1 Glycolate dehydrogenase occurs in the cyanobacteria, cryptophytes, euglenoids, diatoms, and the green algae with the exception of the Charophyceae.
2 Glycolate oxidase occurs in the glaucophytes, red algae, brown algae, and the Charophyceae in the green algae and higher plants.

Division of chloroplasts and mitochondria

Chloroplasts and mitochondria divide by pinching in half to form two new organelles. A plastid-dividing (PD) ring or mitochondrion-dividing (MD) ring surrounds the organelle in the area of fission (Fig. 1.27) (Miyagishima et al., 2003; Osteryoung and Nunnari, 2003). Each ring is composed of two parts, an outer ring in the protoplasm outside of the chloroplast and an inner ring in the stroma inside the inner membrane of the chloroplast. These rings are also called FtsZ (filamentous temperature-sensitive) rings after a counterpart that is present when bacteria divide. The similarity is indicative of the endosymbiotic origin of chloroplasts and mitochondria from bacteria. The plastid-dividing ring appears in the area of division and begins to contract after a microbody has migrated to the plastid-dividing ring (Fig. 1.27). The plastid-dividing ring contracts around the area of plastid fission in association with GTPase proteins called dynamins. The PD ring disappears after fission is completed.

Storage products

The storage products that occur in the algae are as follows:

High-molecular-weight compounds

1 α-1,4 Linked glucans
   a **Floridean starch** (Fig. 1.28): This substance occurs in the Rhodophyta and is similar to the amylopectin of higher plants. It stains red-violet with iodine, giving a color similar to that of the stain reaction of animal glycogen. Floridean starch occurs as bowl-shaped grains from 0.5 to 25 μm outside the chloroplast, inferring the host in the original endosymbiosis took over formation of storage product. This differs from the Chlorophyta where starch is produced in the chloroplast. Despite the differing locations of starch synthesis, the Rhodophyta and Chlorophyta use a common pathway in the synthesis of starch (Patron and Keeling, 2005).

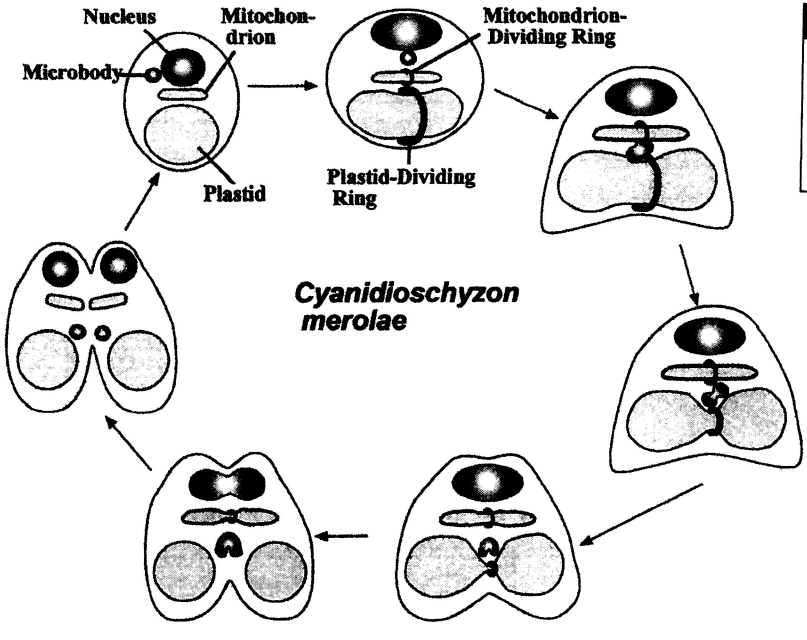

Fig. 1.27 Diagrammatic representation of the behavior of the plastid-dividing ring and mitochondrion-dividing ring in the unicellular red alga *Cyanidioschyzon merolae*.