

## Two new species of red algae from the west coast of Kyushu, Japan

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Two new species of red algae belonging to the genera *Predaea* and *Solieria* (Gigartinales) are described based on specimens collected from Nagasaki and Kumamoto Prefectures, western Kyushu. *Predaea* is recorded for the first time from the northwest Pacific.

*Predaea japonica* differs from the type species of the genus, *P. masonii*, in that it has larger blade without any noticeable venation and is provided with spherical gland cells.

*Solieria dichotoma* is characterized by a flat frond branching dichotomously.

*Key index words:* Gigartinales; Rhodophyta; *Predaea japonica* sp. nov.; *Solieria dichotoma* sp. nov.; taxonomy.

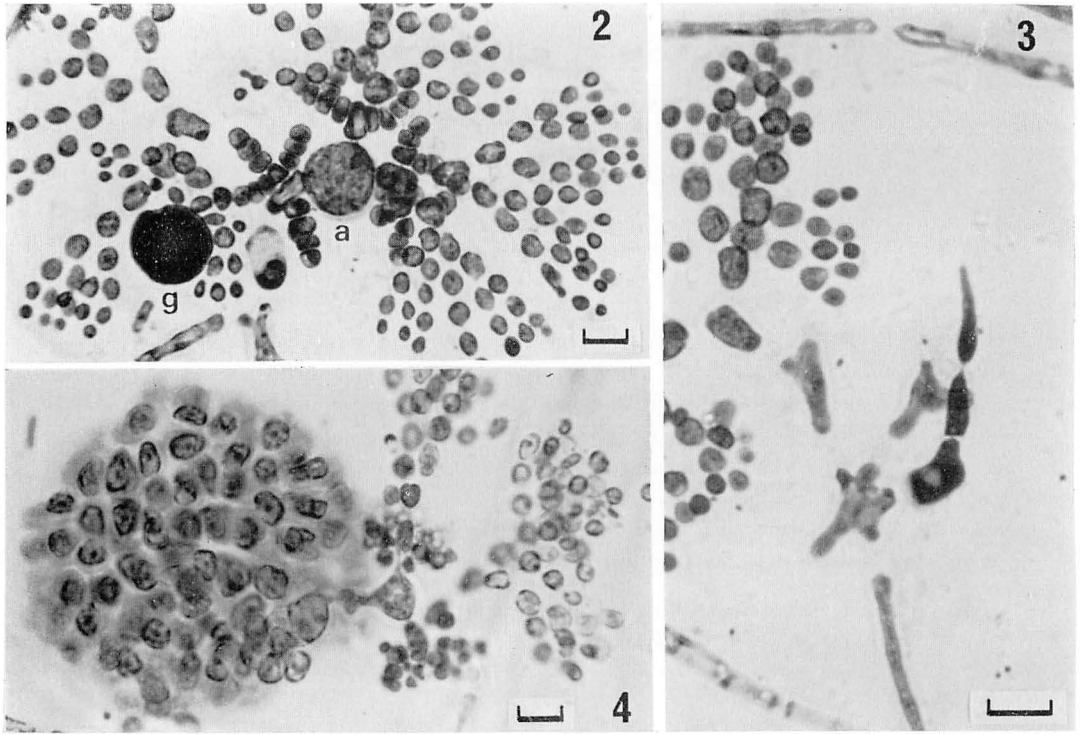
In the course of the study of marine flora of the west coast of Kyushu (SEGAWA and YOHSIDA 1961), we encountered several algae clearly new to Japanese flora. At that time, absence of mature material hindered us to identify them as to the genus. I could obtain suitable materials of two of them through the kindness of Professor S. MIGITA, Nagasaki University, and Dr. T. YOTSUI, Nagasaki Prefectural Fisheries Experimental Station. One of them belongs to the genus *Predaea*, and another represents a new species of the genus *Solieria*.

1. *Predaea japonica* YOSHIDA, sp. nov.  
(Figs. 1-4)

Plantae sessiles, saxicolae, cum haptero discoideo parvo affixae, laminis planis circa 25 cm altis, 20 cm latis, 2 mm crassis, late ovalibus in forma, vulgo lobatis vel divis, mollibus gelatinosis in textura, roseolis in colore; stratum medullosum e filamentis 7-8  $\mu\text{m}$  in diametro laxè implicatis per matricem gelatinam; stratum corticatum circa 100  $\mu\text{m}$  crassum, e filamentis assimilantibus dichotome ramosis quarum cellulae moniliformes prope paginam parviores sunt



Fig. 1. *Predaea japonica* YOSHIDA, Holotype, female, Apr. 5 1977, Mitsuse, Nagasaki Pref., SAP 034525.



Figs. 2-4. *Predaea japonica* YOSHIDA. Scale 10  $\mu\text{m}$

2. An auxiliary cell (a) and a gland cell (g). 3. Carpogonial branch.  
4. Young carposporophyte.

compositum; glandicellulae sphaericae circa 15  $\mu\text{m}$  in diametro, in cellulis strati corticati adsunt; rami carpogoniales 2-cellulares, in cellula prope basin filamenti assimilantis lateraliter portati; cellulae auxiliares transformatione cellulae intercalaris filamenti assimilantis formatae; cellulae supra inferioraque cellulam auxiliarem cellulas nutritas parvas numerosas producentes; gonimoblasti in cellulis auxiliaribus lateraliter initiantur; carposporophyton 1-3 gonimolobis sphaericis vel pyriformibus compositum; filamenta sterilia protectiva circum gonimoblastum maturum non reperta; spermatangia et tetrasporangia ignota.

Plant sessile, growing on rock, attached by a small discoid base, with flat blade about 25 cm high, 20 cm broad and 2 mm thick, broadly oval in shape, usually lobed or divided (Fig. 1), soft gelatinous in texture, pink in color; medullary layer composed of filaments of 7-8  $\mu\text{m}$  in diameter, loosely

interlaced in a gelatinous matrix; cortical layer about 100  $\mu\text{m}$  thick, composed of dichotomously branched assimilatory filaments, with moniliform cells becoming smaller near the surface; spherical gland cells (Fig. 2, g), about 15  $\mu\text{m}$  in diameter occur among the cells of the cortical layer; carpogonial branch (Fig. 3) 2-celled, borne laterally on a cell near the basal part of an assimilating filament; auxiliary cell (Fig. 2, a) formed by transformation of an intercalary cell of assimilating filament; cells above and below auxiliary cell producing many small nutritive cells; gonimoblasts formed laterally on the auxiliary cells (Fig. 4); carposporophyte composed of 1-3 spherical or pyriform gonimolobes; no protective sterile filaments found around the mature gonimoblast; spermatangia and tetrasporangia unknown.

Holotype: Carpogonial, Apr. 5 1977, Mitsuse, near Cape Nomo, Nagasaki Pref.,

Kyushu, T. YOSHIDA (SAP 034525).

Additional specimens: Cystocarpic, June 5 1978, Cape Nomo, Nagasaki Pref., entangle on gill net, T. YOSHIDA (SAP 034528); Cystocarpic, May 14 1956, Tomioka, Kumamoto Pref., T. YOSHIDA (SAP 034527); Apr. 28 1957, Tomioka, Kumamoto Pref., T. YOSHIDA (SAP 034526); Apr. 23 1979, Kiwado, Yamaguchi Pref., T. YOSHIDA (SAP 034597).

Japanese name: Yuruji-ginu (nov.)

The plant with carpogonial branches and auxiliary cells were collected in spring. Cystocarps were found to be matured in June. This species grows at a depth below the low water mark. The holotype specimen was collected by skin diving, and others were obtained with gill nets or as cast up on the shore.

The genus *Predaea* G. DE TONI (= *Clari-  
onea* SETCHELL et GARDNER, Nemastomata-  
ceae) with 6 described species is known  
from Clarión Island (Mexico), Hawaii, south-  
ern Great Barrier Reef and the Atlantic.  
One of the characteristic features of this  
genus distinguishing it from *Nemastoma*  
and other genera of the Nemastomataceae  
is the production of special nutritive cells  
on the cells adjacent to the auxiliary cell.  
In this genus, such characters as number  
of cells of the carpogonial branch, quantity  
of nutritive cells, origin of gonimoblast and  
external habit are useful for discriminating  
the species, as discussed by KRAFT and  
ABBOTT (1971). This new species somewhat  
resembles *P. masonii* (SETCHELL et GARDNER)  
G. DE TONI, the type species of the genus  
from Clarión Island, Mexico, in that they  
have flat blade like thallus, 2-celled carpogonial  
branch, produce many nutritive cells,  
and the origin of gonimoblast is lateral.  
But the blade of *P. japonica* is much larger  
than *P. masonii*, and without any noticeable  
veins. The presence of gland cells in the  
former is another characteristic separating  
it from the latter. *P. pusilla* (BERTHOLD) J.  
FELDMANN and *P. weldii* KRAFT et ABBOTT  
differ from the present new species not  
only by their external habit but also by  
possessing 3-celled carpogonial branch and

by their terminal initiation of gonimoblast.  
*P. ollivieri* J. FELDMANN has also blade like  
thallus, but it can be discriminated in that  
the texture is much softer, no gland cells  
is recorded and gonimoblast initiation is  
described to be lateral, terminal or from  
the connecting filament. *P. subpeltata*  
DAWSON is distinguished by its peltate  
habit and by the origin of gonimoblast  
from the connecting filament. *P. feldman-  
nii* BOERGESEN has 3-celled carpogonial  
branch and dimorphic thallus.

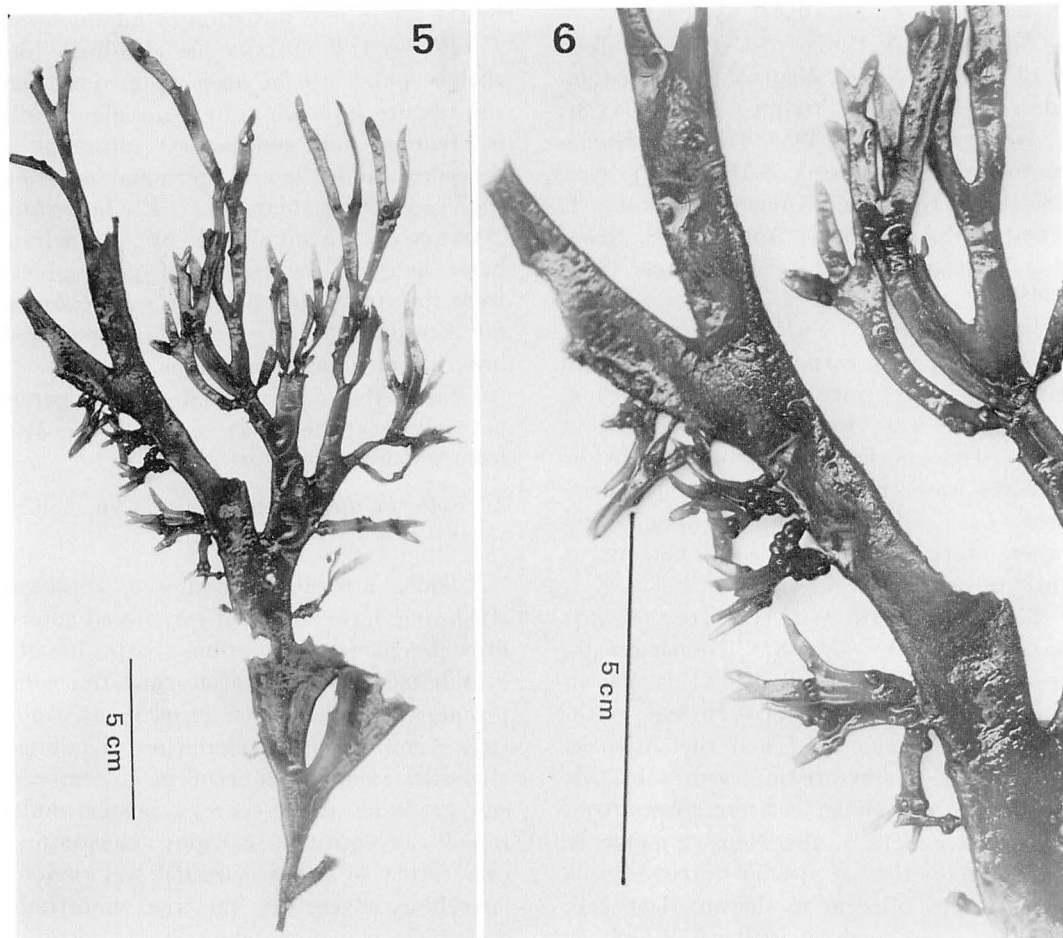
This is the first recored of this genus  
not only from the Japanese coasts, but also  
from northwestern Pacific.

## 2. *Solieria dichotoma* YOSHIDA sp. nov.

(Figs. 5-12)

Frondes atrorubrae, carnosae, 20-30 cm  
altae, singulari vel aliquot surculis e haptero  
discoideo parvo enascentibus; partes basales  
cylindricae, superne statim cuneatim com-  
planatae, 1.5-2.5 cm latae in parte latissima,  
circa 3 mm crassae, irregulariter dichotome  
aliquoties ramosae, superne in apicem ver-  
sus gradatim decrescentes; postea multi  
ramuli adventitii e margine enascentes;  
cystocarpia in parte marginali vel ramulis  
lateralibus adventitiis immersa, maturitate  
e superficie frondium tumescentia; cortex e  
cellulis externis minoribus, atque interiori-  
bus majoribus compositus; medulla fila-  
mentis rhizoidalibus tenuibus composita;  
rami carpogoniales 3-cellulares in cellulis  
corticalibus interioribus nati, trichogyne  
ad superficiem frondis abrupte curvata;  
initium gonimoblast intime enascens; tex-  
tura tegnes crassa circa gonimoblastum  
evolvens formata; cellula conjuncta magna  
in centro cystocarpium praesens; carpospo-  
rangia terminalia in filamentis gonimoblasti,  
22-26 × 46-57 μm in magnitudine; carpos-  
porae ex ostiolo liberatae; tetrasporangia  
super superficiem frondium distribuntur, e  
cellula corticali orientia, zonatim divisa,  
30-55 × 46-84 μm in magnitudine; sperma-  
tangia ignota.

Fronde dark red, fleshy, 20-30 cm high,  
one to several axes arising from a small  
discoid holdfast; basal part cylindrical, im-



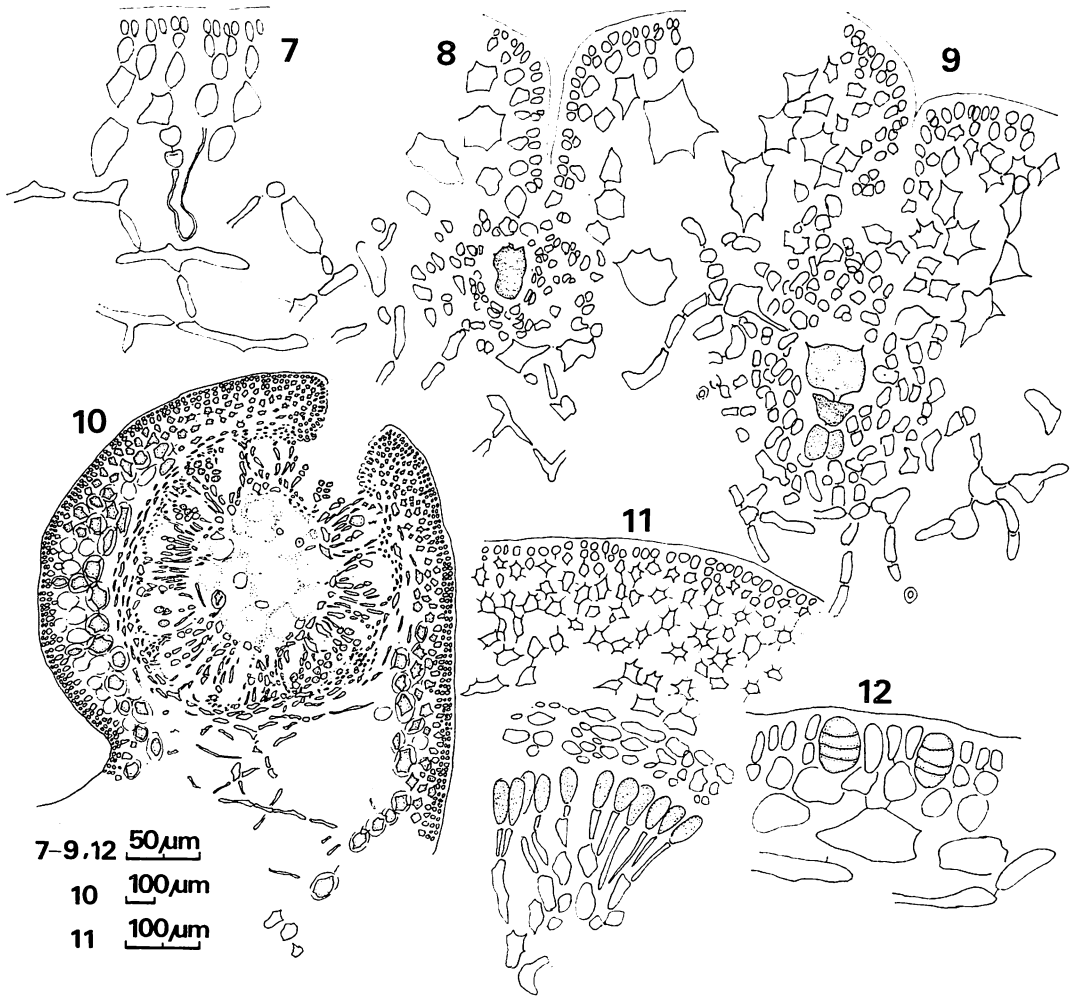
Figs. 5-6. *Solieria dichotoma* YOSHIDA. Holotype specimen before drying, cystocarpic, Dozaki, Nagasaki Pref. Aug. 1 1977, SAP 034551.

mediately flattened above cuneately; 1.5-2.5 cm wide in the broadest part, about 3 mm thick, irregularly dichotomously branched (Fig. 5) several times in one plane, gradually narrowed upwards to tapering apices; later many adventitious branchlets (Figs. 5, 6) arising from the margin; cystocarps immersed in the marginal parts or in lateral adventitious branchlets, swelling from the surface of the frond when matured; fronds constructed multiaxially; cortex composed of cells smaller outwardly and larger inwardly; medulla composed of fine rhizoidal filaments; 3-celled carpogonial branch (Fig. 7) produced from the inner cortical cell inwardly, with trichogyne curved abruptly to the surface of the frond;

one gonimoblast initial (Fig. 9) developed inwardly from the auxiliary cell; thick protective tissue (Fig. 10) formed around the developing gonimoblast; a large fusion cell present (Fig. 10) in the center of the cystocarp; carposporangia terminal (Fig. 11) on the gonimoblast filaments,  $22-26 \times 46-57 \mu\text{m}$  in size; carpospores discharged from an ostiole; tetrasporangia (Fig. 12) dispersed over the surface of the frond, arising from outer cortical cells, zonately divided,  $30-55 \times 46-84 \mu\text{m}$  in size; spermatangia unknown.

Holotype: Cystocarpic, Dozaki, Nagasaki Pref., Kyushu, Aug. 1 1977, YAMAMOTO (SAP 034551).

Additional specimens: Tomioka, Kuma-

Figs. 7-12. *Solieria dichotoma* YOSHIDA.

7. Carpopogonial branch. 8-9. Early stages in development of gonimoblast. 10. Cross section of cystocarp. 11. Terminal carposporangia. 12. Tetrasporangia.

moto Pref., Apr. 10 1955, S. SEGAWA (SAP 034540); Tomioka, Apr. 11 1955, T. YOSHIDA (SAP 034541); Cystocarpic, Sakasegawa, near Tomioka, Aug. 20 1955, T. YOSHIDA (SAP 034542); Mogi, Nagasaki Pref., May 12 1956, T. YOSHIDA (SAP 034543), Tomioka, Mar. 30 1957, T. YOSHIDA (SAP 034530); Tomioka, Apr. 30 1957, T. YOSHIDA (SAP 034533); Mogi, June 30 1957, T. YOSHIDA (SAP 034531); Mogi, May 2 1958, T. YOSHIDA (SAP 034529); Tomioka, May 5 1958, T. YOSHIDA (SAP 034545); Mogi, Apr. 25 1960, T. YOSHIDA (SAP 034538); Tomioka, May 1 1960, T. YOSHIDA (SAP 034544); Cystocarpic, Tomioka, Jul. 18 1960, Y. ONO (SAP

034534); Cape Nomo, Nagasaki Pref., Apr. 5 1977, T. YOSHIDA (SAP 034535); Cape Nomo, June 9 1977, T. YOTSUI (SAP 034537); Tetrasporic, Dozaki, Nagasaki Pref., Aug. 1 1977, YAMAMOTO (SAP 034532).

Japanese name: Hira mirin (nov.)

This species seems to grow in deeper water. All specimens cited above were collected as drift on the shore, or by dredging, or with gill nets operated by fishermen. Plants bearing carpopogonial branches were seen in June. Fertile individuals with cystocarps or tetrasporangia were obtained in July and August.

The genus *Solieria*, the type genus of

the Solieriaceae, is defined by a combination of the following characters: 1) multi-axial in structure of the thallus, medulla with loosely arranged elongate filaments and cortex with inner large round cells and outer small cells, 2) cystocarp with a large round cell surrounded by fertile filaments bearing terminal carposporangia; sterile filaments forming an enveloping sheath around the cystocarp; carposporophyte embedded in the medullary region and with a distinct ostiole, 3) zonate tetrasporangia scattered over the branches. The present new species accords in every respect to the genus *Solieria* as described above. The type species of the genus, *S. chordalis* J. AGARDH, has a terete thallus (KYLIN 1932). Other species placed in this genus by MIN-THIEN and WOMERSLEY (1976), *S. robusta* (GREVILLE) KYLIN and *S. dura* (ZANARDINI) SCHMITZ, have terete or compressed thalli with very different branching patterns. Among the plants assigned to *S. robusta* from Japan, some individuals have clearly compressed thalli. The present new species has a flattened thallus branching dichotomously in one plane. This is one of the distinguishing characters from other

species of the genus.

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#### 吉田忠生：九州西岸産紅藻 2 新種

長崎県・熊本県から紅藻スギノリ目に属する 2 新種を報告する。

ユルヂギヌ (新称, ヒカゲノイト科) *Predaea japonica* は、高さ 25 cm に達する葉状体で、細脈をもたないこと、腺細胞をもつことなどで、アメリカ西岸産のこの属のタイプ種 *P. masonii* と区別される。*Predaea* 属は北西太平洋ではじめて記録されたものである。

ヒラミリン (新称, ミリン科) *Solieria dichotoma* は、扁平で叉状分枝し、後に縁辺から不定枝を副出するので、ミリン *S. robusta* とは容易に区別される。(060 札幌市北区北 10 条西 8 丁目 北海道大学理学部植物学教室)