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T U H I N G A

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***Nesophila hoggardii* gen. et sp. nov.
(Rhizophyllidaceae, Rhodophyta)
from offshore islands of northern New Zealand**

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TE PAPA TONGAREWA
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***Nesophila hoggardii* gen. et sp. nov.**
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W.A. Nelson and N.M. Adams¹

ABSTRACT: A new genus and species of marine Rhodophyceae, *Nesophila hoggardii*, is described and assigned to the Rhizophyllidaceae. Thalli consist of flattened, dichotomously branched axes, with acute apices and a prominent axial row of very large cells surrounded by rhizoidal filaments. Irregularly zonate tetrasporangia are found in nemathecium. *Nesophila hoggardii* is found subtidally around offshore islands of northern New Zealand — the Three Kings, Poor Knights, Alderman and White Islands.

INTRODUCTION

Plants of *Nesophila hoggardii* gen. et sp. nov. (Fig. 1) have been recognised for forty years as belonging to a new taxon, yet have remained undescribed because there has been insufficient fertile material available. The first collection was made at White Island in the Bay of Plenty (Fig. 2) in January 1947, from beach drift. In November 1970 a collection of growing plants was obtained by Mr Vernon Hoggard while SCUBA diving at the Poor Knights Islands off the Northland east coast (Fig. 2). Further collections

were made by Hoggard in November 1971 from the Alderman Islands (Fig. 2). Between 1974 and 1984 a number of collections were obtained from the Three Kings Islands off North Cape (Fig. 2). Some immature female plants and some tetrasporangial plants enabled us to place this plant in the Rhizophyllidaceae as "*Ochtodes* sp.?" (Adams & Nelson 1985) and "New genus" (Nelson & Adams 1987). The most recent collections from the Poor Knights Islands yielded fully mature cystocarpic plants confirming that this entity differed from *Ochtodes*

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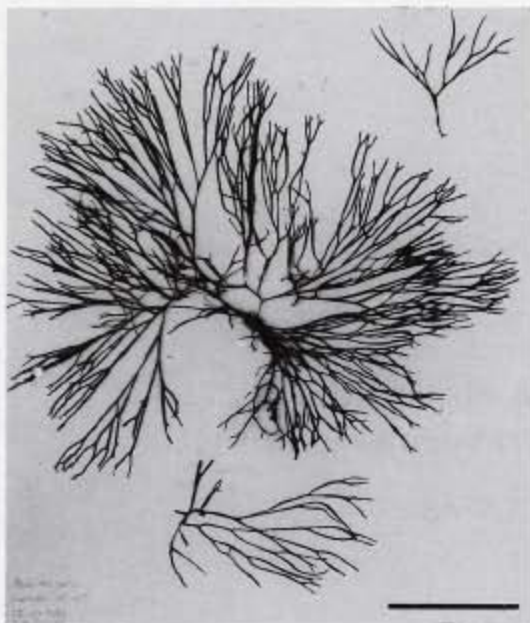


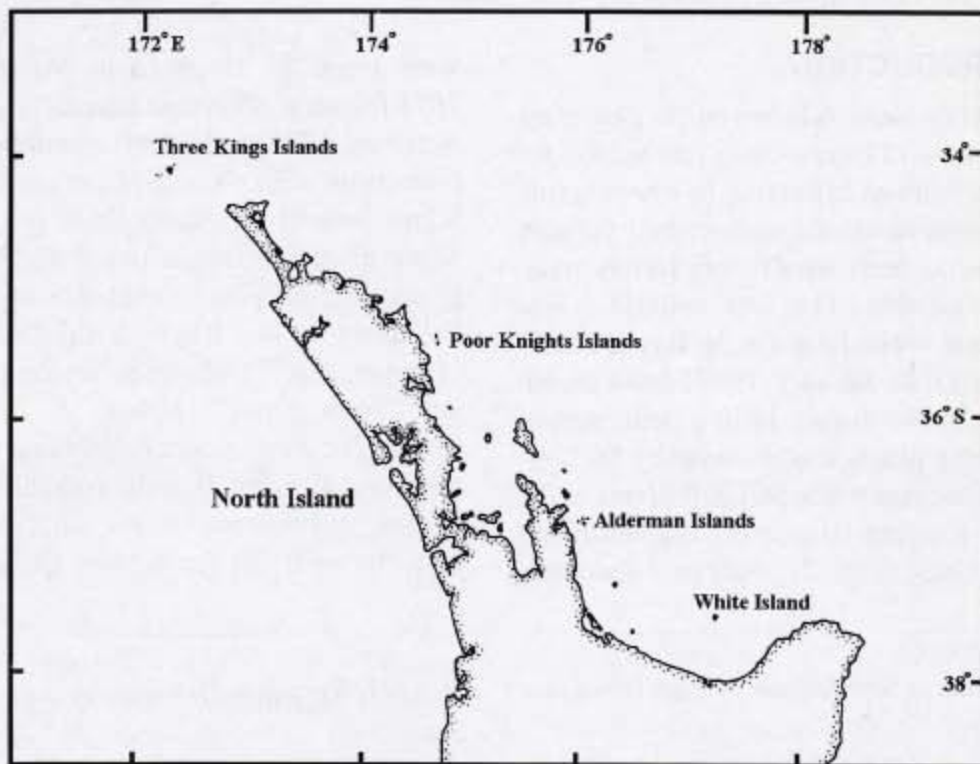
Figure 1. *Nesophila hoggardii* gen. et. sp. nov. Holotype — WELT A20022e. Scale bar = 5 cm.

and other members of the Rhizophyllidaceae.

MATERIALS AND METHODS

Herbarium specimens and slides of *Nesophila hoggardii* are deposited, except where otherwise noted, in the herbarium of the Museum of New Zealand (WELT). Herbarium abbreviations follow Holmgren *et al.* (1990). Material for this study was dried, or preserved in 3-5% formalin/seawater. The following herbarium specimens were examined for comparative purposes:

Figure 2. Map of the northern North Island and offshore islands.



Portieria harvey (J.Ag.) Silva — Tonga, W.H. Harvey 32, 1853 (Friendly Islands Algae), AK 44687. *Portieria hornemanni* (Lyngbye) Silva — Kokomyambu Is., Solomon Islands, A. Bailey, July 1965, AD A36868. Matiu Is., Solomon Islands, H.B.S. Womersley and A. Bailey, Aug 1965, AD A36869. Yonaguni Is., Okinawa, Japan, J. Tanaka, Fasc. V (120), Algae Marinae et Salsugineae Exsiccatae, WELT. *Portieria japonica* (Harvey) Silva — Yenoshima, Sagami, Japan, Herb. Higashi, WELT A543.

Tissue for microscopic examination was sectioned by hand, or embedded in glycol methacrylate, sectioned with a microtome at a thickness of 3µm and stained with Giemsa or toluidine blue.

DIAGNOSIS AND OBSERVATIONS

Nesophila gen. nov.

Phycoma gametophytarum atque tetrasporophytarum similes, axibus compressis, dichotome ramosis e disco basale orientibus. Discus ex ramis angustis, prostratis, implexisque constructus. Cellulae medullosae magnae, rotundatae, in axe conspicue ad centrum dispositae, rhizoideis filamentosis circumcinctae. Cellulae glandulosae obovoideae ad sunt. Cortex ex cellulis parvis, cuboidalibus in strato singulo vel stratis duplicis dispositis, in partibus subcorticalibus cellulis majoribus rotundatis in stratis duplicis vel triplicis constructus. Tetrasporangia in nematheciiis collocata, paraphyses desunt. Cystocarpia inter paraphyses nidulantia, in nematheciiis collocata, ramis auxiliaris tres vel quatuor cellulorum constantiis.

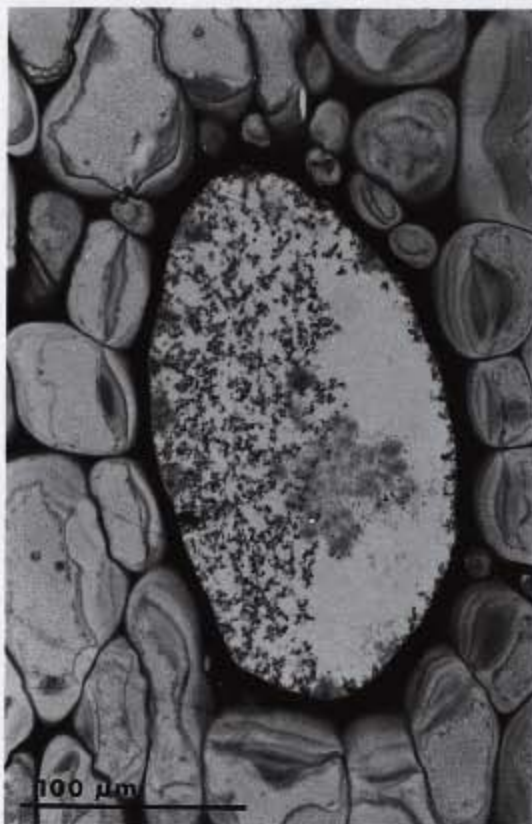


Figure 3. Cross-section showing prominent central axial cell surrounded by rhizoidal filaments.

Thalli (gametophytes and tetrasporophytes) of flattened, dichotomously branched axes arising from a holdfast of tangled, prostrate, narrow branches. Medulla of large, rounded cells with a prominent, central, axial cell row, surrounded by rhizoidal filaments (Figs 3, 4); obovoid gland cells present (Fig. 5). Cortex composed of one or two layers of small, cuboidal cells with a subcortical zone of larger, rounded cells, two to three cell layers deep (Fig. 5). Tetrasporangia (Fig. 7) found in nemathecia; paraphyses absent. Cystocarps in nemathecia embedded among paraphyses; 3-4 celled auxiliary cell branch.



Figure 4. Longitudinal section showing large axial cell.

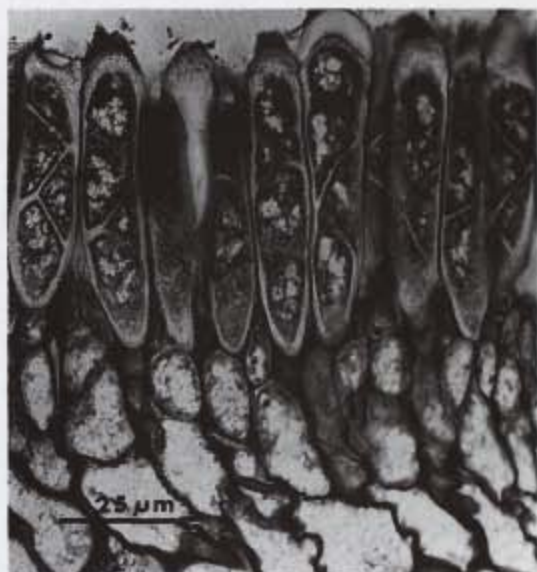


Figure 6. Irregularly zonate tetrasporangia in nemathecium.

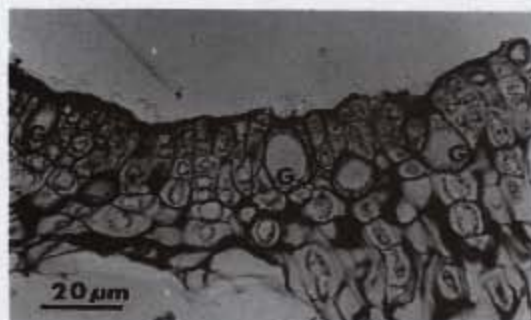


Figure 5. Cortical section with gland cells (G).



Figure 7. Surface view of tetrasporangial nemathecium. Scale bar = 4 mm.

ETYMOLOGY: "island-loving" in reference to its known distribution.

TYPE SPECIES: *Nesophila hoggardii*

Nesophila hoggardii

(Figs 1, 3-10) *Characteribus generis. Phycoma purpureo-phoeniceum ad umbrinum decolorens ad 18 cm attingens, axibus angustis, compressis, circa 2.0-2.5 mm latitudo, aequatis, apicibus acutis. Tetrasporangia irregulariter zonatim vel cruciatim divisa (14-19 μm x 72-80 μm). Cystocarpia in nematheciis pallidis nidulantia. Carposporis ad 27-32 μm diametro.*

With the characters of the genus. Plants crimson red, bleaching to orange rust, up to 18 cm in height with narrow compressed axes of even width (2-2.5 mm) with acute apices. Tetrasporangia irregularly zonate, to cruciate 14-19 μm x 72-80 μm (Fig. 6). Cystocarps embedded in pale nemathecium (Figs 8, 9). Carpospores 27-32 μm in diameter (Fig. 10).

HOLOTYPE: WELT 20022e, 17.v.1988, D.R. Schiel.

ISOTYPES: WELT 20022a-d,f, at WELT, CHR, AK, AD, NSW.

TYPE LOCALITY: Poor Knights Islands.

ETYMOLOGY: The epithet honours Vernon Hoggard, Research Associate of the Museum, in recognition of his contribution to New Zealand phycology through extensive and careful subtidal collections which have been lodged with the Museum of New Zealand (WELT).

DISTRIBUTION: Three Kings Islands (34°09'S, 172°10'E), Poor Knights Islands (35°30'S, 174°44'E), Alderman Islands (36°58'S, 176°05'E), White Island (37°31'S, 177°12'E). (Fig. 2). These northern offshore islands all lie within the summer isotherm of 20-21°C and the influence of the warm East Auckland Current (Harris 1985).

ADDITIONAL SPECIMENS EXAMINED: White Is., W. Hamilton, Jan 1947, CHR

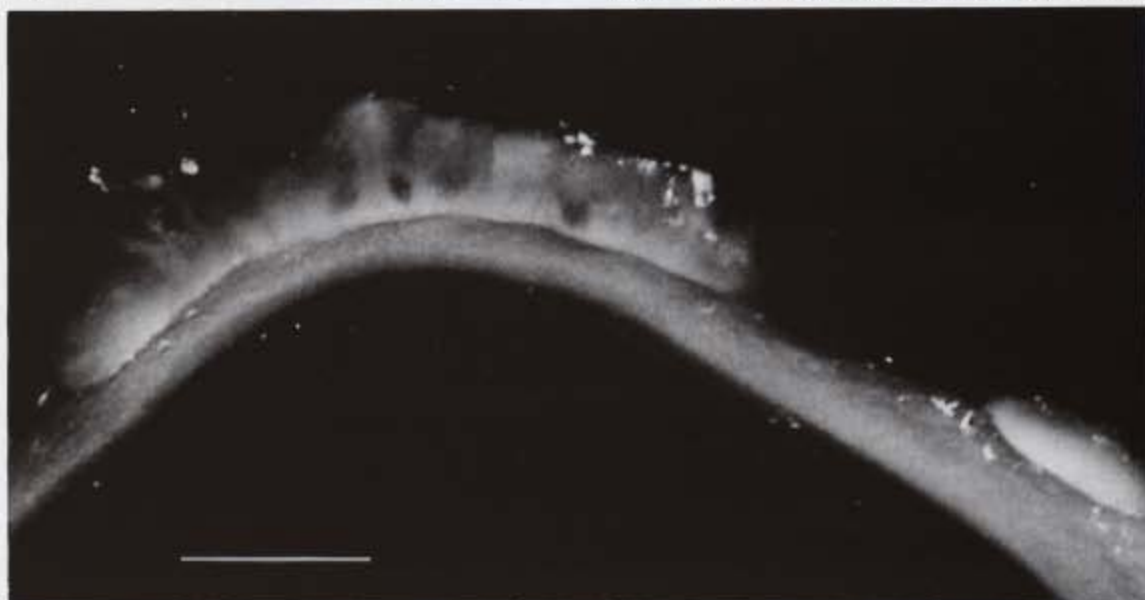


Figure 8. Surface view of cystocarpic nemathecia. Scale bar = 2 mm.

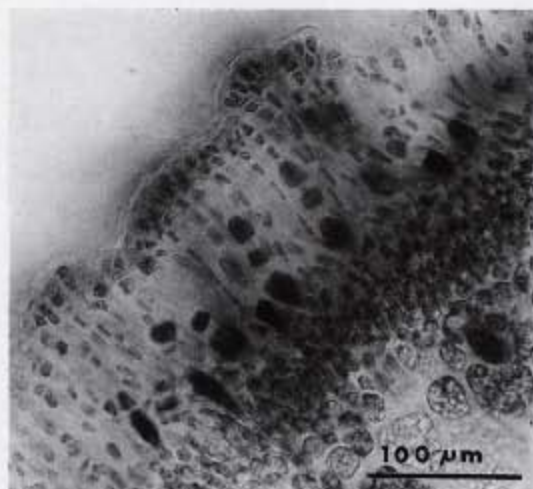


Figure 9. Cross-section of nemathecium with 3-celled auxiliary cell membranes.

55685-87. Poor Knights Is., *Hoggard*, Nov 1970, WELT A4121-22. Alderman Is., *V. Hoggard*, Nov 1971, WELT A6972. Great Is., Three Kings Is., *A.N. Baker*, Feb 1974, WELT A8600. Great Is., Three Kings Is., *R.K. Dell*, Feb 1974, WELT A8669. Great Is., Three Kings Is., *R. Mason*, Jan 1976, WELT A9386, A9389. Great Is., Three Kings Is., *H. Choat*, Oct 1978, WELT A10473. Great Is., Three Kings Is., *H. Choat*, Oct 1978, WELT A10411. West Is., Three Kings Is., *M.A. Francis*, Nov 1983, WELT A13945. Great Is., Three Kings Is., *M.A. Francis*, Dec 1983, WELT A13956. Poor Knights Is., *M. McCormick*, May 1986, WELT A17243. Poor Knights Is., *D.R. Schiel*, Feb 1989, WELT A20021.

HABIT AND HABITAT: *Nesophila hoggardii* grows in clumps on subtidal rocks and on boulders amongst gravel, and on vertical rock walls between 1.5 and 30 m depth. It is found in open areas subtidally,

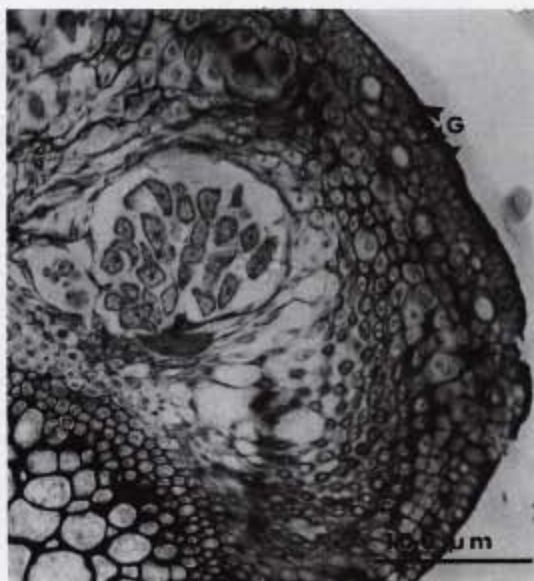


Figure 10. Section through mature cystocarp (G-gland cells).

not as an understorey plant, and is particularly common at the Poor Knights Islands around the nests of the black angelfish (*Parma alboscapularis*) (*D.R. Schiel pers.comm.*).

VEGETATIVE MORPHOLOGY: The axial cell row is very distinctive in this genus. The cells are up to 1.0 mm in length, and have a large lens-shaped thickening at each end. In some pressed specimens this thickening can be seen through the surface of the plants. Although the apices of *Nesophila hoggardii* branch dichotomously, lower axes in some individuals develop proliferous branches. These proliferations, presumably forming at sites of cortical damage, also branch dichotomously.

DISCUSSION

The Rhizophyllidaceae consists of three other genera: *Rhizophyllis* Kuetzing (= *Contarinia* Zanardini), a prostrate,

uniaxial plant; *Ochtodes* J. Agardh, an erect biaxial genus; and the uniaxial *Portieria* Zanardini, a genus with "a troubled nomenclatural history" discussed by Silva (1987). *Portieria* includes species previously treated as *Chondrococcus* Kuetzing and *Desmia* Lyngbye p.p. Although these genera are very different from one another vegetatively, Wiseman (1975, 1976, 1977) notes that they share "a constellation of reproductive features" — namely nemathecial development of tetrasporangia, cystocarps embedded within nemathecium with separate carpogonial filaments, and 3-4 celled auxiliary cell branches interspersed among assimilatory filaments. *Nesophila hoggardii* possesses the reproductive features of the family and differs from all other members in its acute apices, uniaxial construction, and dichotomous branching. Wiseman (1975) transferred the family Rhizophyllidaceae from the order Cryptonemiales to the Gigartinales on the basis of the non-accessory position of the auxiliary cell branch. Kraft and Robbins (1985) subsequently merged these two orders into the Gigartinales, a step which is regarded as "a necessary interim step in sorting out relationships among the included families" (Garbary & Gabrielson 1990).

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