Note on the Tetrasporic Form of *Gigartina alveata.*

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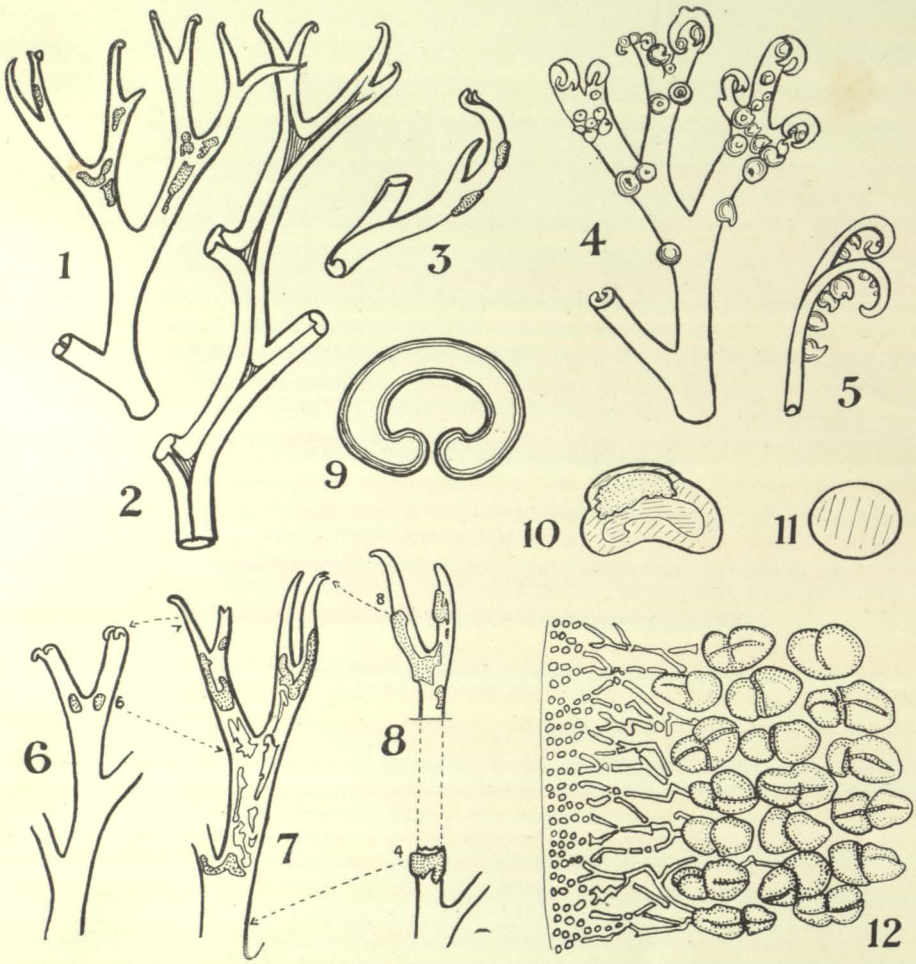
Setchell and Gardner (1933, p. 282), speaking of the sub-genus *Mastocarpus,* note that although cystocarpic and antheridial plants of the Algae belonging to that sub-genus are found in abundance and are so generally distributed, it is a remarkable fact that not a single tetrasporic plant has been recorded in spite of the careful search that has been made for them. The authors even put forward the suggestion that this type of reproduction may be absent in the sub-genus. Again, the same authors (1934, p. 132), referring to *Mastocarpus,* state: "Soris tetrasporangiis nondum visis, probabiliter defectis."

Owing to the desirability of making further observations of the New Zealand plants belonging to this group, and to the fact that some question has always existed as to the exact position of the *Alveatae* in relation to *Gigartina* and *Chondrus,* which might be settled to some extent were tetrasporic material available, the writer has used every endeavour to isolate the tetrasporic plant of *Gigartina alveata* (Turn.) J. Ag. in order to provide the material necessary for the researches of Dr. W. A. Setchell, of California, and Mr. R. M. Laing, of New Zealand.

Although diligent search for some years proved unsuccessful, the writer was rewarded in March, 1937, when the first material was discovered at Long Beach, Russell, Bay of Islands. More specimens were found in the same locality in April and May of that year, while in July a few plants were collected at Takou Bay between the Bay of Islands and Whangaroa, and later, in December, at Ahipara, near the Ninety Mile Beach. No specimens appeared in 1938, but in February and March of this year (1939) rich material was again present at Long Beach.

Description: In general appearance the tetrasporic plants of *G. alveata* resemble the cystocarpic very closely, the branching being strictly dichotomous, the frond palmate, and the tips flabellate. The latter, however, have a tendency to stand erect, although the tip finally incurves, more or less. Juvenile and sterile fronds scarcely differ from those of cystocarpic plants. Tufts of tetrasporic plants have, however, a tentacular appearance at the tips, while in texture the thallus is softer and less rigid to the feel, so that in collecting they may be readily distinguished by that characteristic alone.

The tetrasporic sori: Sporangia first make their appearance in one or more small, oval, raised pustules of a dark sienna colour on the convex side of the frond below the upper forks, generally about the fifth dichotomy. The sori gradually extend upwards and downwards (as the plant grows and adds to its dichotomies), becoming largish patches well raised above the surface of the frond. After the liberation of the spores scars are left in place of the sori, but new



Gigartina alveata (Turn.) J. Ag.

FIG. 1.—Habit sketch of fragment of tetrasporic plant, convex side, showing sori. × 2. FIG. 2.—Sketch of channelled side. × 2. FIG. 3.—Side view of tip of frond bearing sori. × 2. FIG. 4.—Habit sketch of cystocarpic plant for comparison with Fig. 1. × 2. FIG. 5.—Tip of cystocarpic frond, side view, for comparison with Fig. 3. × 2. FIG. 6-8.—Sketches illustrating the progressive extension of the sori upwards and downwards. (Fig. 6.—The first sori appear in this specimen at the base of the sixth dichotomy. Fig. 7.—Frond has increased in length, sori have spread, leaving spent portion between. Fig. 8.—Sori have extended to the ultimate dichotomy above and to the fourth below, where severance has taken place, leaving new sorus band at 4.) FIG. 9.—Cross section of frond at first dichotomy. × 10. FIG. 10.—Cross section of tetrasporic thallus at 7th dichotomy. × 10. FIG. 11.—Cross section of basal part of frond. × 10. FIG. 12.—Cross section showing cruciate tetraspores densely aggregated. × 120.

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sori appear extending to the very tip of the frond. The " spent " portion of the frond has, in the meantime, begun to disintegrate and has acquired a greenish-yellow colour, and here severance takes place at the inferior end, leaving a sorus band at the tip of the standing portion. It will be noticed that the tetrasporangial sori are present only on the under, convex surface of the frond and that they occupy the same relative position as do the cystocarps in the female plant.

As mentioned by Hooker (1867, p. 699) *G. alveata* is a gregarious plant. It occurs on certain clean rocks below the rock-oyster *(Saxostrea glomerata)* and the barnacle (*Chamaesipho columna*) belts on sandy beaches in exposed situations, but never in association with *Xiphophora* or *Carpophyllum* and not always with other *Gigartina*. As far as present observations indicate tetrasporic *G. alveata* prefers situations facing the open sea at low-water mark, neap tides, just above the *Pachymenia himantophora,* the *G. macrocarpa* and *G. cranwellae* belt, and frequently associated with a small mussel (*Mytilus canaliculus*). Rarely are both cystocarpic and tetrasporic plants found growing together apparently from the same vegetative base; usually the plants are isolated, each growing in a small individual tuft.

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