

The occurrence of *Zonaria stipitata* on the southern coasts of Taiwan

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Zonaria stipitata was erected by TANAKA and NOZAWA in 1962 based on the specimens collected at Tanegashima, a small island situated at the southwestern part of Japan. This brown alga is a tropical, subtropical to warm temperate, deep water species found in the southwestern islands of Japan, Ryukyu Islands (TANAKA and NOZAWA 1962), South Vietnam (TANAKA and NOZAWA 1962, HO 1969) and Guam (TSUDA 1972).

During three independent diving surveys on the southern part of Taiwan by Dr. YING-MING CHEN of the Department of Geology, National Taiwan University, at Siaoliuchiu Island on September 9, 1972 and Mr. C. S. CHEN and Miss J. E. LEWIS of the Institute of Zoology, Academia Sinica at Wanlitung, Pingtung Hsien on February 19, 1977 and Lanyeu Island on December 12, 1979 respectively, many specimens of this brown alga were collected at depths of 5 to 20 meters and sent to the writers. Subsequent examinations of the thalli showed that they possess some characters which had not been mentioned in the original descriptions or elsewhere of this alga. The plants at hand reach 5 cm high, growing from a perennial felted rhizoidal base which is up to 1 cm across and 0.5 cm in thickness. From the base arise several cylindrical, slender stalks up to 1.5 cm high. Stalks are usually simple but may occasionally give rise to form one to a few laterals. They are smooth at first, later usually becoming covered with many brown hairs. The stalk is composed of comparatively thick-walled cells which are subspherical to polygonal in the cortical

region and cylindrical in the median portion.

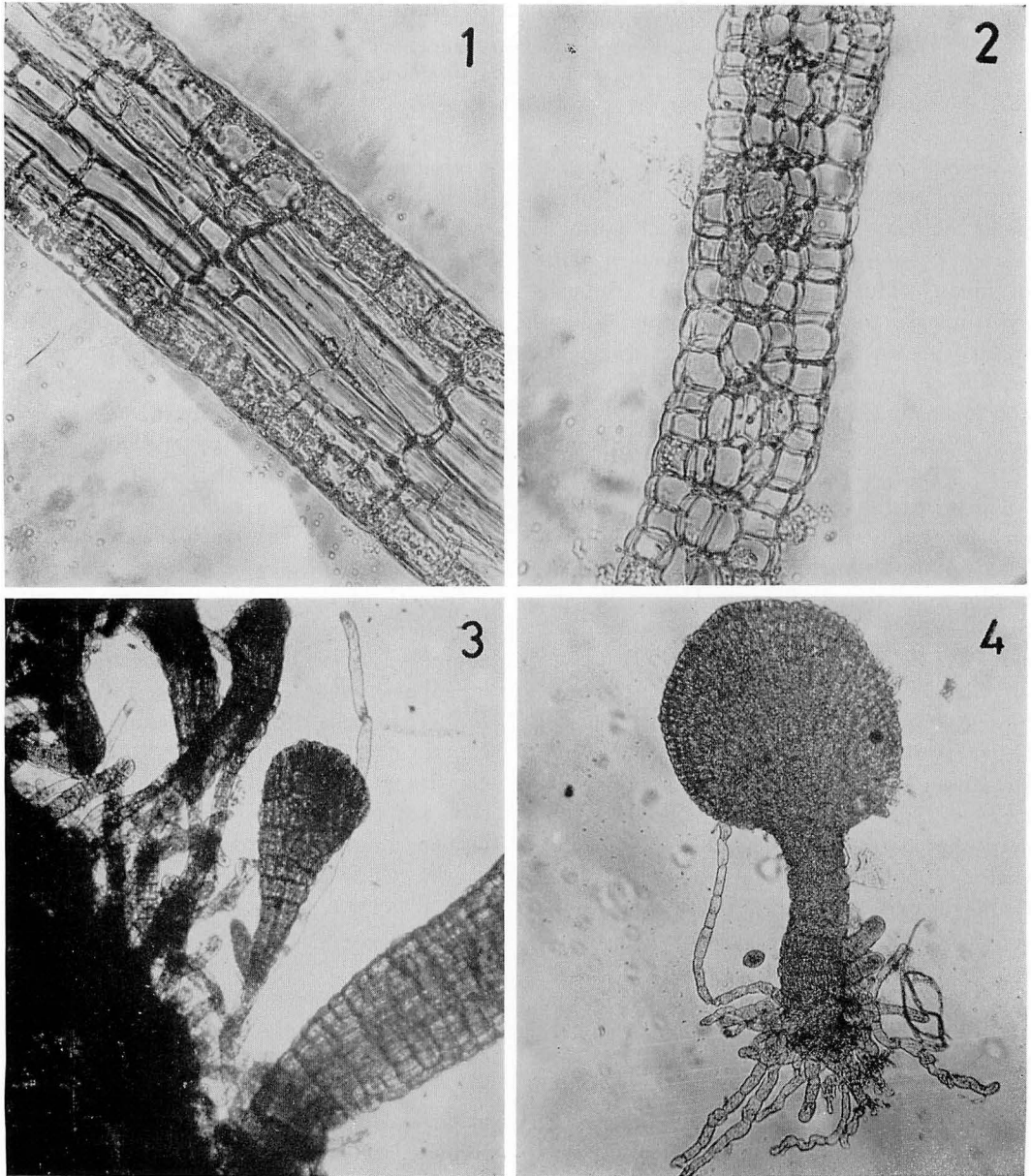
From the top of each stalk arises a membranous blade. The blade is fan-shaped at first, later becoming lobed or lacinate by splitting. Both surfaces of the blade are usually smooth; neither concentric bands of hairs nor veins are present. But in some mature blades, there are rows of brown hairs on the abaxial side of the blade extending from the basal portion to the upper portion in radial directions, and these look like veins on blade when they grow thicker.

Growth of the thallus is by means of a peripheral series of initials. The blade is composed of a layer of epiderms and a medulla of two or more layers of cells. Epidermal cells are cubic to cylindrical and contain many subspherical chromatophores. On the margin of the blade the medullary cells are large and elongated (Fig. 1), but become shorter toward the central portion of the blade (Fig. 2). Therefore, at the central portion of the blade the medullary cells are cuboidal in shape. In a transverse section of a frond it will often be seen that in width, several epidermal cells correspond to a single medullary cell on the margin of the blade (Fig. 1). But progressing toward the median portion of the blade, only one or two epidermal cells correspond to each medullary cell in width (Fig. 2). The margins of young blades are smooth, but as they grow older, some of the marginal initial cells divide periclinally to form filaments (Fig. 3). These filaments are simple, uniseriate, and with chromatophores, but in rare cases they may branch

sparingly.

Of particular significance was the formation of gemmae (Fig. 3) along the margin of the thallus. The gemmae originate either from the apical or cells in the me-

dian portion of the filaments which are produced from the edge of the blade, especially from those on the older or damaged portions. The first division of the gemmae initial is transverse. Gemmae are fan-



Figs. 1-4. *Zonaria stipitata* TANAKA et NOZAWA.

1. A transverse section through the marginal part of the thallus $\times 300$.
2. A transverse section through the median part of the thallus $\times 200$.
3. A portion of the thallus, showing filaments and various stages of gemmae growing out from the margin of the thallus $\times 60$.
4. A mature gemmae separated from a thallus $\times 30$.

shaped with long, uniseriate or multiseriate stalks (Fig. 3). It seems that further development of blade, stalk and basal portion may cause detachment of the mature gemmae from the mother plant (Fig. 4). KUMAGAE (1977) reported that the same kind of gemmae formation was observed in two other species of Dictyotaceae, *Zonaria diesingiana* J. AGARDH and *Pachydictyon coriaceum* (HOLMES) OKAMURA and under cultural experiment the gemmae grew into adult thalli.

No reproductive organs were observed in any of our specimens. Therefore, from the specimens at hand and the reports of TANAKA and NOZAWA (1962), HO (1969) and TSUDA (1972), it seems that the formation of reproductive organs rarely, if ever, occurs. Gemmae formation appears to be common and may be the only method of propagation in nature.

Acknowledgement

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江永棉・周宏農：台湾産のエツキシマオオギについて

エツキシマオオギ *Zonaria stipitata* TANAKA et NOZAWA が台湾南部の地点から採集された。この標本には生殖細胞の形成はみられなかった。葉体の縁辺から生ずる一列細胞糸に無性芽が生じているのが観察された。天然ではこの無性芽によって繁殖していると考えられる。(中華民國台北市 國立台湾大学海洋研究所)