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Pseudobryopsis oahuensis in Hawaii[1]

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While in the Hawaiian Islands during 1959 I made several collections of *Pseudobryopsis* and had opportunity to study additional material collected by others. Preliminary examination of these collections suggested that three or four entities were to be recognized. Careful study has led me to conclude, however, that all of the material represents *Pseudobryopsis oahuensis* EGEROD (1952, p. 372) and that this species is much more variable than would be anticipated from the original description.

In her excellent account, EGEROD reported *Pseudobryopsis oahuensis* as having among other characteristics (1) plants 3–5 cm. tall, composed of a simple or rarely bifurcate axis, 400–500 μ wide, (2) the pinnae filiform, about 30 μ wide and 2.5 mm long, simple or rarely divided, and (3) up to five ovate gametangia borne on the lower half of the pinnae along the adaxial surface. Some of the variations in terms of these three areas are discussed below.

The material collected by Dr. A. J. BERNATOWICZ on February 26, 1959, from a concrete pier at the Diamond Head end of Kuhio Beach, Waikiki, represents in almost all particulars the type description (Figs. 1, A and 2, A). The same is true of PAPENFUSS 10618, cited by EGEROD as an additional collection of *P. oahuensis*, material of which was kindly provided for my study by Dr. G. F. PAPENFUSS.

Some marked deviations from these plants are found in material of *Pseudobryopsis oahuensis* which was growing attached to coral 3–6 feet below the surface in rather swift current at Moloaa, Oahu. In these plants the pinnae are consistently smaller in diameter and many are once or twice, and rarely, three times dichotomously branched. For example, the

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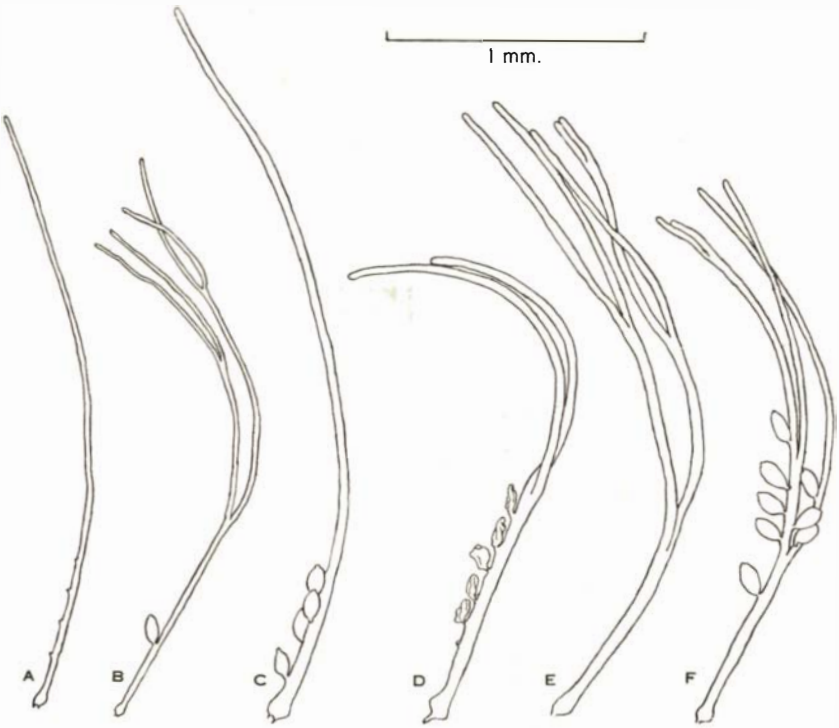

Fig. 1. Camera lucida sketches of pinnae of *Pseudobryopsis oahuensis* EGEROD. A, simple pinna from BERNATOWICZ, Feb. 26, 1959, collection, showing scars of gametangia on adaxial surface near base; B, branched pinna with very narrow ultimate branchlets from GILBERT 9344; C–F, variations in pinna from GILBERT 9701.

pinnae in plants of GILBERT 9344, April 2, 1959, are as a rule once or twice dichotomously branched (Fig. 1, B) and range in diameter from 24–33 μ near their bases to only 13–17.8 μ in the ultimate branchlets. Probably as a result of the narrow diameter, these pinnae, both in living and preserved material, do not appear to curve as markedly toward the apex of the plant as do the wider pinnae of the type material and as do all of the pinnae in my collections that reach 30 μ or more in width. The gametangia in this material range somewhat smaller than in EGEROD's description, but in every instance some fall within the size range she indicated. In addition, in many collections studied, with the exception of the material in GILBERT 9345 and 9486, noted below, some of the gametangia are obovate (Fig. 2, B) rather than ovate. In a few instances the obovate shape is predominant.

Another interesting variation of the gametangia appeared in two clumps of *Pseudobryopsis* also collected at Moloaa (GILBERT 9354, April 4, 1959 and 9486, April 16, 1959). In this material the pinnae are all simple, 21–25 μ diameter, extremely close-packed, but the most unusual aspect is the shape of the gametangia which are crowded together near the bases of the pinnae. These gametangia are asymmetrical (Fig. 2, C–E) and average about 58 μ in width by 91 μ in length. No mention is made in the literature of asymmetrical gametangia for any species of *Pseudobryopsis*. The temptation is great to name these two collections as a variety, but since both clumps were sorted out from among many clumps having symmetrical gametangia it seems best to simply note this variation and wait until the taxonomic picture becomes clearer through additional collections and through cultural and life history studies.

In a large collection from the island of Kauai (GILBERT 9701, from clay tile, Kauai Boat Club, between Kekaha and Waimea, April 30, 1959) there are plants which nearly duplicate the type description but also larger specimens which are so different that they might well be described as a new species if one were unaware of the many intermediates to be found in the same collection. Among the plants in this collection are some which have pinnae that are nearly all simple and approximately 30–40 μ in diameter (Fig. 1, C) while others are more robust, having pinnae that are commonly twice- and three-times (rarely four) dichotomously branched and which range in size from 50–68 μ in diameter below the first dichotomy to 25–36 μ in diameter in the ultimate branchlets (Fig. 1, D–F). Of considerable interest, as well, is that some of these large pinnae bear as many as 19 gametangia spread out over some distance along the length of the pinnae. Where there are but four or five gametangia per pinna they are always found on the adaxial surface near the base of the pinna. When larger numbers are produced some are found farther out on the pinna between the first and second dichotomies and, rarely, beyond the second dichotomy (Fig. 1, F). In most instances the adaxial position is maintained even beyond the first dichotomy, but this is not always true. Even in those plants which produce large dichotomously branched pinnae bearing many gametangia it is possible to find some simple pinnae that are similar in form and approach the size of the pinnae in the type description.

The water where the Kauai material was collected was exceedingly muddy during the incoming tide and was relatively quiet, being protected by a breakwater. Mud was trapped between and toward the bases of the

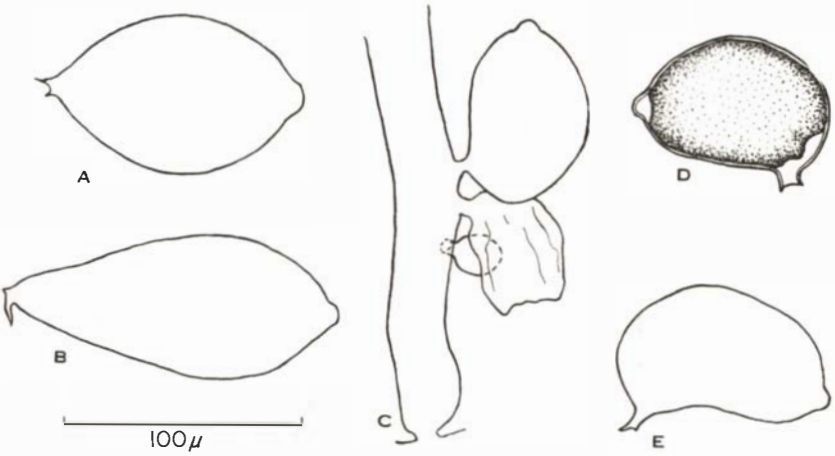

Fig. 2. Camera lucida sketches of gametangia of *Pseudobryopsis oahuensis* EGEROD. A, ovate gametangium from BERNATOWICZ, Feb. 26, 1959, collection; B, obovate gametangium from GILBERT 9701; C, base of pinna showing crowded asymmetrical gametangia in GILBERT 9354; D and E, additional sketches of asymmetrical gametangia.

pinnae. It seems quite possible that the rank habit of many of these plants is related to the ecological situation.

As described by EGEROD, the type material is 3–5 cm tall with the central axis simple or rarely bifurcate and 400–500 μ wide. Many of the plants in the collections I have studied are branched and taller, commonly to 7.5–9.0 cm in GILBERT 9701, and in a single plant collected by ROBERT REISNER in the spring of 1958 from deep water off Kailua Beach, Oahu, the axis is repeatedly branched and reaches 16 cm in length. In these larger plants the diameter of the main axis reaches 800 μ and some of the pinnae attain a length of 2.9 mm.

In comparing *Pseudobryopsis oahuensis* with other known species, EGEROD (1952, p. 373) suggested that the Hawaiian plants she studied were not very widely divergent from the plants reported by BØRGESEN (1925) and FELDMANN (1937) under the name of *P. myura* (J. AG.) BERTHOLD. As a point of difference EGEROD called attention to the height (15 cm) of the specimens from Banyuls reported by FELDMANN in contrast to the shorter plants (3–5 cm) from Oahu. While it now appears that occasionally *P. oahuensis* can attain a height of as much as 16 cm it still appears to be distinct from *P. myura* on the basis of the commonly branching pinnae and the abundance of gametangia.

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