Bull. Toyama Pref. Fish. Res. Inst. No. 8, 21–24 (1996)

Unusual excrescences of nongeniculated coralline alga *Lithophyllum yessoense* (Rhodophyceae, Corallinales) in culture*

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(Accepted on March 29 1996)

Abstract

Two types of unusual excrescences were found on the top surface of cultured natural plants of the nongeniculated coralline algae, *Lithophyllum yessoense* (Rhodophyta, Corallinaceae) dominant on urchin-dominated barren ground. One was a leafy excrescence composed of axial and erect filaments derived from vegetative initials. This type closey resembled a regenerated thallus that occurs from fructure. The other was a cauliflower-like and warty excrescence composed of erect filaments only. The second type of excrescence was presumably a 'gall'. Excrescence formation is well known in the lithophylloid corallines, but the occurrence of these types are reported here for the first time.

Key words: Corallinales, *Lithophyllum yessoense,* nongeniculate coralline algae, unusual excrescence.

Lithopyllum yessoense Foslie (Foslie 1907, Adey *et al.* 1974) (Corallinales, Rhodophyta) is a temperate, perennial nongeniculate coralline alga dominant on 'Isoyake' (urchin-dominated barren) areas along the southwestern coast of Hokkaido (Noro *et al.* 1981, Fujita 1989). In previous culture studies, early development (Fujita 1989), epithallial shedding (Masaki *et al.* 1981, 1984) and regeneration (Fujita *et al.* 1992, Fujita 1992) have been examined. Recently, two types of unusual excrescences were found on natural plants cultured as stock for other uses in the laboratory. In the present paper, the morphology of these excrescences are reported.

Materials and Methods

The plants were collected from a barren ground at a depth of 2 m in Nagaiso, southwestern coast of Hokkaido on May 26, 1991, and brought alive in sea water to the laboratory in Namerikawa, Toyama. Thalli were cultured in filtered sea water (brought seperately, not sterilized). Culture dishes (12 cm diam.× 3 cm or 20 cm diam. × 5.5 cm) were placed under fluorescent light (12 : 12LD) in an incubator kept at 10℃. Specimens were fixed in 10 %

* Dedicated to Professors Tadao Yoshida and Masakazu Tatewaki on the occasion of their academic retirement.

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Contribution A No. 48 from the Toyama Prefectural Fisheries Research Institute.

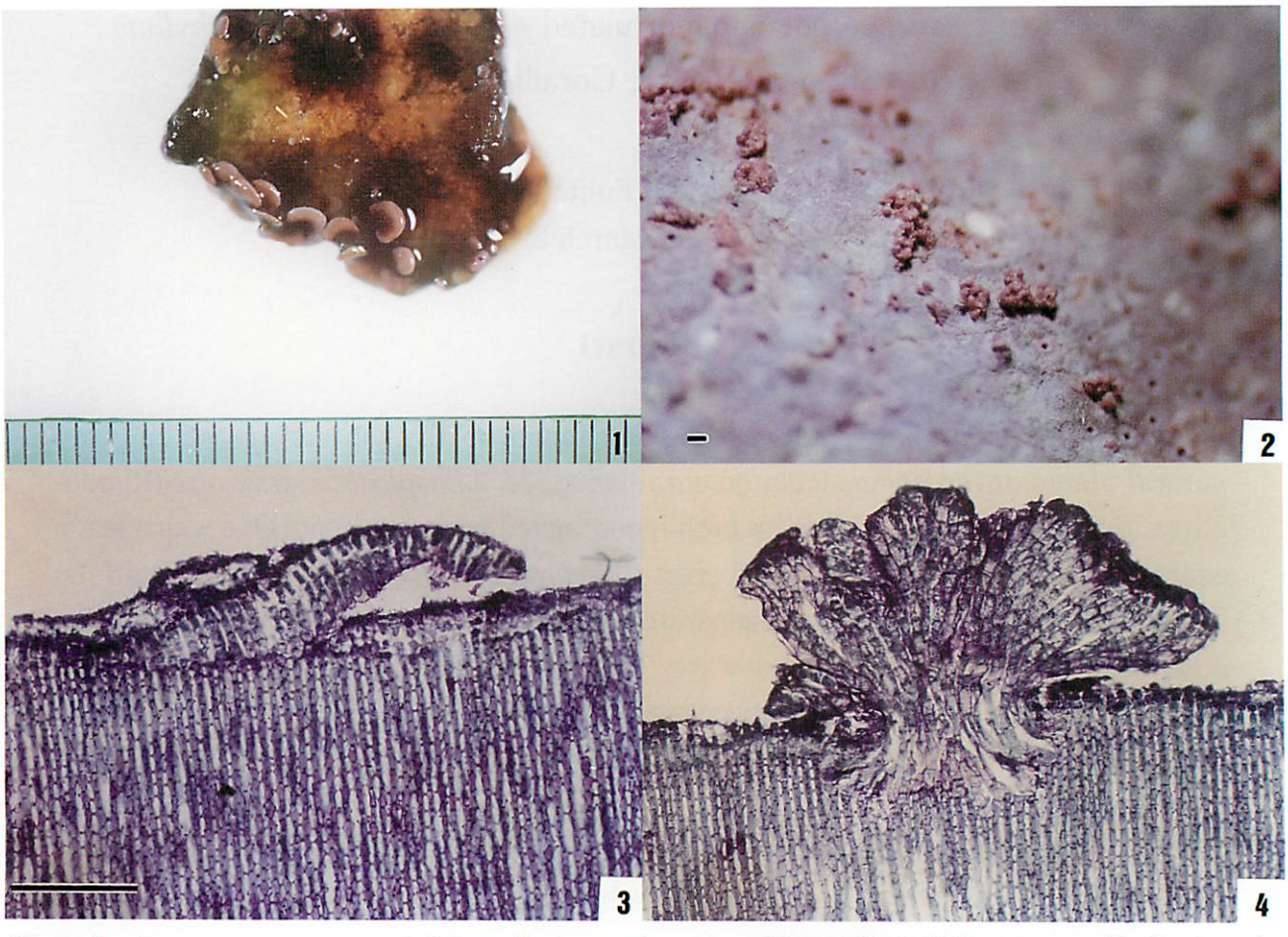

Fig. 1 Leafy excrescences generated from the top surface of a cultured plant of *L. yessoense*. (Scale : 1 mm)
Fig. 2 Light micrograph (LM) of longitudinal section through the margin of a leafy excrescence.
Fig. 3 Cauliflower-like warty excrescences generated from the top surface of a cultured plant of *L. yessoense*.
Fig. 4 Light micrograph (LM) of longitudinal section through the margin of a cauliflower-like warty excrescence.
Scale bars in Fig.2 and Fig.3 (also for Fig.4) = 100μm.

formalin, and decalcified in 0.6M HNO_3. Cross sections were made of paraffin-embedded specimens. Sections were stained with 1 % toluidine blue.

Results and Discussion

The unusual excrescences were found on the top surface of most thalli only in culture series whose sea water was not changed, but not in cultures whose seawater was changed weekly. Even in closed culture condition, where nutrients and oxgen were not supplied, all plants survived, and excrescences continued to grow for at least six months. Some plants were reproductively mature when culture started, but all of the unusual excrescences were vegetative only.

Two kinds of excrescences developed. One was leafy (Fig.1), and was upright or

prostrate on the surfaces of original plants. Leafy excrescences were dimerous in anatomy (Fig.2), the same as the original plants (Adey *et al*. 1974). Each excrescence was composed of erect (=postigenous) filaments that originated from axial (= primigenous) filaments. Secondary pit-connections were less abundant than in the original thallus, but were found in the basal part of the excrescence. Leafy excrescences developed from intercalary vegetative initials just below the epithallial cells. Leafy excrescences also developed on partially discoloured thalli, even when the thalli were extensively covered with filamentous bluegreen algae, and grew up to 3-4 mm in diameter after a half year.

The leafy excrescences differ from the autogenous crustose outgrowth of *Lithophyllum crouanii* (Chamberlain 1988), a species closely related to *L. yessoense* in lacking areal vegetative continuity with the original thallus. On the other hand, it was very similar to a regenerated thallus which covered a fracture of *L. yessoense* (Fujita *et al*. 1992).

The second type of excrescence was cauliflower-like and warty (Fig.3). These were monomerous, composed of erect filaments of larger columnar cells (Fig.4). Secondary pit-connections were also less abundant than in the main part of the thallus. The cauliflower-like excrescences developed from columnar cells below intercalary vegetative initials. The cauliflower-like excrescence may be a 'gall', which developed as a result of hypertrophy of columnar cells. The height of the excrescence was 1-2 mm at most after a half year.

The factors that induced the above kinds of excrescence development are not known. Moreover, such excrescenses have not been found in the field, in outdoor tank culture, in short-term culture of natural plants for the previous studies (Masaki *et al*. 1981, 1984, Fujita 1992a, b) and one-year cultures grown from tetraspores (Fujita 1990). The fate of these excrescences is also unknown, but the occurrence of these excrescences may be a new aspect of the great flexibility or vigorous life force of nongeniculate coralline algae. It calls to mind Chamberlain's statement (Chamberlain 1988) that " ····the development of such outgrowths on lithophylloid algae may be quite a common occurrence.".

Acknowledgement

I am grateful to Dr. Wm. J. Woelkerling for his critical reading of the manuscript.

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エゾイシゴロモの培養藻体に生じた異常突出物

磯焼け地帯に繁茂する無節サンゴモの1種エゾイシゴロモ（紅藻，サンゴモ目）を採取し，恒温器内で換水せずに培養したところ，藻体表面に2種類の異常突出物を生じた。1つは分裂細胞から生じた葉状の突出物で，初生的細胞糸と後生的細胞糸から成り，藻体の破砕面に生じる再生体と酷似していた。もう1つは分裂細胞よりも下の中層細胞から生じたカリフラワー状の突出物で，後生的細胞糸だけで構成されており，腫瘍とみなされた。イシゴロモ属では突出物の形成がふつうに知られているが，今回報告した2種類の異常突出物は今までに知られていない型のものである。