

Notes on the Species of *Zonaria* in South Africa

by

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Summary.—An account is given of the anatomy of the three species of *Zonaria* recorded from South Africa by Stephenson (1948). It is pointed out that *Zonaria harveyana* (Pappe ex Kütz.) Aresch. is dorsiventrally constructed, whereas *Z. tournefortii* (Lamour.) Mont. and *Z. subarticulata* (Lamour.) Papenf. are not. The desirability of a generic separation is acknowledged but, because a nomenclatural problem may arise therefrom a name for the new genus is not given.

Observations.—During a routine check on the identity of a Brown Alga collected in Natal—*Zonaria harveyana* (Pappe ex Kütz.) Aresch. (Papenfuss, 1944)—it was found that this species is distinctly dorsiventral in structure. This dorsiventrality is indicated by the following:—

(i) The cells of one surface (the dorsal) are more or less cuboid but sometimes only half the width of the elongated cells making up the medullary tissue, whereas the ventral surface has cells almost indistinguishable from those of the medulla (Fig. 1; Plate 2A) and are parallelepiped-like.

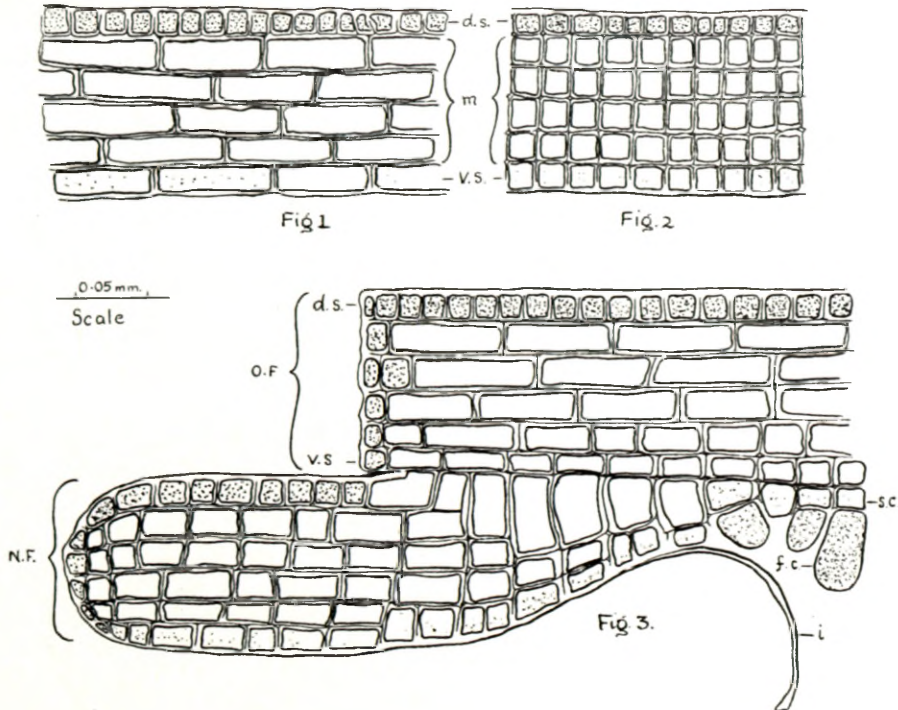


FIG. 1, 2 and 3. Fig. 1.—L.S. of *Zonaria harveyana* thallus. Fig. 2.—T.S. of *Zonaria harveyana* thallus. Fig. 3.—L.S. of *Zonaria harveyana* passing through a transverse ridge.

d.s.—dorsal layer; f.c.—fertile cell; i—indusium; m—medulla; N.F.—new frond; O.F.—old frond; s.c.—supporting cell; v.s.—ventral layer.

(ii) Zones of new growth originate only from the ventral surface of the frond (Fig. 3; Plate 1A).

(iii) Sori arise only on the ventral surface (Fig. 3; Plate 1B).

The structure of *Zonaria tournefortii* (Lamour.) Mont. and *Z. subarticulata* (Lamour.) Papenf. (Papenfuss, 1951), both from Natal, were then studied for comparison, and neither plant was found to have any dorsiventral characteristics. *Z. tournefortii*, however, is sometimes confusingly like *Z. harveyana* in that transverse sections of their thalli are scarcely different from each other; both may have superficial cells of the same width as, or half the width of, the medullary cells (Fig. 2), but these two species differ in respect of the distribution, and relative number, of half and full-width cells in the surface layers. In the specimens examined the relative number of half-width cells was far higher in *Z. tournefortii* than in *Z. harveyana*; furthermore, in the latter species, only full-width cells are present in the ventral surface layer, but in *Z. tournefortii* half-width cells are found equally in both surfaces. The differences between these two species are accentuated in longitudinal section. The contrast between the dorsal and ventral surfaces of *Z. harveyana* is then obvious, whereas it is equally obvious that there is no such contrast in the surfaces of *Z. tournefortii* (Fig. 4). In *Z. subarticulata* (Fig. 5) there is no surface differentiation visible either.

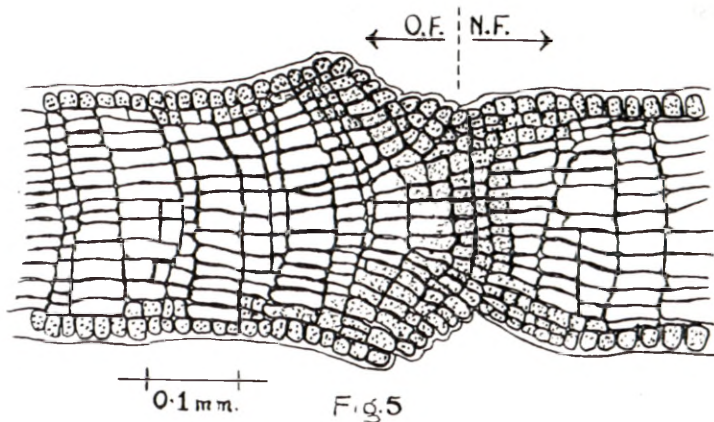
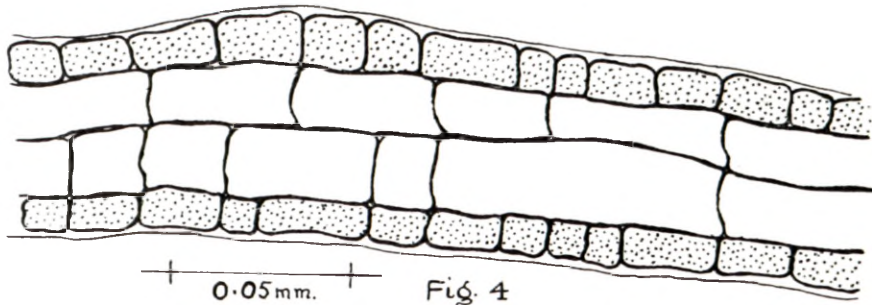


FIG. 4 and 5. Fig. 4.—L.S. of part of thallus of *Zonaria tournefortii*. Fig. 5.—L.S. of part of thallus of *Zonaria subarticulata* passing through a transverse ridge.

N.F.—new frond; O.F.—old frond.

Many species of the Dictyotales have in their fronds narrow transverse bands of rather heavily pigmented tissue often associated with a growth periodicity, each dark band marking the termination of a period of continuous growth. The three species at present being discussed have such markings, but in *Z. harveyana* they are constituted differently from those of the other two species. In *Z. harveyana* the tissue of a new period's growth has its origin in a narrow transverse zone of ventral surface cells lying immediately behind the anterior margin of the tissue of the previous period's growth. This meristem gives rise to a ventral hump of tissue by periclinal division of its cells which first become greatly elevated above the surrounding surface (Fig. 3). Transverse division in this tissue ensues and then becomes confined to the cells in its anterior margin, thereafter extending the length of the frond. At this stage the anterior margin of the previous period's growth plays no part in the extension of the frond and it survives as a dorsal transverse band or ridge (Plate 1A) which is rendered visible by the accumulation of pigment.

In *Z. subarticulata* a new period's growth is initiated and maintained by transverse divisions of part of the tissue of the anterior margin of the old growth. There is no further activity of the anterior cells of either surface in this region, however, and on becoming heavily pigmented these cells form the transverse bands (Fig. 5) seen on both surfaces. The transverse bands of *Z. tournefortii* are visible only from the surface; in longitudinal section they cannot be recognized at all.

Lastly, consistent with its dorsiventral character, the sori of *Z. harveyana* occur on only one surface, namely the ventral. Both *Z. tournefortii* and *Z. subarticulata*, however, show no such surface discrimination in their fertile fronds.

Other observations made on the sori of *Z. harveyana* were that each is covered by an indusium (Plate 1B) and that the fertile cells seen had undivided contents. The latter observation suggests that these cells might have been oogonia. A further feature of the fertile cells was that each had a special stalk cell (Fig. 3; Plate 1B).

Discussion.—The genus *Zonaria* in South Africa, as constituted by the three species recorded by Stephenson (l.c.) exhibits two types of basic structure, the one dorsiventral, the other not. Obviously the two groups should have separate generic status, as in fact they once had when *Z. harveyana* was included in the genus *Homoeostrichus* J. Ag. The latter genus, however, contains four species and the type species was not indicated in the original diagnosis (J. Agardh, 1894). Of the four species only *Z. harveyana* (*Homoeostrichus harveyana*) occurs in South Africa. Because no mention of dorsiventrality or any other character for a valid separation of *Zonaria* and *Homoeostrichus* was made in their diagnoses no conclusion can at present be reached as to whether *Z. harveyana* should be included in *Homoeostrichus*.

LITERATURE CITED

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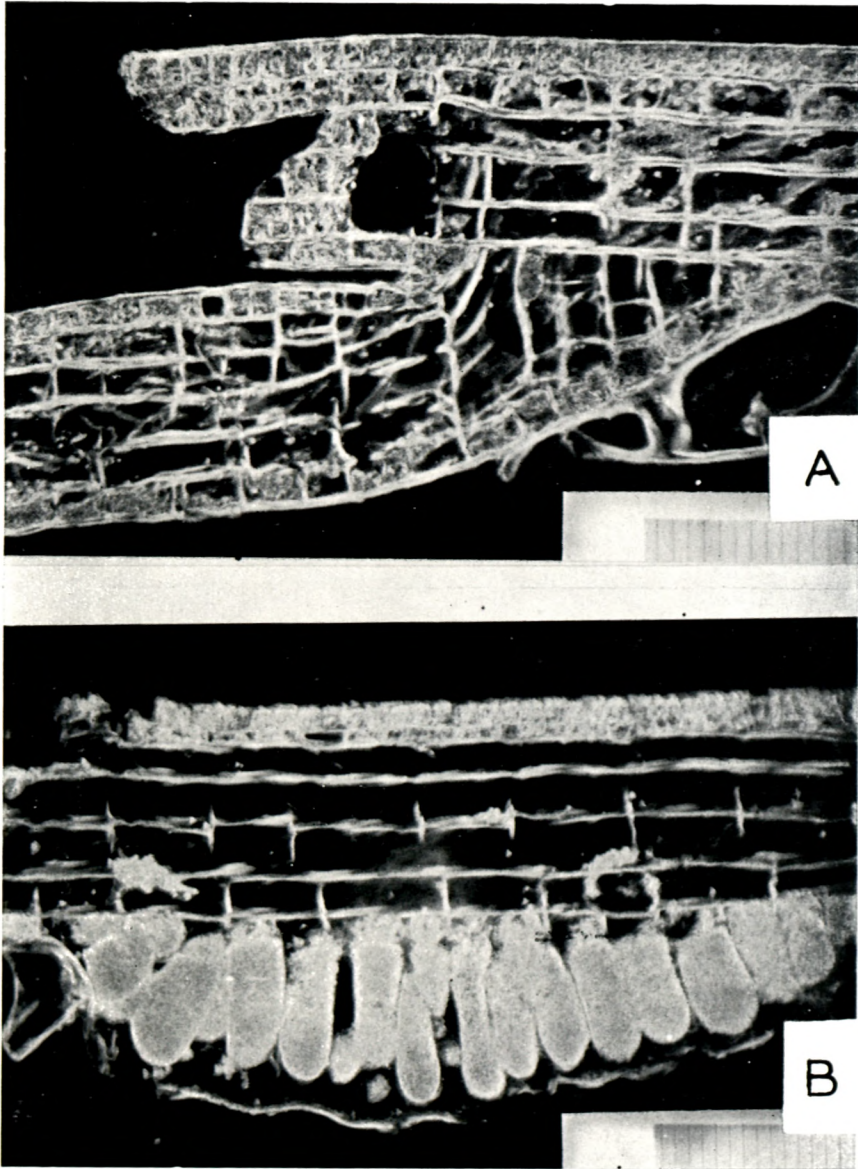


PLATE 1.—*Zonaria harveyana*. A: L.S. of frond through junction of old and new growth; B: L.S. of frond through a sorus. Scale: 1 div. = 10μ .

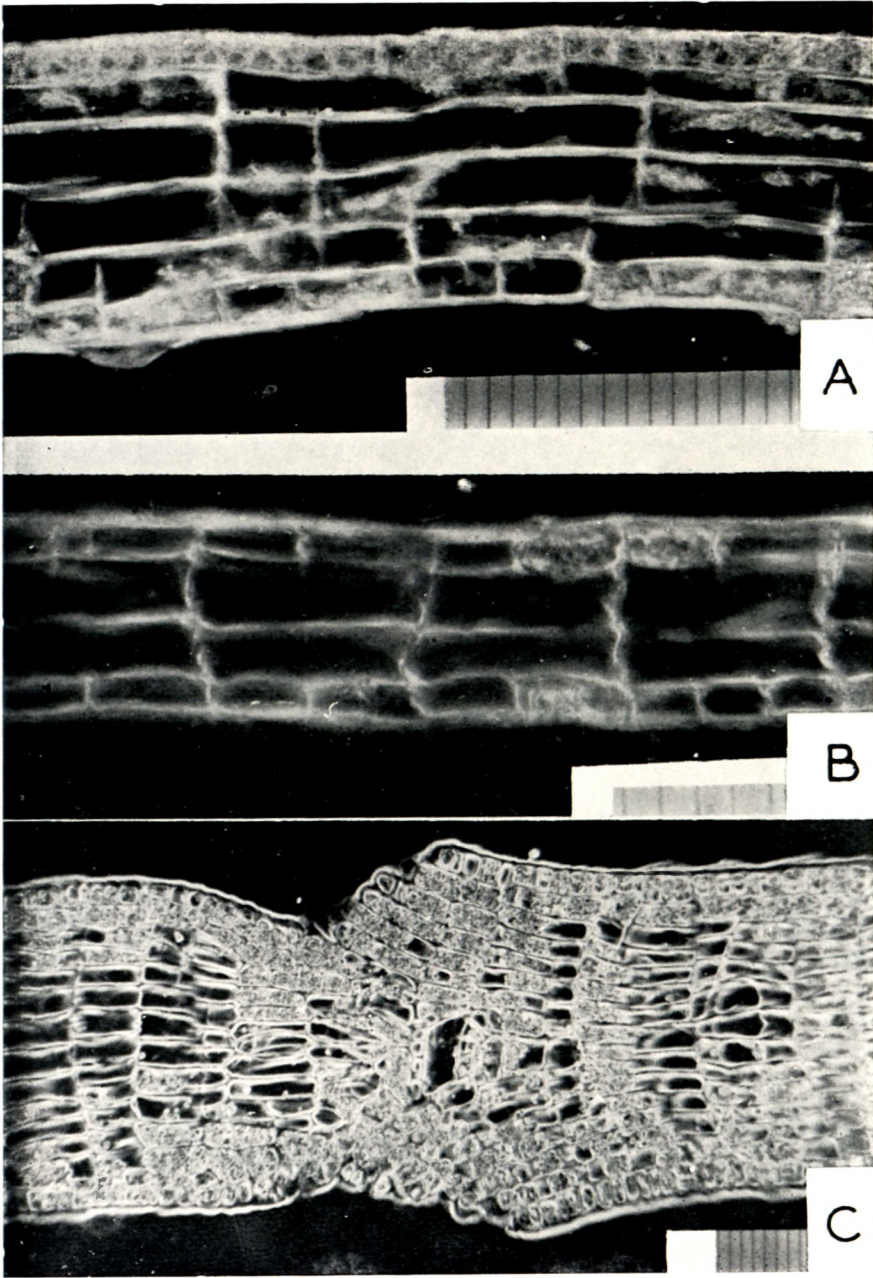


PLATE 2.—A: *Zonaria harveyana*, L.S. of frond. B: *Z. tournefortii*, L.S. of frond. C: *Z. subarticulata*, L.S. of frond through junction of old and new frond tissue. Scale: 1 div. = 10 μ .