

New Species of Punctariaceae (Phaeophyta) from China

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Abstract: This paper demonstrates three species of Punctariaceae, newly-recorded in China, i.e. *Desmotrichum balticum* Kuetzing, *Myriotrichia clavaeformis* Harvey and *Punctaria projecta* Yamada.

Keywords: Punctariaceae; newly-recorded species; *Desmotrichum balticum*; *Myriotrichia clavaeformis*; *Punctaria projecta*

Introduction

Punctariaceae belongs to Phaeophyta, Phaeophyceae, Dictyosiphonales. Researchers have different opinions on how to divide the genus, and they haven't achieved a uniform result at present. Some believe there are up to 20 genres (Smith, 1951)^[1], while others claim there are only several genres (Fletcher et al, 1987)^[2], so the species vary very much correspondingly. The species reported in this paper are mainly according to the standard established by Taylor (1957)^[3] and Smith^[1] etc.

The earliest report on the categories of Punctariaceae is *Punctaria latifolia* Greville, which was found in Qingdao and reported by Zeng Chengkui and Li Liangqing^[4] in 1935; Zeng Chengkui and Zhang Junpu^[5] reported *P. plantaginea* (Roth) Greville in 1962; In 2000, the authors^[6] of this paper reported *Pogotrichum yezoense* (Yamada and Nakamura) Sakai and Saga, *Punctaria Hesperia* Setchell and Gardner and *P. occidentalis* Setchell and Gardner. There are totally 2 genres and 5 species up to now. This paper reports *Desmotrichum balticum* Kuetzing, *Myriotrichia clavaeformis* Harvey and *Punctaria projecta* Yamada. The specimens are stored in the ocean research laboratory of the Chinese Academy of Sciences.

1 Materials and methods

1.1 Sampling and fixing

Materials (specimens) were collected from the ocean, and then were put into the stable conserving liquid (Ingredients' volume proportions: seawater 60 %, alcohol 36 %, formaldehyde 4 %, glycerin 1 %, a little saleratus) immediately after they were collected.

1.2 Making slice and observing

Take the specimens out of the conserving liquid, rinse them with tap water, then choose part of the algae (2.1, 2.2) and slice them (2.1, 2.3) on the carrier glass, drip the volume percent 10 % glycerin liquid, put the cover glass, observe and measure the related data and plot under the light microscope.

2 Results

2.1 *Desmotrichum balticum* Kuetzing

Desmotrichum balticum Kuetzing 1849: 470^[7]; Levring 1937: 65^[8]; Taylor 1957: 164^[3].

Dsemotrichum balticum f. *paradoxum* Gran 1897: 37.

Punctaria baltica (Kuetzing) Batters 1902: 26.

Desmotrichum scopulorum Reinke 1888: 18.

The frond is filamentous and pale brown, simple or tufted, 0.5-1.5 cm tall, the monolayer cells' basal disc epiphytic on other algae at the basal part which is composed of creeping filaments. The creeping filaments' cells are 5.5-10 μm long, 5.5-10 μm wide. The erect protonema are linear or speculate, the lower parts are usually composed of uniseriate cells, while the middle and the top parts are composed of pluriseriate cells in flat leaf shape. They are 20-100 μm thick, 25-1200 μm wide, which are composed of 2-4 layers of cells, some even have more than 6 layers. Both margins are accidented, like blunt serrations. There are not many differences between inner and outer cells of the transection. The cells are rectangular or square, 12-25 μm long, 12-20 μm wide. The epidermal cells are rectangular, 12-16 μm , 12-25 μm wide. Hairs develop and scatter on the top, along the leaf margins or on the leaves singly. The cells are 50-120 μm long, 10-12 μm wide. The length is 5-12 times the width. They live in the basal region, there are 3-7 disperse cells. Chromatophores are discoid, scatter sparsely.

The plurilocular sporangia satterea, from ovoid to conical, 30-60 μm long, 15-25 μm wide, pedicelled or sessile, grow along the blade margins or on the blades. Some are on the basal disc. The sessile plurilocular sporangia are mostly buried among the layers of the thallus. The pedicelled usually grow on the basal disc or under the thallus. The unilocular sporangia are unknown.

Habit and locality: Epiphytic on *Chaetomorpha aerea* on the tide pools in the intertidal zone, grow mixed with *Ectocarpus confervoides*, get mature in spring or summer. The specimens were collected from Lianyungang City, Jiangsu Province (AST 9990175).

Distribution: North Atlantic, North-eastern America.

Type locality: North Europe.

Desmotrichum was established by Kuetzing in 1845. Some researchers (Fletcher, 1987)^[2] united it

with *Punctaria* in *Punctaria* based on their similar features, while we insist that *Desmotrichum* should be retained because *Desmotrichum* has the following distinguished characters: the rhizoid-shaped creeping filaments cling to the stroma; the uniseriae cells usually distribute at the basal part of the erect filament, which are cylindrical; there are some branches at the base; the middle and the top parts are membranaceous; the margins are anomalous; the hair is simple along the blade margins or on the blades. the *Punctaria* base has a plate-like sessile organ; the erect front is leaf-like and has no branches; the margins are slightly smooth; the hairs are tufted.

There is no uniform opinion on whether *D. balticum* and *D. undulatum* can exist independently. Rosenvinge & Lunt (1947) ^[9] and Fletcher (1987) ^[2] believed they were synonymous, while Levring (1937) ^[8] and Taylor (1957) ^[3] claimed they were different. The main differences include: *D. balticum* is not more than 1.5 cm tall; some have branches at the base; the plurilocular sporangia are pedicelled, while *D. undulatum* is over 1.5 cm tall; has no branches; the plurilocular sporangia are sessile. We agree with Levring and Taylor because there are many differences between them, they should represent two different species.

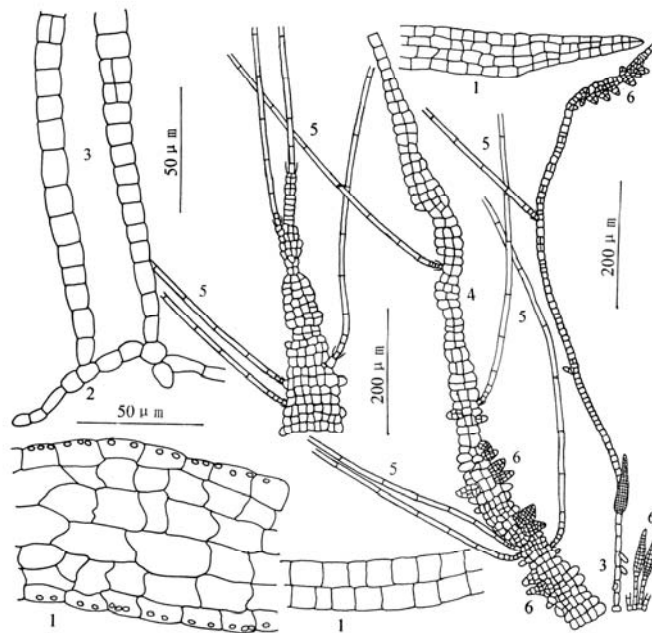


Fig. 1 *Desmotrichum balticum* Kuetzing

1. transection of the frond; 2. creeping filament; 3. lower part of the frond; 4. upper part of the frond;
5. hairs; 6. plurilocular sporangia

2.2 *Myriotrichia clavaeformis* Harvey

Myriotrichia clavaeformis Harvey 1834: 300; Levring 1937: 70 ^[8]; Rosenvinge and Lund

1941: 50^[10]; Taylor 1957: 161, pl. 10, (Figs.4-7)^[3]; Fletcher 1987:174, pl. 4c-e, (Figs.38-39)^[2].

Myriotrichia repens Hauck 1879: 242; Levring 1937: 70^[8]; Rosenvinge and Lund 1941: 48^[10]; Taylor 1957: 160^[3].

Dichosporangium repens (Hauck) Hauck 1885: 339.

Myriotrichia filiformis Harvey 1841; 44; Levring 1937: 70^[8]; Taylor 1957: 161^[3].

The frond is brown, 0.7-1 mm tall, epiphytic on the hosts. The base is composed of creeping branched filaments. A few short rhizoids extend to the cortexes and plurilocular sporangia. The creeping filament cells are anomalistic, which are 10-25 μm long, 8-12 μm wide. The length is 1.3-3.6 times the width. The erect filaments grow on the creeping filaments, which have prominent main stems, and have no branches or have some short branches at the middle and top parts. The main axis cells' septum constricts, some cells divide longitudinally. The middle and top parts are slightly thick, become slim basally. The basal cells are 30-45 μm long, 15-16 μm wide. The length is 2-4 times the width. The middle and top cells are 17-30 μm long, 16-25 μm wide. The length is 0.75-1.8 times the width. The hairs are on the top of the main axis or on the lateral base of short branches. There is a growing region at the base, having 4-6 meristematic cells. The middle and top cells are 60-200 μm long, 10-12 μm wide. The length is 6-20 times the width. The chromatoplasm is discoid.

The unilocular sporangia are solitary, opposite or thickly whorled, only a few on the creeping filaments, which are orbicular, oval or long-obovate, and 35-80 μm long, 32-50 μm wide. Most of them are sessile, some have one pedicel. The plurilocular sporangia are unknown.

Habit and locality: Epiphytic on the *Scytosiphon lomentarius* on the tide pools in the lowtidal zone, grow mixed with *Ectocarpus* sp. Grow in the early summer. The specimens were collected from Changhai County, Liaoning Province (DNHM83-1293).

Distribution: the east and west coasts of North Atlantic.

Type locality: Germany.

The holotype and original paper couldn't be found. We mainly based ourselves on the reports written by Levring (1937)^[8], Rosenvinge and Lund (1941)^[10], Taylor (1957)^[3] and Fletcher (1987)^[2].

The primary characters of *Myriotrichia* are: the basal creeping filaments are composed of uniseriate cells; some rhizoids stretch to the hosts' tissues from the base; the erect filaments are epiphytic on the creeping filaments, which is cylindrical and solid; the lower part is composed of uniseriate cells, the middle and top parts are composed of multiseriate cells because of the cells' longitudinal division; there are many short radiate branches with hairs on the main axis; unilocular sporangia and plurilocular sporangia are in the same body; the unilocular sporangia are adnate, opposite or whorled, and orbicular or oval; the plurilocular sporangia are adnate, simple or gregarious, uniseriate or multiseriate, cylinder or spindle. The cladistic location of this genus is controversial, Levring (1937)^[8], Rosenvinge and Lund (1941)^[10] and

Fletcher (1987)^[2] referred *Myriotrichia* as one genus of Myrotichiaceae, while Taylor claimed *Myrotrichia* belongs to Punctariaceae. We agree that *Myrotrichia* belongs to Punctariaceae based on its characters.

Myriotrichia clavaeformis is similar to *M. densa* Batters, the main differences are: the former's lateral branchlet is not or seldom ramose, the main axis usually exposes; while the latter's main axis has many dichotomous lateral branchlets.

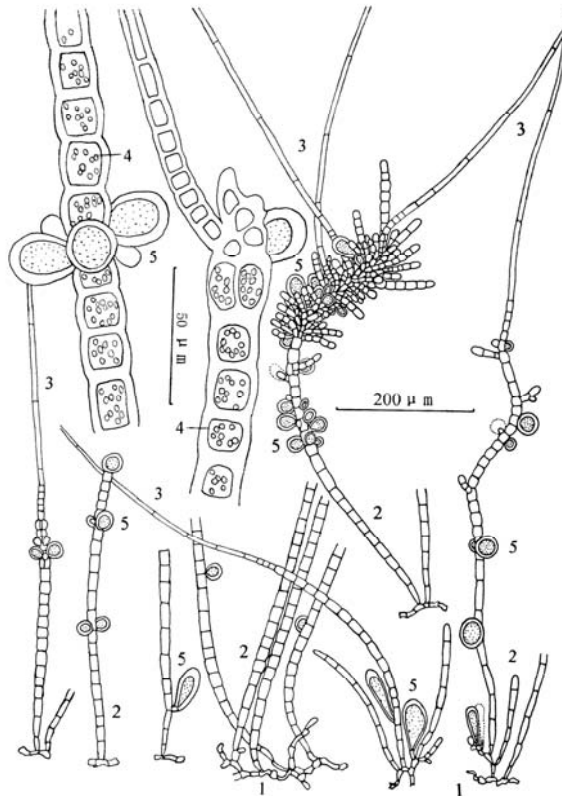


Fig. 2 *Myriotrichia clavaeformis* Harvey

1.creeping filament: 2.erect filament: 3.hairs: 4.chromatophore: 5.unilocular sporangia

2.3 *Punctaria projecta* Yamada

Punctaria projecta Yamada 1968: 372, (Figs.1-2)^[11]; Yoshida et al. 1998: 294, (Figs. 1-16E)^[12].

The frond is brown but turns to olive green after dried. They are tufted and epiphytic on other algae, foliaceous or lanceolate. Its holdfast is discoid, its base is narrowly cuneate, both margins are slightly rugate. Its top is often broken and blunt round. It is 4-8 cm tall, 0.5-2 cm wide and 110-170 μm thick. It consists of cortexes and medullae. There are totally 4-5 layers of cells. The cortex is on the outer, its cells have chromatophore. The transections are 10-25 μm long and 10-20 μm wide. The medulla is inside the cortex, the cell sizes diverse greatly. They are rectangular or sub-round. The transections are 20-75 μm

long and 15-50 μm wide. The hairs are tufted. They are formed by cortical cells' division, and the cells are 55-125 μm long and 8-15 μm wide. The length is 5.5-13 times the width. The base has a growing region and 6-15 meristematic cells.

The plurilocular sporangia and the unilocular sporangia are in the same body or in different bodies. They are both formed by cortex cells. The plurilocular sporangia are simple or aggregate in 2-3, irregularly subulate. Some are slightly curving, 35-55 μm long and 16-27 μm wide, pedicelled or sessile. The unilocular sporangia are oval, sessile, 40-55 μm long and 16-27 μm wide.

Habit and locality: Epiphytic on *Laurencia* sp. and *Sargassum* sp. between low and mid tidal zones. The specimens were collected from Lianyungang City, Jiangsu Province (AST9990139).

Distribution: Japan.

Type locality: Miyazu, Japan.

Punctaria projecta is similar to *P. Hesperia* Setchell and Gardner (1924: 3)^[13] in shape. The main differences are: the thallus of *P. projecta* Yamada is 110-170 μm thick; the plurilocular sporangia are irregularly subulate, 35-55 μm long; pedicelled or sessile. The latter is 60-70 μm thick; some are even 100 μm . The plurilocular sporangia are short-taper shaped or oval, sessile, 25-38 μm long.

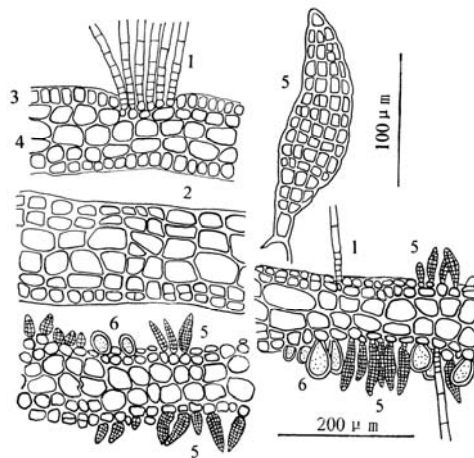


Fig. 3 *Punctaria projecta* Yamada

1.hairs; 2.transsection of the frond; 3.surface layer; 4.medulla;
5.plurilocular sporangia; 6.unilocular sporangia

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中国点叶藻科（褐藻门）新记录种

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摘要：报道中国点叶藻科的新记录种，波罗丝毛藻 *Desmotrichum balticum*，棍状毛丝藻 *Myriotrichia clavaeformis*，突起点叶藻 *Punctaria projecta*。

关键词：点叶藻科；波罗丝毛藻；棍状毛丝藻；突起点叶藻