Volvox carteri from Taiwan

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Abstract:

The genus *Volvox* represents the most advanced member of volvocine green algae, especially in multicellularity and sex (Kirk 1998, Hiraide et al. 2013). Recently, *Volvox carteri* f. *nagariensis* has been studied extensively by cellular and molecular data (e.g. Kirk et al. 1999, Ferris et al. 2010). Although this taxon or forma was originally described based on natural sample collected in Nagari, India (Iyengar 1933), most of the recent studies used only Japanese strains such as Eve and Adam (e.g. Kirk et al. 1999, Ferris et al. 2010). In addition, the most distinctive morphological attribute of *V. carteri* f. *nagariensis* is the 1:1 ratio of sperm packets (androgonidia) to somatic cells in sexual male spheroids (Nozaki 1988). However, this ratio has been examined in only Japanese strains irrespective of the presence of Indian strains from Poona (Adams et al. 1990).

V. carteri f. *nagariensis* has heterothallic sexuality with male and female genders determined by the mating type locus where gender-limited genes are present (Ferris et al. 2010). Thus, it seems very easy to determine the gender in natural populations of *V. carteri* f. *nagariensis* based on the presence or absence of the gender-limited genes. However, no identification of natural populations of this species has been performed by using molecular identification. Furthermore, the mating type locus of *V. carteri* f. *nagariensis* is composed of ca. 1 Mbp linear chromosome where recombination is suggested to be repressed (Ferris et al. 2010). However, actual recombination of the mating type locus genes has not been examined in natural population of *V. carteri*.

During a recent field collection of the freshwater green algae in Taiwan, we fortunately encountered natural populations of *V. carteri* in rice paddies. Based on the internal transcribed spacer regions of nuclear ribosomal DNA, it was clearly identified to *V. carteri* f. *nagariensis*. However, male sexual spheroids of the Taiwan strains do not exhibit 1:1 ratio of sperm packets to somatic cells in male spheroids. Furthermore, molecular identifications of genders of natural populations of these Taiwanese strains were carried out in the present study.

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