Phycological Observations III

On the juvenile thallus and the renovation of lamina of *Arthrothamnus kurilensis* RUPR.

By

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With 5 text-figures

Arthrothamnus kurilensis RUPR. is one of our most interesting endemic species growing restrictively in the middle Kuriles and the so-called MAKAROV's spot[1] in southern Saghalien. Since RUPRECHT[2] established the species, our knowledge concerning its morphology has been almost limited to the mature form found from summer to autumn. In last April the author had a good fortune to collect a late spring form in the vicinity of Cape Notoro, Saghalien. In the collection are found a quite young stage of the species still remaining without auricles, as well as the older ones renovating their blades.

The young plants before us measure 55–70 cm. in height, and 8–12.2 cm. in width in the broadest portion of the lamina. The rhizoidal hapteres are rater thick, somewhat complanate, dichotomously branched, and arise verticillately at the base of the stipe. The stipe is very short, cylindrical below, and compressed above. The lamina is broadly oblanceolate in shape, gradually attenuated toward the base, more or less deeply split into several narrow segments in the upper portion, and with a row of rough bullae along both sides of the median fascia. The bullation has been observed by Dr. K. YENDO[3] and Dr. Y. YAMADA[4] in *Arthrothamnus bifidus* (GMEL.) J. AG. on the newly formed lamina of an old frond. In the species under consideration, the bullation is always present on the primary lamina while young, as mentioned above,

1) Cf. MIYABE, K., On the Occurrence of a Certain Behring and Kurile Species of Laminariaceae in a Small Isolated Region off the Southern Extremity of Saghalien. (Proc. Third Pan-Pacific Sci. Congr., Tokyo, 1926, p. 954).

2) RUPRECHT, F. J., Bemerkungen über den Bau und das Wachsthum einiger grossen Algen-Stämme etc. (Mém. de l'Acad. Imp. des Sci. Nat., vol. 6, 1848).

3) YENDO, K., *Hedophyllum spirale*, sp. nov. and its relation to Thalassiophyllum and Arthrothamnus. (Bot. Mag., Tokyo, vol. 17, p. 165, 1903).

4) YAMADA, Y., On *Arthrothamnus bifidus* J. AG. (*in Japanese*). (Journ. Jap. Bot., vol. 10, no. 11, p. 732, figs. 1–2, 1934).

Fig. 1. *Arthrothamnus kurilensis* RUPR.
From a photograph of a group of young plants.

usually disappearing as the lamina grows larger, but sometimes persistent as shown in Fig. 5a. The mucilage lacunae are present in both hapteres and lamina but absent from the stipe. On close examination it was revealed that in general the primary stipe lacks the lacunae in the lower half of its length, and the secondary as well as the successive stems are also destitute of them at least in the lowermost portion just above the scar, that is to say in the portion belonged to the stipe proper. On the other hand, the upper half of

the stems is originally the basal portion of a lamina, and it is no wonder that the lacunae should be present there.

As to the process of renovation of lamina it is essentially the same as in the case of *Arthrothamnus bifidus* which has been studied by Dr. YAMADA[1]. The so-called auricle at the base of the lamina of a summer plant is shown

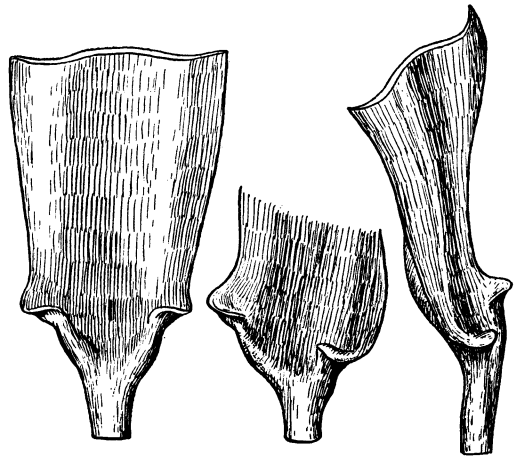


Fig. 2. *Arthrothamnus kurilensis* RUPR.
Habit sketches of the basal portion of a lamina of a summer plant collected in July 1932, at Cape Notoro. Reduced.

in Fig. 2. It is a marginal outgrowth of the lamina at the transition region, scrolled inside for one turn. The auricle is not itself the initial of a new shoot, but its margin develops in winter into a thin leaflet, fairly auriculate in shape, up to 5 cm. in length, 2.5 cm. in width, usually furnished with a row of irregular bullae. As season advances the auricle first begins to wear away and then the old lamina, leaving their scars on the stems. In some of our specimens the auricles are already partially worn away. The basal margin of the lamina is gradually thickened in the portion beneath the auricle so as to become almost cylindrical, and constitutes later on the basal part of a new stem which grows out at the axil between the inner edge of the auricle and the lamina. In other words, the new shoot springs out at the summit of the thickening margin of the lamina base as will be understood by Fig. 4b. In that figure the old lamina and the two new ones are all shown to be depressed on the same surface. In the natural state, as the result of the scrolling, the surface of the

1) YAMADA, Y., 1934. *l. c.*

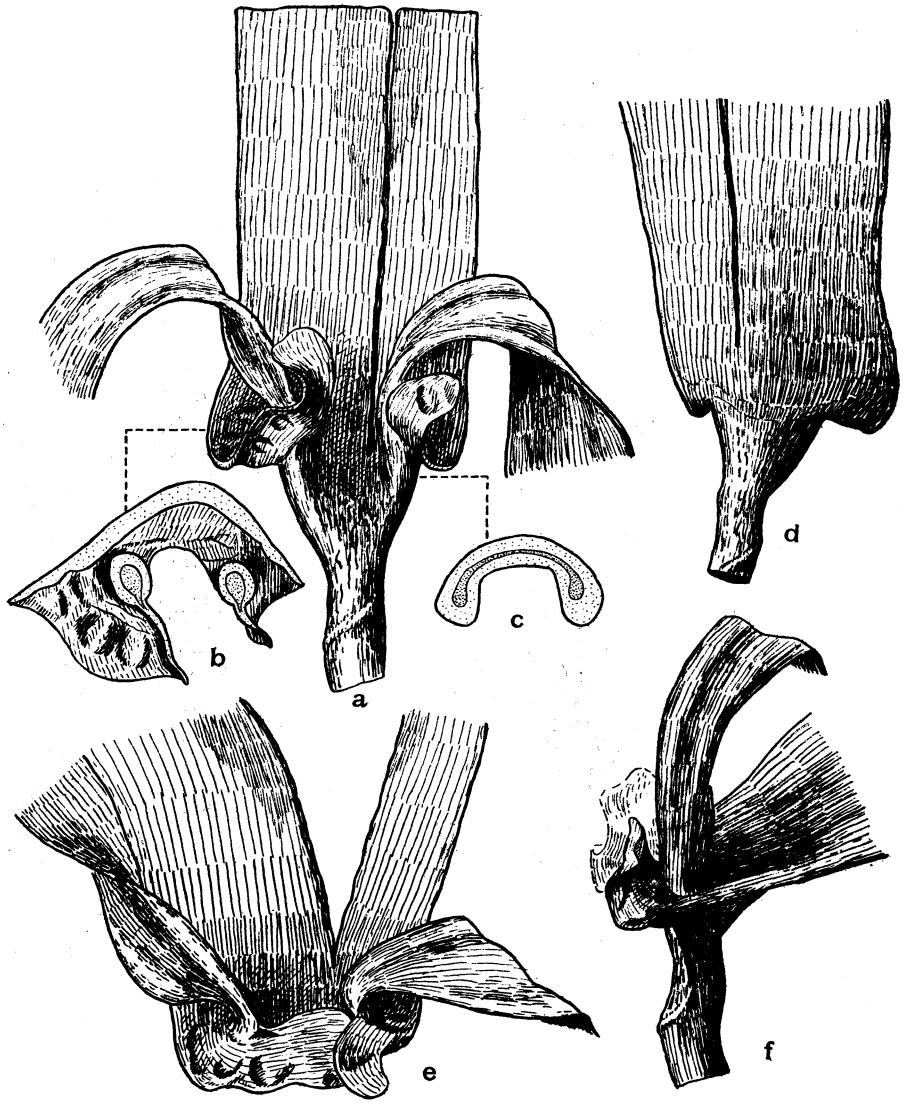


Fig. 3. *Arthrothamnus kurilensis* RUPR.

Habit sketches of the basal portion of an old lamina detached from a several years old plant collected in April 1937, at Cape Notoro, showing the full grown auricles and the new laminae. Reduced.

a. Seen from the upper surface; b & c. Cross sections through the transition region at two different leveles; d. Seen from the under surface; e. Seen from above, showing the connection between the suricles and the new lamina; f. Side view.

new lamina is often nearly perpendicular to that of the old lamina, with the depressed surface facing outside. Rarely, the new lamina gets twisted for one more turn at its basal portion as shown in Fig. 4 a. The relative position of these laminae can be also recognized in the illustration of Dr. K. OKAMURA in his Icones of Japanese Algae, vol. 5, no. 6, pl. 228. In his plant, which represents a more advanced stage of development as compared with our plant, the auricles have entirely fallen off from the base of the old lamina and the new auricles are already recognizable in the lower portion of the new laminae. The new lamina of our plants dose not form auricles yet, and in early stages it resembles so closely the young primary lamina above described in having two rows of the bullae and several segments split downward from the apex,

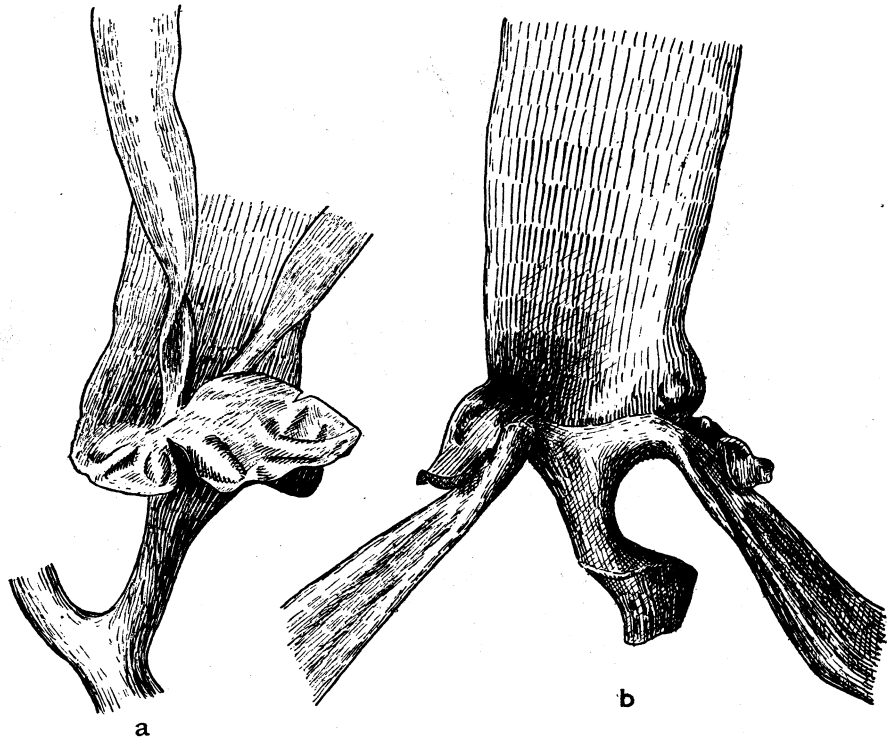
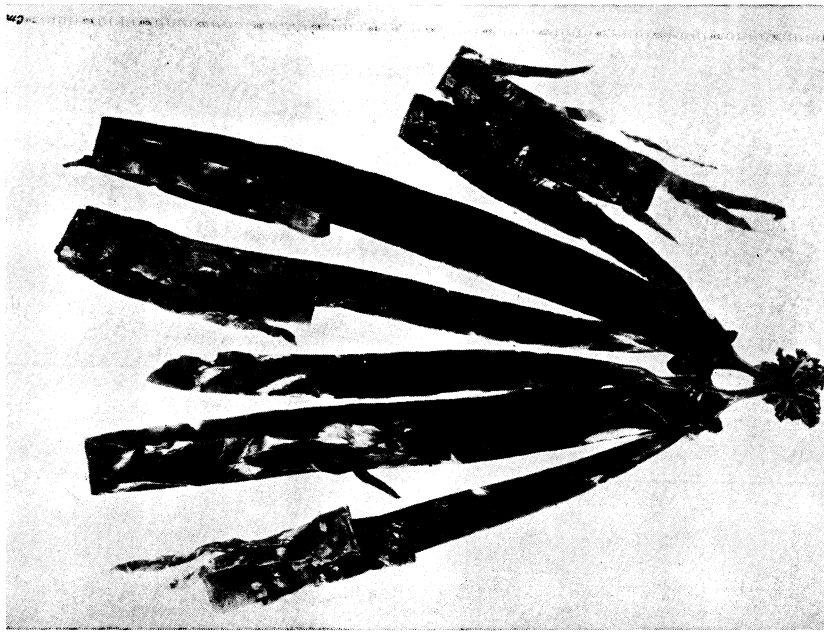


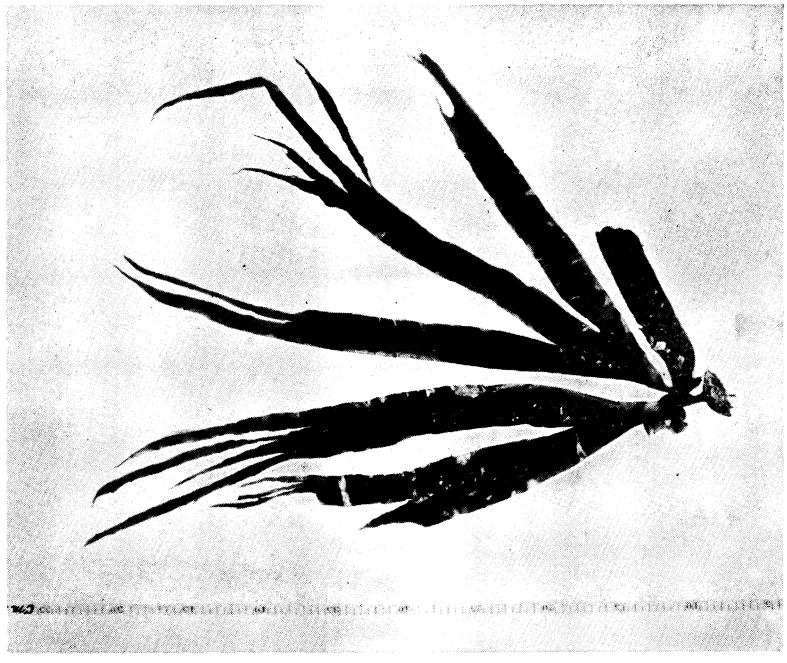
Fig. 4. *Arthrothamnus kurilensis* RUPR.

Habit sketch of the basal portion of two old laminae. Reduced.

a. Showing a large auricle and a new lamina twisted at its basal portion; b. Showing the continuity between the thickened basal margin of the old lamina and the new stems. To draw the figure b, the plant was stretched by force unrolling the inwardly scrolled portion beneath each auricle.



b



a

Fig. 5. *Arthrothamnus kurilensis* RUPR.
a. From a photograph of a 2-years old plant.
b. From a photograph of a 3-years old plant.

from which we can refer without hesitation our young plant as that of the present species. (Cf. Fig. 1 & 5 a). Such a digitate form was found growing near the low water mark and we are uncertain whether it is a normal form of the juvenile lamina of this species or not.

Accompanied with the renovation of lamina a whorl of several thick hapterer appears at the base of the primary stipe, entirely covering the old holdfast. (Cf. Fig. 5 b).

In conclusion, the writer wishes to acknowledge his indebtedness for the fund granted by the Hattori Hôkôkai for collecting a part of the materials devoted to the present study. His hearty thanks are also due to Emeritus Prof. K. MIYABE for his valuable suggestions.

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摘　　要

藻　類　觀　察　III

チシマネコアシコンブの幼体並に葉部の更新に就て

チシマネコアシコンブの形態は從來、夏季採集の材料に就て知るのみであつたが、昭和十二年四月下旬、樺太西能登呂岬附近で、本種の耳形体形成前の幼体と葉部更新中の成体とを採集することが出來たので、其等の形態を記述した。