

Gamete conjugation in *Pandorina* (Chlorophyta, Volvocales) with particular reference to the mating papilla

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The process of sexual reproduction in the two species of *Pandorina*, *P. morum* BORY and *P. unicocca* RAYBURN et STARR, was observed under controlled laboratory conditions in the previous studies (NOZAKI and KASAKI 1979, NOZAKI 1981). However, it was not determined whether this isogamous genus has a mating papilla which initiates the plasmogamy of the gametes, as do the related isogamous genera, *Volvulina* (STARR 1962, CAREFOOT 1966, NOZAKI 1982) and *Astrephomene* (BROOKS 1966). The present paper gives a detailed account of gamete conjugation in the two species of *Pandorina*, with particular reference to the role of mating papilla.

The strains of *P. morum* and *P. unicocca*

used in this study, as well as the methods of culture, mating and observation, are the same as in the previous studies (NOZAKI and KASAKI 1979, NOZAKI 1981).

P. morum and *P. unicocca* showed essentially the same process in gamete conjugation.

During colony clumping, the first step of the mating reaction, the constitutive cells of the colony escaped from the gelatinous matrix and functioned as gametes. These spherical isogametes had the same organelles as the vegetative cells except that they bore transparent papillae at the base of the flagella (Figs. 1, 3). These papillae were varied in size and could not be detected in some gametes even with a phase contrast microscope.

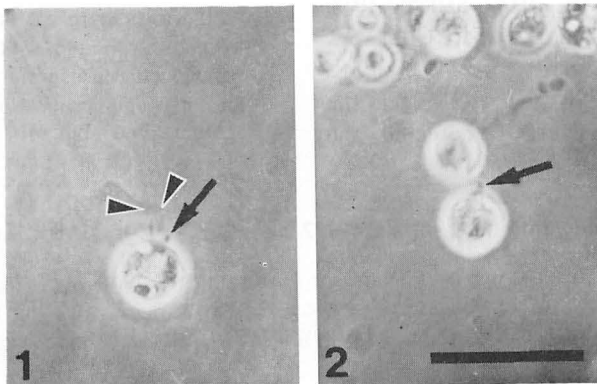


Fig. 1. Gamete of *Pandorina unicocca*, showing mating papilla (arrow) at the base of flagella (arrow heads). Fig. 2. Initial stage of plasmogamy in *P. morum*. Note cytoplasmic bridge (arrow) formed by mutual mating papillae. Scale 20 μ m.

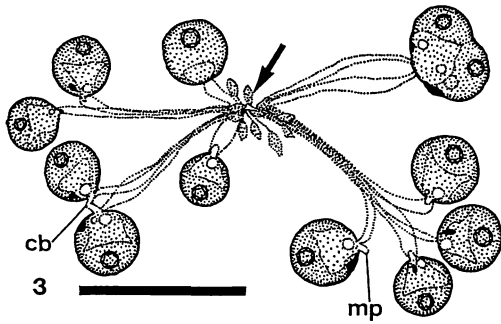


Fig. 3. Gamete clumping and conjugation of gametes in *Pandorina morum*. Note mating papillae (mp) and the cytoplasmic bridge (cb) formed by the mutual papillae. The arrow indicates residual flagellar tips of gametes. Scale 20 μ m.

The gametes soon aggregated in a clump with their flagellar tips sticking to one another (Fig. 3). Conjugation of the gametes occurred in this gamete clumping. During this process, two of the gametes connected their papillae (Fig. 2), and the fusing of their whole bodies proceeded laterally (Fig. 3). As a result, a quadriflagellate zygote was formed in the clumping group. This motile zygote soon departed from the group, leaving the tips of the flagella (arrow, Fig. 3), and entered a dormant period.

The mating papilla of the gamete has not been reported in earlier observations on the sexual reproduction of *Pandorina* (PRINGSHEIM 1870, IYENGAR 1933, SMITH 1933, MEYER 1935, THOMPSON 1954, COLEMAN 1959, RAYBURN and STARR 1974, NOZAKI and KASAKI 1979, NOZAKI 1981). In the present study, however, I detected the

mating papilla in the two species of *Pandorina* using a phase contrast microscope.

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野崎久義: *Pandorina* (緑藻・オオヒゲマワリ目) の配偶子の接合過程と接合突起について

Pandorina 属の *P. morum* BORY と *P. unicocca* RAYBURN et STARR の同型配偶子の接合の過程を培養条件下で詳細に観察したところ、本属において今までに報告のない接合突起 (mating papilla) が確認され、配偶子の融合は両接合突起の結合から開始した。(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)