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Plumularia roxanae, a new epiphytic hydroid (Cnidaria: Hydrozoa: Plumulariidae) from the Indo-Pacific

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Abstract: A new epiphytic, small-sized species of *Plumularia* Lamarck, 1816, *P. roxanae* sp. nov., is described based on fertile material from Bali, Indonesia. Its deep hydrothecae are characteristically narrowed distally through a distinctive hypertrophy of the free portion of their adaxial wall. Its minute gonothecae, however, are comparable in shape and size to those of the well-known, circumtropical *P. floridana* Nutting, 1900.

Keywords: Taxonomy - new species.

INTRODUCTION

The highly speciose, circumglobal, ecologically diverse genus *Plumularia* Lamarck, 1816 comprises feather-shaped hydroids ranging in form from small, pinnate colonies with monosiphonic, unbranched stems to large structures composed of repeatedly branched, occasionally fascicled stems (Bouillon *et al*., 2006). As noted by Schuchert (2013a, b), its taxonomy proves occasionally challenging, due to an important intraspecific variation (e.g. internode length, shape of hydro- and gonothecae) and a limited availability of diagnostic morphological characters. Although new species are still created based on infertile specimens (Watson, 2012), thus adding to the actual difficulties in the identification of numerous poorly-described nominal taxa erected by earlier authors (e.g. Mulder & Trebilcock 1911, 1914, 1915; Fraser 1938a, b, c, 1948), a small, epiphytic *Plumularia* with distinctive hydro- and gonothecae is described from material collected recently from Bali, Indonesia.

MATERIAL AND METHODS

Hydroid-covered algae freshly washed ashore were collected by hand during an ebb tide, and fixed immediately in 4% buffered formalin in seawater. The material was subsequently sorted in the laboratory and observations were made according to the methods described by Galea (2007, 2008). Holo- and paratype specimens are deposited in the invertebrate collection of the Muséum d'histoire naturelle of Geneva, Switzerland.

RESULTS

***Plumularia roxanae* sp. nov.**

Figs 1-2; Tables 1-2

Holotype: MHNG-INVE-137167; INDONESIA, Bali, Pererenan beach; -8.650831°, 115.119820°; 13 Jan. 2020; fertile colony on red alga.

Paratypes: MHNG-INVE-137168; INDONESIA, Bali, Pererenan beach; -8.650831°, 115.119820°; 13 Jan. 2020; fertile colony on red alga. – MHNG-INVE-137169; INDONESIA, Bali, Pererenan beach; -8.650831°, 115.119820°; 13 Jan. 2020; fertile colonies on 3 fragments of red algae.

Diagnosis: Small-sized, epiphytic *Plumularia* arising from stolon with perisarcal spurs, giving rise to monosiphonic stems divided homomerously by transverse nodes into rather short, collinear internodes, each with a subterminal cladial apophysis provided with an inconspicuous adaxial mamelon and a pair of axillar nematothecae; cladia heteromerously segmented by alternating straight and oblique nodes into short, ahydrothecate internodes occasionally provided with a nematotheca, and up to three, comparatively longer hydrothecate internodes accommodating a centrally-placed hydrotheca and its three associated nematothecae; hydrotheca deep, saccate, partly adnate, distal portion distinctly constricted through the hypertrophy of the free adaxial wall that adopts a triangular shape, considerably reducing the thecal lumen; abaxial wall slightly convex; gonothecae in two closely-set, parallel rows along the stem, borne on the cladial apophyses, minute, ovoid, thick-walled.

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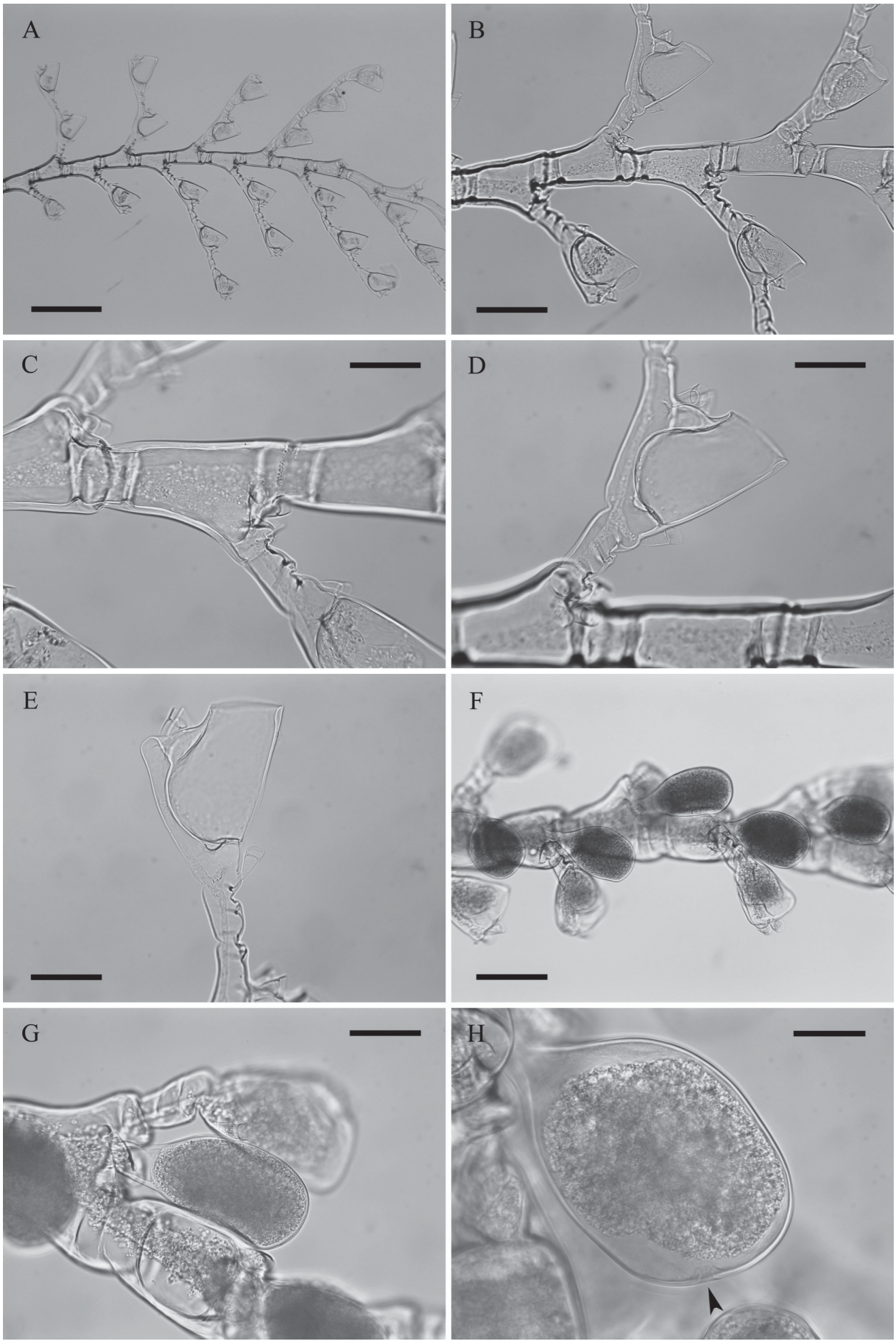

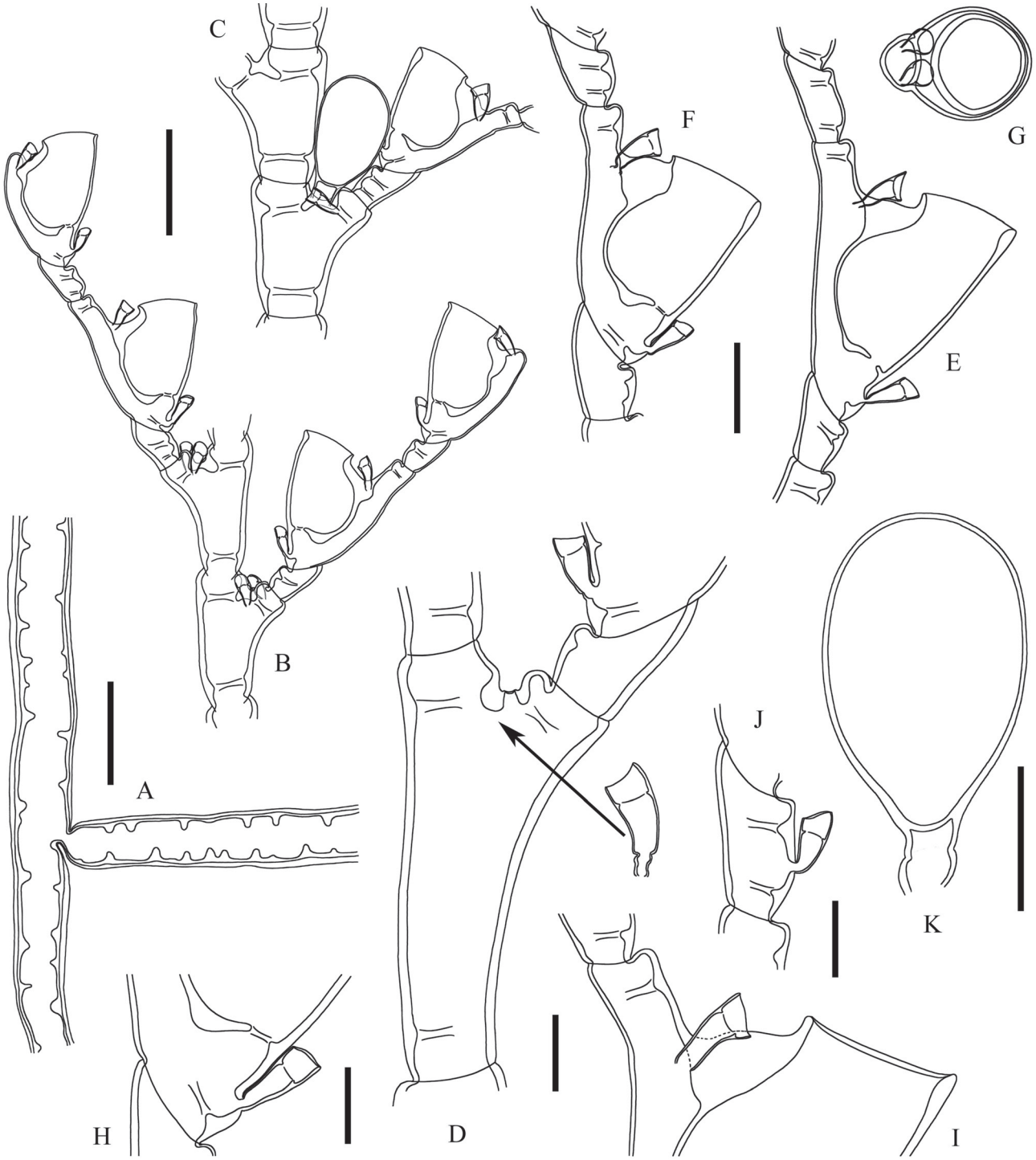

Fig. 2. *Plumularia roxanae* sp. nov. (A) Portion of ramified stolon, showing internal spurs. (B) Two stem internodes and proximal parts of their corresponding cladia. (C) Portion of stem with gonotheca. (D) Detail of stem internode. (E, F) Two hydrothecae seen laterally, note differences in the adaxial perisarc thickening. (G) Hydrotheca seen from above, note the position of lateral nematothecae. (H) Base of hydrotheca with mesial nematotheca. (I) Distal part of hydrotheca with lateral nematotheca. (J) Cladial ahydrothecate internode. (K) Gonotheca. Scale bars: 50 μm (D, H-K), 100 μm (E-G), 200 μm (B, C), 300 μm (A).

Fig. 1. *Plumularia roxanae* sp. nov. (A) Portion of cormoid. (B) Detail of a portion of stem with proximal parts of four successive cladia. (C) Detail of a stem internode, showing centrally an apophysis and the proximal part of the corresponding cladium. (D) Proximal most hydrotheca. (E) Distalmost hydrotheca, note the absence of the distal part of its corresponding internode. (F) Portion of fertile stem with rows of gonothecae. (G) Gonotheca. (H) More detailed view of a gonotheca, showing apical aperture (arrowhead). Scale bars: 50 μm (H), 100 μm (C-E, G), 200 μm (B, F), 500 μm (A).

◄

Etymology: It is my great pleasure to dedicate this new species to the memory of my late mother, Roxana S. Galea (née Florescu, 5 Oct. 1946 – 18 Jan. 1994), a Romanian biologist, who passed on to me her interest for natural sciences.

Description: Colonies epiphytic on algae, composed of numerous erect cormoids arising from creeping, branching, flattened stolonal tubes firmly attached to substrate; lumen with two lateral rows of perisarcal spurs; a wide flange of thinner perisarc flanking outer lateral sides. Stems short, up to 5 mm high, with thick and firm perisarc, gradually thinning out distally; monosiphonic, divided by means of transverse nodes into a regular sequence of collinear, rather short internodes, length slightly increasing gradually towards tips of cormoids; each internode with two internal perisarc ridges (one above proximal node, the second below the distal node) and a subterminal cladial apophysis; apophyses alternate along the stem, the two rows either in one plane in some specimens or variably shifted on to the anterior side of the colony in others; apophyses well-developed, each with a subterminal, internal perisarc ridge, an inconspicuous mamelon (reduced to a mere pore) with small, circular aperture on adcauline side, and a pair of axillar nematothecae, one to each lateral side; distal node straight. Cladia given off at an angle of about 45° with the long axis of the stem; up to 1 mm long, divided heteromerously by an alternation of deeply-incised, straight and oblique nodes delimiting a- and hydrothecate internodes; first cladial internode ahydrothecate; all ahydrothecate internodes short, with proximal node straight and distal node oblique, with two internal perisarc ridges (one proximal, one distal) and, occasionally, with a nematotheca in middle of upper side; hydrothecate internodes, up to 3 per cladium, comparatively longer than their ahydrothecate counterparts, slightly sigmoid in overall shape, with proximal node oblique and distal node straight, a centrally-placed hydrotheca (together with its 3 associated nematothecae), occupying more than half the length of the internode, and two internal perisarc ridges near both ends. Hydrotheca deep, saccate, adnate for about 2/3 to its corresponding internode; abaxial wall thick, slightly convex proximally; free adaxial wall exceedingly hypertrophied, adopting a triangular shape, free angle upturned; adnate adaxial wall moderately thick, forming an L-shaped perisarc thickening at junction with the hydrothecal base, the latter pierced by circular foramen for the passage of the hydranth; hydrothecal aperture facing nearly upwards, rim entire, circular in apical view; mesial nematotheca well below the hydrothecal base, mounted on small prominence of the internode; lateral nematothecae borne on indistinct apophyses and hidden by the free portion of the adaxial wall when the hydrotheca is seen frontally, and typically inclined over this side of the thecal wall; hydranths able to completely retract into their corresponding hydrothecae, with ca. 12 filiform tentacles in a whorl around a dome-shaped hypostome. All nematothecae of the colony movable, elongate-conical in shape and bithalamic; lower chamber comparatively taller than upper one, the latter with the wall slightly lowered on adaxial side. Gonothecae in two parallel, closely-set rows along the stem, arising singly from the anterior side of each cladial apophysis; likely male in the present material, with a homogenous, granular content; elongate-globular, thick-walled, with smooth outer surface, apically with a small funnel-shaped aperture in some specimens, delimited basally by transverse, thick diaphragm from a short, tubular pedicel.

Remarks: Upon a comparison with all shallow-water, small-sized (generally not surpassing 1 cm high), short-cladiate, nominal species of *Plumularia* Lamarck, 1816 from the tropical Indian and western Pacific oceans (Table 1), it appears that the material at hand is

Table 1. Measurements of *Plumularia roxanae* sp. nov., in µm.

Stem	
- internodes, length	220-285
- internodes, diameter at node	45-95
- cladial apophyses, length	40-45
Cladia	
- ahydrothecate internodes, length	65-95
- hydrothecate internodes, length	255-300
- diameter at transverse node	30-40
Hydrotheca	
- abaxial wall, length	180-195
- free adaxial wall, length	75-85
- adnate adaxial wall, length	110-120
- diameter at rim	100-115
Nematothecae	
- axillar, length	60-65
- axillar, diameter at rim	ca. 25
- of ahydrothecate internodes, length	ca. 40
- of ahydrothecate internodes, diameter at rim	ca. 25
- mesial, length	ca. 55
- mesial, diameter at rim	ca. 25
- lateral, length	55-60
- lateral, diameter at rim	ca. 35
Gonotheca	
- length	195-220
- maximum width	135-140
- pedicel, length	45-50
- pedicel, width	40-45

Table 2. Nominal species of *Plumularia* Lamarck, 1816 from the tropical Indo-west Pacific, and their distinctive features to *P. roxanae* sp. nov.

Nominal species	**Distinctive features to *P. roxanae* sp. nov. Remarks. Habitat**	**Distribution and references**
P. amphibola (Watson, 2011)	Nominal species indistinguishable morphologically from *P. crateriformis* Mulder & Trebilcock, 1911, from which it was separated only on the account of the presence of single hydrothecate internodes on cladia. Epiphytic	Australia (Watson, 2011)
P. angusta Stechow, 1923	Nominal species created by Stechow (1923: 226) for 3 varieties (a, b, d) of *P. setaceoides* Bale, 1882 dealt with by Mulder & Trebilcock (1911: pl. 3 figs 3-3b, pl. 3 fig. 6, pl. 2 fig. 9, respectively). Subsequently reported upon by Watson (1975: figs 30-31). No comprehensive description available, but morphology of both hydro- and gonothecae similar to that of the better-known *P. wilsoni* Bale, 1926 (see below), with which it could be conspecific, in that case having priority. Presumably epiphytic	Australia, Tasmania (Mulder & Trebilcock, 1911; Watson, 1975)
P. australis Kirchenpauer, 1876	Stem internodes moderately-long, geniculate; cladial apophyses with a mamelon and an axillar nematotheca; cladia composed of a proximal, short, athecate internode, followed by a hydrothecate internode; hydrotheca seated in a concavity of internode, slightly compressed laterally, abaxial wall distinctly cambered, adaxial wall projecting a strong, oblique intrathecal septum, rim weakly to noticeably sinuous; dioecious, 1-3 gonothecae on lower stem internodes, large, flask-shaped, body narrowing distally to an upwardly bent, cylindrical neck, with a wide, circular, thickened aperture with broadly everted rim. Epiphytic	Australia (Watson, 1990, 2011)
P. caliculata Bale, 1888	Stem internodes moderately-long, slightly geniculate, with internal septa at both ends, and 1 nematotheca; cladial apophyses with low mamelon and 1 axillar nematotheca; cladia heteromerous, internodes with septa at both ends, up to 5 hydrothecate internodes; hydrothecae cup-shaped, shallow, fully adnate, abaxial wall thickened and swollen basally; monoecious, gonothecae forming a continuous row on front of stem, attached to successive cladial apophyses just under mamelon, female globular with external marsupium, male elongated. Epiphytic	Australia, New Zealand, Japan (Vervoort & Watson, 2003)
P. compressa Bale, 1882	The hydro- and gonothecae of this nominal species appear indistinguishable from those of *P. australis* Kirchenpauer, 1876 (see above); compare Bale (1882: p. 15, figs 5-5a), Bale (1884: pl. 12 figs 9-10, pl. 19 figs 39-40) and Bale (1888: pl. 19 fig. 14) with Bale (1884: pl. 12 figs 7-8, pl. 19 figs 43-44) and Watson (1990: figs 177-182), respectively. If the synonymy is accepted, Kirchenpauer' species has priority. Epiphytic	Australia (Watson, 2005)
P. corrugatissima Mulder & Trebilcock, 1914	Nominal species inaccurately described. Stem internodes with 1 nematotheca; cladial apophyses with 2 nematothecae; cladia heteromerous, hydrothecate internodes distinctly swollen; hydrothecae small, cup-shaped, shallow, about as deep as wide, fully adnate, rim everted frontally, aperture somewhat oblique; gonothecae unknown. Presumably epiphytic	Australia (Mulder & Trebilcock, 1914; Bale, 1919)
P. crateriformis Mulder & Trebilcock, 1911	Stolon with nematothecae. Stems divided by strongly oblique nodes; internodes short, robust, with several thick complete internal septal ridges, and 1 nematotheca; cladial apophyses with 1 axillar nematotheca; ahydrothecate internodes with 1 nematotheca, with the exception of the proximal most; hydrothecae perched on bulges of upper side of hydrothecate internodes, alternating with 3 strong septal ridges; symmetrical, cup-shaped, walls expanding to margin, base rounded, aperture outrolled; 1-3 gonothecae in lower stem region, often of both sexes, urn-shaped, distally a dome-shaped cap, gonophore with row of refringent corpuscles. Epiphytic	Australia (Mulder & Trebilcock, 1911; Watson, 1990, 2005)
P. crateroides Mulder & Trebilcock, 1911	Nominal species inaccurately described. Stolon with nematothecae; stem internodes "with about three transverse wrinkles" and 1 nematotheca; cladial apophyses with 1 nematotheca; cladia heteromerous; hydrothecae cup-shaped, rather shallow, expanding upwards, partly adnate to the corresponding internode; gonothecae given off singly from base of stem, "somewhat flattened beneath, convex on top, obliquely truncated, aperture very large, margin everted". Presumably epiphytic	Australia (Mulder & Trebilcock, 1911)

Nominal species	Distinctive features to *P. roxanae* sp. nov. Remarks. Habitat	Distribution and references
P. epibracteolosa Watson, 1973	Stem divided by strongly oblique nodes; internodes with 3-4 internal ridges of perisarc, and 1 nematotheca; cladial apophyses with an axillar nematotheca besides the adaxial pore; cladial hydrothecate internodes with 4-5 internal ridges of perisarc; hydrothecae wide, shallow, cup-shaped; abaxial wall distinctly thickened; adaxial wall adnate to hydrocladium only near base, the remainder joined to the internode by a wedge of perisarc; margin sinuated, with a thickened outwardly rolled rim, the line of the margin curved down posteriorly to meet the internode; aperture truncated adaxially by a delicate transverse sheet of perisarc; a couple of large, piriform gonothecae arising from old, basal hydrocladial apophyses. Epiphytic	Australia, New Zealand (Watson, 1973; Vervoort & Watson, 2003)
P. excavata Mulder & Trebilcock, 1911	Nominal species inaccurately described. Stem "annulated", without nematothecae; cladia bearing single, concave hydrothecate internodes; hydrothecae cup-shaped, partly adnate, abaxial wall distinctly sigmoid (strongly concave proximally, convex distally); gonothecae unknown. Presumably epiphytic	Australia (Mulder & Trebilcock, 1911)
P. filicaulis Kirchenpauer, 1876	Colonies with sessile cladia and/or erect stems; stem divided by oblique nodes; internodes moderately-long, with 1 nematotheca; cladial apophyses with mamelon and 1 axillar nematotheca; cladia heteromerous, with up to 6 hydrothecate internodes; hydrothecae cup-shaped, basally adnate, abaxial wall slightly rounded, adaxial wall giving rise to an intrathecal septum, margin forming an angle of 45° with the internode, produced to form a peak on both the ad- and abaxial sides; gonothecae borne on hydrorhiza, firmly applied to substratum, flattened, thick-walled, irregularly ovate in outline, aperture small, circular on upper surface of distal end, a number of minute pores on upper surface. Epiphytic	South Africa, Australia, Japan, Madagascar (Millard, 1975; Watson, 2005)
P. flexuosa Bale, 1894	Stem occasionally branched; internodes moderately-long, geniculate, with 1 nematotheca; cladial apophyses with 1-2 axillar nematothecae, as well as an additional nematotheca on the apophysis itself; hydrothecae deeply campanulate, expanding to aperture, abaxial wall weakly concave, adaxial wall almost straight, a small portion free from the internode; dioecious, gonothecae on lower stem internodes, elongate-ovoid, twice as long as wide, distal end tapering, truncate above and there provided with a rather small, somewhat oblique aperture, without submarginal teeth. Epiphytic and epizoic	Australia, New Zealand, Japan (Bale, 1894; Watson, 1973, 2000, 2005)
P. floridana Nutting, 1900	Stem internodes relatively long, slender, slightly geniculate, each with an internal perisarc ridge at each end, and 1 nematotheca; cladial apophyses with mamelon and 2 axillar nematothecae; cladia heteromerous, ahydrothecate internodes moderately-long and with 1 nematotheca, hydrothecate internodes with a centrally-placed hydrotheca; the latter fairly deep, cylindrical, half adnate; gonothecae small, globular, thin-walled, borne on cladial apophyses. Epiphytic	Circumglobal in warm waters (Ansín Agís *et al*., 2001)
P. fragilia Watson, 2012	Stem internodes long, slender, with 2 nematothecae on opposite sides; cladial apophyses with a bun-shaped mamelon and 2 axillar nematothecae; cladia heteromerously segmented into long a- and hydrothecate internodes, the former with 1 nematotheca; hydrothecae seated about halfway along the internodes, small, deep bowl-shaped, abaxial wall deeply concave to straight, adaxial wall weakly concave and fully adnate to internode, margin oblique to internode axis, circular, rim everted; gonothecae unknown. Epizoic	Australia (Watson, 2012)
P. goldsteini Bale, 1882	Nominal species inadequately described, though easily recognizable through the peculiar shape of its hydrothecae. Cladia heteromerous, with up to 4 hydrothecate internodes; hydrotheca slipper-shaped, long axis strongly sigmoid, base distinctly swollen, aperture facing away from the internode; gonothecae unknown. Epiphytic	Australia (Bale, 1882, 1884 ; Watson, 1973)

Nominal species	Distinctive features to *P. roxanae* sp. nov. Remarks. Habitat	Distribution and references
P. hyalina Bale, 1882	Stem internodes of varied length, with or without internal septa, with 0-1 nematotheca; cladial apophysis with conical mamelon and 1 axillar nematotheca; hydrotheca deep bowl-shaped, abaxial wall slightly convex, adaxial wall concave and fully adnate to internode, margin a broad sinuous curve down to internode; one to several gonothecae in a row around lower stem, large, piriform, walls smooth to obscurely undulated, when mature flattened at top, and opening by a large, smooth-edged, circular aperture, gonophore with belt of refringent corpuscles. Epiphytic and epizoic	Australia (Mulder & Trebilcock, 1911; Trebilcock, 1928; Watson, 2011)
P. lucerna Mulder & Trebilcock, 1911	Very likely a stemless variety of *P. filicaulis* Kirchenpauer, 1876 (see above); compare Mulder & Trebilcock (1911: pl. 3 fig. 4) with Bale (1884: pl. 11 figs 6-7). Presumably epiphytic	Australia (Mulder & Trebilcock, 1911)
P. meretricia Watson, 1973	Stem internodes long, slender, occasionally with 1-2 nematothecae, often absent; cladial apophyses with prominent mamelon (with 1-2 apertures) adaxially and 1 axillar nematotheca, the latter often absent; hydrothecae campanulate, abaxial wall straight for most of its length, expanding below aperture; margin everted, slightly sinuated, curving down adaxially; gonothecae unknown. Epizoic	Australia (Watson, 1973, 2005)
P. mooreana Schuchert, 2013	Stem internodes relatively short, sturdy, each with 1 nematotheca; cladial apophyses with 1 axillar nematotheca; cladia heteromerous, with up to 4 relatively short hydrothecate internodes, each with a centrally-placed hydrotheca; the latter bowl-shaped, shallow, inclined downward at 45° with the internode; 1-2 gonothecae near stem bases, borne on laterally-set pedicels, urn-shaped, perisarc undulated, outer surface with scattered nematothecae. Inert substrates	French Polynesia, Fiji (Schuchert, 2013b)
P. obesa Blackburn, 1938	Stem internodes short, sturdy; cladial apophyses with mamelon and 1-2 nematothecae; cladia with single, short, concave hydrothecate internode, accommodating distally a hydrotheca; the latter laterally compressed, abaxial wall sigmoid, adaxial wall fully fused, concave, giving rise to a forwardly and upwardly-directed intrathecal ridge, margin sinuous, somewhat everted abaxially, distinctly lowered adaxially; gonothecae unknown. Epiphytic	Australia (Blackburn, 1938; Watson, 1990)
P. obliqua Johnston, 1847	Stem internodes moderately long, geniculate, with 1 nematotheca; cladial apophyses with conical mamelon and 1 axillar nematotheca; hydrothecate cladial internode with 2 internal septa behind the hydrotheca, the latter distal on internode, scoop-shaped, fully adnate, abaxial wall smoothly convex, thickened or not, margin cut obliquely back to internode, rim slightly everted, a perisarc thickening behind; gonothecae on lower stem internodes, large, urn-shaped, perisarc fairly thick, distally truncate, aperture closed by sheet of tissue; gonophore a medusoid. Epiphytic	Circumglobal in temperate to tropical waters (Watson, 2011)
P. pulchella Bale, 1882	Stem internodes robust, moderately long, with several transverse internal septa and 1 nematotheca; cladial apophyses with 2 axillar nematothecae; hydrothecate internodes short, concave, hydrotheca distally-placed, fully adnate, cup-shaped, slightly flaring, abaxial wall weakly concave, variably thickened; dioecious, gonothecae on lower stem internodes, at base of a cladial apophysis, large, globular, thick-walled, smooth to faintly rugose, aperture distal, set obliquely, aperture narrow, circular, with a row of large, internal submarginal cusps. Epiphytic	Australia (Watson, 1973, 2011)
P. rotunda Mulder & Trebilcock, 1911	Stem internodes moderately long, slightly geniculate, with 1 nematotheca; cladial apophyses with 1 axillar nematotheca; cladia heteromerously segmented, ahydrothecate internodes short and with 1 nematotheca, hydrothecate internodes up to 2, comparatively longer, each with a hydrotheca distally; hydrothecae elliptic, abaxial wall strongly arched, becoming thicker towards aperture where it is incurved, appearing as a submarginal septum, aperture small, set obliquely forwards, subrectangular, rim weakly lobate; gonothecae unknown. Epiphytic	Australia (Bale, 1919; Watson, 2015)
P. spinulosa Bale, 1882	Stem internodes moderately long and slender, with 1 nematotheca; cladial apophyses with mamelon and 1 axillar nematotheca; cladia with single, concave hydrothecate internode, ending in a distal spine of variable length, projecting beyond hydrotheca; the latter bonnet-shaped, fully adnate, laterally compressed, abaxial wall convex, a strong adaxial intrathecal septum projecting halfway across lumen, aperture sinuated adaxially; one to several gonothecae on lower cladial apophyses, large, elongated-conical, sometimes curved asymmetrically, with wide terminal aperture set perpendicularly to long axis. Epiphytic and epizoic	Australia, New Zealand, South Africa, Japan (Millard, 1975; Watson, 2011)

Nominal species	Distinctive features to *P. roxanae* sp. nov. Remarks. Habitat	Distribution and references
P. strictocarpa Pictet, 1893	Stolon with nematothecae; cauline internodes long, slender, slightly geniculate, with 1-2 nematothecae; cladial apophyses with mamelon and 1 axillar nematotheca; cladia heteromerous, ahydrothecate internodes relatively long, with internal septa at both ends and 1 nematotheca; hydrothecate internodes comparatively longer, with up to 3 internal septa; hydrothecae conical, fully adnate, margin rounded, tilted abaxially; gonothecae borne below lower cladial apophyses, large, partly or fully seated on substrate, barrel-shaped in frontal view, flattened dorso-ventrally, distinctly transversely ridged, aperture distal, circular. Epiphytic, epizoic, also growing on inert substrates	Circumglobal in warm waters (Ryland & Gibbons, 1991; Hirohito, 1974)
P. togata Watson, 1973	Cauline internodes moderately long and slender, with 1 nematotheca; cladial apophyses with conical mamelon and 1 axillar nematotheca; hydrotheca slipper-shaped, longitudinal axis S-shaped, abaxial wall considerably produced frontally, aperture narrowed and tilted adaxially; gonotheca borne beside apophysis of first stem internode, large, urn-shaped, distally truncate, walls smooth to weakly undulated, aperture closed by sheet of tissue. Epiphytic	Australia (Watson, 1973, 2011)
P. tubacarpa Watson, 2000	Cauline internodes long, each with 1-4 cladial apophyses (usually 2) and a variable number of nematothecae, 1 in axil of apophysis, 1 beside apophysis, 1 halfway between hydrocladia and sometimes 1 at side of internode just above node; cladia divided homomerously into quite long hydrothecate internodes; hydrothecae deep cup-shaped, adaxial wall entirely adnate, abaxial wall straight to faintly sinuous, concave just behind margin; gonothecae exceedingly long, tubular, rounded apically. Epizoic	Australia (Watson, 2000)
P. warreni Stechow, 1919	Stem internodes moderately long, with 1 frontal nematotheca; cladial apophyses with 1 axillar nematotheca; cladia heteromerous, ahydrothecate internodes short, with internal septa near ends, and 1 nematotheca, hydrothecate internode comparatively longer, with internal septa near ends and a centrally-placed hydrotheca; the latter inverted conical, completely adnate, margin slightly oblique; monoecious, gonothecae on cladial apophyses, elongate-ovoid, outline irregular, slightly flattened dorso-ventrally. Epiphytic	From South Africa to Australia (Millard, 1975)
P. wilsoni Bale, 1926	Stolon with internal pegs and nematothecae; stem internodes relatively short, with internal ridges near their ends, and 1 nematotheca on side opposite to cladial apophysis; the latter with 2 axillar nematothecae; cladia heteromerous, hydrothecate internodes relatively long, with a centrally-placed hydrotheca; abaxial wall sigmoid, thickened, adaxial wall free for 1/3 from corresponding internode, concave, aperture tilted abaxially; gonothecae borne on lower stem internodes, large, piriform, transversely ridged, distal end truncate. Presumably epiphytic, also epizoic	Australia, Tasmania, New Zealand (Ralph, 1961; Watson, 2015)

distinctive, mainly through the shape of its hydrothecae. Similar gonothecae are only found in *P. floridana* Nutting, 1900, a species of circumtropical occurrence, described under various names (Calder, 1997: 15).

The epiphytic hydroid erroneously assigned (Watson, 2011: 78) to *Monotheca hyalina* (Bale, 1882) by Vervoort & Watson (2003) resembles the present species, notably in the structure of the colony and the shape of hydrotheca, but shows several differences: 1) its stolon is devoid of perisarc spurs; 2) there is only one axillar nematotheca associated to the cladial apophyses of the stem; 3) the hydrothecae are devoid of the characteristic thickening of the free adaxial wall; 4) its (female) gonothecae are much bigger, ca. 1 mm high, as deduced from their fig. 90I, and they are piriform, with an apical, broad, circular aperture closed by an operculum. For these reasons, their record is not included in the synonymy of the present species, pending the discovery of colonies belonging to the opposite (female) sex.

Distribution: Known only from Bali, Indonesia, but presumably spread throughout the archipelago.

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