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An abnormal specimen of *Laminaria digitata* (L.) Lamouroux

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Rhodora

[Cambridge, Mass., etc.]New England Botanical Club [etc.]

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AN ABNORMAL SPECIMEN OF
LAMINARIA DIGITATA (L.) LAMOUROUX

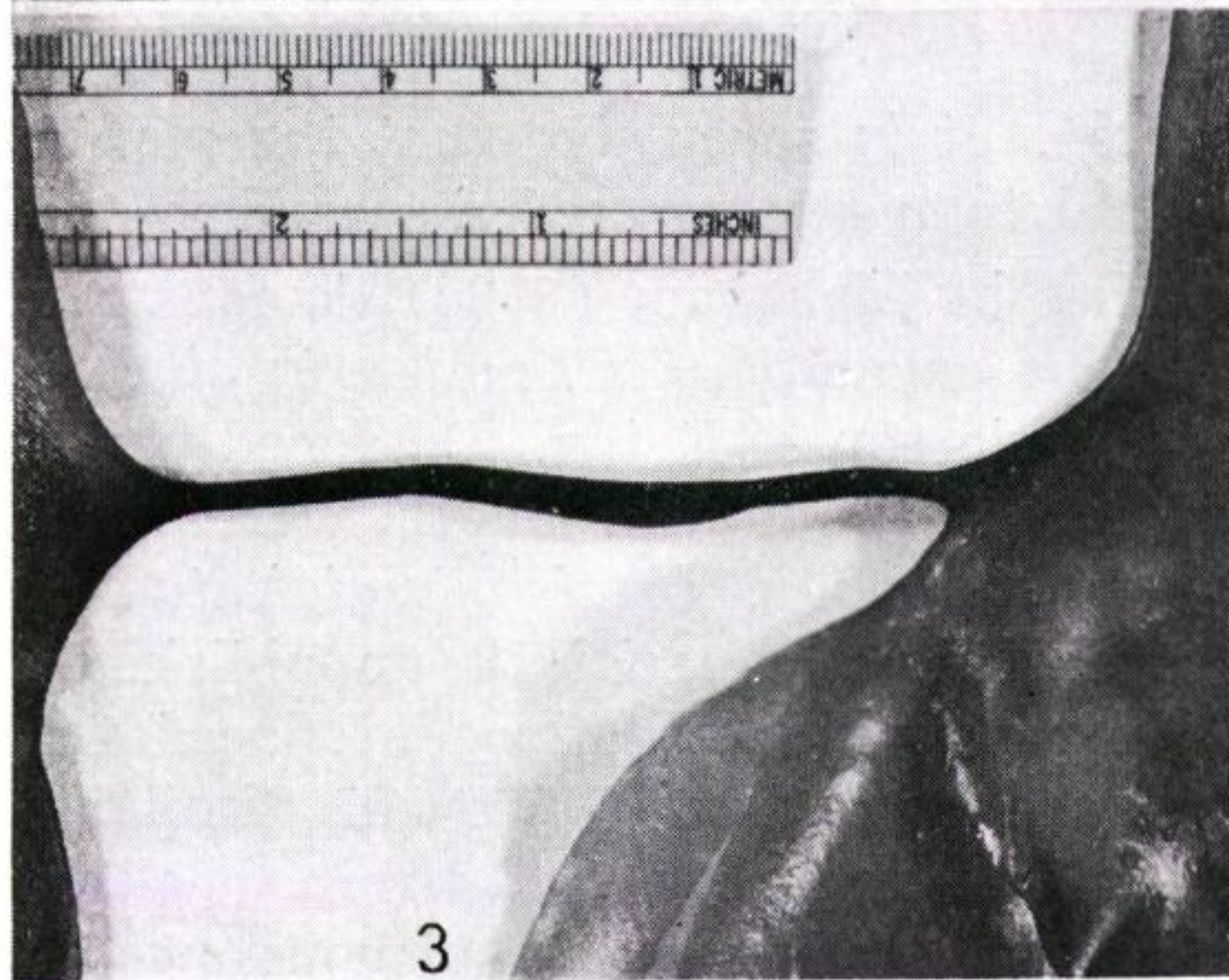
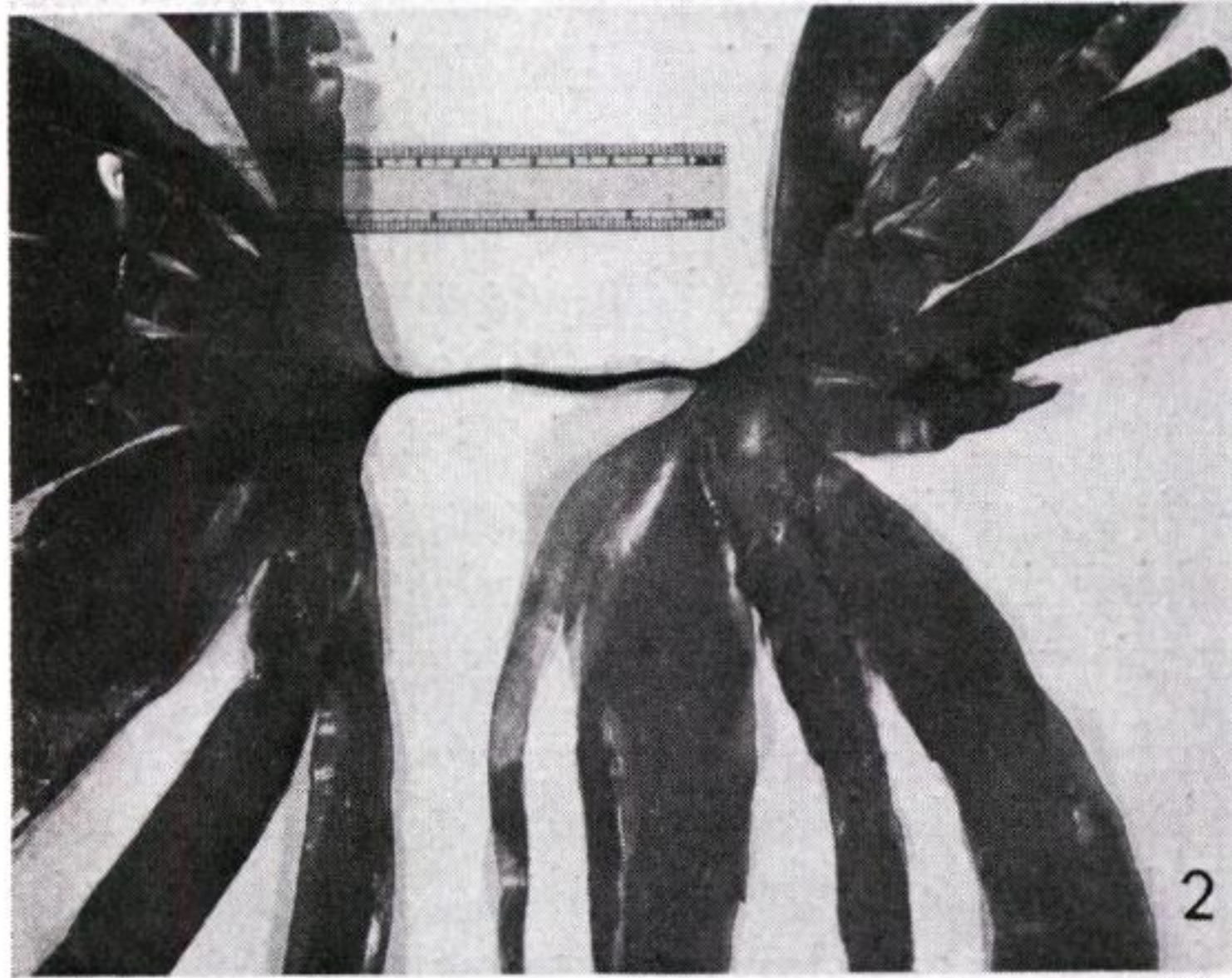
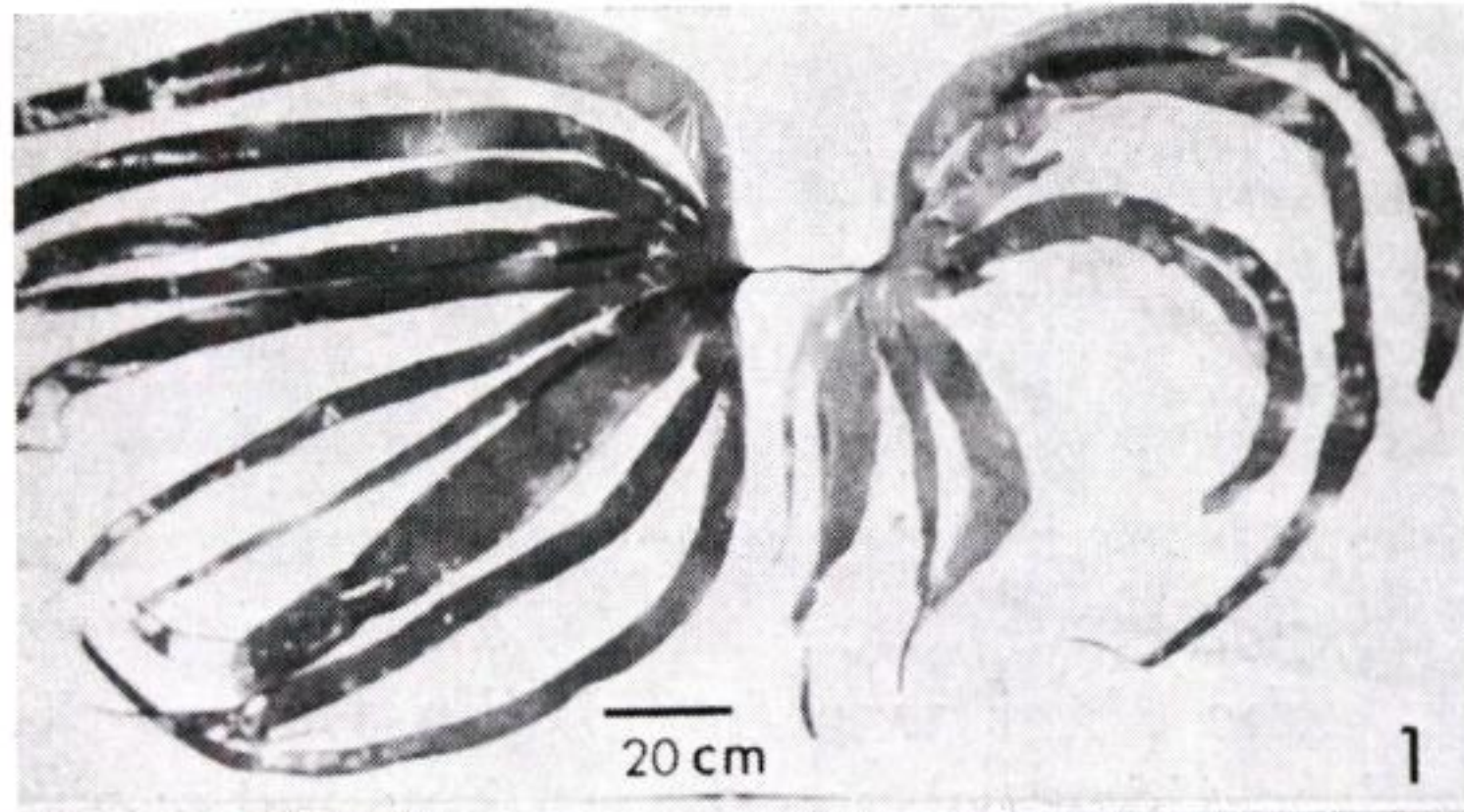
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AND RICHARD A. FRALICK¹

The present report describes the occurrence and morphology of an abnormal specimen of *Laminaria digitata* (L.) Lamouroux. The plant was found (by Emery Swan) detached in a deep tide pool near mean low water at Odiornes Point, Rye, New Hampshire, U.S.A. (70°42'42" W longitude, 43°03'33" N latitude) on May 16, 1971. Figures 1 and 2 illustrate the general morphology of the plant; a single stipe and two attached blades are evident. The overall length of the plant was 208 cm. The maximum dimensions of the fronds were 120 × 98 and 76 × 74 cm respectively, exclusive of the stipe. The larger blade was darker in color, healthier in appearance, and it seemed to be more actively growing, as evidenced by its segmentation (Fig. 2), than the smaller frond.

Laminaria digitata is a common plant in the vicinity of Odiornes Point. It grows abundantly on solid rocks from 0 to 14 m below mean low water, with maximum biomass occurring from -2 to 10 m (Mathieson, Hehre and Reynolds, in press). It is speculated that the plant broke off its holdfast and then regenerated a second frond.

Recent studies by Markham (1968) demonstrated extensive regenerative capacities in *Laminaria sinclairii* (Harvey) Farlow, Anderson *et* Eaton. Detached portions of its haptera, as short as 2.5 mm in length, were capable of developing into entire plants. *Laminaria digitata* also exhibits extensive regenerative capacities (unpublished data, A. Mathieson), for new blades can be produced from intact stipes if they are injured or destroyed. Similar regenerative capacities are probably evident in healthy, pelagic specimens. Figure 3 shows a conspicuous swelling of the

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stipe in the abnormal specimen; it probably represents the site of regeneration of the second frond. The swelling is several cm below the transition zone — the area of “active” cell division. Thus, regeneration occurred in an area presumably restricted to elongation and differentiation of cells. The older appearance of the smaller frond suggests that it is the original one. However, in order to preserve the intact specimen a critical examination (section) of the stipe was not made.

Burrows (1956, 1958) reported extensive populations of loose-lying algae (particularly *Chorda filum*, *Desmarestia aculeata*, *Laminaria saccharina* and *Saccorhiza polyschides*) from the subtidal zones at Port Erin Bay, Isle of Man — particularly after periods of calm weather and high insolation. Most of the plants were initially attached. Extensive SCUBA observations near Odiornes Point have never shown quantities of loose-lying *L. digitata* or any other algae — perhaps because of the exposed nature of the site. The accidental deposition of the specimen in a deep tide pool may have provided a relatively stable habitat and allowed regeneration to occur. According to Burrows (1958) members of the loose-lying populations may serve as a means of restocking habitats devoid of reproductive plants. No reproductive sori were found on the specimen of *L. digitata*. The vegetative stae of the plant may have been due to the time of its collection, for *L. digitata* exhibits limited reproduction during the spring in New England (Mathieson, Hehre and Reynolds, in press). It should also be noted that several pelagic algae (e.g. *Sargassum*, *Focus* and *Gracilaria*) are reported (Fritsch, 1959) to have limited reproductive capacities.

Figure 1. Intact specimen of *Laminaria digitata*, with a single stipe and two attached blades.

Figure 2. Close up of stipe and fronds, showing darker and healthier appearance of larger (left) frond. Active segmentation of the larger frond is also visible.

Figure 3. Conspicuous swelling of the stipe, that may represent the site of regeneration of the second frond.

According to van Overbeek (1940 a, b) auxins may be found in *Macrocystis pyrifera* and other known brown algae. If this were true for *L. digitata*, then the loss of polarity, due to a pelagic state, may explain the regeneration of a second frond rather than a holdfast. Extensive regeneration and the loss of polarity must also occur in other unattached algae that produce spherical morphologies, such as *Cladophora holsatica* Kützing described by Smith (1950) and the "beach form" of *Ascophyllum nodosum* (L.) Le Jolis ead *Mackaii* (Turner) Cotton reported by Gibb (1957).

In conclusion the occurrence of an abnormal specimen of *L. digitata* poses a variety of questions concerning the growth and ecology of the species. Additional studies should be carried out to determine the growth, reproduction and ecological significance of pelagic specimens of *L. digitata*.

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