

Note on the marine algal flora of the Oki Isls. XIV*

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Abstract *Pleonosporium caribaeum* (Børgesen) Norris (Ceramiaceae, Rhodophyta) is reported in this paper not only as a new entry to the present writer's algal list of the Oki Islands in the Sea of Japan, but also as a new algal record for Japan except for the Amami-oshima Island in southern Japan.

Key Index Words: marine algal flora, the Oki Isls., *Pleonosporium caribaeum*.

Introduction

The present writer has reported 416 species in 85 families and 204 genera of benthic marine algae from the Oki Islands since 1970, which consist of 33 species in 5 families and 15 genera of Cyanophyta, 68 species in 18 families and 21 genera of Chlorophyta, 96 species in 21 families and 48 genera of Phaeophyta, and 219 species in 41 families and 120 genera of Rhodophyta (Hagihara *et al.* 1970; Hirose and Kajimura 1973; Kajimura 1975a-1995). One more new entry, *Pleonosporium caribaeum* is added not only to his algal list of the Oki Islands, but also to Japan except for the Amami-oshima Island.

Materials and Methods

Many mature spermatangial and cystocarpic female gametophytes as well as many polysporangial and sterile plants of *Pleonosporium caribaeum* used for the present study were collected with dredge (Kajimura 1987e) at the depths ranging from eight to 10 m offshore from Tsudo (18 February 1986, 19 January 1988, 10 May 1989, 3 February 1993, 15 November 1993) as well as at Tsuma Bay on 17 December 1991. Those specimens collected offshore from Tsudo were all epiphytic on *Zostera marina*

Linné and those from Tsuma Bay were on drifting *Gelidium amansii* (Lamouroux) Lamouroux respectively.

Representative specimens used for the present study were deposited in the Phycological Herbarium of the National Science Museum, Tokyo (TNS).

Fresh specimens as well as those dried or preserved in formalin-seawater were used for the morphological study of this alga. The preserved specimens were stained with a 1% aqueous solution of aniline blue to which acetic acid had been added in the volumetric ratio of 1 to 9. The stained materials were mounted in a 50% aqueous solution of rice syrup to which was added acetic acid in the volumetric ratio of about 1 to 33.

Observations

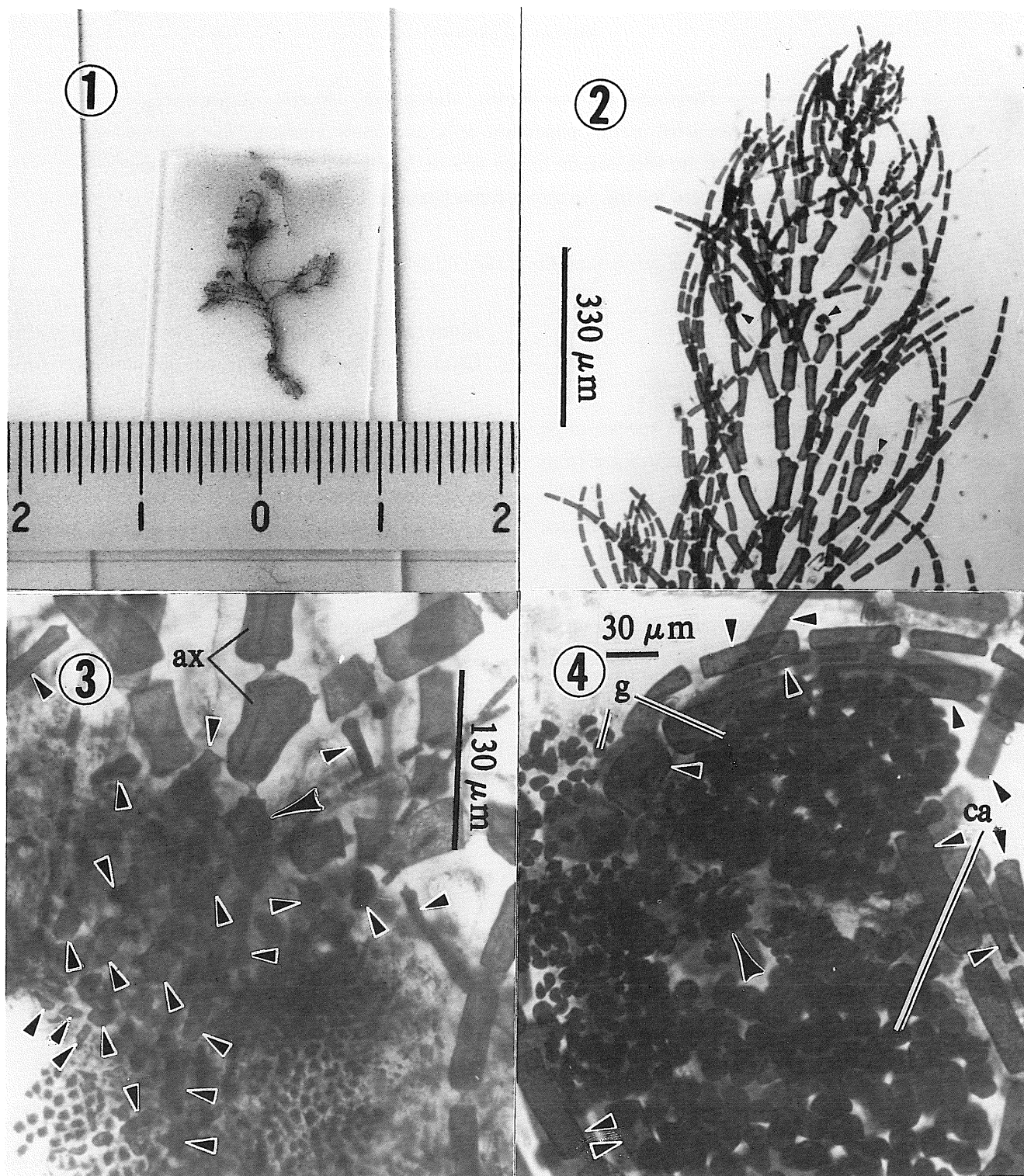
Rhodophyta
Rhodophyceae
Florideophycidae
Ceramiiales
Ceramiaceae

Pleonosporium caribaeum (Børgesen) Norris

Br. phycol. J. 20, p. 59, 1985; as *Mesothamnion caribaeum* Børgesen, Dansk Botanisk Arkiv, 3, p. 208, 1917.

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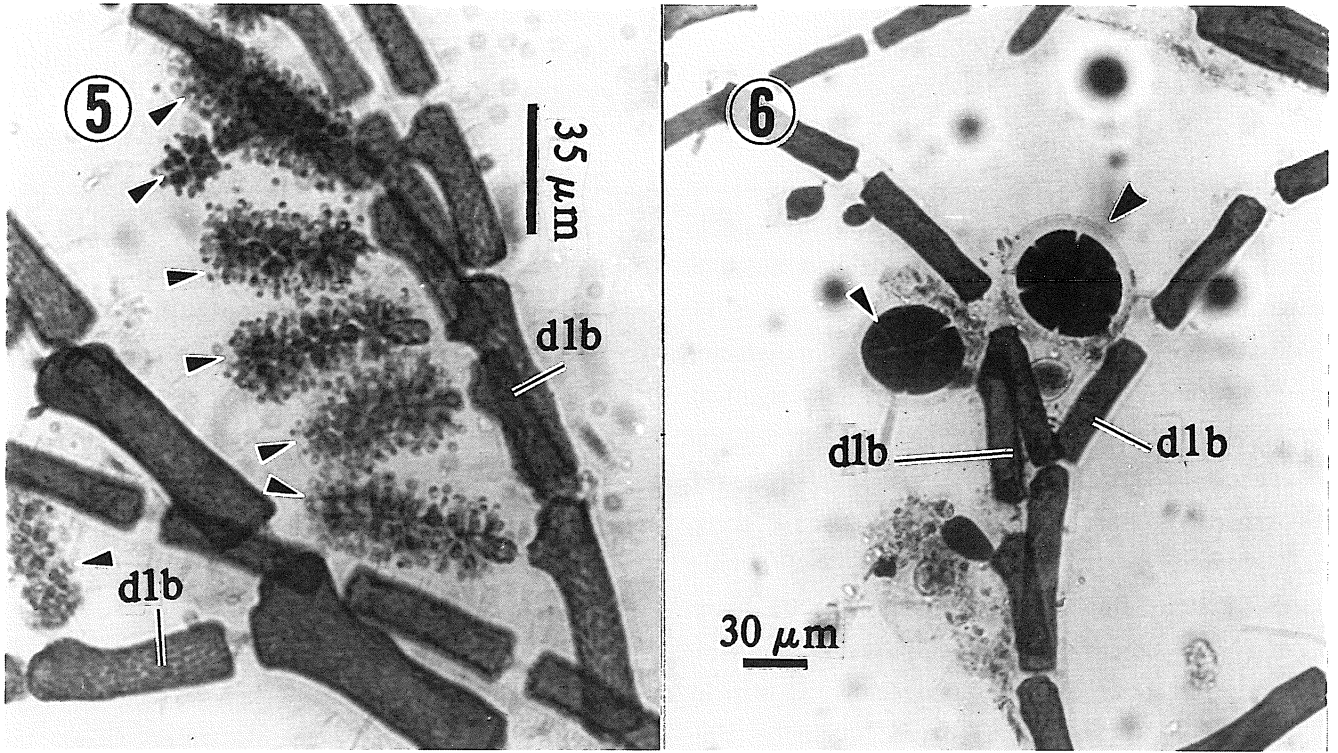
Figs. 1-4. *Pleonosporium caribaeum* (Børgesen) Norris.

Fig. 1. Habit of a polysporic plant collected at 10 m depth offshore from Tsudo on November 15, 1993, stained with aniline blue and mounted on a microscope slide.

Fig. 2. Upper part of a female plant showing three young procarps (arrowheads).

Fig. 3. Basal part of a male plant showing some rhizoids (small arrowheads), and the basal axial cell (large arrowhead).

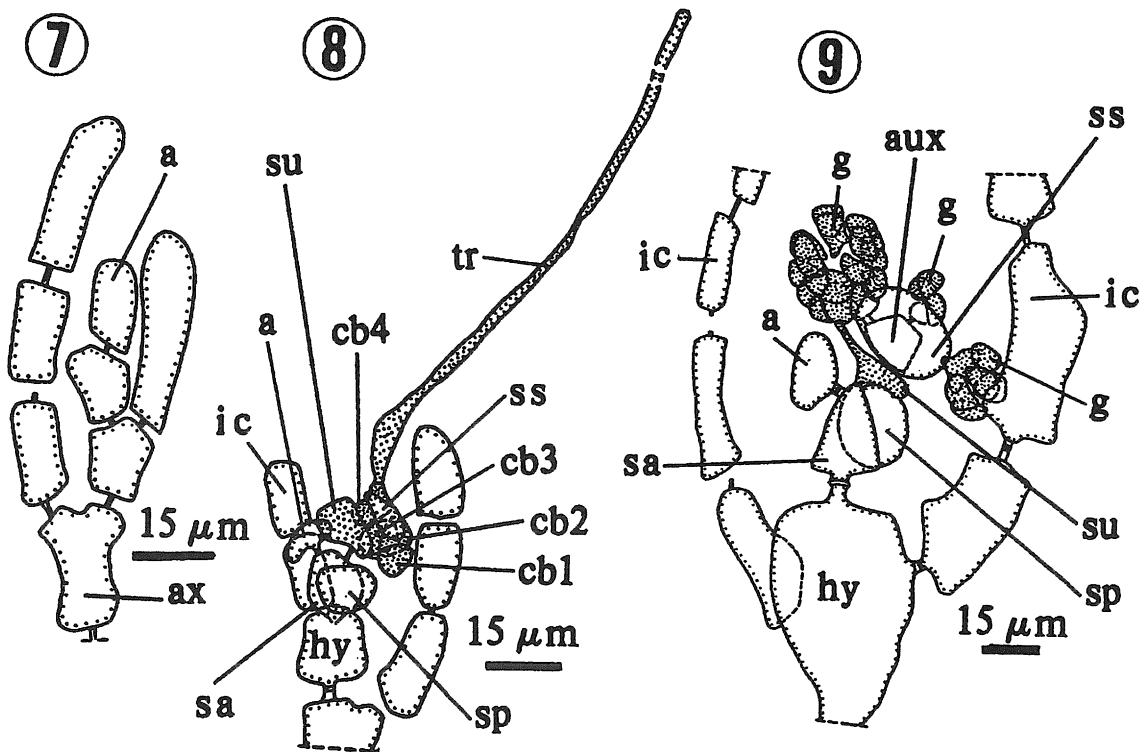
Fig. 4. Part of a female plant showing a mature carposporophyte with several gonimoblasts arising from the auxiliary cell (large arrowhead) and some involucral filaments (small arrowheads).



Figs. 5, 6. *Pleonosporium caribaeum* (Børgesen) Norris.

Fig. 5. Part of a male plant showing some spermatangial stichidia (arrowheads).

Fig. 6. Part of a polysporic plant showing one mature (large arrowhead) and one developing (small arrowhead) polysporangia.



Figs. 7-9. *Pleonosporium caribaeum* (Børgesen) Norris.

Fig. 7. Distal part of an indeterminate branch showing an apical cell divided obliquely.

Fig. 8. Part of a female plant showing a mature procarp with a four-celled carpogonial branch.

Fig. 9. Part of a female plant showing a young carposporophyte with three young gonimoblasts arising from the auxiliary cell.

Vegetative structure

The thallus is light red, erect, attains the height of 5-25 mm, filamentous, ecorticate (Fig. 1). The apical cell divides obliquely (Fig. 7). The main axis is distinct and simple or irregularly branched, but it is often obscure in the upper part of thallus (Fig. 1). Main axial cells are cylindrical, 27-80 μ m in diameter and 65-163 μ m in length respectively. Each segment of an axis produces a single lateral branch. Lateral branches are arranged in alternately 1/4 spiral, therefore lateral branches are superimposed at every four indeterminate axial cells. The determinate lateral branch ramifies subdichotomously 1-5 times (Fig. 2). The determinate branch cells are also cylindrical, attain 13-27 μ m in diameter, 34-133 μ m in length respectively, and incurved adaxially. The indeterminate branch is formed on the axial cell at irregular intervals, replacing the determinate branch (Fig. 2). The holdfast consists of several to some usually simple multicellular rhizoids arising from several proximal axial cells as well as one to several proximal cells of lateral branches near the basal part of thallus (Fig. 3). The rhizoids develop a branched digitate attachment organ on contact with the host.

Reproductive structures

Gametophytes are dioecious and isomorphic with polyspolic plants. Procarps are formed terminally on lateral branches (Fig. 2). The fertile axis consists of two cells, namely the apical cell and the subapical cell which produces a supporting cell and a sterile-pericentral cell. The supporting cell produces a four-celled carpogonial branch and a supporting-sterile cell. The carpogonium is provided with a straight long trichogyne (Fig. 8). The involucrel filament initiates from the hypogynous cell prior to fertilization (Fig. 8).

After fertilization, the supporting cell cuts off one auxiliary cell which presumably directly connects with the carpogonium. Thereafter, three or four gonimoblasts developed from the auxiliary cell in

sequence (Fig. 9). The mature carposporophyte is surrounded by some to many involucrel filaments (Fig. 4).

Spermatangial stichidia are sessile and formed on the adaxial side of determinate branch cells (Fig. 5). The mature spermatangia are subcylindrical, *c.* 66 μ m in length and *c.* 28 μ m in diameter.

Polysporangia are sessile and formed on the adaxial side of the determinate branch cell (Fig. 6). Mature polysporangia are subspherical, *c.* 57 μ m in diameter, and the cell content of the sporangia divides into 12. No tetrasporangia were detected in the Oki plants.

Discussion

Pleonosporium caribaeum has been reported widely from tropical to warm-temperate waters (Itono 1977, Stegenga 1986, Kim and Lee 1988) since the basionym *Mesothamnion caribaeum* Børgesen was described from the Danish West Indies (Børgesen 1916). However, *P. caribaeum* has been reported only from Amami-oshima Island (Itono 1977) in Japan, and the present collection of it is not only a new entry to the present writer's algal list of the Oki Islands, Shimane Prefecture, but also a new algal record for Japan except for the Amami-oshima Island.

Abbreviations used in Figures

a	apical cell
aux	auxiliary cell
ax	axial cell
ca	carposporangium
cb1, cb2, cb3, cb4	cells of carpogonial branch
dlb	determinate lateral branch cell
g	gonimoblast cell
hy	hypogynous cell
ic	involucrel filament
sa	subapical cell of fertile axis
sp	sterile-pericentral cell
ss	supporting-sterile cell
su	supporting cell

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