On *Caulerpa anceps*, Harv.

By

K. Yendo, *Rigakushi*.

Dr. Okamura has collected a species of *Caulerpa* in the province of Boshū and identified it with *Caulerpa brachypus*, Harv. The details of the character are well described in the Botanical Magazine.¹⁾ Afterwards he corrected his former determination and referred it to *C. anceps*, Harv.²⁾

The original plant of *C. brachypus* has been first collected by Charles Wright in Japan and described by Harvey; and *C. anceps* was known from the Friendly Islands. The principal characters to distinguish them were on the points that *C. brachypus* has thicker frond with its base and apex obtuse, while *C. anceps* has thinner frond and the both ends tapering. These characters, however, are highly variable and seem to have less morphological value as Weber van Bosse has already remarked.³⁾ The last author described a new species with the name of *C. Stahlii*. It is closely related to *C. anceps* but separated by having conspicuous serrature and many proliferations. These characters also, in my opinion, seem to be unfixd.

The present writer found a small reef in the sea at the Marine Biological Station at Misaki. It is about a fathom below low water mark and covered with the thick vegetation of *Caulerpa* with exclusive of other plant. The first collection on the reef has been made in October, 1898. I identified the plant with *C. brachypus*. Collections have been repeatedly made on the same reef at different seasons of the following years leaving always a portion of the vegetation for the future. I noticed that the specimens collected in summer were much more applicable to *C. anceps* while those in winter, to *C. brachypus*.

A doubt occurred to me that if two species might have been growing on the reef. To solve the problem I observed and collected the plant by diving myself in Jan., Apr., July-Aug., Oct., and Dec. No doubt is at present left that the plant assumed the different appearances according to the season.

1. Botanical Magazine, Tokyo. vol. XIII.

2. Alg. Japonicæ Exsiccæ, fasc. I. No. 47.

3. Monog. d. Caulerpes. p. 277.

The specimens collected in July and August (this I would call summer form) have the fronds lineari-spathulate with obscure serrature. The

thickness of the fronds measures 0.2–0.25 mm. and the edge is more or less ancipitous. In a plant about 16 cm. long the fronds growing face to face were counted 4 pairs among 23 fronds. The margins of the fronds, though apparently unserrated, showed minute dentation with small but sharp teeth (fig. 3). The cellwall at the spinous region is much thicker than at sinus. In some fronds they were more or less regularly arranged each at a distance ranging from 1. to 1.5 mm. Some were absolutely smooth. The young fronds are mostly simple (fig. 2.) but the matured ones have the proliferations on the surface

as well as the margins. (fig. 1).

The specimens collected in December have a very robust appearance (this I would call winter form). The full grown fronds measure about 6–7 mm. in the breadth and as high as 3 cm. with the both ends obtuse (fig. 4). The fronds bifurcate, or give off proliferations more at the margin than from the surface. Some of the fronds are found standing oppositely. The serrature is highly distinct in the adult fronds, each tooth at a distance of 1.5–2.5 mm. The cellwall is, as in the summer form, more thickened at the spinous region than at the sinus (fig. 5). In the proliferated fronds they are not so conspicuous as the mother fronds, and are similar in appearance to the case of the summer form. Thickness of the fronds measures 0.35–0.4 mm. with round edge.

The summer form gradually changes into the winter form at the beginning of autumn. The fronds become thicker and thicker, the dentations gently conspicuous. The winter form withers late in March as Misaki. In April the fronds are mostly found near at the growing regions of the

stolons. The old parts of the stolons are almost always naked but provided with number of scars, apparently wart-like processes, which must have been the pedicels of the thick winter fronds.

The alternative change of the form regularly takes place at Misaki. But in the other localities the rule seems to be little modified according to the climate and the conditions of the place where the plant grows. Those plants collected at Sunosaki in December were quite similar with those collected at Misaki in October: those at Shiomisaki in April were entirely wanting of the serrature and had the fronds lineari-spathulate. The specimens collected in a high tide pool at Tateyama, near Sunosaki, in December had the serrature quite obscure and the frond robust—the typical form of *C. brachypus*.

These facts lead us to believe that the seasonal dimorphism in a sense might occur in *Caulerpa*. The season only, however, is not the factor to cause the change, but the conditions of the environs have also some influence upon it. This is proved by the case of Tateyama.

C. anceps, *C. brachypus*, and *C. Stahliei* are closely related to one another. The principal characters to distinguish them, with those grouped in the section *Phyllantoideae* J. Ag., as formerly remarked, lie on the proliferation, the serrature, the thickness and shape of the fronds. These characters are highly variable and by no means serviceable to separate the species, as Weber v. Bosse has already mentioned.¹⁾ The three species above mentioned which are separated by the slight differences of these characters become naturally doubtful.

A special character of our plant seems to have been overlooked by the former observers

1. Mon. d. Caul. p. 277.

It is the bullation of the short pedicels. The pedicels are sometimes nearly wanting but mostly measure 1-2 mm., and often as long as 3 mm. They are sharply constricted at the point of insertion to the stolon and again at the base of the frond so as to retain an orange or club shaped pedicel (fig. 1, 2 & 4). The proliferations when they occur on the surface of the fronds have also the characteristic bullated pedicels and the segments pronounced from the margins of the fronds have mostly none of them.

This character is constantly found in our plant through the year, although the proliferation, dentation and the external appearance of the fronds might undergo any modification. It is clearly visible in the fresh material or those preserved in an aqueous reagent. In the dried specimens the character is liable to be overlooked if not noticed beforehand. Especially in the dried specimens of summer form it is very often hardly visible before dipping in water. This is owing to its extreme delicacy of the cellwall.

I wrote to Weber v. Bosse for a bit of *C. Stahlia* in order to compare it with our plants. She was so kind as to send me the original specimen of Pl. XXII. fig. 4. of her excellent work, Monographie des Caulerpes, for examination. It is alcoholic specimen preserved in a very good state. In

it, the shape of the fronds show quite similar character with ours but the bullated pedicel was not to be detected. The teeth of the serrature are arranged at nearly similar intervals with *C. brachypus* but they are more blunt at the apices (fig. 6). No special thickening of the cellwall could be found at the teeth.

I am sorry to say that Harvey's authentic specimens of both *C. brachypus* and *C. anceps* are not accessible to me. And we are not sure whether *C. anceps* from Japan and Friendly Islands are the same species or not. Though *C. brachypus* has been defined "à bord uné rétrécie par endroits," I have no doubt that the plant collected at Misaki belongs to it. Fig. 2a. Pl. XXII. in the Monograph, which was reproduced from the original specimen shows one of the fronds with much swollen pedicel. Would it be rather speculative to suppose if the other fronds in the figure might have been provided with similar character?

C. Stahlia might be easily separated from *C. brachypus* by wanting the bullated pedicel. If *C. anceps* of Friendly Islands had not been

provided with the characteristic pedicel, *C. Stahliei* must be reduced to it; and *C. anceps* must be taken away from the list of Japanese algæ. If, on the other hand, the plant from the Friendly Islands had bullated pedicels it is nothing but same species to *C. brachypus*. Weber von Bosse remarks. "Avant de décider la question si le brachypus est une forme du *C. anceps*, comme on serait enclin à le croire, il faudrait encore en avoir vu d'autres exemplaires."¹⁾ This would be decided by examining the original specimen of Friendly Islands if the pedicels were bullated or not.

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Notes on Some Himalayan Plants collected by the Rev. Keikai Kawaguchi in 1902.

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The Rev. Keikai Kawaguchi, a Buddhist priest of the Wōbaku Sect, whose indefatigable journey to Lhasa, the capital of Tibet, is now well-known in this country, was so fortunate as to collect some plants on his way back from that capital to Japan, in December, 1902, in the vicinity of Darjeeling in Sikkim Himalaya. Unfortunately, all the specimens collected by the reverend gentleman being sterile and, indeed, most of them consisting only of detached leaves, their determination is extremely difficult for us, as there exists at present no collection of Himalayan plants for reference in the herbaria in Tōkyō; but no pains have been spared to make them botanically accurate. Since, however, they represent the first collection of Himalayan plants hitherto made by the Japanese, and, moreover, notwithstanding the great distance between Japan and the Himalayas, they contain some interesting species which seem to indicate a close affinity between the floras of these two regions, it may not therefore be

1. Monogr. p. 281.