

1. Charales (Fritsch, 1935; Iyengar, 1951) are world-wide in their distribution. According to Pal *et al.* (1962) these are represented in India by 65 species

**Charophyta**

belonging to 5 genera (*Chara*, *Nitella*, *Lychnothamnus*, *Nitellopsis* and *Tolypella*).

2. They are found in freshwater with sandy or muddy bottoms. Some species occur in brackish water, whereas others grow in waters running over limestone rocks. Many Charales become encrusted with calcium carbonate.
3. Plant body is well-developed, large, macroscopic, erect, branched and reaches up to 30 cm or more in length. It is differentiated into nodes and internodes. From the nodes develop many branches of limited growth arranged in the form of whorls.
4. Besides the branches of limited growth, some branches of unlimited growth also arise from the nodes of the main axis, and therefore the plants appear like that of small aquatic angiosperms.
5. The cells are very long, uninucleate and contain discoid chloroplasts.
6. Plant show cortication.
7. Sexual reproduction is highly advanced and of oogamous type.



8. Male and female reproductive bodies are well-developed, can easily be seen with the naked eye, and are called *globule* and *nucule*, respectively.
9. The oospore is spherical to narrowly ellipsoid, hard nut-like body of various colours (black, brown, yellow or red).
10. No asexual spores are formed.

Fritsch (1935) treated Charales as an order of class Chlorophyceae, and placed all of them under one family, i.e. Characeae having two sub-families: Nitelleae and Chareae.

Pal *et al.* (1962) placed them in a separate division Charophyta, divisible further as:

<i>Division</i>	: CHAROPHYTA
<i>Order</i>	: CHARALES
<i>Family</i>	: CHARACEAE
<i>Subfamily</i>	: NITELLEAE
<i>Genera</i>	: <i>Nitella</i> and <i>Tolypella</i>
<i>Subfamily</i>	: CHAREAE
<i>Genera</i>	: <i>Nitellopsis</i> , <i>Lychnothamnus</i> , <i>Lamprothamnium</i> , <i>Chara</i> and <i>Protochara</i> .



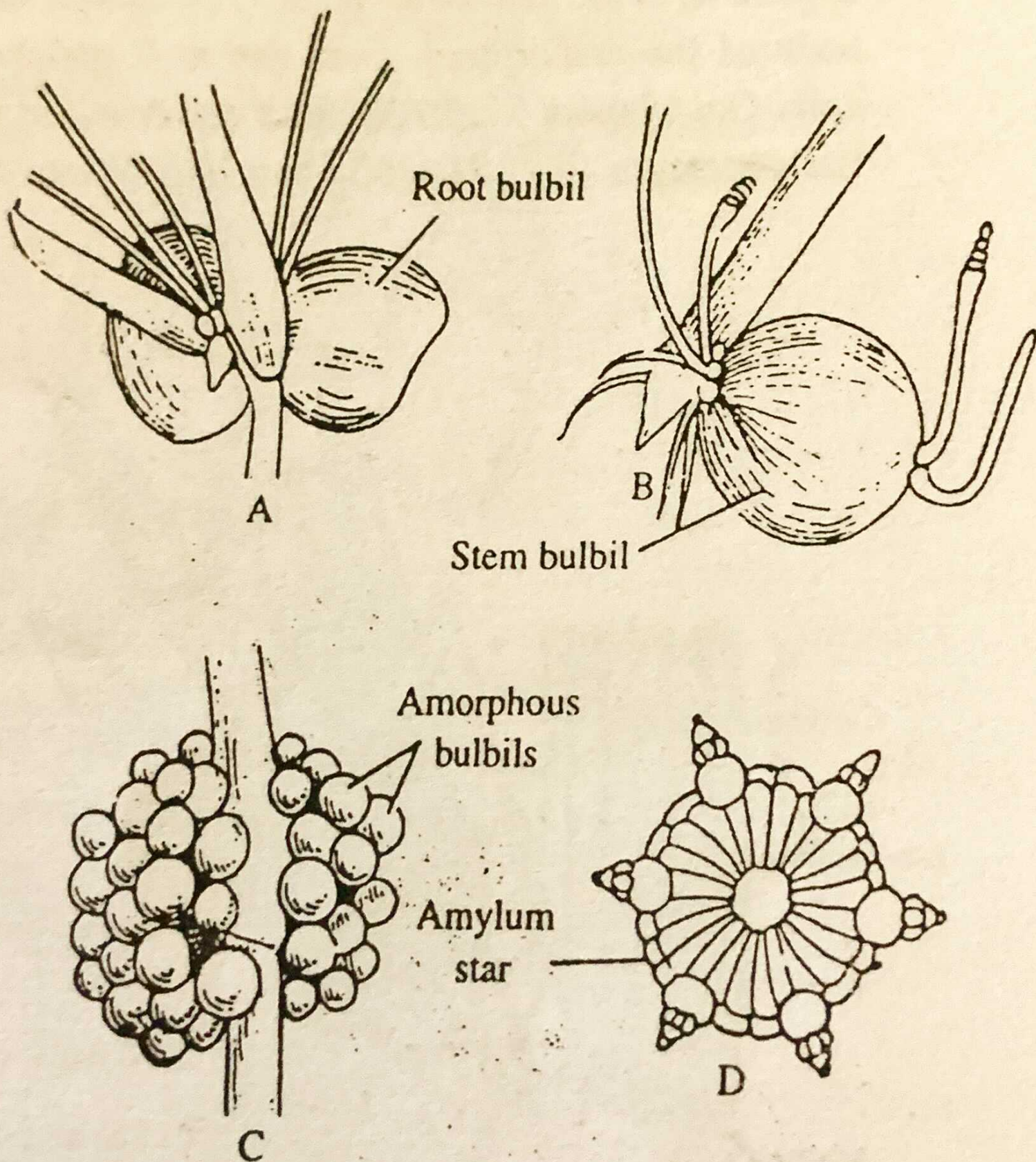
## 24.41.5 Reproduction

*Chara* reproduces either vegetatively or sexually. Formation of asexual spores is absent.

**Vegetative Reproduction:** It reproduces vegetatively by the following methods:

1. *Bulbils*: These are the round or star-shaped bodies “found either at the root nodes or stem nodes” (Pal *et al.* 1962). Root bulbils of *C. aspera* (Fig. 24.108A) and stem *bulbil* of *C. baltica* (Fig. 24.108B) are spherical bodies. On being detached, the bulbil germinates into a new plant.
2. *Amorphous Bulbil*: In some species of *Chara*, many small cells aggregate on stem or root nodes and form many lateral outgrowths, called *amorphous bulbils* in *C. baltica*, *C. fragifera* (Fig. 24.108C) and *C. delicatula* (Pal *et al.*, 1962).
3. *Amylum Stars*: In a few species of *Chara*, some amy-lum-starch containing cells aggregate on the lower nodes of the main axis, and develop into star-shaped bodies, and hence called *amylum stars*. On being detached they develop into new plants of *Chara*.





**Fig. 24.108**

Bulbils of *Chara*. A, Root bulbil of *C. aspera*; B, Stem bulbil of *C. baltica*; C, Multicellular root amorphous bulbil of *C. fragifera*; D, An amylum star.



**Sexual Reproduction:** *Chara* reproduces sexually by an advanced and specialized type of oogamy. The sex organs are well-developed and visible even by the naked eye. The male reproductive bodies are spherical, bright-yellow or red structures, called antheridia or *globules*. The female reproductive bodies are somewhat oval, green structures, called oogonia or *nucules*. Most species of *Chara* are monoecious but a few are also dioecious (*C. wallichii*). The monoecious or homothallic species are protandrous. Sex organs are present on the adaxial side of the nodes of the primary laterals. The nucule is present above the globule on the node (Fig. 24.106A, 24.109). In dioecious species both the sex organs are borne separately on different plants.