

Cladosiphon novae-caledoniae KYLIN (Phaeophyceae, Chordariales) from New Caledonia

Tetsuro AJISAKA

Abstract

The specimen, collected from New Caledonia in December 1987, was identified as *Cladosiphon novae-caledoniae* KYLIN. As KYLIN (1940) has not made its description, this is the first one presented in paper. Its morphological characters were compared with those of the "type specimen" in the Botanical Museum, University of Lund and some species of *Cladosiphon* collected in Pacific Ocean. It has a potential for a new mariculture resource in New Caledonia.

Key words: *Cladosiphon novae-caledoniae*, New Caledonia, Phaeophyceae, Chordariales.

Introduction

The specimen, collected from Freycinet Island near Noumea in New Caledonia, the South Pacific, by *Grunow* in August 1884, was identified as *Eudesme flavescens* (ZANARD.) DE TONI by KUCKUCK (1929). Later, KYLIN (1940) studied same (?) specimen belonging to the Botanical Museum, University of Lund (LD, Herbarium AGARDH) in detail. He considered it was not *E. flavescens*, and settled a new species name, *Cladosiphon novae-caledoniae* KYLIN belonging to a new genus *Cladosiphon* KYLIN. However, as he has made no scientific description for the new species, I should make it based on the "type specimen" from LD and fresh materials collected by the author from New Caledonia in December 1987.

Materials and methods

Though KUCKUCK (1929) studied on the material in the Herbarium of Helgoland, KYLIN (1940) studied on it in LD. It can not be made sure now that these materials were the same specimen. All specimen in the Herbarium of Helgoland had been lost by British bombings in the World War II (KORNMANN, personal communication). Type specimen of LD (LD90/54-3104) was labelled *Castagnea flavescens* (? Type of *Cladosiphon novae-caledoniae* KYLIN) (Fig. 2A).

* 京都大学農学部熱帯農学専攻 鯉坂哲朗

Division of Tropical Agriculture, Faculty of Agriculture, Kyoto University, Kyoto 606, Japan.

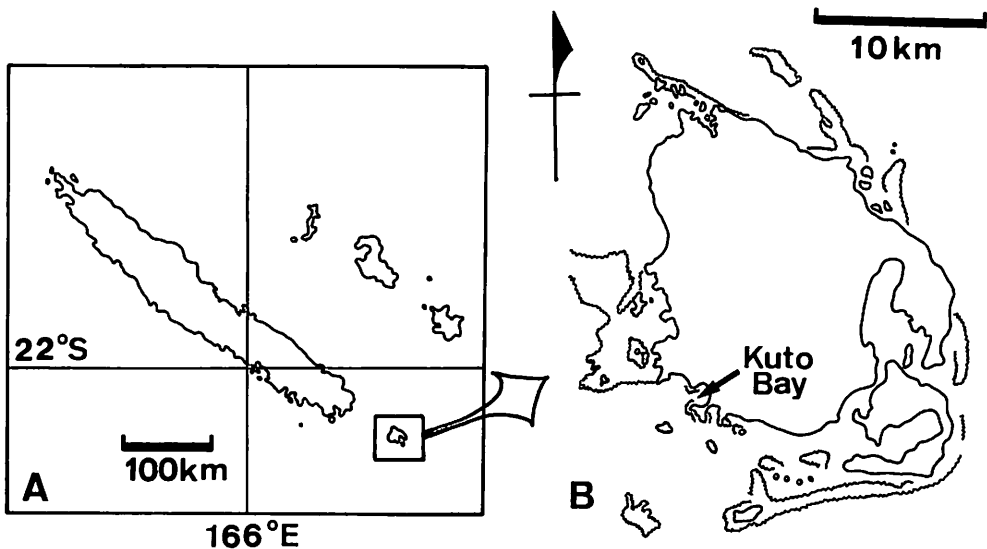


Fig. 1. Collection site (Kuto Bay) at Ile de Pins, New Caledonia. A: New Caledonia; B: Ile de Pins.

Natural growing fronds were collected from "Ile de Pins", south-east of main island of New Caledonia (19–23°S, 163–168°E) in December 19th, 1987. "Ile de Pins" is a small island surrounding by reefs. Fronds were collected at the sublittoral zone of Kuto Bay (Fig. 1).

The fronds were growing on the rocks in the subtidal zone. Near the bottom of Kuto Bay, in the depth of three to five meters, the fronds were usually drifting with *Zonaria* sp. and *Sargassum* sp. They were fallen from the substratum by the strong waves in this season. In Japanese *Cladosiphon*, *C. okamuranus* TOKIDA, we can see a same condition for its maturing periods (summer).

Morphological characters of these materials were studied in detail by a microscope in the laboratory and compared with those of other several species of *Cladosiphon* from Pacific Ocean.

Description

(Fig. 2, Fig. 3)

Cladosiphon novae-caledoniae KYLIN

Fronde erect, caespitose from a small discoid base, cylindrical, lubriciously, up to 30 cm high, 1 to 1.5 mm in diameter, moderately, irregularly alternately branched; central axis sympodial, polysiphonous, composed of cylindrical large cells (medullary layer cells), lengthwise, loosely, more or less parenchymatously arranged; subcortical layer very thin, consisting of 1 to 2 cells, divaricate transforming into the assimilatory filaments; assimilatory filaments of the cortical layer, 160–300 μm high, 10–30 cells long, the lower cells cylindrical, 7–8 μm in diam., the upper cells swollen, 8–10 μm in diam., strongly constricted at dissepiments, curved in the apical portion; hairs hyaline, 8–10 μm in diam., uniseriate with

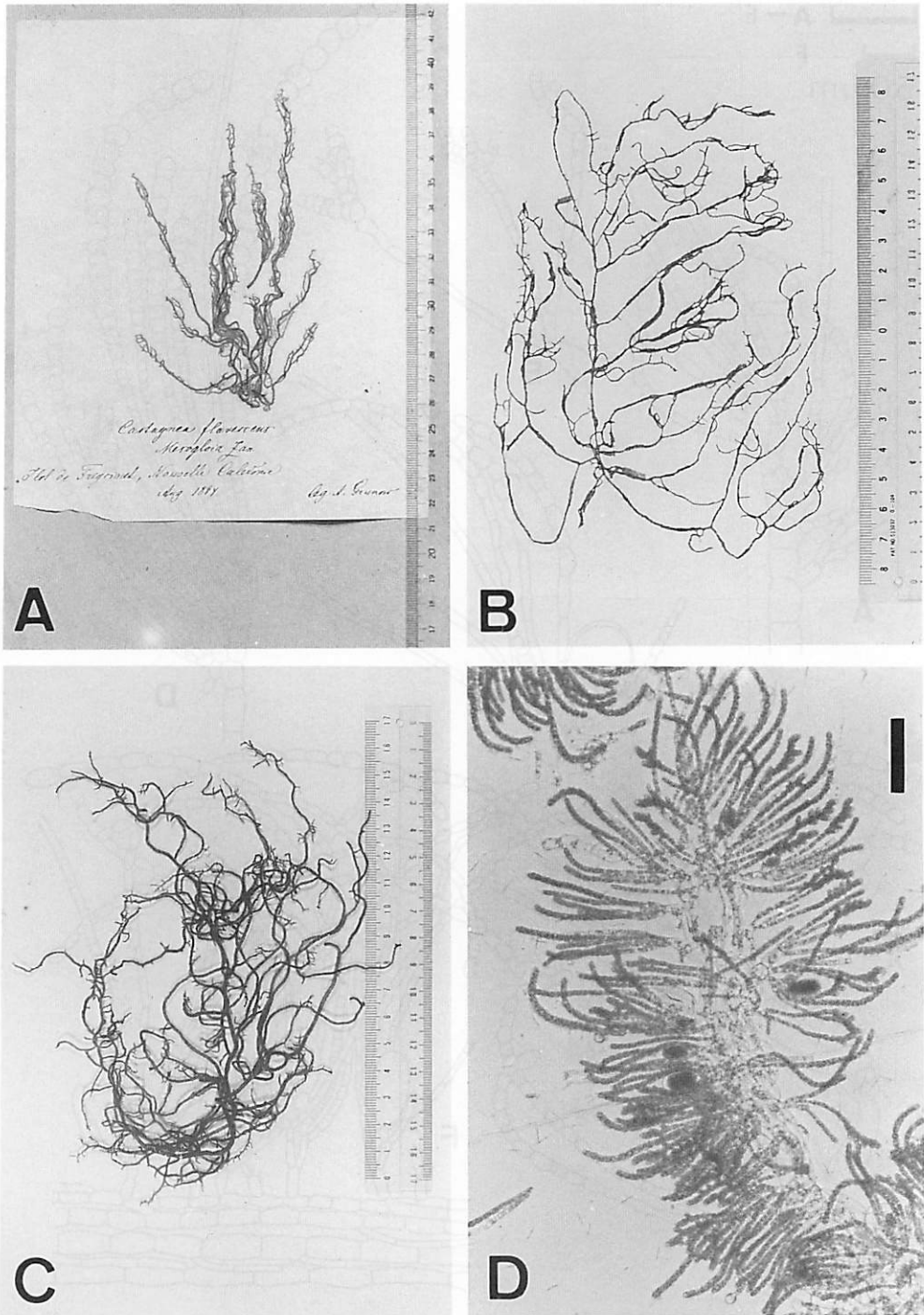


Fig. 2. *Cladosiphon novae-caledoniae* KYLIN. A: "type specimen" of LD (LD90/54-3104); B-D: fresh material (B), dried specimen (C) and tissue (D) of the frond, collected from New Caledonia in December 1987. Scale D=100 μ m.

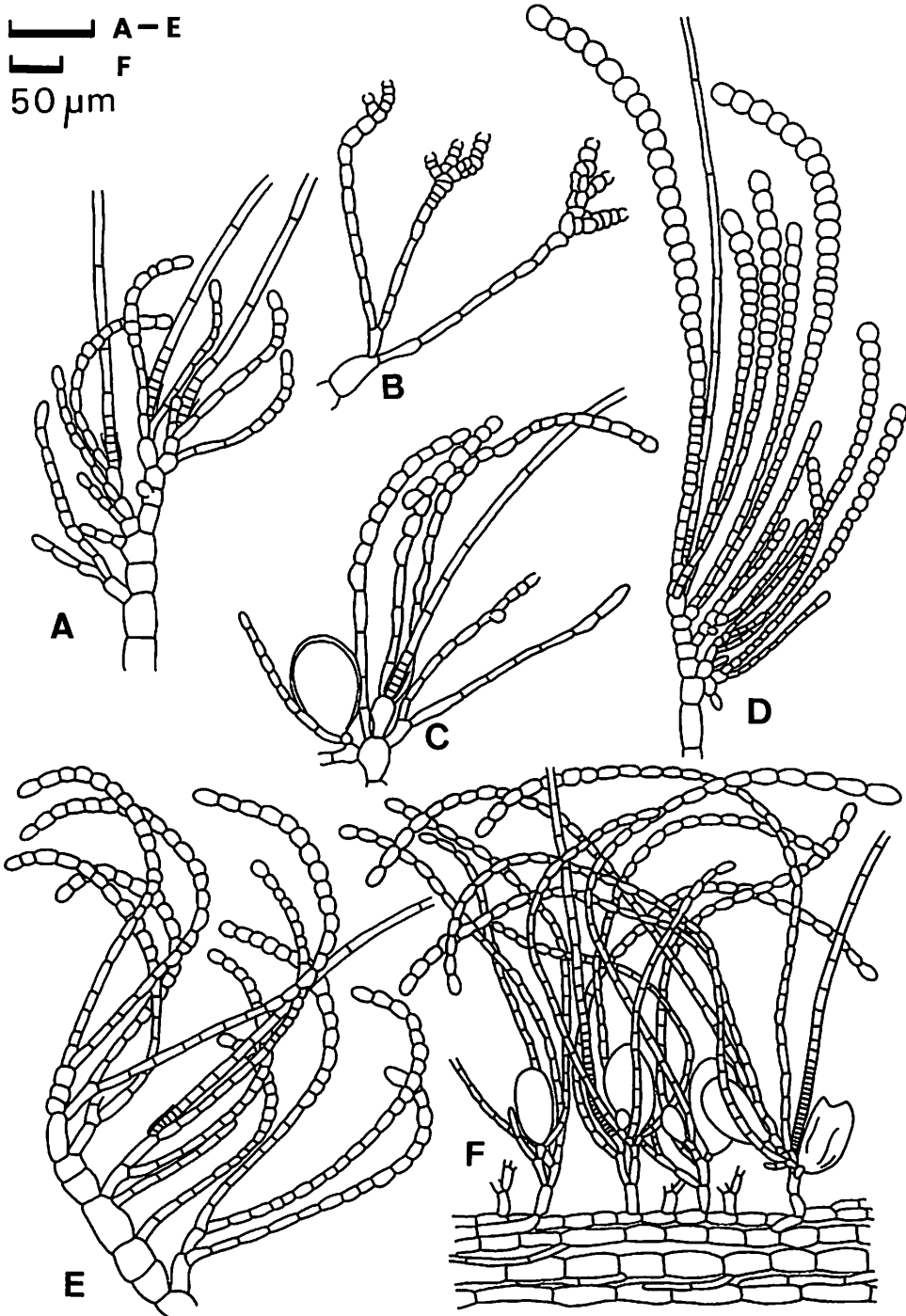


Fig. 3. Cortical layer of 4 species belonging to *Cladosiphon* from Pacific Ocean. A-C: *C. novae-caledoniae* KYLIN (A: a growing point, B: plurilocular sporangia, C: an unilocular sporangium); D: *C. sp.* from Kushimoto, Japan; E: *C. okamuranus* TOKIDA from Okinawa, Japan; F: *C. vermicularis* (J. AG.) KYLIN (after KUCKUCK 1929).

cylindrical cells covered with basal sheaths; unilocular sporangia borne on the basal part of the assimilatory filaments, elliptical-obovate, 50–55 μm in length, 25–30 μm in width; plurilocular sporangia transformed from the upper segments of the assimilatory filaments, seriate, at maturity with unilateral openings; both sporangia on the same individual; frond brownish in colour, closely adhering to paper when dried.

Discussions

As the subcortical layer of the species from New Caledonia was very thin (1–2 cells), it was identified as a member of the genus *Cladosiphon*, in the Chordariaceae, Chordariales.

Two species of *Cladosiphon*, *C. novae-caledoniae* and *C. okamuranus* have been reported from New Caledonia (GARRIGUE 1988). However, GARRIGUE recognized only the latter species from New Caledonia, because of no description of the former one (personal communication). The morphological characters of New Caledonian species were compared with those of *C. vermicularis* (J. AG.) KYLIN, growing along the coasts of southern Australia and New Zealand, *C. okamuranus* from Okinawa, southern part of Japan and *Cladosiphon*

Table 1. A comparative study of 4 species belonging to *Cladosiphon*.

	<i>C. novae-caledoniae</i> (New Caldeonia)	<i>C. vermicularis</i> (LINDAUER <i>et al.</i> 1961) (New Zealand)	<i>C. okamuranus</i> (INAGAKI 1958) (Okinawa, Japan)	<i>C. sp.</i> (Kushimoto, Japan)
frond				
height	10–30 cm	over 8 cm	20–25 cm	10–30 cm
thickness	1.0–1.5 mm		1.0–1.5 mm	1.5–2.5 mm
medullary layer				
cell length	80–400 μm	(50–100 μm)*	20–150 μm	50–120 μm
diam.	40–150 μm	33–44 μm	20–50 μm	15–20 μm
subcortical layer				
num. of cells	1–2 cells	(2–4 cells)*	1–3 cells	1–2 cells
cortical layer				
assimilatory filament				
length	160–300 μm	(350–500 μm)*	150–250 μm	540–840 μm
num. of cells	10–30 cells	25–30 cells	5–20 cells	40–90 cells
upper-cell (diam.)	8–10 μm	11–16 μm	10 μm	12–15 μm
lower-cell (diam.)	7–8 μm	6–11 μm	7–8 μm	6–8 μm
hair				
sheath	present	absent	present	absent
diam.	8–10 μm	10–12 μm	8–10 μm	6–12 μm
unilocular sporangium				
length	50–55 μm	77–92 μm	60 μm	60–110 μm
width	25–30 μm	44–55 μm	30 μm	25–50 μm
plurilocular sporangium				
	known	unknown	known	unknown

* Data from the material which was kindly sent by Dr. WOMERSLEY. Bicheno Tasmania 29, Dec. 1963. coll. A. W. OLSEN, ADU A 27062.

sp. from Kushimoto, middle part of Japan (Table 1). The species from New Caledonia resembled morphologically to *C. okamuranus* very much, but the former one was distinguished from the latter one by its larger medullary layer cells and the former's localized distribution.

Though it was very hard to make its clear observation, very thin subcortical layer and only plurilocular sporangia were observed in the "type specimen" of LD. The materials collected in 1987 from New Caledonia had unilocular and plurilocular sporangia on the same individual. However, some of the *Cladosiphon* species usually bear both sporangia only in summer season. I concluded that the material collected in 1987 should be identified as *C. novae-caledoniae* KYLIN.

In southern parts of Japan, the commercial mariculture of *C. okamuranus* for fresh foods "Okinawa-moduku" was completely established and developed into a big industry (7,000 wet metric tons in 1986). As the quality of New Caledonian species are very good, it has a potential for a new mariculture resource in New Caledonia.

Acknowledgements: I wish to express my sincere thanks to Dr. P. LASSEN in the Botanical Museum, University of Lund for kindly sending me the "type specimen". Thanks are also extended to Dr. L. O. BRUN and Dr. C. GARRIGUE in ORSTOM (Centre de Noumea) for useful informations about *Cladosiphon* in New Caledonia, and to Dr. H. B. S. WOMERSLEY in the University of Adelaide, for kindly sending me the frond of *C. vermicularis*. I should express sincere thanks to Dr. P. KORNMANN in Helgoland Marine Botanical Laboratory, for the information of KUCKUCK's specimen, and to Mr. T. THOMA in Okinawa Fisheries Station for useful informations about the mariculture of *C. okamuranus*.

References

- GARRIGUE, C. and TSUDA, R. T. 1988. Catalog of marine benthic algae from New Caledonia. *Micronesica*, 21: 53-70.
- INAGAKI, K. 1958. A systematic studies of the Chordariales from Japan and its vicinity. *Sci. Pap. Inst. Algol. Res., Fac. Sci. Hokkaido Univ.*, 4: 87-197.
- KUCKUCK, P. 1929. Fragmente einer Monographie der Phaeosporeen. *Biol. Anst. Helgol.*, 17: 1-91.
- KYLIN, H. 1940. Die Phaeophyceenordnung Chordariales. *Acta Univ. Lund N. F. Avd.* 2, 36: 1-67.
- LINDAUER, V. W., CHAPMAN, V. J. and AIKEN, M. 1961. The marine algae of New-Zealand. II: Phaeophyceae. *Nova Hedwigia*, 3: 129-350.

(Accepted July 1, 1991)