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Two new species of Family Prasiolaceae (Prasiolales, Chlorophyta) from China Sea

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Abstract
Amomg the 30 known species of the algal family Prasiolaceae (Prasiolales, Chlorophyta), nine marine species have been found in marine environments but none in China seas. We reported here two new species *Prasiola fangchengensis* Luan et Ding sp. nov. and *Prasiola volcanica* Luan et Ding sp. nov. from subtropical coastal water of southern China.

Key words: Prasiolaceae, new species, *Prasiola fangchengensis* Luan et Ding sp. nov., *Prasiola volcanica* Luan et Ding sp. nov., China Sea

1 Introduction

Prasiola (C.Agardh) Meneghini is the only genus of the family Prasiolaceae. There are more 30 species and variations in the genus reported to freshwater, marine water and terrestrial conditions (Rindi et al., 2004, www. algaebase. org). About nine species distributed in marine water were reported mainly from Europe, northeast and northwest America, Japan, South Australia and Mauritius and so on. In China Sea, no species were reported until now. Marine species locate mostly in high intertidal and adjacent splash zone habitats where they grow in great densities, often associated with rocks inhabited by birds.

Here two new species, vs. *Prasiola fangchengensis* Luan et Ding and *Prasiola volcanica* Luan et Ding in the family Prasiolaceae, are introduced and preserved in the hortus siccus of Marine Biological Museum, Chinese Academy of Sciences (ab. AST).

2 Materials and methods

Material was preserved in 10% formalin/seawater and then maintained in 5% formalin/seawater or mounted onto herbarium paper preserved in Marine Biological Museum, Chinese Academy of Sciences and Dalian Museum of Natural History.

The thalli color, outline and blades are observed. The section is cut manually by razor with 5–10 μm thick. Microscopic features, such as cell shape, size and arrangement, chromatophore and pyrenoids are observed, measured and drawn on the microscope or dissector microscope. The species identification is carried out by the compare of above features and data with known references. The drawings are dealt with Photoshop software on computer.

3 Descriptions and observations

3.1 *Prasiolaceae Blackman et Tansley 1902: 138*

The family Prasiolaceae is charactered by thalli forming monostromatic blades, vegetative cells tetragonal or rectangular with few irregular polygones on the surface view, usually 2-4 cells arranged in parent cell wall, with single, stellate chromatophore and prominent central pyrenoid.

Other characteristics are similar to those of the Order Prasiolales.

This family consists of only one genus *Prasiola* (C. Agardh) Meneghini.

Type genus: *Prasiola* (C. Agardh) Meneghini nom.cons.

3.1.1 *Prasiola (C. Agardh) Meneghini 1838: 360 nom. cons.*

Thalli forming monostromatic blades generally expanded above and narrowing to short stipitate region at base, attached to substrate by filamentous rhizoids prolonged from basal cell. In the surface view, cells are squareto or rectangular, sometime subglobal

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or polygonal, usually 2-4 cells together. Cells with one nucleus, chromatophore asteroidal locate to its center with one pyrienoid.

Asexual reproduction commonly by fragmentation or release of vegetative cells as akinetes. Uninucleate cells with single, stellate chloroplast and prominent central pyrenoid. Sexual reproduction oogamous with eggs and biflagellate sperm.

Type: *Prasiola cripsa* (Lightfoot) Kuetzing.

3.1.1.1 *Prasiola fangchengensis Luan et Ding sp.nov.*

Figure 1a-k

Chinese name: Fangchengxicai.

Frons viridis vel viridula, 5–10 cm alta, stipite brevi ad basim, in saxo affixa, lobis aliguot lobatis vel partitis, projecturis dentiformibus in marginibus loborum. Cellulis a facie visae multiangulatis vel ovatis, 2 vel 3–4 agaregatis in vaginis gelatinosis.

Thalli are green or aqua, monostromatic blades,

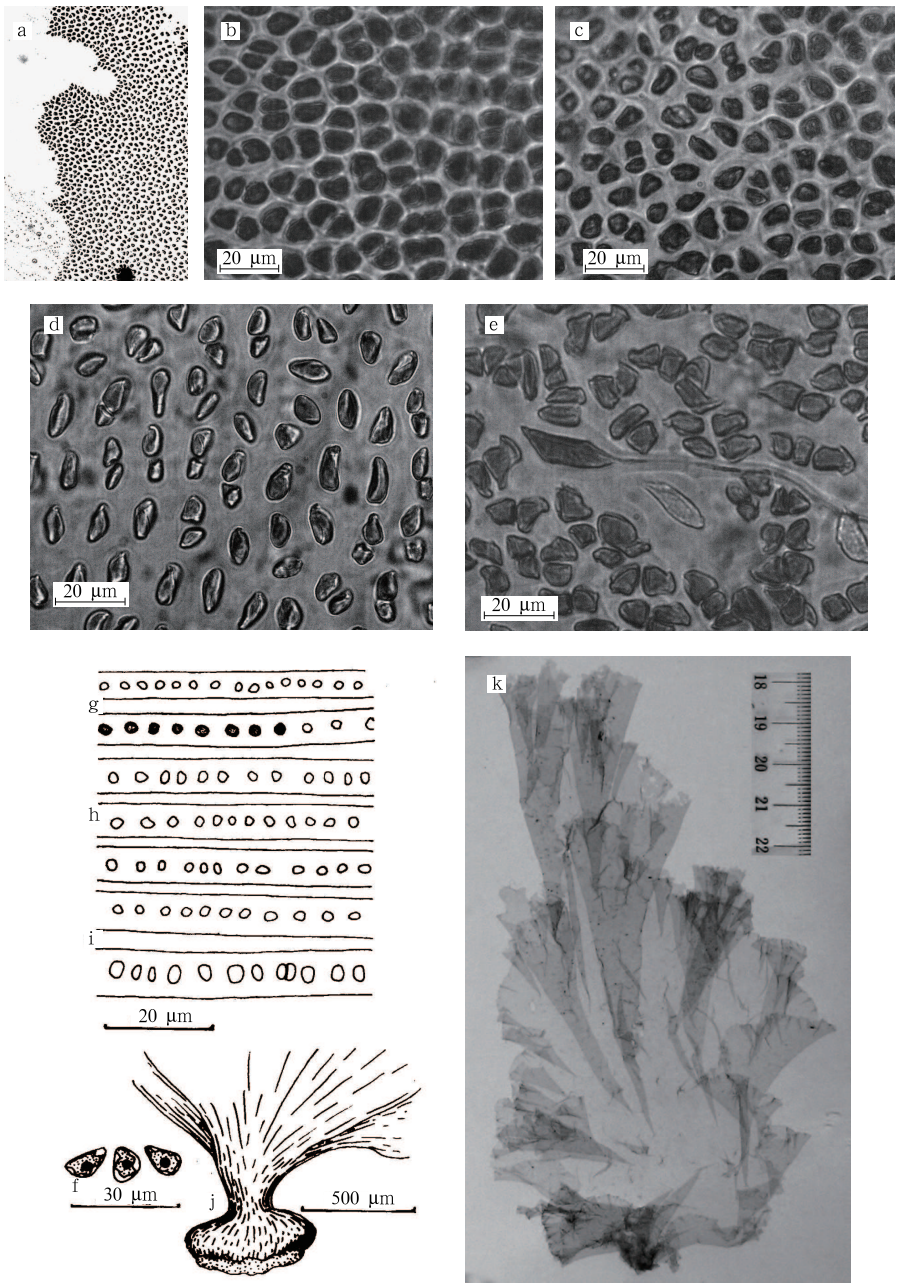

Fig.1. *Prasiola fangchengnnsis* Luan et Ding. a. Mature thalli margin with toothed porjection; b. surface view of upper portion of thalli; c. surface view of middle portion of thalli; d. surface view of lower portion of thalli; e. basal portion of the thalli with rhizoid-shaped cell; f. chromatophore; g. transverse section of upper portion of thalli; h. transverse section of middle portion of thalli; i. transverse section of lower portion of thalli; j. holdfast; k. thallus (AST20059003).

mucilage with reflet, slightly transparent, 5–10 cm in length. Blades are goffered commonly, ovate or extensively ovate, with shallow or deep splits. Split blades are lanceolate or extensively lanceolate, with dentate margins composed of 1–2 cells. Holdfast is discal, composed of rhizoidal filaments extended down by basal cells. Rhizoidal filaments are 50–150 μm in length, 6–10 μm in width at the upper portion, 3–5 μm in width at the lower portion. Thalli base is with short stem. On the transverse section, the thalli are 17–22 μm in thickness, with cell (inner size) 5–8 μm in length and 4–8 μm in width, cell wall 4–8 μm in thickness at the lower portion; 17–21, 5–7.5, 4–7 and 4–7 μm thickness in the middle portion; 18–23, 6–8, 5–7.5 and 4–7 μm at the upper portion, respectively. On the surface view, cells are irregular, ovate or polygonal, mostly two cells surrounded a parent cell, but 3–4 cells arranged at the outer margins; cell (inner size) 5–10 μm in length and 4–7 μm in width at the lower portion, 5–12 and 5–10 μm at the middle portion, 6–12 and 5–7 μm at the upper portion, respectively. Chromatophore stellate, located in the middle portion of cell, with one pyrenoid, of them pyrenoids.

Habitats and distribution: grow on rocks covered by sand from high to middle tidal zone, caespitose or solitary. The specimen were collected from Bailongwei, Fangcheng City, Zhuang autonomous Region of Guangxi in 5 March 2005 by Luan Rixiao, AST 20059003 (Typus) and 27 April 2000 by Luan Rixiao, AST 20009207.

Main characteristics of the Species: thalli of the new species are up to 5–10 cm in height, which are longer than other species of the genus. Burrows (1991:21) reported that Britainic P. crispa 1–6 (–10) cm in height, but Womersley (1984:162) reported southern Australian P. crispa 1–6(–10) mm in height, and few other species reported were less than 2 cm in height. The new species of our study holds irregular splits with dentations composed of 1–2 cells at the margins of thalli, especially the young plants. It distributes in high tide zone but other species mainly in upper intertidal zone.

Geographical distribution: southern China Sea.

Type location: Fangcheng, Guangxi, China.

3.1.1.2 *Prasiola volcania Luan et Ding sp.nov.*

Figure 2a–l

Chinese name: Huoshanxicai.

Frondes dense caespitosae vel fasciculatae offixae ad tantummodo volcanicis rupes, rectae vel subvexae, sessiles, usque ad 4–12 mm. altae, 20–60 μm. crassae, marginibus circinalibus, lobis multo corrugates. Cellulis a facie visae multiangulatis vel orbicularibus, irregularibus dispasitibus.

Thalli are bottle green, caspitose or fascicular on rocks, 0.4–1.2 cm in height. Blades are sessile, more rugose, curly, usually broken to irregular overlapped splits as similar to those of Ulva conglobata, attached to substrate by filamentous rhizoids prolongated downwards mostly from basal cell. Such filamentous cells are 50–100 μm in height and 2–3 μm in width (diameter). Thalli are monostromatic thicker in the lower part and gradually thinner at the upper part. In the transverse section, 35–60 μm in thickness, cells are subround or ovoid with 8–15 μm in length, 5–15 μm in width (inner diameter) and the cell wall is 10–25 μm in thickness at the lower part of thalli. And the 20–40 μm, 7–20 μm, 6–15 μm and 6–12 μm thickness at upper and middle part of thalli, respectively. In the surface view, cells are irregularly arranged, polygonal or round, with long strip-like close to basal part, usually 2 or 3–4 cells arranged to form a gelatinous sheath, 7.5–20 μm in length and 5–15 μm in width at low part of thalli, and 7–12 μm in length and 5–10 μm in width at upper and middle part of thalli. Chromatophore stellate, located in the middle portion of cell, with one pyrenoid.

Habitats and distribution: tightly attached to lava at middle intertidal zone, caspitose densely or fascicular, exceptional with single individual, erect or inclined. The specimen collected from Weizhoudao island, Beihai city, Zhuang autonomous Region of Guangxi in 17 March 2005 by Luan Rixiao, AST 20059055 (Typus) and 30 April 2001 by Luan Rixiao, AST 20019023.

Geographical distribution: Tonkin Gulf, Southern China Sea.

Type location: Weizhoudao, Guangxi, China.

4 Discussion

Prasiola fangchengensis Luan et Ding sp. nov. is very similar to *Monostroma nitidum* both in color, shape, size, growth period and habitat. It is possible that it is considered as *Monostroma nitidum* at past years and not been in attention. The two species hold distinct discriminations when their thalli are observed and measured carefully under microscope. The thalli of the new species are less than 23 μm in thickness with dentated margins and stellate chromatophore located in the middle portion of cell. And those

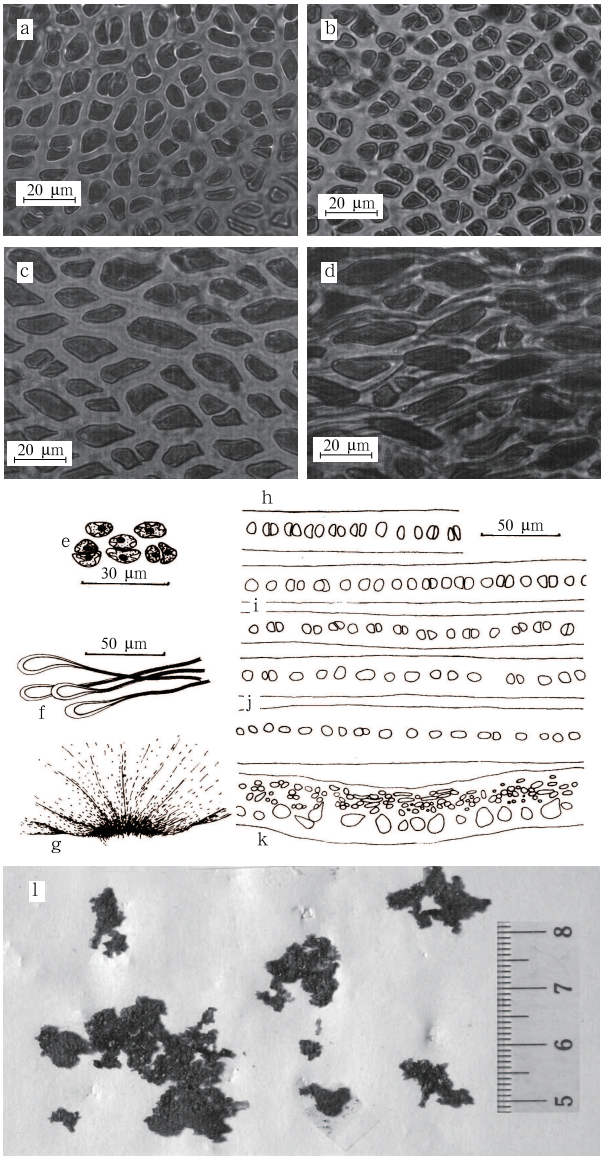

Fig.2. *Prasiola volcania* Luan et Ding. a. Surface view of upper portion of thalli; b. surface view of middle portion of thalli; c. surface view of lower portion of thalli; d. surface view of closely basal portion of thalli; e. chromatophere; f. rhizoid-shaped cell; g. habit sketch of basal portion of thalli; h. transverse section of upper portion of thalli; i. transverse section of middle portion of thalli; j. transverse section of lower portion of thalli; k. transverse section basal portion of the thalli; l. thallus (AST20059055).

of *Monostroma nitidum*, thalli are more than 25 μm in thickness with entire margins and patch-like chromatophore located at the lateral wall of cell. The new species was found at high tide zone but other species of the genus reported were mostly distributed in the upper intertidal zone.

Prasiola volcania Luan et Ding sp. nov. grows diffusely on the reef of lava at Weizhoudao from March to May and is a common marine green algae. It possibly had been regarded as young thalli of *Ulva conglobata*. This new species is charactered by erect or slanting thalli with filamentous rhizoids extended down from basal cells attaching to substrate, curled margins damaged usually to splits, thalli gradually thinner upwards with 60–20 μm in thickness, only found at surface of lava.

This new species is similar to *P.crispa* (Lightfoot) Kützing 1843 (Womersley 1984:163; Burrows 1991:2) in shape. But thalli of the former is 4–12 mm in height, bottle green, cells polygonal irregularly or rounded at the surface view, only attaching to lava substratum; those of the latter 1–6(–10) mm in height, green or breen, cells square or rectangle at the surface view, attaching to rock inhabited by birds at 3–4 m

exceeding supralittoral zone.

The new species is also shares some similarity with *P meridionalis* Setchell et Gardner (1920:291) in shape. But thalli of the former is 60–20 μm in thickness, deep green in color, sessile, attaching to lava at middle to high tidal zone; those of the latter 45–40 μm in thickness, pea green, petiolate, attaching to rock spread by spoondrift.

P. volcania Luan et Ding sp. nov. is somewhat similar to *P. stipitata* Suhr (Taylor 1957:75; Womersley 1984:162) in shape. But thalli of the former is 4–12 mm in height, sessile, attaching to lava; those of the latter 2–6 mm in height with long petiolate, attaching to rock inhabited usually by birds at high tidal zone.

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