Algae
Volume 14(2): 83-85, 1999

# *Pediastrum privum* (Printz) Hegewald new to Korea

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*Pediastrum privum* was reported for the first time from Korea and the remainder of Asia. We observed it in two ponds. An isolate from Kyung-Ju was studied under the LM and SEM.

**Key Words:** cell wall structure, culture, *Pediastrum*, taxonomy

## INTRODUCTION

*Pediastrum privum* (Printz) Hegewald is little known throughout the world. It is known from Europe and the United States (Hegewald and Schnepf 1979). It is small in size compared to coenobia of other species of *Pediastrum* and has been found hitherto in oligotrophic and acidic lakes (Willén 1992). Four-celled coenobia are similar to *Crucigenia tetrapedia* and can be distinguished with certainty only under the electron microscope or after isolation and culture.

*Pediastrum privum* is not mentioned in the revision of the genus *Pediastrum* in Korea (Kim 1994). We isolated one strain from Korea for the first time and studied it by means of a light microscope (LM) and a scanning electron microscope (SEM).

## MATERIALS AND METHODS

We studied living and formaldehyde-preserved samples from about 60 waters from different parts of Korea in 1996 and 1997. The isolate (An 1996-9) was cultured as described in Hegewald *et al.* (1998) and stored at the Research Center Jülich. For size measurement, 100 cells were used. For the SEM, the algae were fixed with 2 % glutaraldehyde, dehydrated in alcohol series, critical-point dried, sputtered with gold and studied under a JEOL JSM 6300F.

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## RESULTS AND DISCUSSION

In the pond of the Bulkuk Temple in Kyung-Ju, Kyungsangbuk-Do, Korea (September 14, 1996), we observed a population of algae similar to *Crucigenia tetrapedia*. However, it was suspected that it could also be *Pediastrum privum*. We isolated several strains, one of these (An 1996-9) produced eight-celled coenobia in culture, hence we were sure that it was a *Pediastrum* and not a *Crucigenia*. However, it occurred together with *Crucigenia tetrapedia* (Fig. 1) and the latter was much more common in the plankton sample. In addition, we found *Pediastrum privum* in the pond Okdong-Mot, Ulsan, Korea (April 3, 1997, Fig. 2). In both ponds, the species was found only as four-celled coenobia, with one exception (Fig. 2). However, in culture, eight-celled coenobia are frequently also produced. Higher numbers of cells were never found and are not reported in literature either.

In batch culture, the size of the four-celled coenobia of the strain An 1996-9 was 4-9-10.6 x 2.3-5.7 $\mu$m, the colony size was 5.7-11.8 $\mu$m, which was similar to measurements of *Crucigenia tetrapedia* given in Komárek and Fott (1983). Up to 20 % of the coenobia in cultures were eight-celled. Their cells were smaller, outer cells: 5.3-8.7 x 3.4-6.1 $\mu$m and inner cells: 3.8-7.6 x 2.7-4.6 $\mu$m. These measurements were in good agreement with those of the type description of Printz (1914) and of Hegewald and Schnepf (1979). The colony size of eight-celled coenobia of the strain was 11.4-18.6 $\mu$m, similar to the measure-

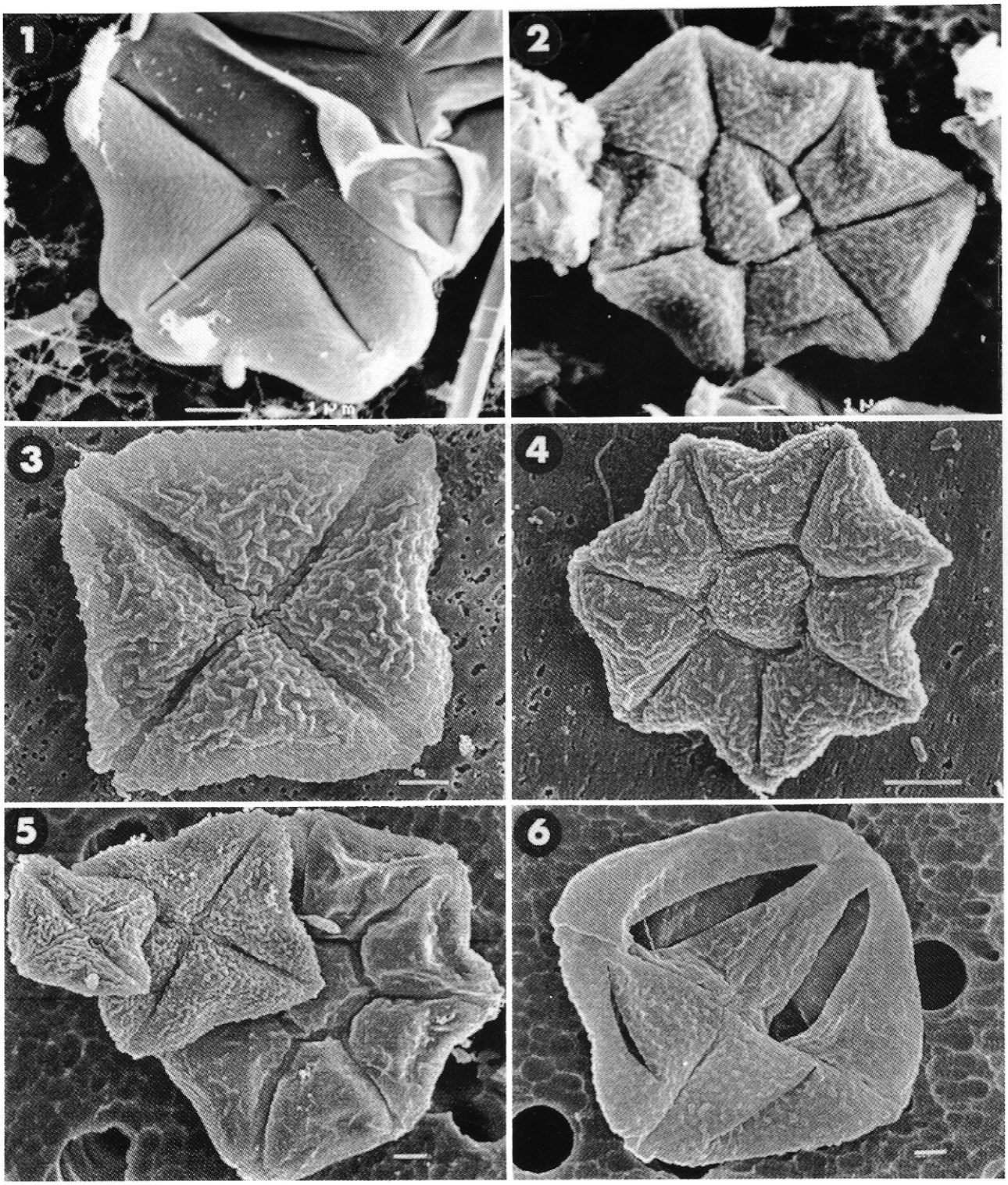


**Fig. 1.** *Crucigenia tetrapedia* from Bulguksa Temple pond under the SEM, mother cell wall and just released young coenobium with smooth cell wall. Scale: 1 μm.

**Fig. 2.** Eight-celled coenobium of *Pediastrum privum* from Okdong-Mot under the SEM. Scale: 1 μm.

**Fig. 3.** Young four-celled coenobium of *Pediastrum privum*, strain An 1996-9, cell wall with pronounced folds. Scale: 1 μm.

**Fig. 4.** Eight-celled coenobium of *Pediastrum privum*, strain An 1996-9, cell wall with pronounced folds. Scale: 3 μm.

**Fig. 5.** Two four-celled coenobia of different age and an old eight-celled coenobium of *Pediastrum privum*, strain An 1996-9, showing different prominences of cell wall structures. Scale: 1 μm.

**Fig. 6.** Empty cell wall of a four-celled coenobium of *Pediastrum privum*, strain An 1996-9, cell wall with folds reduced to nearly smooth. Scale: 1 μm.

ments given in Wawrik (1986), but slightly smaller than in Printz (1914), Smith (1920), and Hegewald and Schnepf (1979). However, Tikkanen (1986) mentioned sizes of up to 25 μm. The coenobia of *Pediastrum privum* had no perforation between the cells. The outer cells of the coenobia have no process. The marginal cells are slightly concave or straight. In old cultures, we also observed unicells on rare occasions, but eight-celled coenobia with irregularly arranged cells were more common. Wawrik (1986) reported one seven-celled coenobium and illustrated a nine-celled coenobium. We never observed such cell numbers. We also did not observe the very different cell sizes of marginal cells within one coenobium as illustrated in Wawrik (1986). In this publication the central cell illustrated was very large.

Under the LM, the cell wall of *Pediastrum privum* appears to be smooth. According to the cell shapes and cell size, we were unable to distinguish *Pediastrum privum* from *Crucigenia tetrapedia* with certainty.

Under the SEM, the cell wall of *Pediastrum privum* has irregularly arranged folds of different shape (Figs 2-6), dense in young coenobia (Figs 3, 5) becoming more smooth with age (Figs 5, 6). In contrast, the cell wall of *Crucigenia tetrapedia* is smooth (Fig. 1).

We found the species in two about 60 studied waters in Korea. The species has been hitherto reported from oligotrophic and acidic waters. The localities in Korea were eutrophic and not acidic. The species has been hitherto known from the northern hemisphere only, where it seems to be most common in Scandinavia (Printz 1914, Hegewald and Schnepf 1979, Tikkanen 1986, Willén 1992). In addition, it is reported from USA (Smith 1920, Prescott 1962) and Austria (Wawrik 1986). The new records are very distant from the localities given in the literature, but we suspect that the species has a continuous distribution and has been merely overlooked.

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Accepted 31 May 1999