ON SEXUAL REPRODUCTION IN A NEW SPECIES OF *GOLENKINIA*

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(With 12 Text-Figs.)

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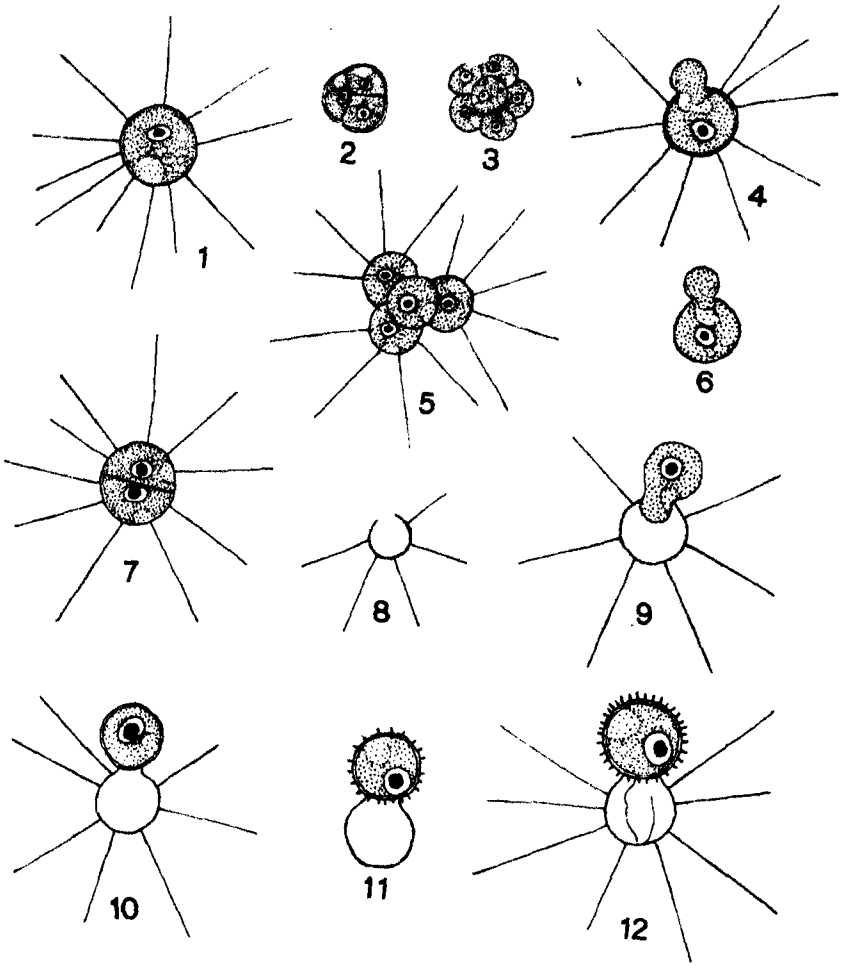
UNTIL quite recently, no case of oogamous reproduction was known in the Chlorococcales. Korschikoff (1937) was the first to observe oogamous reproduction in the order. He described the details of oogamous reproduction in *Golenkinia longispina* Korsch., *G. solitaria* Korsch. and *Micractinium pusillum* Fres. Iyengar and Ramanathan (1940) described in detail oogamous reproduction in *Dictyosphaerium indicum* Iyengar & Ramanathan. Nygaard (1949, pp. 36–37) and Lund (1954, pp. 84–85) observed probable oospores in *Micractinium pusillum* Fres. But they did not observe any of the stages of sexual reproduction leading to the formation of the oospores. Recently the authors, while examining some formalin material of plankton algae from a temporary rain-pool near Lake Pashan, Poona, observed several stages of oogamous reproduction in a *Golenkinia* which appears to be a new species, and which has been named by them *Golenkinia minutissima* sp. nov. A brief account of this alga and the details of its reproduction are given below.

The cells of the alga are solitary, small and round and measure 4·5 to 6·5 μ in diameter. Its cell-wall is thin and bears a number of fine bristles all over the surface. The bristles are difficult to see in unstained material, but can be seen fairly clearly after staining in dilute aqueous solution of basic fuchsin or safranin. They are 7·5 to 10·5 μ long. The chloroplast is cup-shaped with a single pyrenoid (Fig. 1).

Asexual Reproduction.—Two, four or eight autospores are formed in a cell. The mother-cell-wall breaks up into two or more pieces releasing the daughter-individuals, which develop the characteristic bristles after liberation.

Sexual Reproduction.—A number of oogonial cells with the antherozoids fusing with the eggs was found in the material (Figs. 4, 6). But no cells were found showing the division of their contents to form the antherozoids. On the other hand, a number of small empty cells from which the contents had escaped were found in the material (Fig. 8). The size of these small empty cells (3·5 to 4 μ in diam.) corresponded very closely with the size of the antherozoids (about



TEXT-FIGS. 1–12. *Golenkinia minutissima* sp. nov. Fig. 1. A single cell. Fig. 2. Formation of 4 daughter-cells. Fig. 3. Formation of 8 daughter-cells. Bristles not shown in Figs. 2 and 3. Fig. 5. A group of four daughter-cells before separation. Fig. 7. A cell showing division of its contents into two protoplasts. Figs. 4 and 6. Fusion of the antherozoid with the egg-cell. Bristles not shown in Fig. 6. Fig. 8. Probably the empty wall of a male cell after the escape of the antherozoid. Fig. 9. Zygote just escaping out of the oogonial wall. Fig. 10. Zygote which has covered itself with a smooth wall and is attached to the open end of the empty oogonial wall. Figs. 11 and 12. Zygotes with a spiny wall.

Figs. 2, 3, 6, 9, 10, 11 and 12, ×1,600.
Figs. 1, 4, 5, 7 and 8, ×1,000.

3·5 μ in diam.) which were fusing with the eggs. It is very probable that the antherozoids which were fusing with the eggs came out of these small, but now empty, cells. If this should prove to be

the case, then these small cells must be considered as male cells, each producing a single antherozoid.

After the fusion of the antherozoid with the egg, the zygote emerges from the oogonium (Fig. 9) and remains attached to the empty oogonial wall and soon covers itself with a wall (Fig. 10). The wall of the oospore then forms numerous short spines all over its surface (Figs. 11, 12). The ripe oospore has a firm wall which bears numerous short spines. The oospore is 6 to 7 μ in diameter, and the spines are 1 to 1·5 μ long.

DESCRIPTION

Golenkinia minutissima sp. nov.

Cells solitary, spherical, with a thin but firm wall bearing a number of fine bristles. Chloroplast cup-shaped with a single pyrenoid. Cells 4·5 to 6·5 μ in diameter. Bristles 7·5 to 10·5 μ long. Asexual reproduction by 2, 4 or 8 autospores. Sexual reproduction oogamous. Oospore verrucose 6 to 7·5 μ in diameter. Spines 1 to 1·5 μ long.

Habitat.—Planktonic in a rain-pool near Lake Pashan, Poona, Leg. M. S. Balakrishnan.

Golenkinia minutissima sp. nov.

Cellulæ solitariæ, sphæricæ, ornatæ tenui sed firmo pariete nonnullas subtiles setas supportante. Chloroplastum cyathiforme, unico pyrenoideo præditum. Cellulæ 4·5 to 6·5 μ diameter. Setæ 7·5 to 10·5 μ longæ. Reproductio asexualis per 2, 4, vel 8 autosporas. Sexualis vero reproductio oogama. Oosporæ verrucosæ, 6 to 7·5 μ diameter. Spinulæ 1 to 1·5 μ longæ.

Typus lectus in lacuna pluviosa planktonica ad lacum Pashan prope urbem Poona, a M. S. Balakrishnan.

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