

The asexual reproduction of Japanese *Pandorina morum* BORY (Chlorophyta, Volvocales)

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The asexual reproduction in Japanese strains of *Pandorina morum* BORY was observed in detail under controlled laboratory conditions. As a result, my observation was different from the results reported by COLEMAN (1959) with regard to the parental gelatinous matrix.

Key Index Words: Asexual reproduction; Chlorophyta; gelatinous matrix; *Pandorina morum*; Volvocales.

The sexual process of Japanese strains of *Pandorina morum* BORY was described in detail in the previous paper (NOZAKI & KAZAKI 1979). Though we did not describe, we observed the asexual reproduction in these strains and discussed it to be similar to the results reported by COLEMAN (1959). Later, however, as I observed it more carefully, I have obtained the different results from hers with regard to the parental gelatinous matrix. In the present paper I described the asexual reproduction of Japanese strains of *P. morum* in detail.

The strains used in the present study as well as the methods of culture and observation are the same as in the previous study (NOZAKI & KAZAKI 1979).

In the asexual reproduction, each cell of the colony performs daughter colony formation equally. Previous to the cell division, the constitutive cells, the size of which has attained to about 15 μm in surface diameter, become separated from one another to be spherical in shape in the swollen gelatinous matrix. Following the progress of the cell division, the gelatinous matrix becomes more swollen to reveal its internal structure (Fig. 1), which forms a keystone-shaped space for each parental cell; i.e.

16 spaces in case of a 16-celled parental colony. At last the gelatinous matrix attains to about 130 μm in length as a whole in case of a 16-celled parental colony.

Each parental cell is embedded in this keystone-shaped space and conducts the colony formation. Namely, it performs usually 4 longitudinal divisions successively to form a 16-celled plakea, and a spherical colony, in which each cell has a cup-shaped chloroplast with a single basal pyrenoid, is formed as a result of inversion. After the

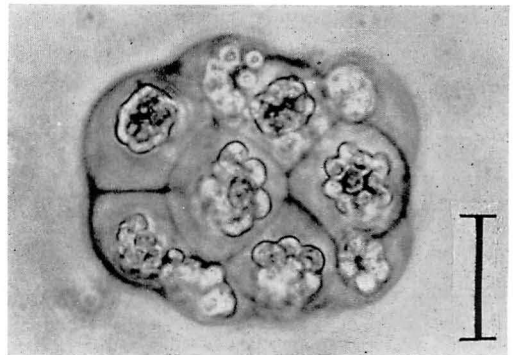


Fig. 1. Asexual reproduction of *Pandorina morum* showing plakeas, daughter colonies and internal structure of parental gelatinous matrix. Scale 30 μm .

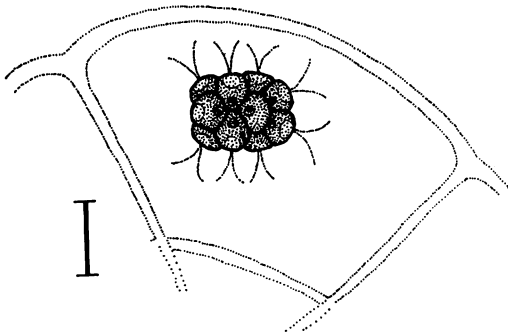


Fig. 2. A daughter colony of *Pandorina morum* before secretion of new gelatinous matrix in each keystone-shaped space of parental gelatinous matrix. Note a pyrenoid and two flagella of equal length in each individual cell, and a parental stigma in one cell of daughter colony. Scale 10 μm .

inversion, each individual cell begins to project two flagella of equal length (Fig. 2). Up to this time, the stigma of the parental cell has remained to one of the cells of the plakea or daughter colony. When the projection of the flagella has nearly completed, a new gelatinous matrix is secreted and a new stigma appears from each individual cell. As a result, the daughter colony, which has the same form as the parental colony except in size, is formed in the keystone-shaped space of the parental gelatinous matrix and then swims away from the matrix. One side of a square plakea with 16 cells is about 20 μm long. The 16-celled daughter colony, just after its formation, is measured 16–18 μm in length.

Although COLEMAN (1959) did not report

the keystone-shaped space in which each daughter colony is formed, this space is clearly recognized in my observation in the same strains used by her (In 50-3, In 50-11, In-BI II-9 and Cal-68-8). This disagreement of the two observations may be caused by the difference of the methods of observation; in the present study, the materials were stained with methylene blue and observed with a phase contrast microscope. It is considered that this keystone-shaped space in the asexual reproduction is resulted from the direct swelling of the gelatinous matrix which surrounds the keystone-shaped cell tightly in the vegetative phase. Such a structure of the gelatinous matrix of *Pandorina morum* was recently reported by FULTON (1978) using a electron microscope. Furthermore, it is noteworthy that in 19th century, PRINGSHEIM (1870) had already reported such spaces, in which daughter colonies were formed, with his natural collection of *P. morum*.

References

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野崎久義：本邦産 *Pandorina morum* BORY (緑藻・オオヒゲマワリ目) の無性生殖について

前報で筆者ら(野崎・加崎 1979)は本邦産の *Pandorina morum* BORY の有性生殖について報告したが、無性生殖は報告しなかった。今回、筆者は前報と同じ株の *P. morum* の無性生殖の過程を培養条件下で詳細に観察した。その過程は基本的には COLEMAN (1959) の結果と同一であったが、親のゼラチン様膜に関しては異なる結果を得た。(223 神奈川県横浜市港北区日吉四丁目一番二号 慶応義塾高等学校)