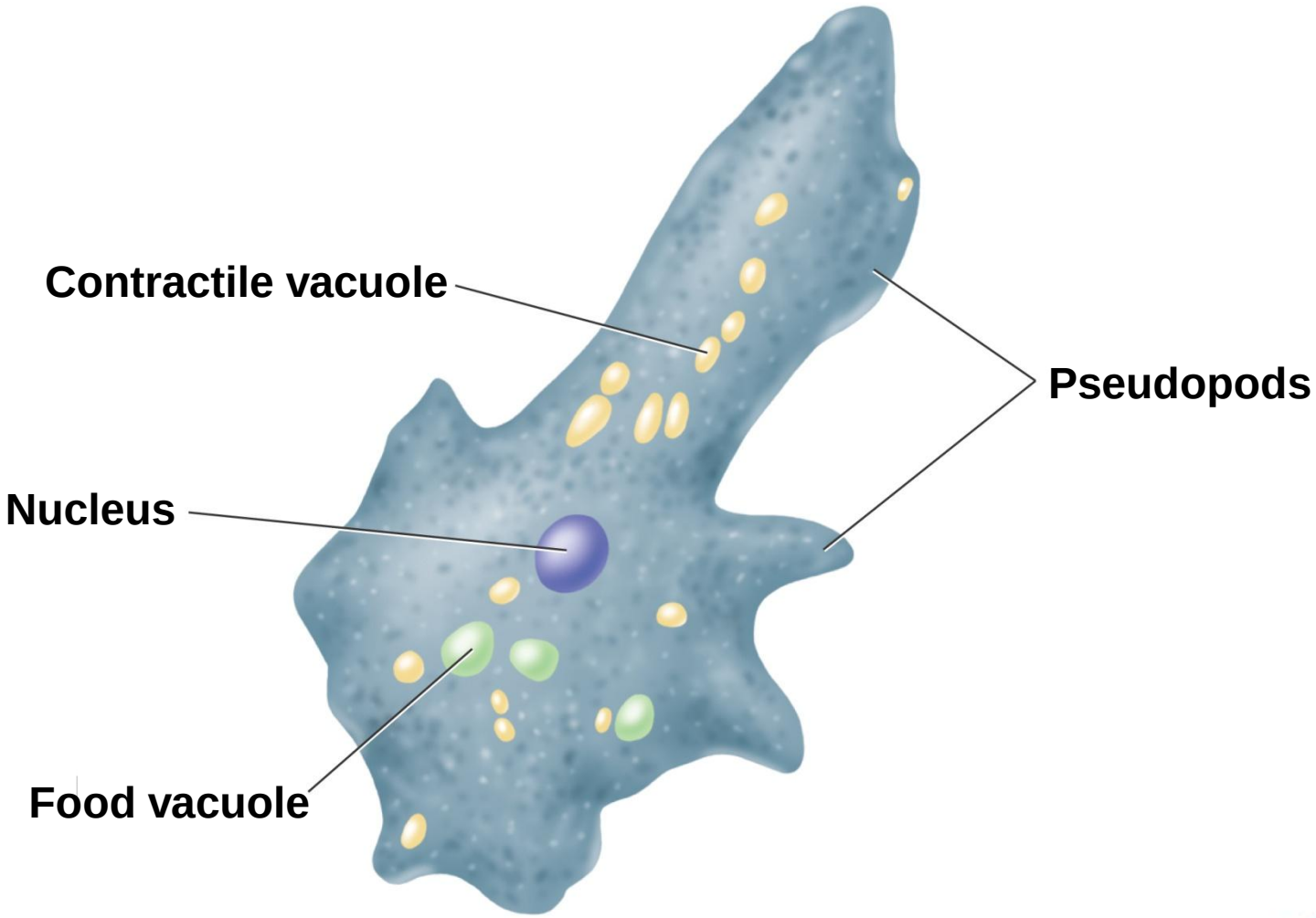
Amoebas

Amoebas are flexible, active cells with thick pseudopods that extend out of the central mass of the cell.

Cytoplasm streams into the pseudopod, and the rest of the cell follows.

This type of locomotion is known as **amoeboid movement**.

Structures of an Amoeba



Amoebas surround food and engulf it in a food vacuole.

A **food vacuole** is a small cavity in the cytoplasm that temporarily stores food.

Food is digested and nutrients are passed to the cell.

Waste stays in the vacuole until it is released outside the cell.

Amoebas reproduce by mitosis and cytokinesis.

Other sarcodines include:

- Foraminiferans
- Heliozoans (“sun animals”)

Ciliates

What are the distinguishing features of the ciliates?

Ciliates use cilia for feeding and movement.

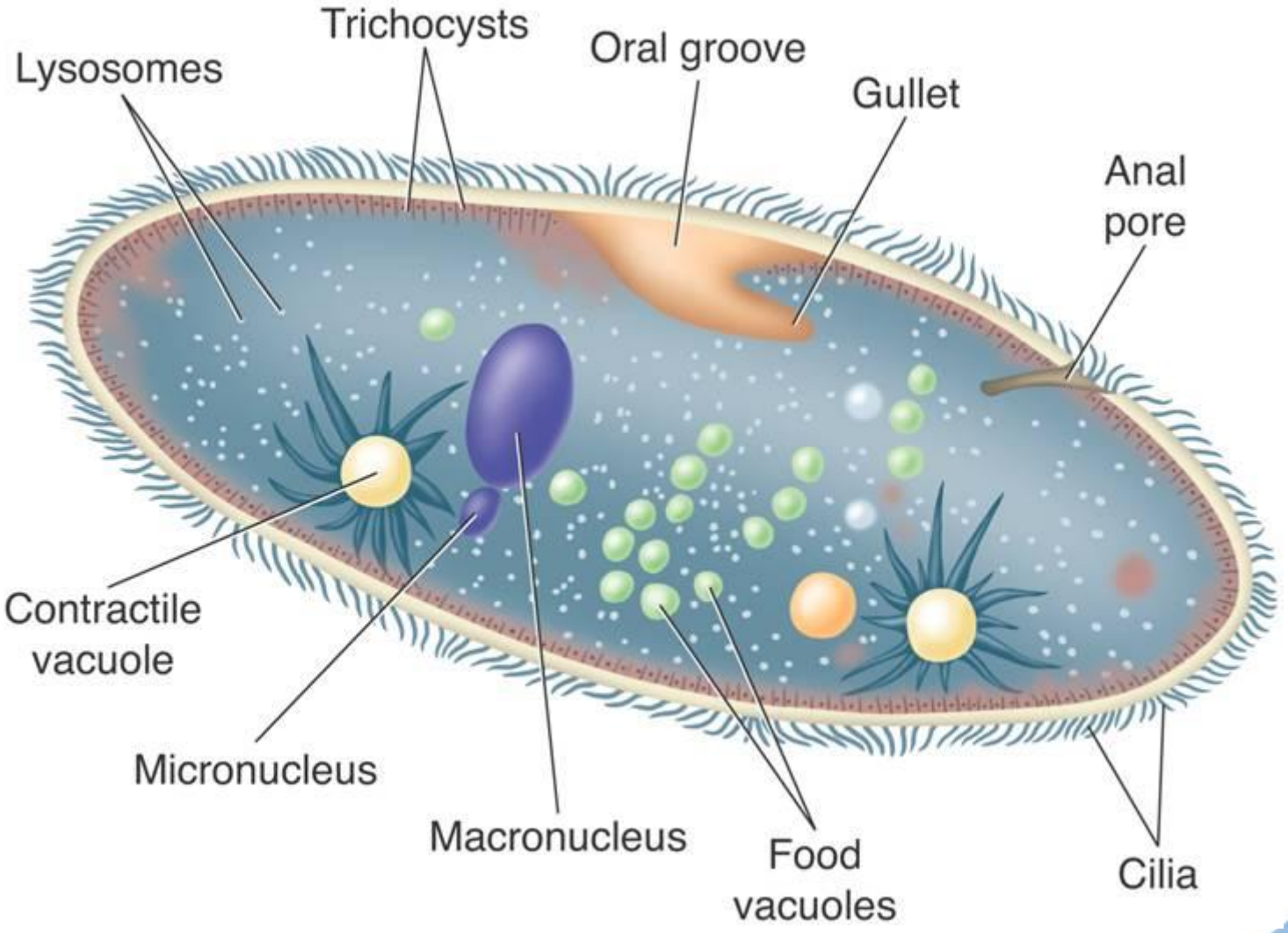
Cilia are short hairlike projections that propel a cell.

Paramecia

One type of ciliate is a paramecium.

In a paramecium, the cilia are grouped into rows and bundles, and beat in a regular pattern.

Structures of a Paramecium



Trichocysts are bottle-shaped structures found just below the surface of the cell membrane.

They are used for defense.

Paramecia possess two types of nuclei:

The **macronucleus** keeps multiple copies of most genes that the cell needs in its day-to-day existence.

The **micronucleus** contains a copy of all of the cell's genes.

Cilia sweep food particles into the **gullet**, an indentation in one side of the organism.

The gullet traps the particles and forces them into food vacuoles. The food vacuoles fuse with lysosomes which contain digestive enzymes.

Once the material in the food vacuole is digested, the waste material empties through the **anal pore**.

In fresh water, water moves into the paramecium by osmosis.

Excess water is collected in contractile vacuoles.

Contractile vacuoles are cavities in the cytoplasm that are specialized to collect water.

Once full, they contract, pumping water out of the organism.

Conjugation

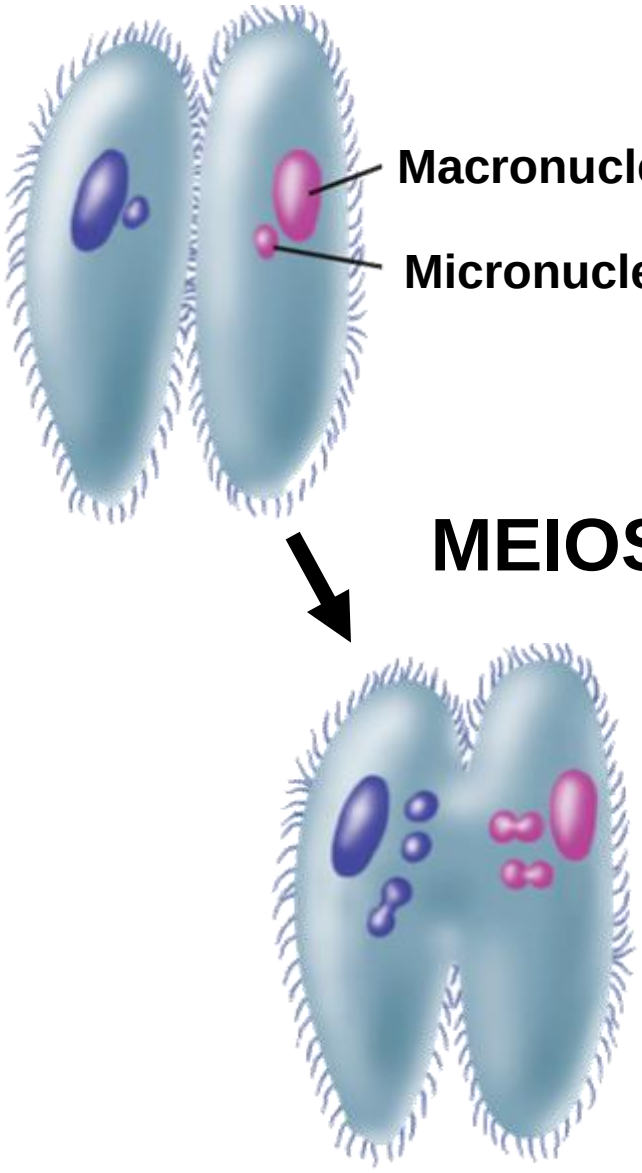
Ciliates reproduce asexually by mitosis and cytokinesis.

When placed under stress, paramecia may engage in **conjugation**, which allows them to exchange genetic material with other individuals.

Two paramecia attach themselves to each other.

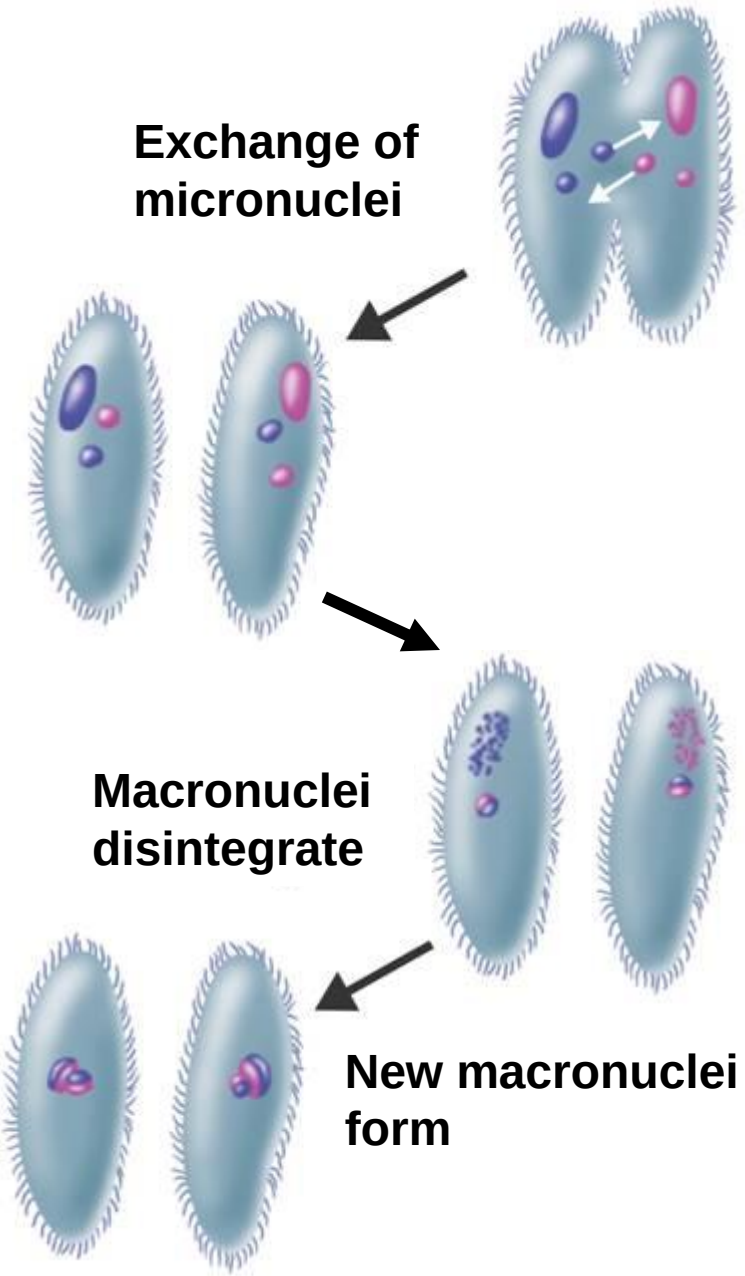
Meiosis produces four haploid micronuclei, three of which disintegrate.

The remaining micronucleus in each cell divides again.



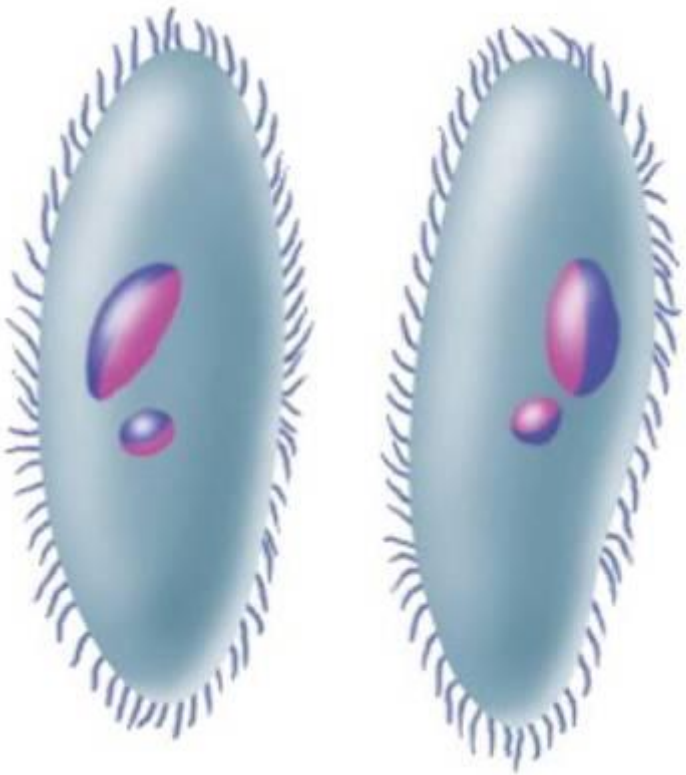
The two cells exchange one micronucleus from each pair.

The macronuclei disintegrate, and each cell forms a new macronucleus from its micronucleus.



Conjugation is not a form of reproduction. In large populations, conjugation helps produce and maintain genetic diversity.

Genetically identical paramecia form



Sporozoans

What are the distinguishing features of the sporozoans?

Sporozoans do not move on their own—they are parasitic.

Sporozoans are parasites of a wide variety of organisms, including worms, fish, birds, and humans.

Many sporozoans have complex life cycles that involve more than one host.

Sporozoans reproduce by sporozoites.

A sporozoite can attach itself to a host cell, penetrate it, and then live within it as a parasite.

Animal-like Protists and Disease

How do animal-like protists harm other living things?

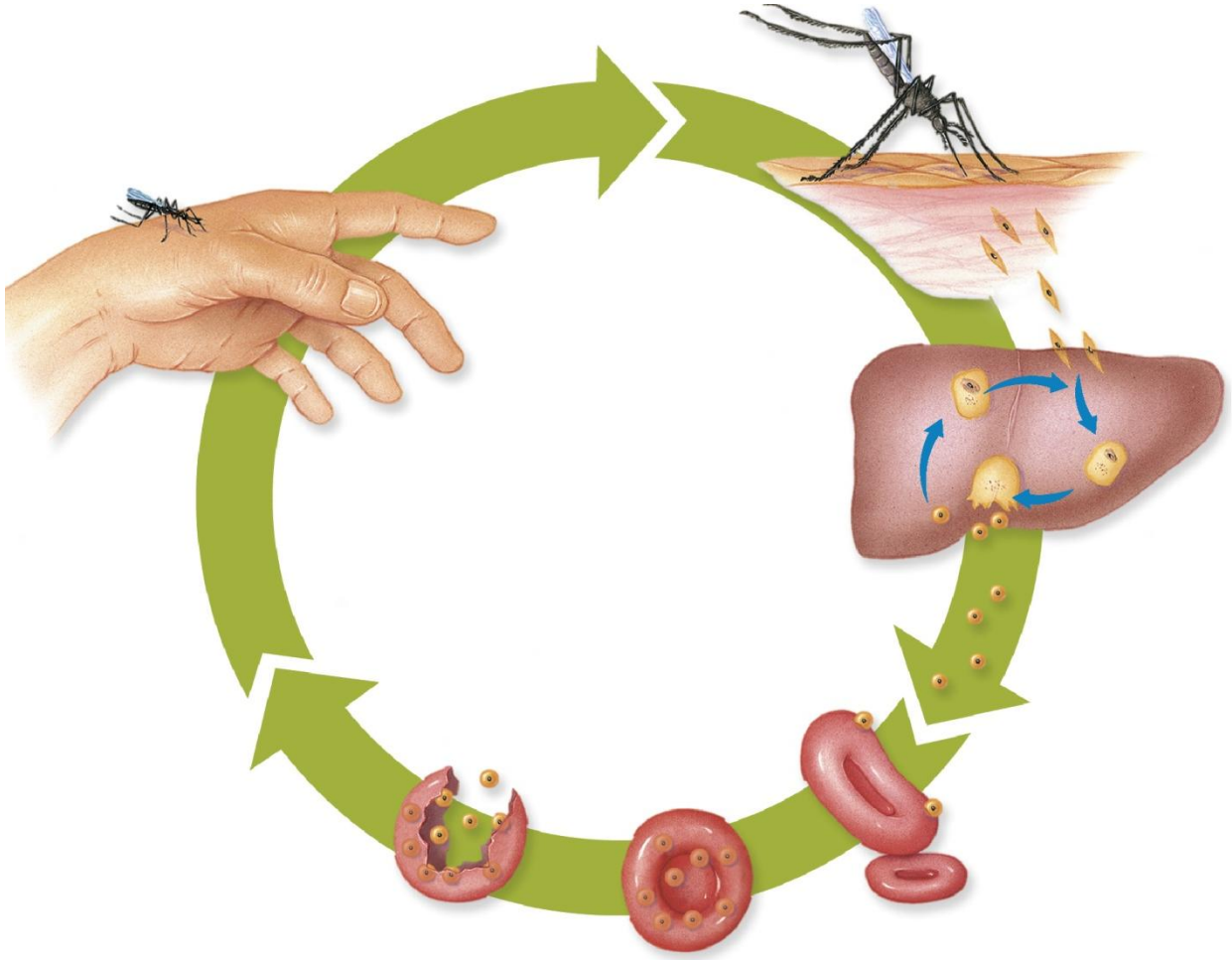
Some animal-like protists cause serious diseases, including malaria and African sleeping sickness.

Malaria

Malaria is one of the world's most serious infectious diseases, killing as many as 2 million people each year.

The sporozoan *Plasmodium*, which causes malaria, is carried by the female *Anopheles* mosquito.

Malarial Infection

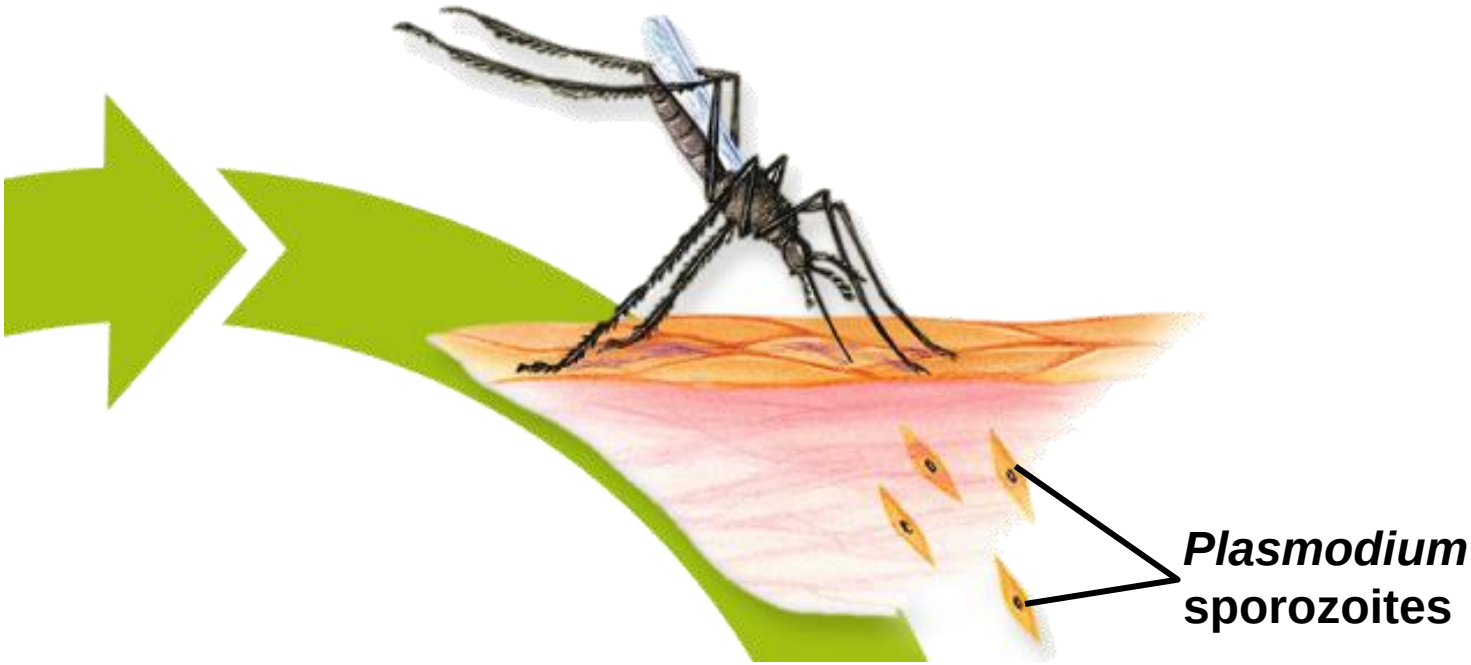


A female *Anopheles* mosquito bites a human infected with malaria and picks up *Plasmodium* gamete cells.

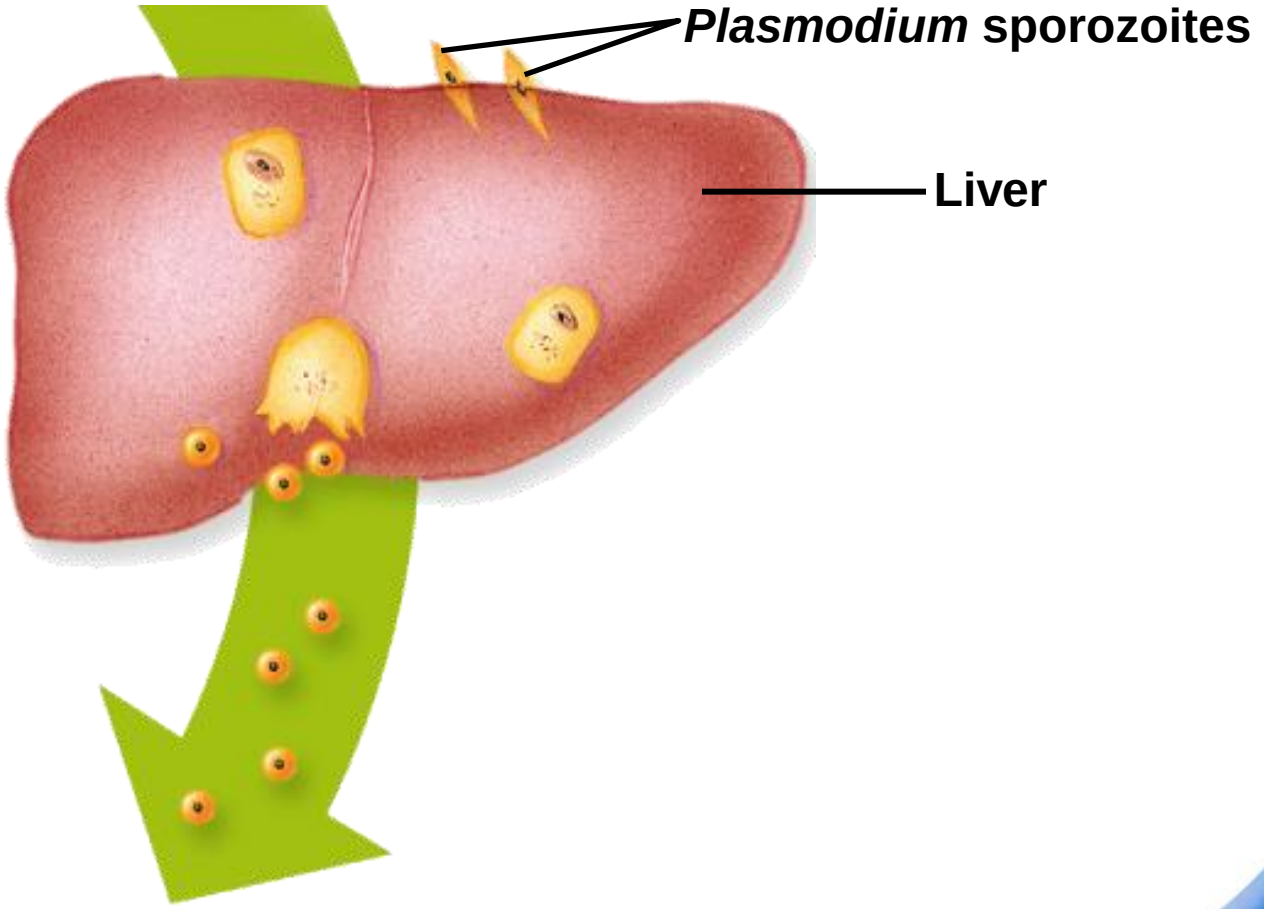
The sexual phase of the *Plasmodium* life cycle takes place inside the mosquito.

Gametes fuse to form zygotes, meioses occurs, and sporozoites are produced and migrate to salivary gland.

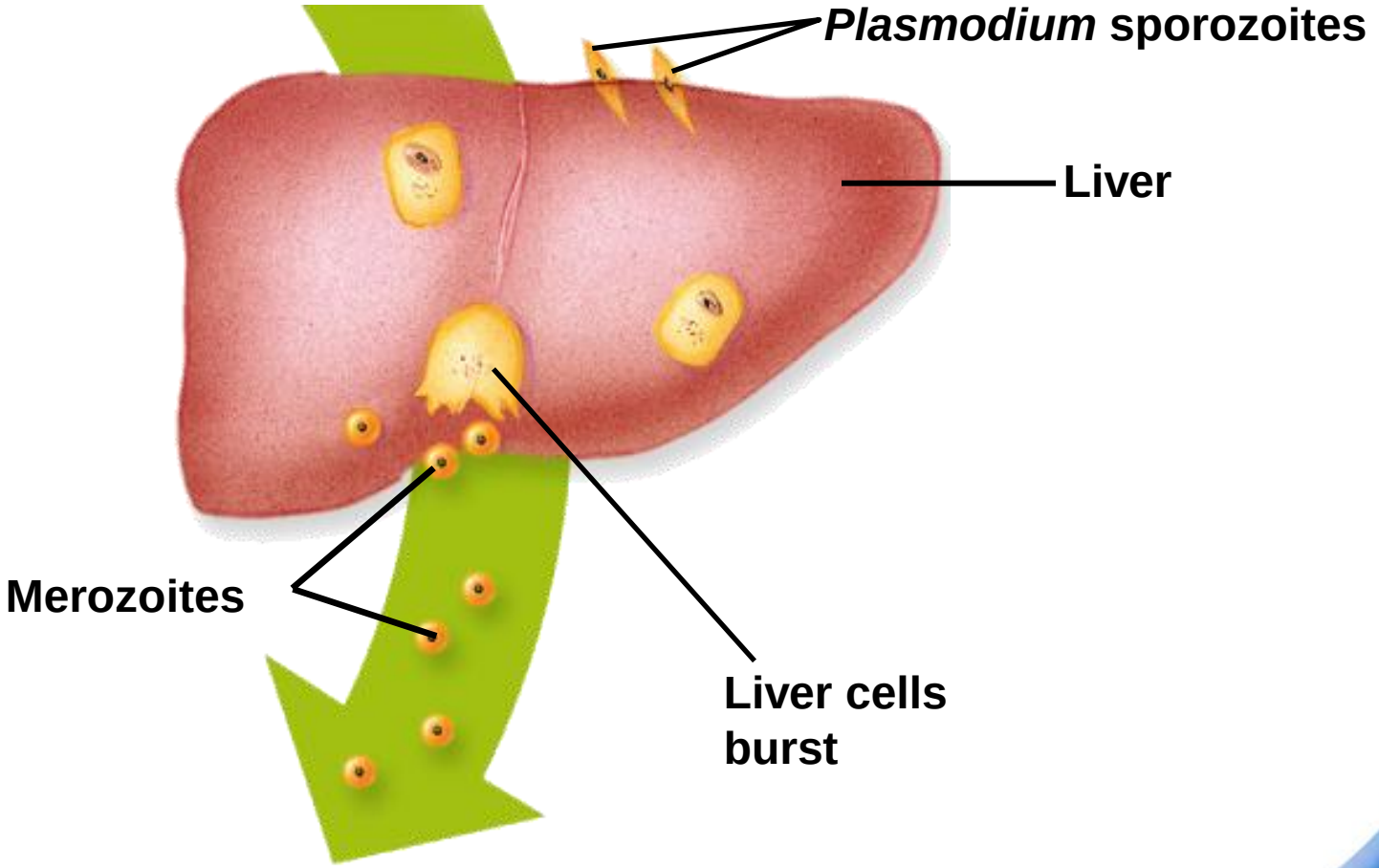
Infected mosquito bites another human, injecting saliva that contains *Plasmodium* sporozoites.



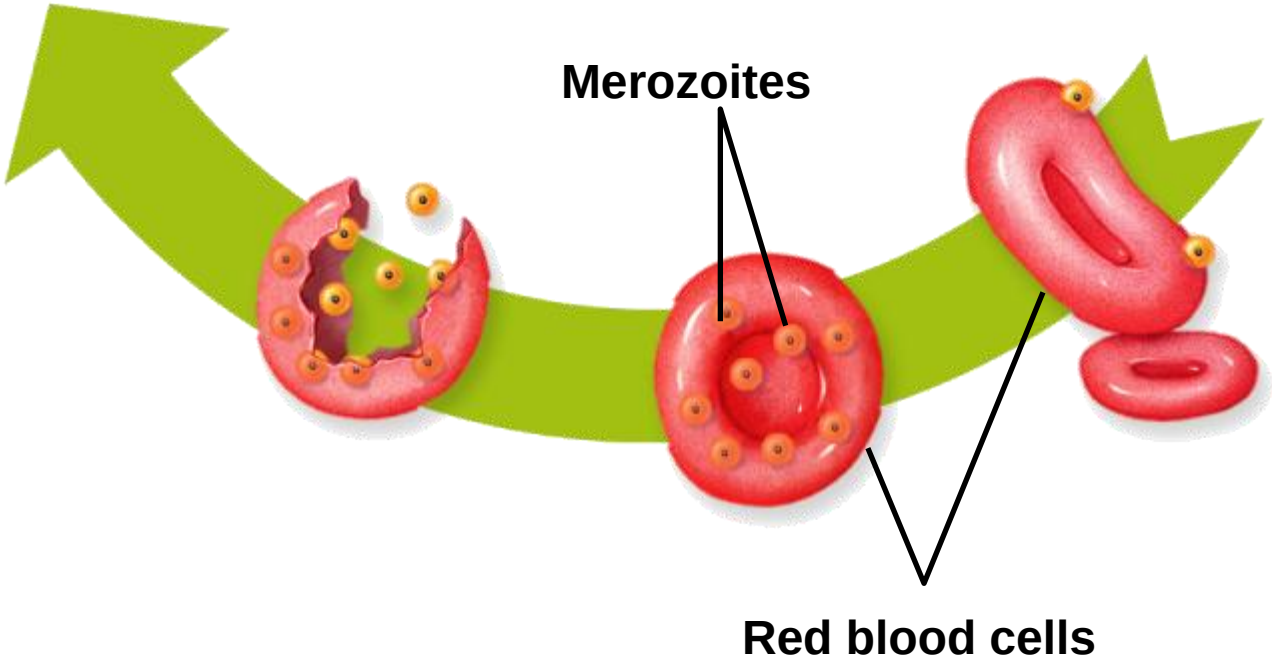
Sporozoites infect liver cells and multiply asexually.



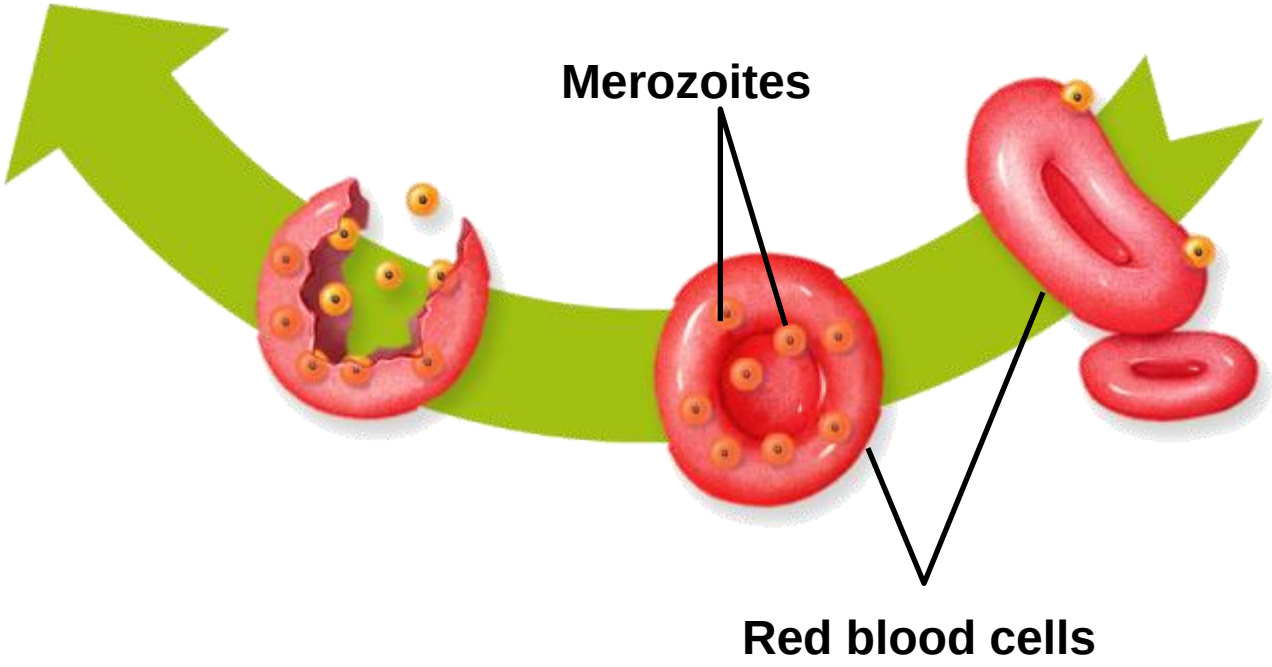
Infected liver cells burst, releasing *Plasmodium* cells called merozoites that infect red blood cells.



Merozoites reproduce asexually inside red blood cells.



Infected red blood cells burst, releasing merozoites that infect other red blood cells. Some cells release gametes that can infect mosquitoes.



Other Diseases Caused by Protists

African sleeping sickness

Amebic dysentery

Giardia

Ecology of Animal-like Protists

Many animal-like protists are essential to the living world.

- Some live symbiotically within other organisms.
- Some recycle nutrients from dead organic matter.
- Some live in water, where they are eaten by tiny animals, which in turn serve as food for larger animals.

Some animal-like protists are beneficial to other organisms.

The protist *Trichonympha* lives within the digestive systems of termites.

It breaks down cellulose, allowing termites to digest wood.

20–2 Section QUIZ

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20–2 Section QUIZ

1 Structures found in sarcodines that are used for feeding and movement are known as

A a. pseudopods.

b. flagella.

c. cilia.

d. food vacuoles.

2 The structure found in most ciliates that contains a “reserve copy” of all the cell's genes is the

a. macronucleus.

A b. micronucleus.

c. trichocysts.

d. contractile vacuole.

3 One way to classify the various groups of animal-like protists is by

a. the presence of a nuclear membrane.

b. the presence of mitochondria.

A c. their means of movement.

d. the number of contractile vacuoles.

4 Malaria is caused by the sporozoan

A a. *Plasmodium.*

b. *Anopheles.*

c. Amoeba.

d. *Paramecium.*

5 Which human disease is caused by the protist *Trypanosoma*?

a. measles

A b. African sleeping sickness

c. malaria

d. diarrhea

END OF SECTION