

FIGURE 5.7 The usual method of reproduction in diatoms is by cell division. Most, but not all, frustules get smaller after each successive division. Resistant cells called auxospores are produced two ways: directly from the expansion of a smaller frustule or by sexual reproduction when an egg is fertilized by a sperm cell, both of which are liberated from separate frustules.

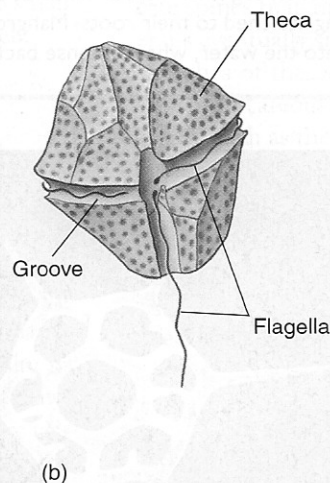
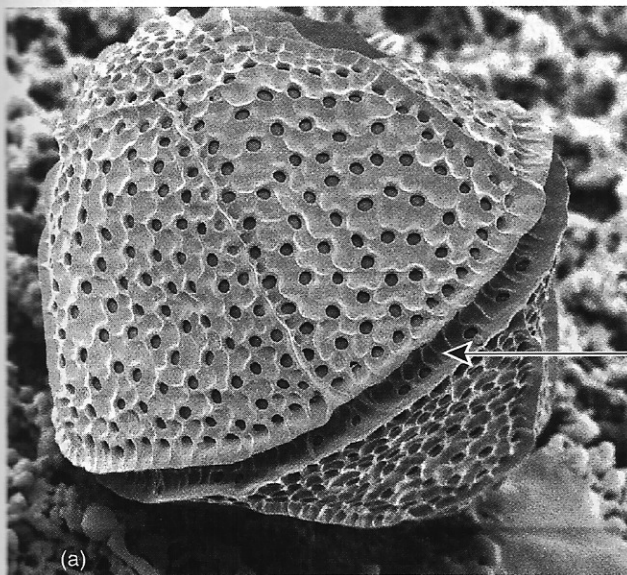


FIGURE 5.8 Dinoflagellates like *Gonyaulax polyedra* have a cell wall, or theca, which consists of cellulose plates. The theca is marked by grooves for the flagella; only one groove is visible here (arrow). This species is bioluminescent and it produces red tides.

Dinoflagellates

The **dinoflagellates** (division, or phylum, **Dinophyta**) make up another large group of planktonic, unicellular organisms. Their most outstanding characteristic is the possession of two flagella, one wrapped around a groove along the middle of the cell and one trailing free (Fig. 5.8). These flagella direct movement in any direction. Most dinoflagellates have a cell wall armored with plates made of **cellulose**, the characteristic component of the cell walls of seaweeds and land plants. The plates may have spines, pores, or other ornaments.

Though most dinoflagellates photosynthesize, many can also ingest food particles. A few have a light-sensitive pigment spot that acts as a crude eye. It has been suggested that during their evolution dinoflagellates gained the ability to function as primary producers by capturing and using chloroplasts from other algae. Almost all known dinoflagellates, around 1,200 living species, are marine. Dinoflagellates are important planktonic primary producers, especially in warm water (see Table 15.1, p. 336).

Dinoflagellates reproduce almost exclusively by simple cell division (see Fig. 4.18). They sometimes form blooms that color the water red, reddish-brown, yellow, or other unusual shades (see “Red Tides and Harmful Algal Blooms,” p. 338). Some of these dinoflagellates release toxic substances, and seafood collected during red tide periods may be poisonous. Other dinoflagellates are noted for the production of light, or bioluminescence (see “The Bay of Fire,” p. 96). Though bioluminescence has also been observed in some bacteria and many types of animals,

though bioluminescence has also been observed in some bacteria and many types of animals,

Types of reproduction:

Asexual (or vegetative) The production of new individuals by simple division (or other means) without involving *gametes*, so that the offspring are genetically identical to the parents.

Sexual The production of new individuals by the formation of *gametes* (sperm and eggs), so that the offspring are genetically different from the parents.

• Chapter 4, p. 77