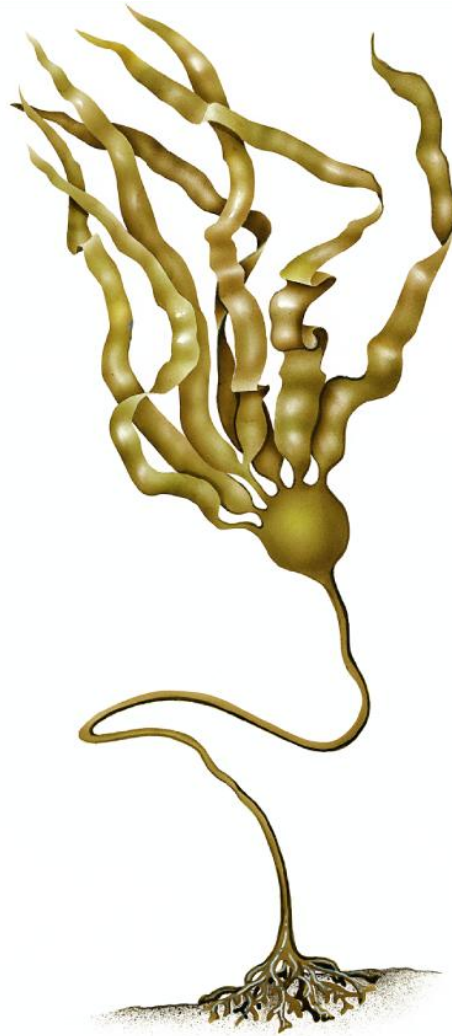


20-4 Plantlike Protists: Red, Brown, and Green Algae



20-4 Plantlike Protists: Red, Brown, and Green Algae

The three phyla of algae that are largely multicellular are:

- red algae
- brown algae
- green algae

20-4 Plantlike Protists: Red, Red Algae Brown, and Green Algae



Red algae are able to live at great depths due to their efficiency in harvesting light energy.

Red algae contain chlorophyll *a* and reddish accessory pigments called phycobilins.

Phycobilins absorb blue light, enabling red algae to live deep in the ocean.

20-4 Plantlike Protists: Red, → Brown Algae
Brown, and Green Algae



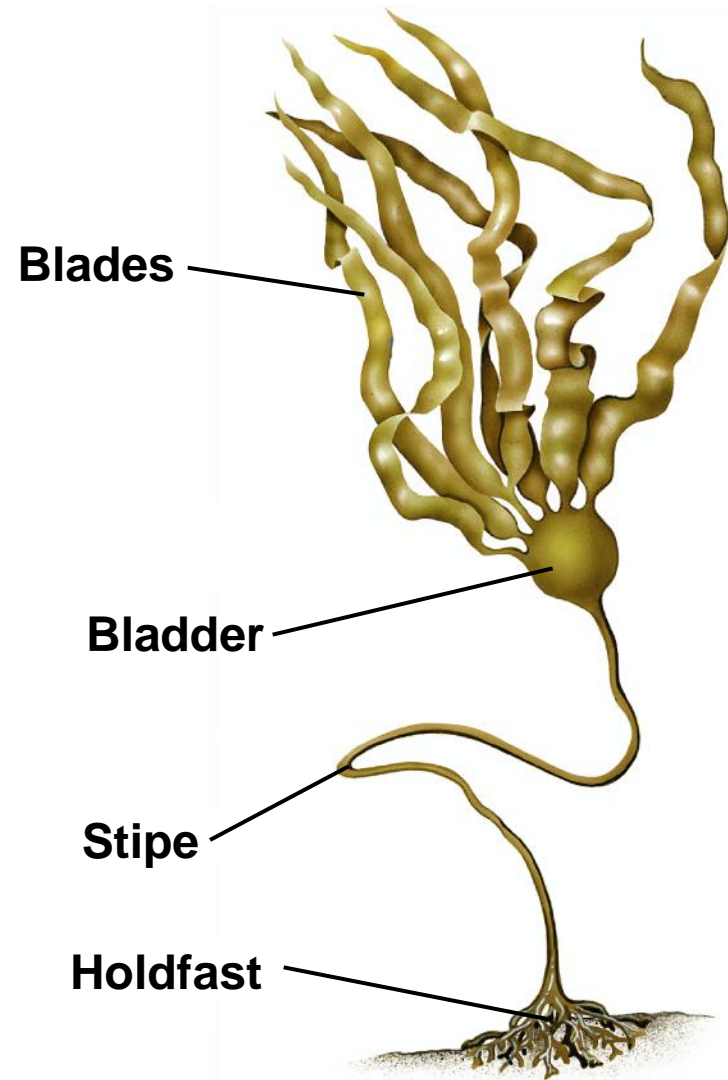
Brown algae contain chlorophyll *a* and *c*, as well as a brown accessory pigment, fucoxanthin.

20-4 Plantlike Protists: Red, → Brown Algae Brown, and Green Algae

Brown algae are the largest and most complex of the algae.

All are multicellular and most are marine, commonly found in cool, shallow coastal waters of temperate or arctic areas.

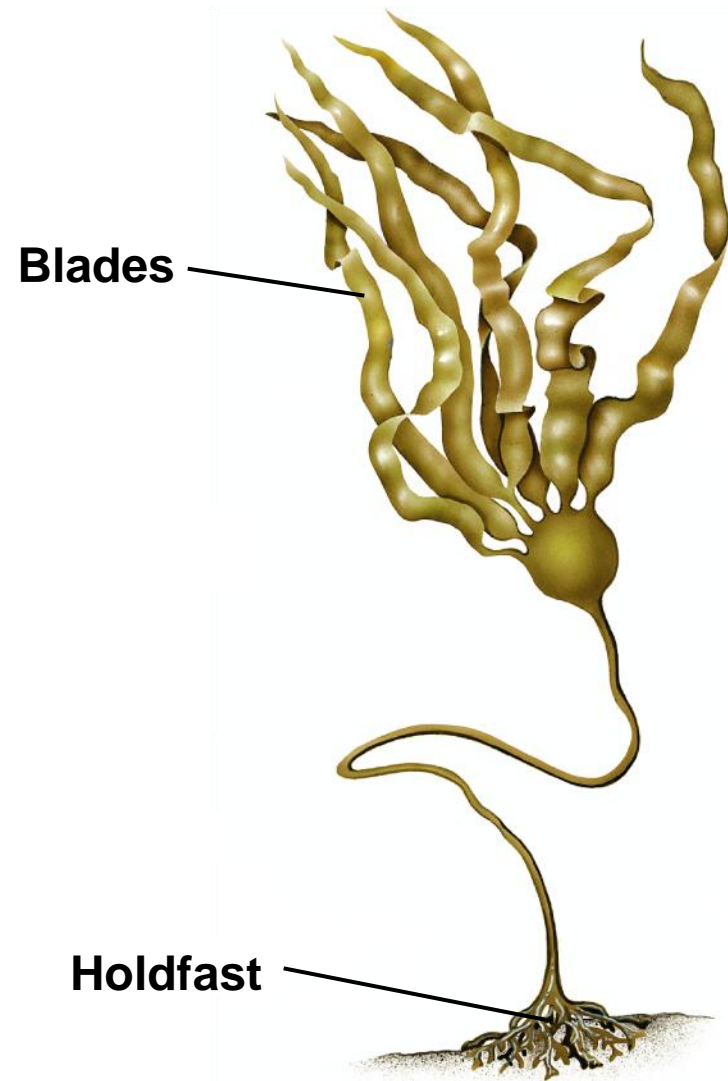
Brown Alga Structure



20-4 Plantlike Protists: Red, → Brown Algae
Brown, and Green Algae

Fucus, a common brown alga, is made up of a holdfast, stipes, bladders, and blades.

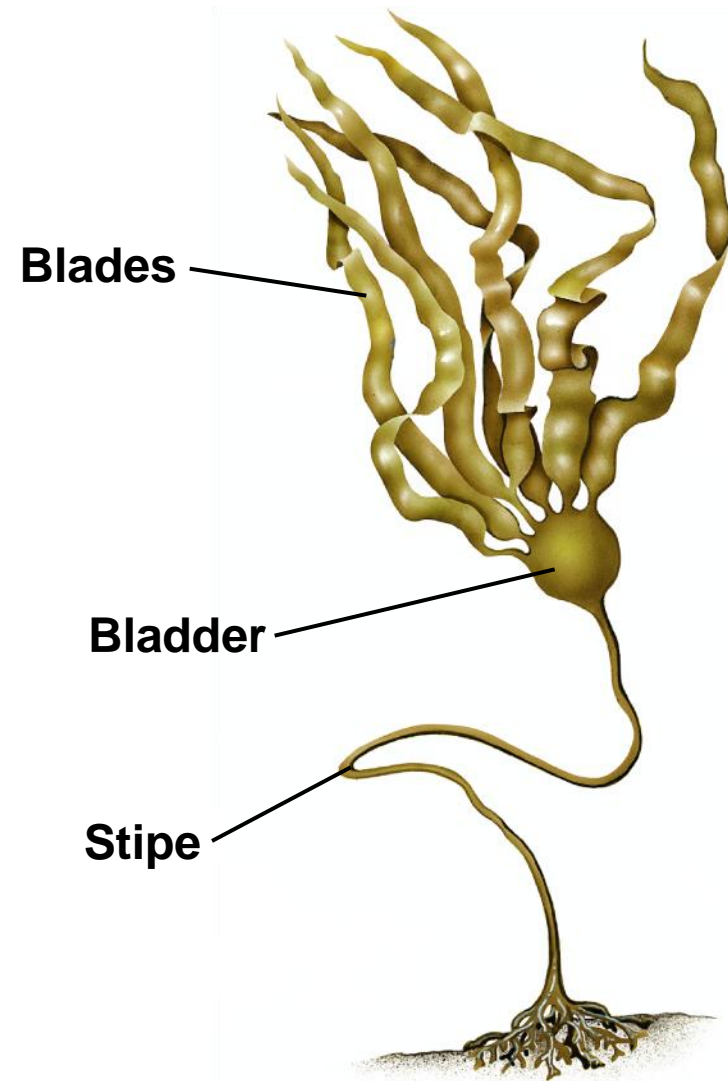
The holdfast attaches the alga to rocks.



20-4 Plantlike Protists: Red, → Brown Algae Brown, and Green Algae

The body of *Fucus* contains:

a flattened stemlike structure called a stipe, leaflike structures called blades, and gas-filled bladders that keep the alga afloat and upright.





Green algae share many characteristics with plants, including their photosynthetic pigments and cell wall composition.

Scientists hypothesize that the ancestors of modern land plants looked like certain species of living green algae.

20-4 Plantlike Protists: Red, Green Algae Brown, and Green Algae

Green algae live in fresh and salt water, and moist land areas.

Many species live most of their lives as single cells.

Others form colonies, groups of similar cells that are joined together but show few specialized structures.

A few are multicellular and have specialized structures.

Reproduction in Green Algae



How do multicellular algae reproduce?



The life cycles of many algae include both a diploid and a haploid generation.

20-4 Plantlike Protists: Red, → Reproduction in Green Algae
Brown, and Green Algae

Switching between haploid and diploid stages during a life cycle is known as **alternation of generations**.

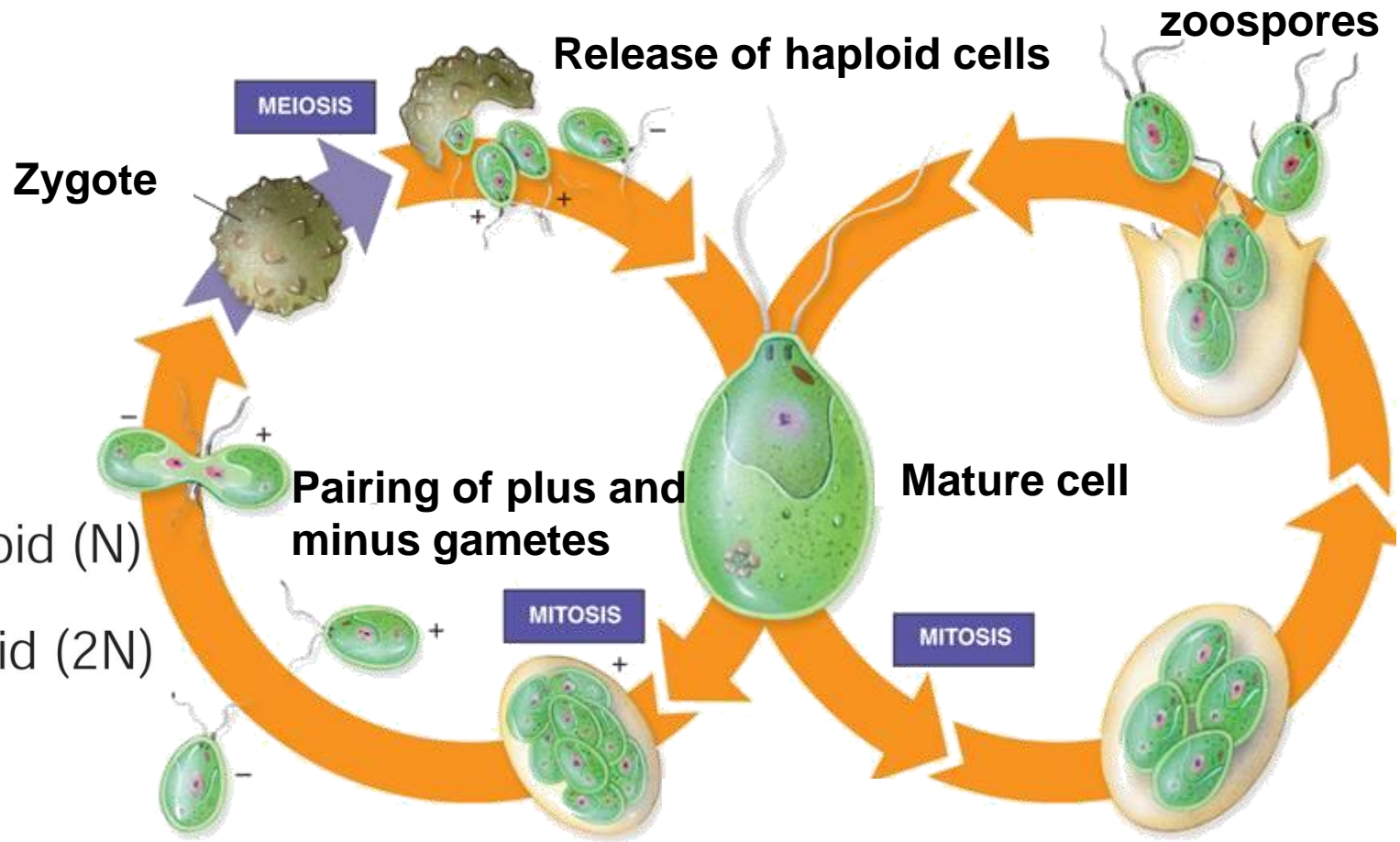
Many alga also shift between sexual and asexual reproduction.

Reproduction in *Chlamydomonas*

The unicellular *Chlamydomonas* spends most of its life in the haploid stage.

20-4 Plantlike Protists: Red, Brown, and Green Algae → Reproduction in Green Algae

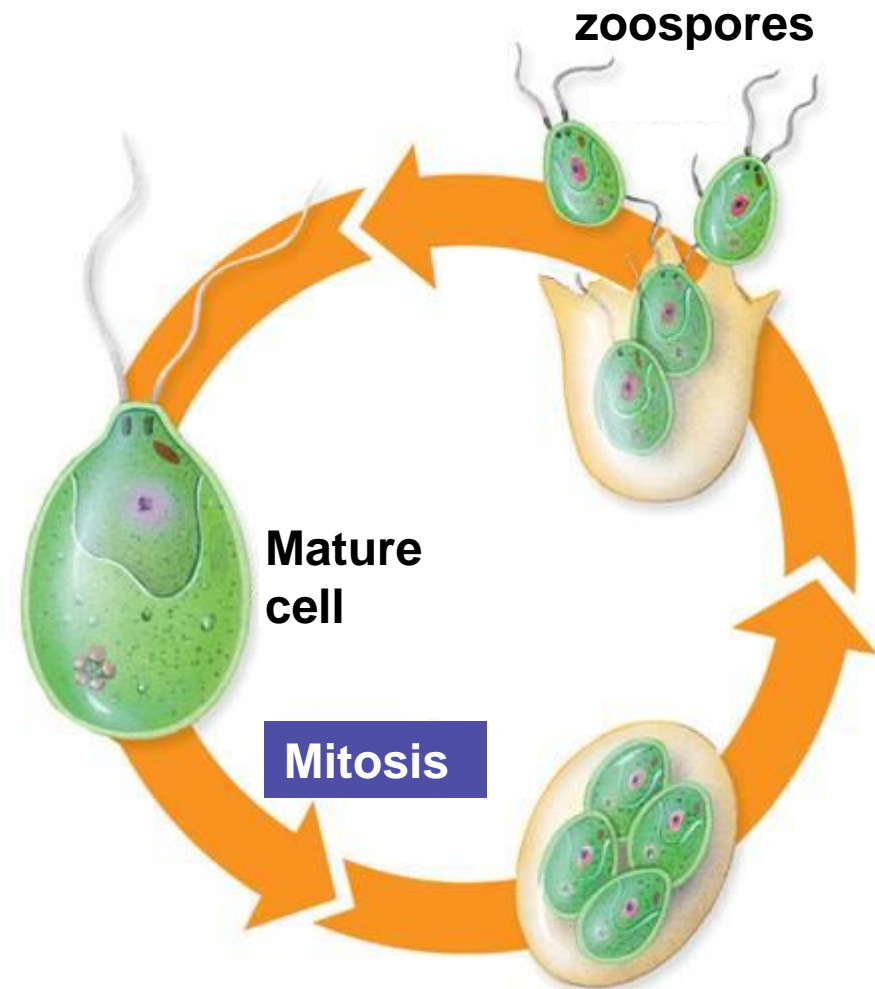
Reproduction in *Chlamydomonas*



■ Haploid (N)
■ Diploid (2N)

Asexual Reproduction in *Chlamydomonas*

In suitable living conditions, this haploid cell reproduces asexually, producing cells called zoospores by mitosis.

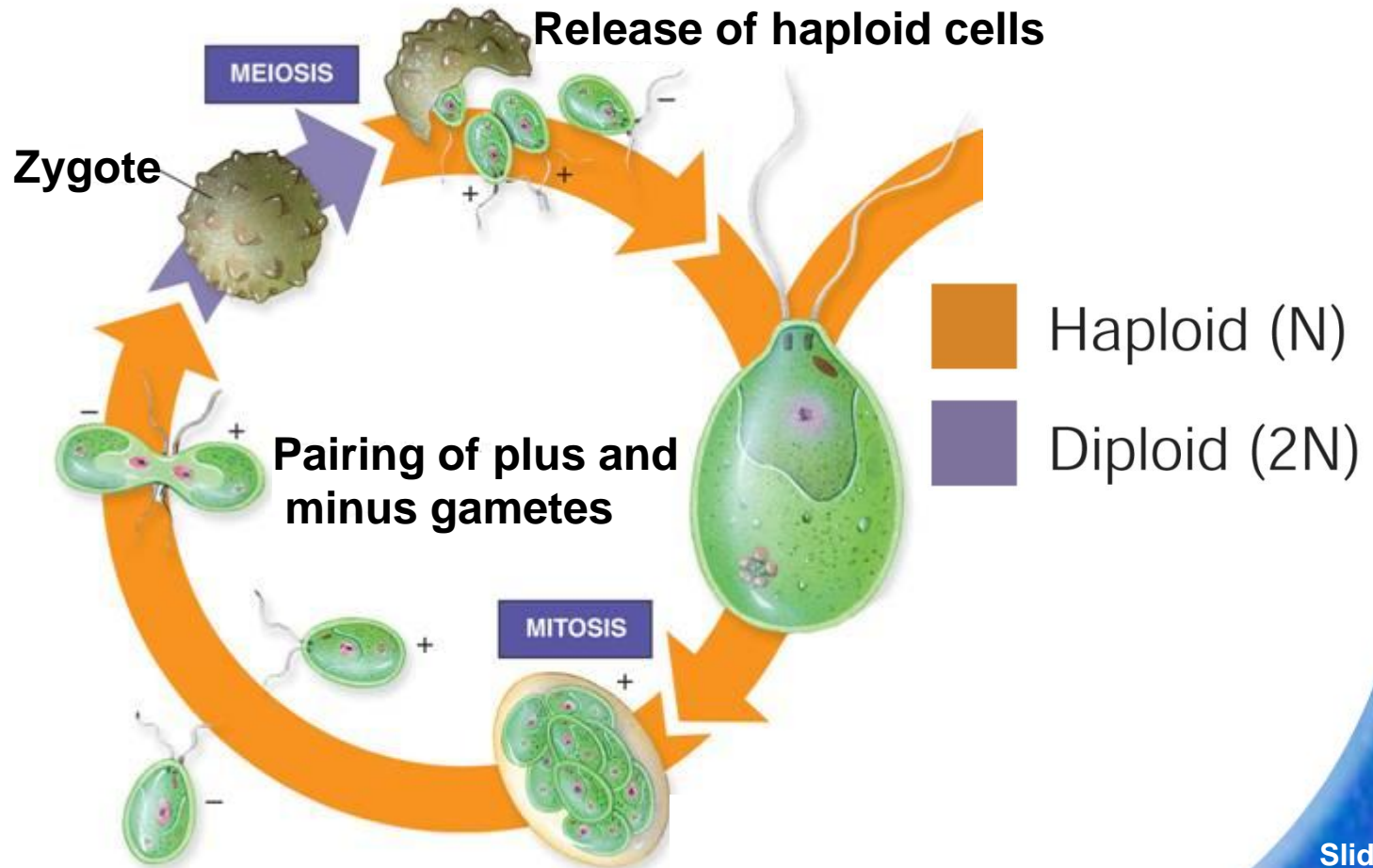


20-4 Plantlike Protists: Red, → Reproduction in Green Algae
Brown, and Green Algae

If conditions become unfavorable, *Chlamydomonas* can also reproduce sexually.

20-4 Plantlike Protists: Red, → Reproduction in Green Algae
Brown, and Green Algae

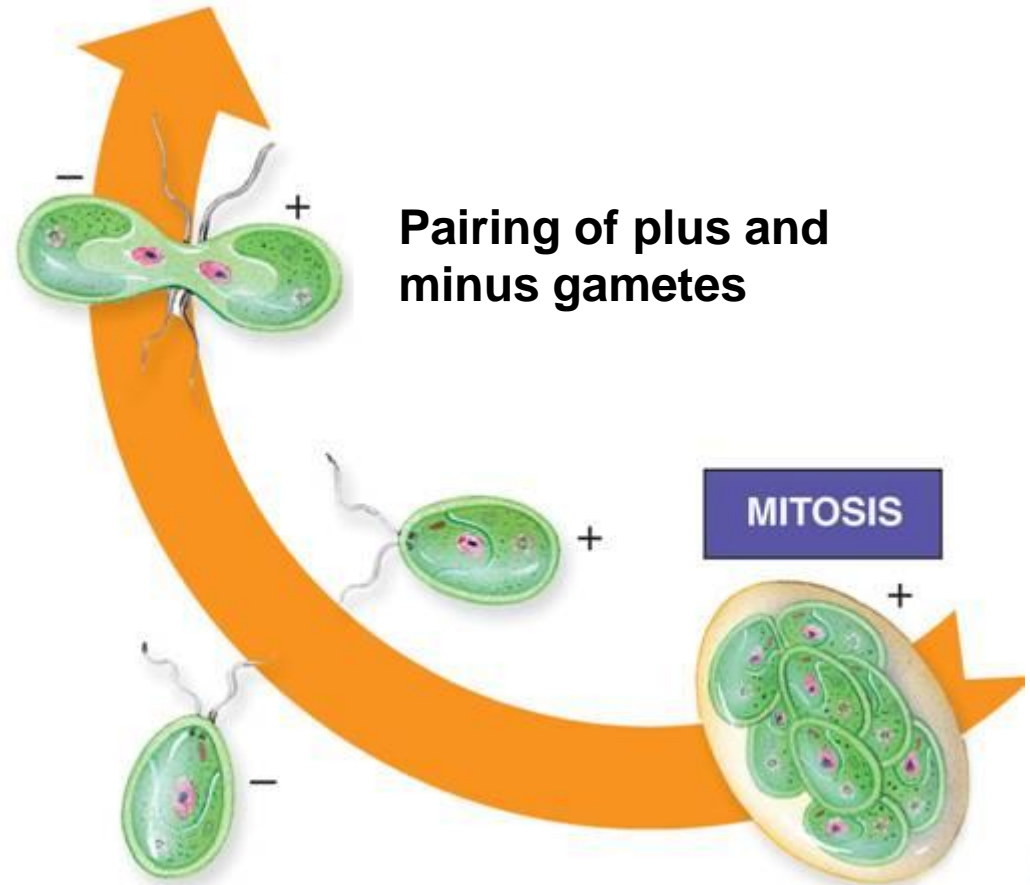
Sexual Reproduction in *Chlamydomonas*



20-4 Plantlike Protists: Red, Reproduction in Green Algae Brown, and Green Algae

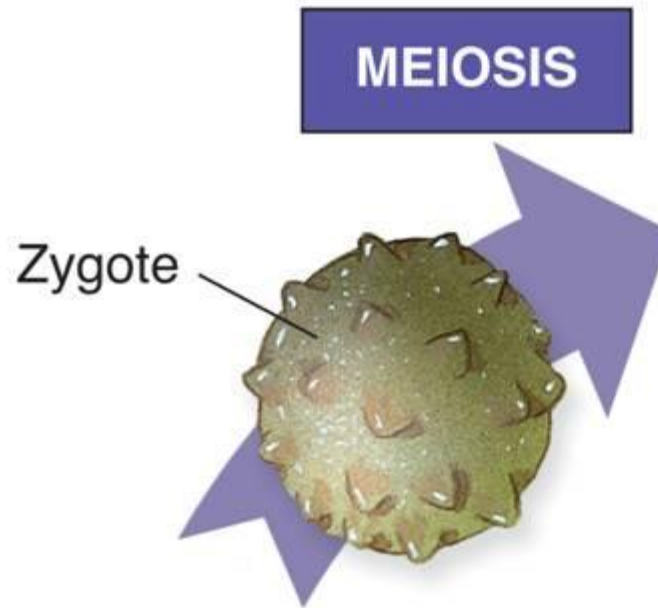
Haploid cells undergo mitosis, but release gametes instead of zoospores.

The zoospores are of two opposite mating types—plus (+) and minus (-).



20-4 Plantlike Protists: Red, Reproduction in Green Algae Brown, and Green Algae

The plus and minus gametes form pairs and fuse, forming a diploid zygote.

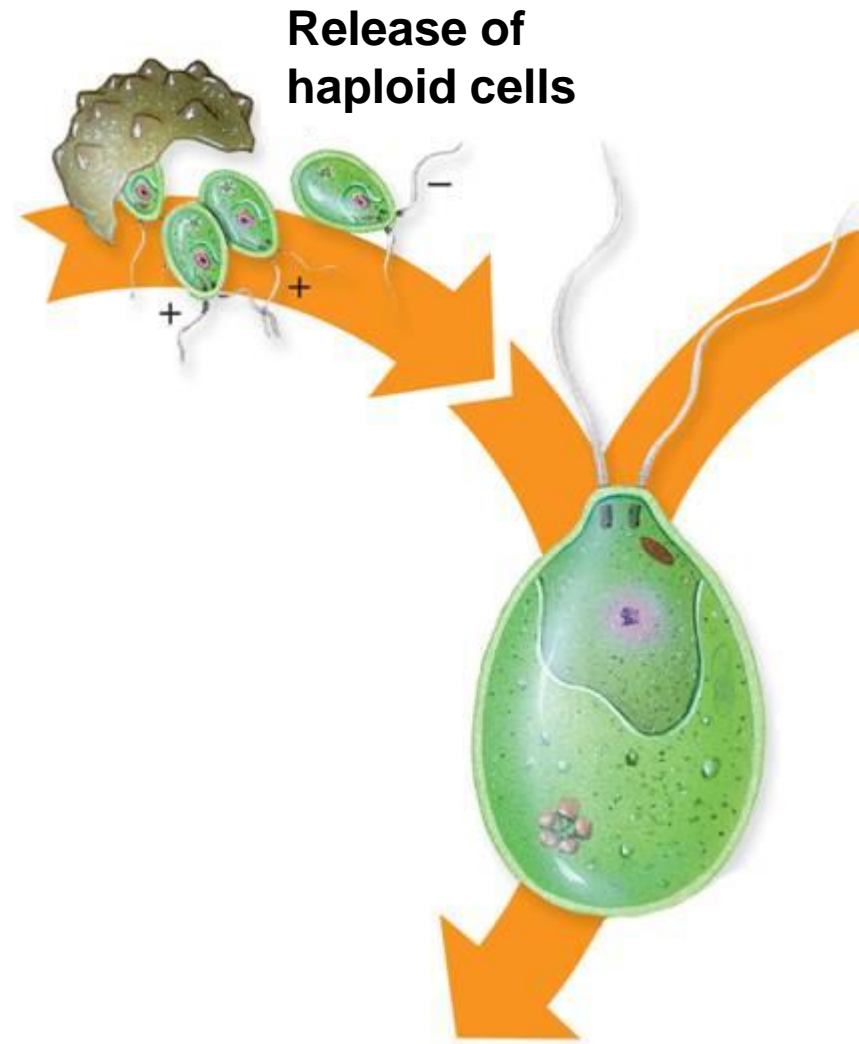


20-4 Plantlike Protists: Red, Reproduction in Green Algae Brown, and Green Algae

The zygote grows a thick protective wall. Within this protective wall, *Chlamydomonas* can survive conditions that otherwise would kill it.

20-4 Plantlike Protists: Red, Reproduction in Green Algae Brown, and Green Algae

When conditions again become favorable, the zygote grows, divides by meiosis, and produces four haploid cells.

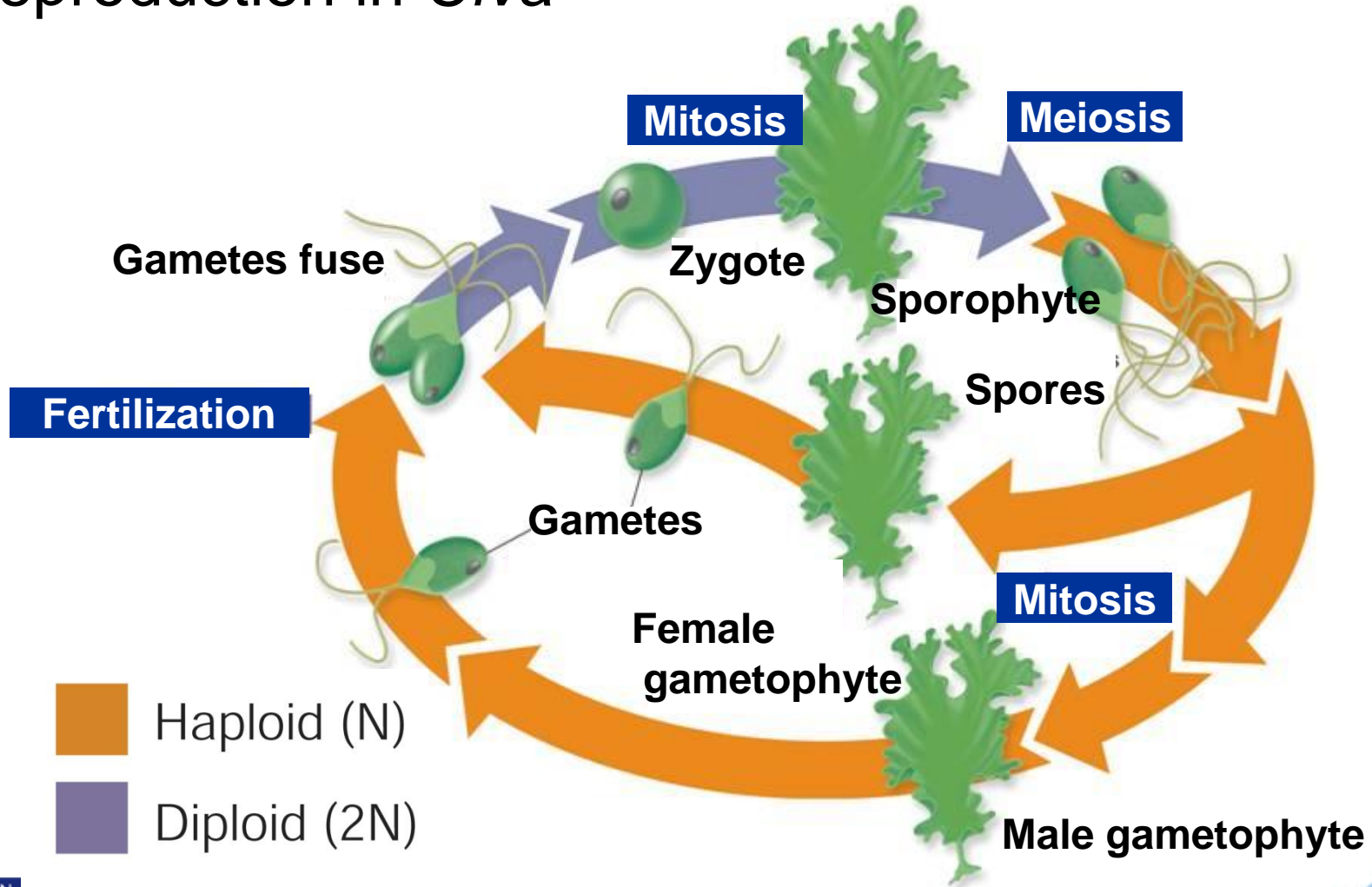


Reproduction in *Ulva*

The life cycle of the green alga *Ulva* involves alternation of generations.

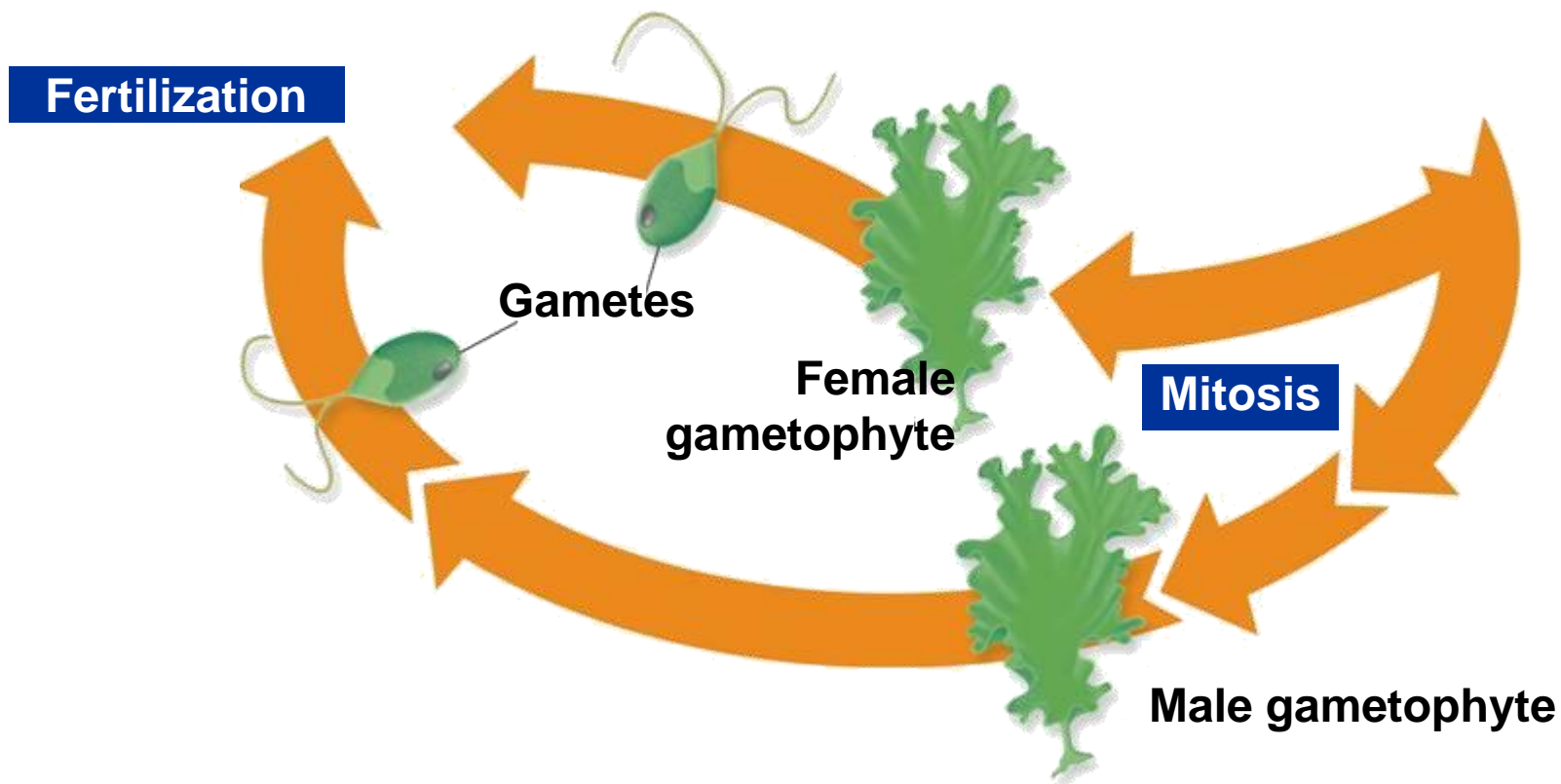
Ulva are **gametophytes**, or gamete-producing plants.

Reproduction in *Ulva*



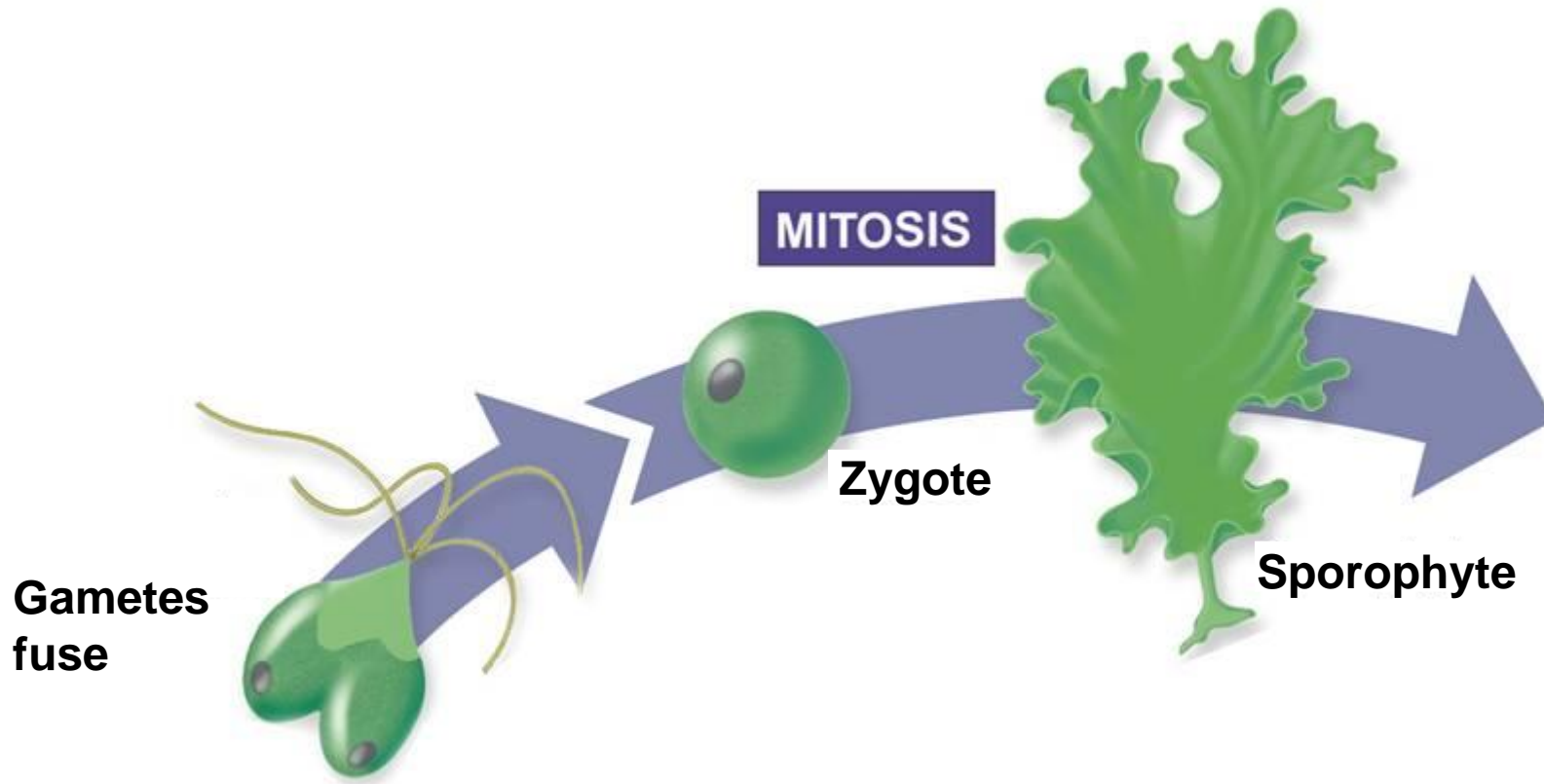
20-4 Plantlike Protists: Red,  Reproduction in Green Algae
Brown, and Green Algae

The haploid phase of *Ulva* produces male and female gametes.



20-4 Plantlike Protists: Red, Reproduction in Green Algae Brown, and Green Algae

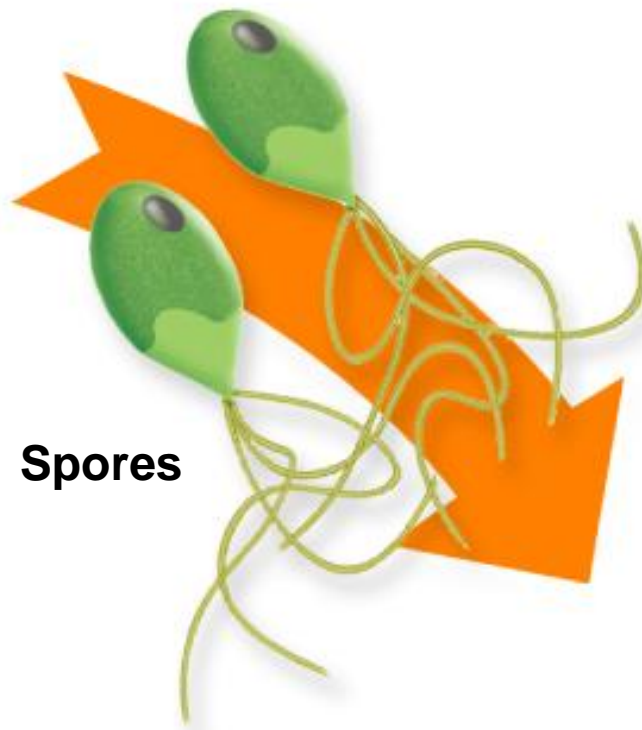
When male and female gametes fuse, they produce a diploid zygote cell, which grows into a diploid multicellular *Ulva*.



20-4 Plantlike Protists: Red, → Reproduction in Green Algae
Brown, and Green Algae

The diploid *Ulva* undergoes meiosis to produce haploid reproductive cells called **spores**.

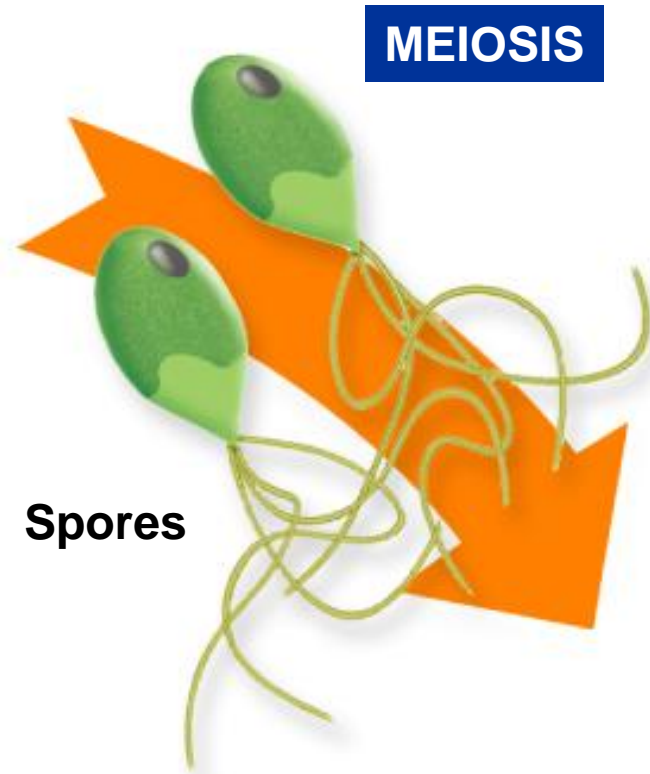
MEIOSIS



20-4 Plantlike Protists: Red, Brown, and Green Algae → Reproduction in Green Algae

Each spore can grow into a new individual without fusing with another cell.

Because the diploid *Ulva* produces spores it is known as a **sporophyte**, or spore-producing organism.



Ecology of Algae

Algae produce half of Earth's oxygen through photosynthesis.

Algae is found in sushi, ice cream, and other foods.

Chemicals from algae are used to make plastics, waxes, transistors, deodorants, paints, lubricants, and artificial wood.

Agar thickens nutrient mixtures in scientific labs.

20-4 Section QUIZ

Continue to:

Section QUIZ

- or -

Click to Launch:



20-4 Section QUIZ

1 Reddish accessory pigments found in red algae are known as

a. chlorophyll a.

A b. phycobilins.

c. fucoxanthins.

d. chlorophyll c.

20-4 Section QUIZ

- 2** The giant kelp belongs to the group known as
- a. green algae.
 - A** b. brown algae.
 - c. red algae.
 - d. golden algae.

20-4 Section QUIZ

3 The life cycles of many algae include

- a. haploid generations only.
- b. diploid generations only.

A c. both haploid and diploid generations.

d. only asexual reproduction.

4 The green alga *Chlamydomonas* reproduces asexually by producing

a. zygotes.

b. gametes.

A c. zoospores.

d. holdfasts.

- 5** Cells that can grow into new organisms without fusing with another cell are called
- a. gametes.
 - A** b. spores.
 - c. gametophytes.
 - d. sporophytes.

END OF SECTION