

## One Red Algal Parasite from Japan

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Four genera (*Corallina*, *Jania*, *Prionitis* and *Callophyllis*) of Cryptonemiales have been reported as host plants of red parasitic algae. In 1959, one red parasitic plant on *Carpopeltis angusta* (HARV.) OKAM. was newly collected at Hananose, near Mt. Kai-mon, Kagoshima Prefecture by the writers.

This parasitic plant grows scattered over the stem and branches of the host plant, forming a somewhat ceranthus or hemiconfetto shape in the matured ones. The frond consists of wartlike basal and of somewhat columnar branches. The colour varies from

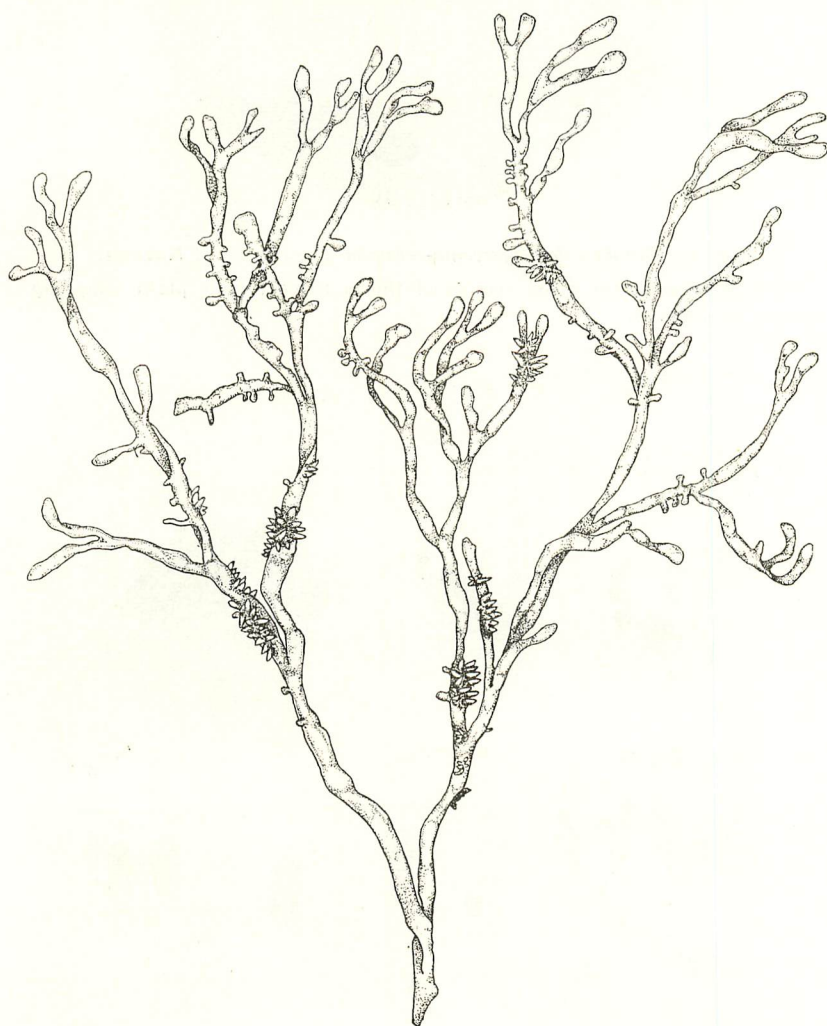


Fig. 1. *Kintokiocolax aggregato-cerantha* TANAKA et Y. NOZAWA.

Habit of parasitic plants on *Carpopeltis angusta* (HARV.) OKAM.  $\times 1$ .

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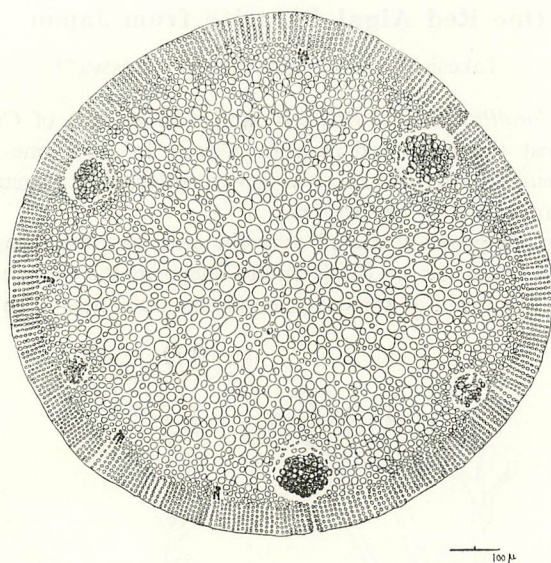


Fig. 2. *Kintokiocolax aggregato-cerantha* TANAKA et Y. NOZAWA.

Fig. Portion of the cross section of the matured female plant, showing many cystocarps.

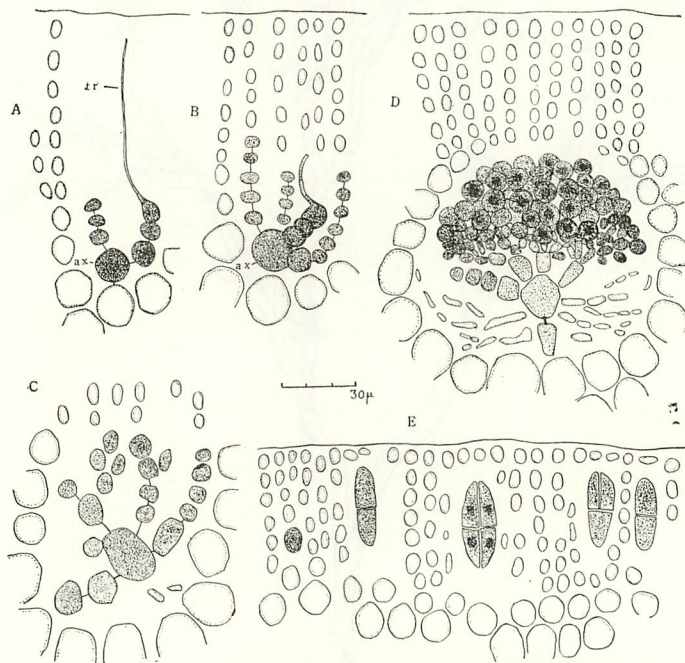


Fig. 3. *Kintokiocolax aggregato-cerantha* TANAKA et Y. NOZAWA.

A. Matured carpogonial branch (tr. Trichogyne, ax. Auxiliary cell). B-C. Carpogonial branch after fertilization (ax. Auxiliary cell). D. Immatured cystocarp. E. Portion of the cross section of the frond of tetrasporic plant, showing tetrasporangia.

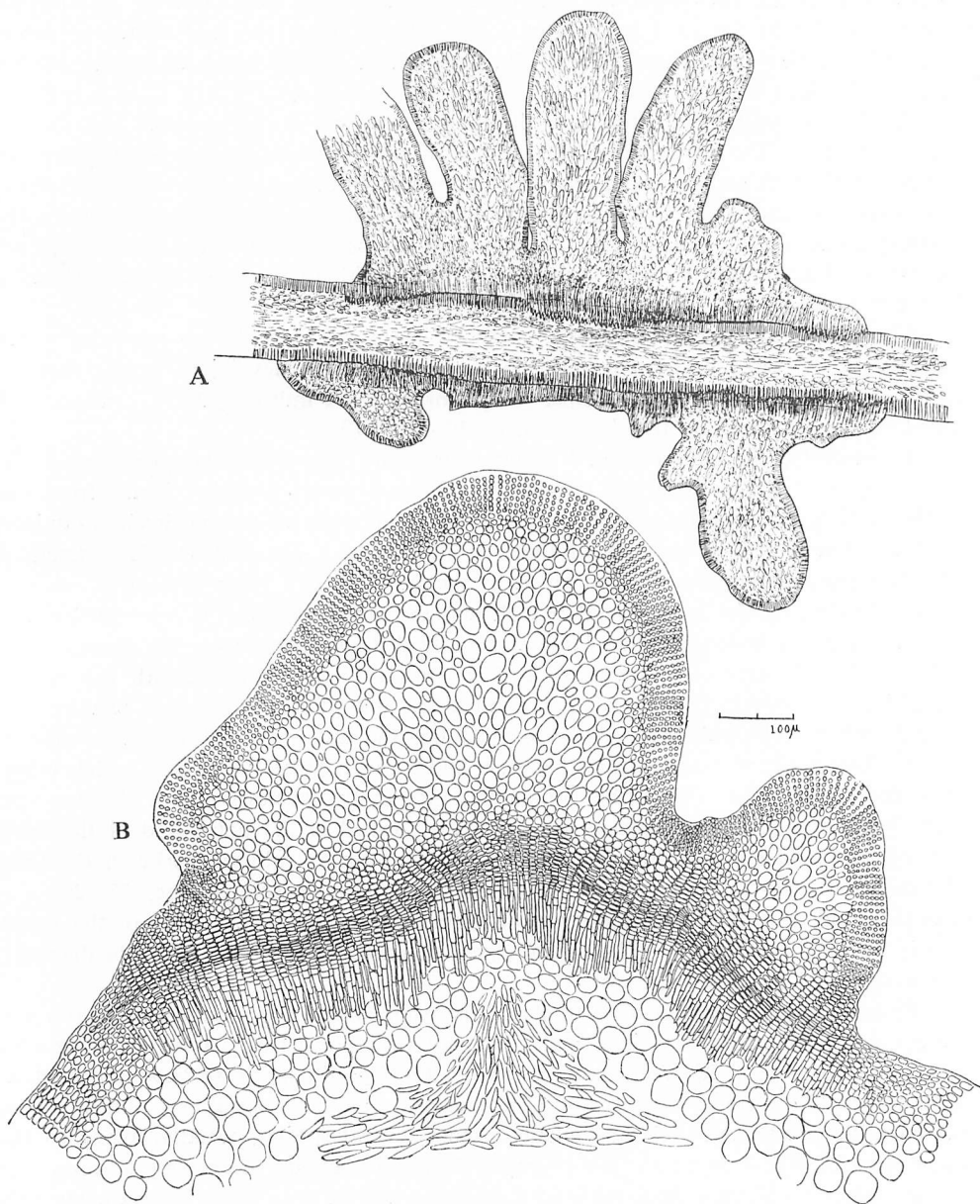


Fig. 4. *Kintokiocolax aggregato-cerantha* TANAKA et Y. NOZAWA.

A. Portion of the transverse section of the fronds.  $\times 20$ . B. Portion of the transverse section of frond, showing the rhizoidal filaments penetrate into the cortical tissue of the host plant.  $\times 100$ .

light reddish yellow to purplish red. The surface of the frond is smooth, and the substance is rather cartilagenous. The plant attaches to the host plant by its rhizoidal filaments or by its flattened basal layer. The penetration of the host occurs by means of slender, rather long rhizoidal cell filaments which deeply penetrate to the cortical layer of the host plant.

As for the anatomical structure, the thallus consists of the cortical and the medullary tissues. The medullary tissue is formed with rather parenchymatic filaments composed of large and elongate, often dichotomously branched, cylindrical cells. When seen from the cross section, the medullary tissue is observed to be parenchymatic. The cortical tissue seen in cross section is composed of short, 6-7 vertical cell-rows. Each outermost of medullary tissue is directly connected with two cells of cortical tissue at its outer side.

The tetrasporic or female plantis may be observed in each separated individual parasite on the same host. The tetrasporangia, which are developed in the layer of cortex, are usually ellipsoid in shape. The sporangia are quite regularly, cruciately divided, when measured by the dimension by  $10-15 \mu \times 18-36 \mu$ .

Fortunately, the authors could observe the many stages and the processes of the development of the cystocarps. Originally, the carpogonial branches issues from one of the cells in the outermost portion of the medullary. In all the specimens examined, we have found that it consists of three or four cells. The carpogonial branch, is slightly curved, being directly connected by the auxiliary cell lying beneath it. A procarp is formed by the carpogonial branch and the auxiliary cell. Before fertilization, the auxiliary cell becomes rather large and easily distinguishable from the normal vegetative cells. Generally the auxiliary cell is constantly accompanied with the row of nourishing cells which consists of 2-3 small cells, and whose top cell is usually connected with the cortical cells. After fertilization, the auxiliary cell produces another two or three rows of nourishing cell groups and forms a large fusion-cell, which brings forth the gonimoblast. Then the gonimoblast gradually develops and is divided into many branches. And carpospores are gradually formed at the upper end of the branches of gonimoblast, but filaments of the lower part remain almost sterile in the form of slender filaments. The matured cystocarp is globose or semiglobose,  $150-200 \mu$  in diameter, and is formed in the outer-most portion of the medullary layer of the frond, and is devoid of pericarps. The measurement of carpospore is about  $15 \mu$  in diameter. The antheridial plant is unknown.

From the above mentioned characters it is assumed that the present species is a new parasitic one belonging to Gigartinales and not Cryptonemiales. About seven genera and many species of Rhodophyceae belonging to Gigartinales have been reported as parasites of the various members of Gigartinales. Generally speaking, almost all of the parasitic plants and their host plants, except several species, usually belong to the same order of Rhodophyceae. For example, *Lobocolax* belongs to exceptional ones, and yet according to Howe's description of *Lobocolax*, and judging from its character, this may also be made to belong to Nemalionales.

The main characteristics and chief differences observed in these three groups, namely, these seven genera, *Lobocolax* and present species, are shown in Table 1

*Kintokiocolax* TANAKA et Y. NOZAWA, gen. nov.

Thallus in *Carpopeltis* parasiticus, tuberculiformes aut cerantiformes, dein hemiconfettiformes efficens, constans e filamentis multis in telam hospitis profunde penetrantibus ;

Table 1.

	Shape of the frond	Basal part of the penetrating rhizoidal filaments	Tetraspore	Cystocarp	host
<i>Gracilaria triophila</i> Setchell & Wilson 1910	irregular spherical form	present (California)	cruciate	with pericarp, wart-like surface	<i>Gracilaria</i> , <i>Gracilariaopsis</i> <i>Corallopsis</i> , <i>Lytotus</i>
<i>Plocamionocolax</i> Setchell 1923	irregular spherical form	lack (Maly)		in resemblance to <i>Plocamium</i> , wart-like surface	<i>Plocamium</i>
<i>Gardneriella</i> Kyllin 1941	irregular spherical form with many projection	present	bispore only	without pericarp and carpostome, many carpoconial branches around the auxillary cell	<i>Agardhiella</i>
<i>Cattenellocolax</i> Weber van Bosse 1928	semispherical form				<i>Cattenella</i>
<i>Hypnocolax</i> Borgessen 1920	irregular spherical form	lack	zonate	wart-like surface	<i>Hypnea</i>
<i>Celatocolax</i> Weber van Bosse 1928	bush-like form	present	cruciate nemathecia-like	in resemblance to <i>Phyllophora</i>	<i>Phyllophora</i>
<i>Gracilariaocolax</i> Weber van Bosse 1928	irregular spherical with stem or not	lack	zonate?	wart-like surface	<i>Gracilaria</i>
<i>Lobocolax</i> Howe 1914	semispherical cushion without stem	present	monospore only	in resemblance to <i>Nemalionales</i>	<i>Prionitis</i>
<i>Kintokiocolax</i>	hemiconfetto form without stem	present	cruciate	without pericarp, smooth surface	<i>Carpopeltis</i>

medulla filis cellulis magnis irregulariter ramosis formata; corticalis filis elongatis compactis radiato-verticilibus, simplicibus, strata cuticula in superficiem plus minus tenuis; procarpia non simplicia, pluricellularia; ramus carpoconialis 3-4 cellularis, trichogynis filiformibus, cellulis auxiliariis magnibus, ante fertilizatoris; cystocarpia per frondem sparsa, globosa vel semiglobosa, plus minus minuta, in cryptis saepe pluriseriariis intra stratum medullae excavatis; tetrasporangia cruciate divisa; antheridia ignota;

*Kintokiocolax aggregato-cerantha* TANAKA et Y. NOZAWA, spec. nov.

Thallus in *carpopeltis angusta* (HARV.) OKAM. parasiticus, cartilagenous, ceranthus aut semiconfettiformes, 300  $\mu$ –1.5 mm in diam., 1–2 mm altus; constans e filamentis multis in telam hospitis profunde penetrantibus; strata corticula 6–7 stratosa, 40–70  $\mu$  crssa; cystocarpia globosa ovel semiglobosa, 150–200  $\mu$  in diam., in intra strata meddula formantia; tetrasporangia ellipsoidea, 10–15  $\mu$   $\times$  18–36  $\mu$ , cruciate divisa; antheridia ignota; colore pallido luteo-rubo aut porphyreo.

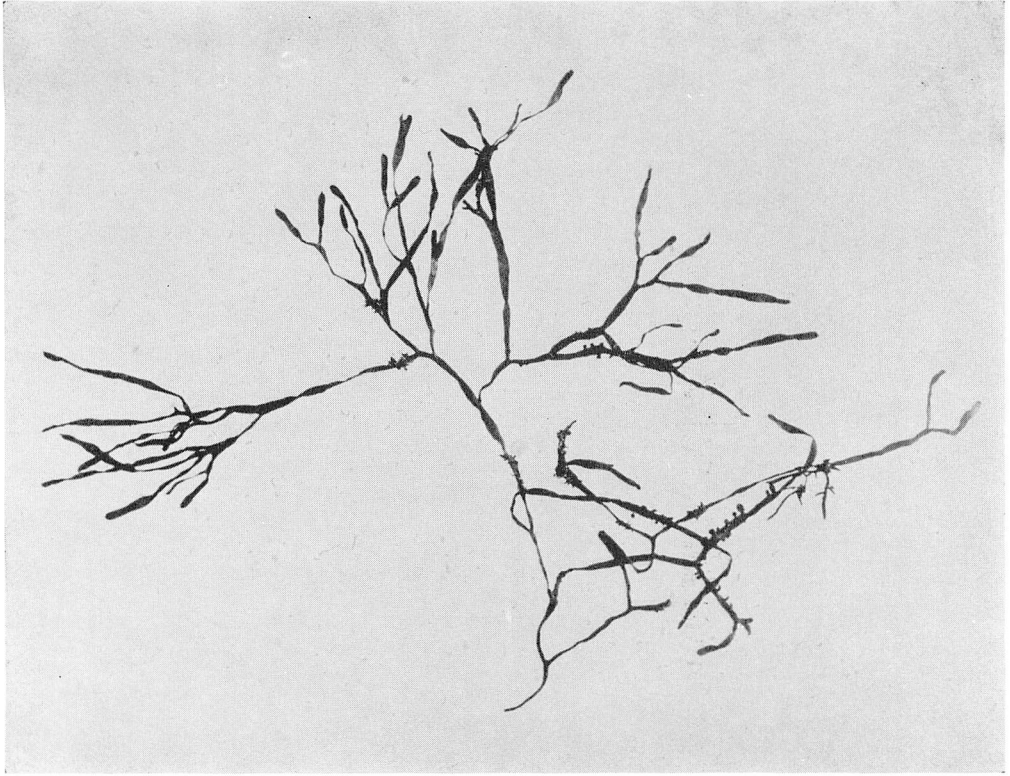
Japanese name; Kintoki-yadori.

Habitat and localities; Hananose, Kagoshima Prefecture. Growing on *Carpopeltis angusta* (HARV.) OKAMURA in the upper sublittoral zone. (Col. June 10th, 1959 and May 12th, 1960).

Frond parasitic on *Carpopeltis angusta* (HARV.) OKAM., cartilagenous, ceranthus or tubercularis when young, but hemiconfetto shape in matured, usually attached by many rhizoidal filaments which penetrate into the cortex of the host, but often fixed simply by flattened basal layer; penetrating rhizoidal filaments consisting of elongate cells, 180–200  $\mu$  in length; basal portion of the frond somewhat wart-like, 1–3 mm in diam., 500–700  $\mu$  in height, upper frond somewhat columnar, 300  $\mu$ –1.5 mm in diam., 1–2 mm in height, and rarely branched; structually, frond consisting of cortical and medullary tissue, cortical layer consists of 6–7 rows of small cells, 40–70  $\mu$  in thickness, medullary layer somewhat parenchymatic, consists of vertically elongated cells; carpogonial branch three or four celled, slightly curved, formed in the outermost part of the medullary layer; trichogyne usually straight and rather long; auxiliary cell rather large before fertilization, and directly connected with the carpogonial branch; cystocarp rather minute, globose or semiglobose and without pericarp, 150–200  $\mu$  in diam., formed in the outermost portion of the medullary layer; tetrasporangia ellipsoidal, 10–15  $\mu$   $\times$  18–36  $\mu$ , formed in the cortical layer; anthridia unknown; surface of the frond rather smooth; colour of the frond light yellowish red or purplish red.

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A



B

C

*Kintokiocolax aggregato-cerantha* TANAKA et Y. NOZAWA.

A. Parasitic plants growing on *Carpopeltis angusta* (HARV.) OKAM.  $\times 1$ .  
B, C. Habits of parasitic fronds on the host plants.  $\times 4$ .