

Observations on *Pseudolaingia larsenii* (SKOTTSB.) LEVR. (Delesseriaceae, Rhodophyta)

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WYNNE, M. J. 1989. Observations on *Pseudolaingia larsenii* (SKOTTSB.) LEVR. (Delesseriaceae, Rhodophyta). Jpn. J. Phycol. 37: 39–45.

New records of *Pseudolaingia larsenii* (SKOTTSB.) LEVR. are reported from southern Chile, the Falkland Islands, and the Kerguelen Islands. Since this species has been sometimes confused with superficially similar species such as *Delesseria lancifolia* J. AG. and *Laingia hookeri* (LYALL) KYLIN, the criteria used to distinguish these related taxa are discussed.

Key Index Words: Delesseriaceae—Falkland Islands—Kerguelen Islands—*Pseudolaingia larsenii*—southern Chile.

The genus *Pseudolaingia* was established by LEVRING (1944) on the basis of *Delesseria larsenii* SKOTTSBERG (in KYLIN and SKOTTSBERG 1919), and it remains a monotypic genus. MENDOZA (1973) described male, female, and tetrasporic material based upon collections made in southern Argentina. Recognition of this taxon variously mis-identified among holdings in three herbaria (FH, MICH, and NY) prompts me to report some observations concerning this alga and to clarify its relationship with vegetatively similar species such as *Delesseria lancifolia* J. AG. and *Laingia hookeri*. (LYALL) KYL. Some remarks are also made in regard to a collection of nine syntype specimens of *Delesseria sanguinea* var. *lancifolia* HOOKER now in FH. The relationship of *Pseudolaingia* with *Pseudonitophylla* and *Odontolaingia* also deserves attention.

The type locality of *Pseudolaingia larsenii* is South Georgia, and it has also been reported from the Kerguelen Islands (LEVRING 1944; ZINOVA 1963) and Tierra del Fuego of southern Chile (LEVRING 1960; ETCHEVERRY 1986) and of southern Argentina (MENDOZA 1973).

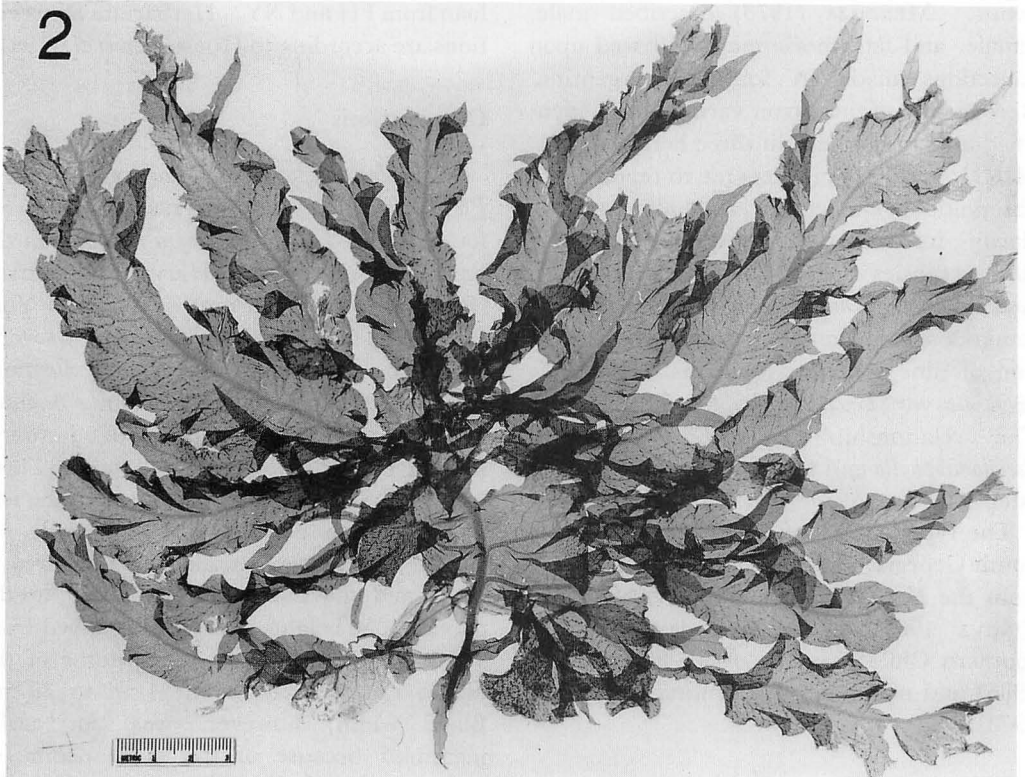
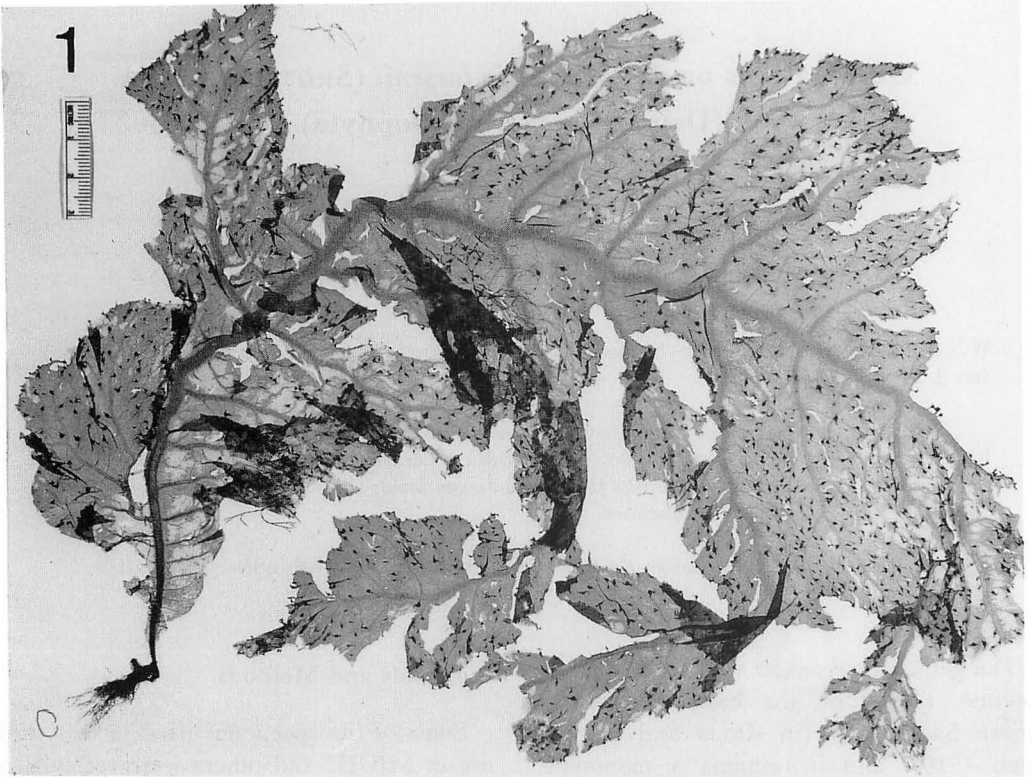
Materials and Methods

Some of the specimens used in this study are in MICH, and others were received on loan from FH and NY. Herbarium abbreviations are according to HOLMGREN *et al.* (1981).

Observations

Male, female, and tetrasporic specimens of *Pseudolaingia larsenii* (SKOTTSB.) LEVR. were found (labeled as "*Schizoneura hookeri*") in the Farlow Herbarium of Harvard University (FH) and the Herbarium of the New York Botanical Garden (NY). These several specimens (a total of five) were collections made by Roland THAXTER at Punta Arenas, Strait of Magellan, Chile, in January, February and March of 1906. Three specimens were tetrasporic, one specimen was male, and one specimen was cystocarpic.

The color of the specimens was pale red to pink, and the thalli adhered firmly to the paper. The heights of the thalli ranged from 15 cm to 37 cm, whereas the widths of the blades ranged from about 4 cm to 28 cm. Blade width, however, was not easily measured because of the great degree of lacination and lateral branching of the



primary blades. The cystocarpic specimen (Fig. 1) was an essentially unbranched blade, although it was lacerated along the margins. One tetrasporic blade was also minimally branched, although it also had been torn in several places and bore a few small marginal proliferations. Two other tetrasporic specimens (Figs. 2 & 3) bore numerous lateral secondary blades, some of which in turn bore marginal bladelets.

All blades showed a broad, well developed midrib with similarly developed lateral nerves, mostly oppositely placed. A system of anastomosing tertiary nerves was also evident, particularly in the tetrasporic blades because tetrasporangial sori usually followed these tertiary veins (Figs. 2 & 3). Branching from the blade margin (Fig. 4) was much more common than branching from the midrib, although the latter pattern did also occur.

Apices were attenuated (Fig. 5) and with an organization typical of the *Delesseria*-type apex (KYLIN 1924; WYNNE 1985). Lateral pericentral cells underwent transverse divisions, and the development of midrib cortication commenced relatively close to the apex.

On the female specimen (Fig. 1) special proliferations bearing procarps and cystocarps arose at random over the blade surface and had no relationship with the midrib or lateral nerves of the parent blade.

The male specimen bore small spermatangial sori over the entire blade surface, the sori being separated into discrete islands by intervening sterile cells (Fig. 6), as has been shown for this species by MENDOZA (1973).

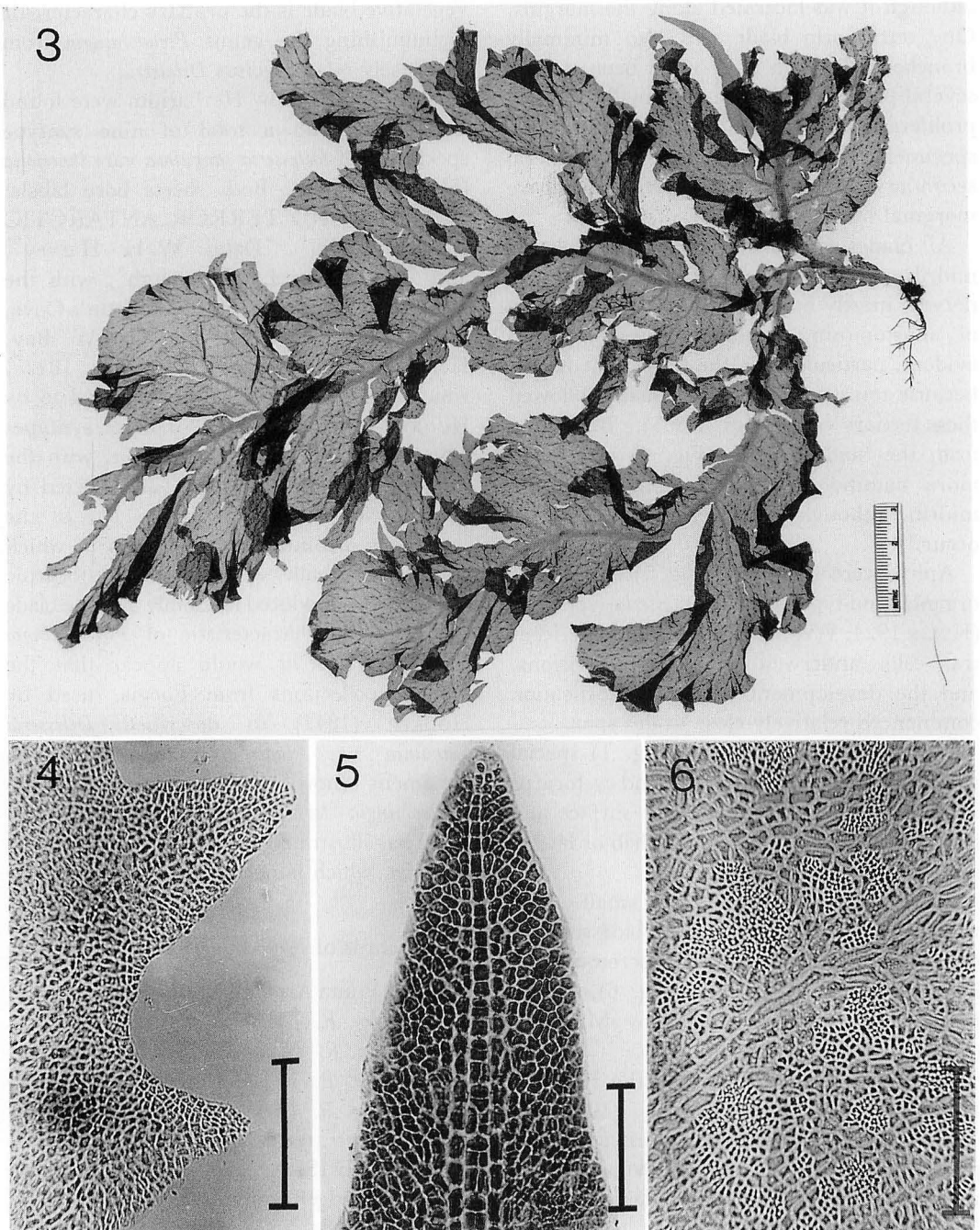
A collection in MICH from the Falkland Islands reported by TAYLOR (1939) as "*Delesseria lancifolia*" upon examination also proved to be *Pseudolaingia*. TAYLOR (1939), referred to the surface of the blade as being "beset with very many tiny pedicellate-lanceolate proliferations 1-3 mm long" bearing evident pericarps and also to the fact that these pericarps did not occur on the main

blade proper. This distribution of female bladelets scattered over the surface of the vegetative blade is the primary characteristic distinguishing the genus *Pseudolaingia* from the closely related genus *Delesseria*.

Also in the Farlow Herbarium were found two sheets with a total of nine syntype specimens of *Delesseria sanguinea* var. *lancifolia* (HOOKER 1847). Both sheets bore labels: "EREBUS AND TERROR ANTARCTIC EXPEDITION", "Deter. W. H. Harvey", and "Herbarium Landsborough", with the additional information of: "St. Martin's Cove, Cape Horn, Oct. 1842" and "N. W. Bay, Hermite Island, Cape Horn, Nov. 1842", which were the two localities referred to by HOOKER (1847). Several of these syntypes have the narrow, lanceolate habit, with the slightly undulating margins, as depicted by HOOKER for this alga. But a few of the specimens are much broader, two of which are female thalli with special cystocarpic proliferations produced randomly over the blade surface as is characteristic of *Pseudolaingia larsenii*. Thus, it would appear that the original collections from Fuegia, used by HOOKER (1847) to describe *Delesseria sanguinea* var. *lancifolia* contained some specimens (now in FH) attributable to *Pseudolaingia larsenii*. RICKER (1987, fig. 110c) has illustrated the lectotype of *Delesseria lancifolia*, which is now housed in Lund (LD 31749).

New records of *Pseudolaingia larsenii*:

CHILE. Punta Arenas, Strait of Magellan: 7. ii. 1906, leg. R. Thaxter, cystocarpic (FH); 1. ii. 1906, leg. R. Thaxter, tetrasporic (FH); 25. ii. 1906, leg. R. Thaxter, tetrasporic (FH); 1. iii. 1906, leg. R. Thaxter, male (FH); ii. 1906, leg. R. Thaxter, tetrasporic (NY).
FALKLAND ISLANDS. North side of Port William, dredged from 26-28 m, 9. iv. 1927, leg. W. Schmitt 257, cystocarpic (MICH). Kidney Island, scuba collection at 6 m depth, 7. i. 1987, leg. B. Patterson-van Tussenbroek 251, tetrasporic (MICH).



Figs. 3-6. *Pseudolaingia larsenii* (SKOTTSB.) LEVR. 3. Tetrasporic thallus (in FH). 4. Blade with marginal branching. 5. Blade apex. 6. Blade with spermatangial sori separated by sterile cells. Scale bars: 100 μm in Figs. 4 & 6; 50 μm in Fig. 5.

KERGUELEN ISLANDS. Long Island, Station 49, 2–20 m depth, 20. ii. 1930, *leg. BANZARE 930 and 933*, cystocarpic (BM); 1. iii. 1930, *leg. BANZARE 939* (BM).

Discussion

The fact that problems in the identification of *Pseudolaingia* have been encountered is a basis for a discussion of the criteria that can be used to separate certain genera of Delesseriaceae that are sometimes confused. *Pseudolaingia* is most closely related to *Delesseria*, both genera having a similar apical organization and monostromatic blades in regions between midribs and lateral nerves. Several species of *Delesseria* are distributed in the same cold Subantarctic waters in which *Pseudolaingia larsenii* is present (PAPENFUSS 1964). In *Delesseria* bladelets bearing procarps/cystocarps arise only from the midrib or lateral nerves of parent blades (MENDOZA 1974; WYNNE 1982). *Pseudolaingia larsenii* is vegetatively similar to *Delesseria lancifolia* J. AG.* WHEN SKOTTSBERG (1923) first delineated *D. larsenii*, he referred to its apical organization and the structure of the midrib as being identical to that of *D. lancifolia*. He said that *D. larsenii* differed by the dark brownish red color of the frond, its non-adherence to paper, and in the richer development of its anastomosing tertiary nerves.

Delesseria lancifolia has been depicted as having usually simple blades (HARIOT 1889; LEVRING 1960; LAMB and ZIMMERMANN 1977), occasionally branching from the midrib. RICKER (1987), however, showed this species to be considerably branched from the midrib. Cystocarps in *D. lancifolia* are formed either directly on the midrib of primary blades or on the midrib of small proliferations arising from the midrib and lateral nerves. Tetrasporangia are produced in

small elongate or irregular sori on the primary blade or on small bladelets arising from the midrib and nerves. The color of the blades of *D. lancifolia* is rose to deep red (RICKER 1987). Blades are up to 50 cm long and about 10 cm broad. From a comparison of the observations made on *Delesseria lancifolia* and *Pseudolaingia larsenii*, it is evident that the different location of cystocarpic proliferations is the best criterion to distinguish these two genera. Blades can be simple in both taxa, but where branching does occur, it tends to be from the midrib in *Delesseria* but from the blade margins in *Pseudolaingia*. The greater development of tertiary veins in *P. larsenii* is a secondary distinction but perhaps less reliable. It is concluded that the color of blades and their adherence or non-adherence to paper are not reliable distinctions.

COTTON (1915) recorded, with hesitation, *Delesseria lancifolia* (as *Paraglossum lancifolium*) from the Falkland Islands. His description of minute cystocarpic proliferations arising "over the entire surface of the frond" would be evidence that his material was *Pseudolaingia* rather than *Delesseria*.

Odontolaingia, like *Pseudolaingia*, is present in the region of Tierra del Fuego but can be distinguished from the latter genus by the production of both numerous vegetative bladelets and small cystocarpic bladelets from veins of the primary blades (MENDOZA 1976). *Pseudolaingia* lacks such vegetative bladelets and bears its cystocarpic bladelets randomly over the blade surface.

Pseudonitophylla, which has been described from Argentina (MENDOZA 1975), can be separated from *Pseudolaingia* by the fact that cells in first-order rows undergo intercalary divisions and branching of the thallus occurs both from blade margins and from the midrib. Furthermore, procarps in *Pseudonitophylla* are produced on the lateral nerves of blades and are not restricted to primary cell rows as in *Pseudolaingia*. Thus, these two genera belong to the two different subfamilies: *Pseudolaingia* to the Delesserioideae and *Pseudonitophylla* to the Nitophylloideae.

* When J. AGARDH (1872) described *Delesseria lancifolia*, he cited *Delesseria sanguinea* var. *lancifolia* HOOK. & HARV. as a doubtful synonym. Therefore, the variety of HOOKER and HARVEY (1847) should not be regarded as the basionym, and authorship should be credited solely to J. AGARDH.

As previously mentioned, the Thaxter collections from Chile (in FH and NY) had been mis-identified as *Schizoneura hookeri* (LYALL) J. AG., a synonym of *Laingia hookeri* (LYALL) KYLIN. *Laingia* is a genus known from New Zealand (WAGNER 1954) and its Subantarctic islands (HAY *et al.*, 1985) and is also placed in the *Delesseria* Group (WYNNE 1983). Both *Laingia* and *Pseudolaingia* produce their cystocarps on special proliferations that are distributed more or less randomly over the surface of the primary blade. These two genera, however, can be separated by the fact that in *Laingia* blades are polystromatic throughout and lateral pericentral cells do not undergo transverse divisions unlike the condition in *Pseudolaingia* (WAGNER 1954; MENDOZA 1973; MIKAMI 1978).

Acknowledgements

I wish to acknowledge National Science Foundation Systematic Biology Grant No. BSR-85-16669. I thank Mrs. Brigit PATTERSON of the Marine Biological Laboratory, University of Liverpool, Port Erin, Isle of Man, for sharing her Falkland Island collections with me. Dr. Barbara THIERS (NY) and Dr. Donald PFISTER (FH) kindly assisted me during my visits to their herbaria, for which I am grateful.

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**Michael J. WYNNE : 紅藻コノハノリ科の *Pseudolaingia larsenii*
(SKOTTSB.) LEVR. の観察**

Pseudolaingia larsenii (SKOTTSB.) LEVR. が新しく南チリー、フォークランド諸島、およびケルゲレン諸島から報告された。この種は、*Delesseria lancifolia* J. AG. や *Laingia hookeri* (LYALL) KYLIN などのような見かけ上よく似た種と時々混同されるので、これらと識別するための基準について論議した。(Department of Biology and Herbarium, University of Michigan, Ann Arbor, MI 48109, U.S.A.)