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Pseudobryopsis australis (Ulvophyceae, Pseudobryopsidaceae), a new species of marine green algae from south-west Western Australia

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SHORT COMMUNICATION

Pseudobryopsis australis Huisman & Verbr., *sp. nov.*

Type: Cape Peron, 22 February 2018, *J.M. Huisman* 22.2.18.1.1 (*holo*: PERTH 09183507).

[*Pseudobryopsis hainanensis auct. non* C.K.Tseng: J.M. Huisman, *Mar. Pl. Australia* 367, 2 unnumbered figures (2023).]

Thallus upright, bright green, siphonous, to 7–10 cm in height, with several terete, primary axes growing from a rhizoidal plexus. Primary axes 0.8–1 mm diam, tapering slightly to apices, simple or generally dichotomously or subdichotomously branched every 7–20 mm, with constrictions at base of branches, densely radially covered by lateral ramuli to near the base. Branches (primary axes plus ramuli) 5–8 mm diam. Ramuli straight or inwardly curved, simple, terete, 4–5 mm long, constricted at base, inflated and rounded, to 70–85 µm diam., tapering to 55–60 µm diam., then 50 µm diam. mid ramulus and 35 µm diam. at the rounded apices. Plastids subspherical to ellipsoidal. 2–4 µm diam., without an obvious pyrenoid. Mature gametangia borne 1 or 2 per ramulus, close to base, initially with an open connection to the ramulus but this eventually occluded. Spent gametangia often present as empty walls, in addition to mature gametangia. Gametangia 100–120 µm long, 65–85 µm diam., ellipsoidal or obovoid, with an apical papilla. (Figure 1)

Diagnostic features. *Pseudobryopsis australis* is the only species of the genus to occur in the southwest of Western Australia. It can be distinguished by its size (7–10 cm in height), branched upright axes to 1 mm diam., dense covering of relatively long ramuli (2–4 mm long), and gametangia lacking a distinct pedicel.

Specimens examined. WESTERN AUSTRALIA: Rottnest Is., 6 Apr. 1989, *J.M. Huisman* JH 1499 (PERTH 06546587); Narrow Neck, Rottnest Is., 10 m depth, 16 Sep. 1994, *J.M. Huisman* JH 327 (PERTH 06546935); Carnac Is., 7 Dec. 1995, *J.M. Huisman* JH 628 (PERTH 06546927); off The Basin, Rottnest Is., 31 Oct. 2009, *J.M. Huisman s.n*. (PERTH 08813973); Roe Reef, Rottnest Is., 17 Dec. 2009, *J.M. Huisman s.n.* (PERTH 08187851); Straggler Reefs, 20 Dec. 2011, *J.M. Huisman* 20.12.11.1.1 (PERTH 08924007); Cape Peron, epilithic at 2 m depth, 28 Feb. 2019, *J.M. Huisman s.n.* (PERTH 09184651); Cape Peron, 25 Feb. 2021, *J.M. Huisman* 25.2.21.2 (PERTH 09316752); Cape Peron, 24 Feb. 2022, *J.M. Huisman* 24.2.22.6 (PERTH 09564128); The Nook, [Houtman] Abrolhos Islands, 15-20 m depth, 3 Dec. 1988, *J.M. Huisman & P. Dingle* HA 276 (PERTH 06524443); Penguin Is., Safety Bay, growing on sandstone, 13 Dec. 1984, *G.T. Kraft* K-GEN-7653e *& J.M. Huisman* (MEL 2526431A; MELUA130008a);

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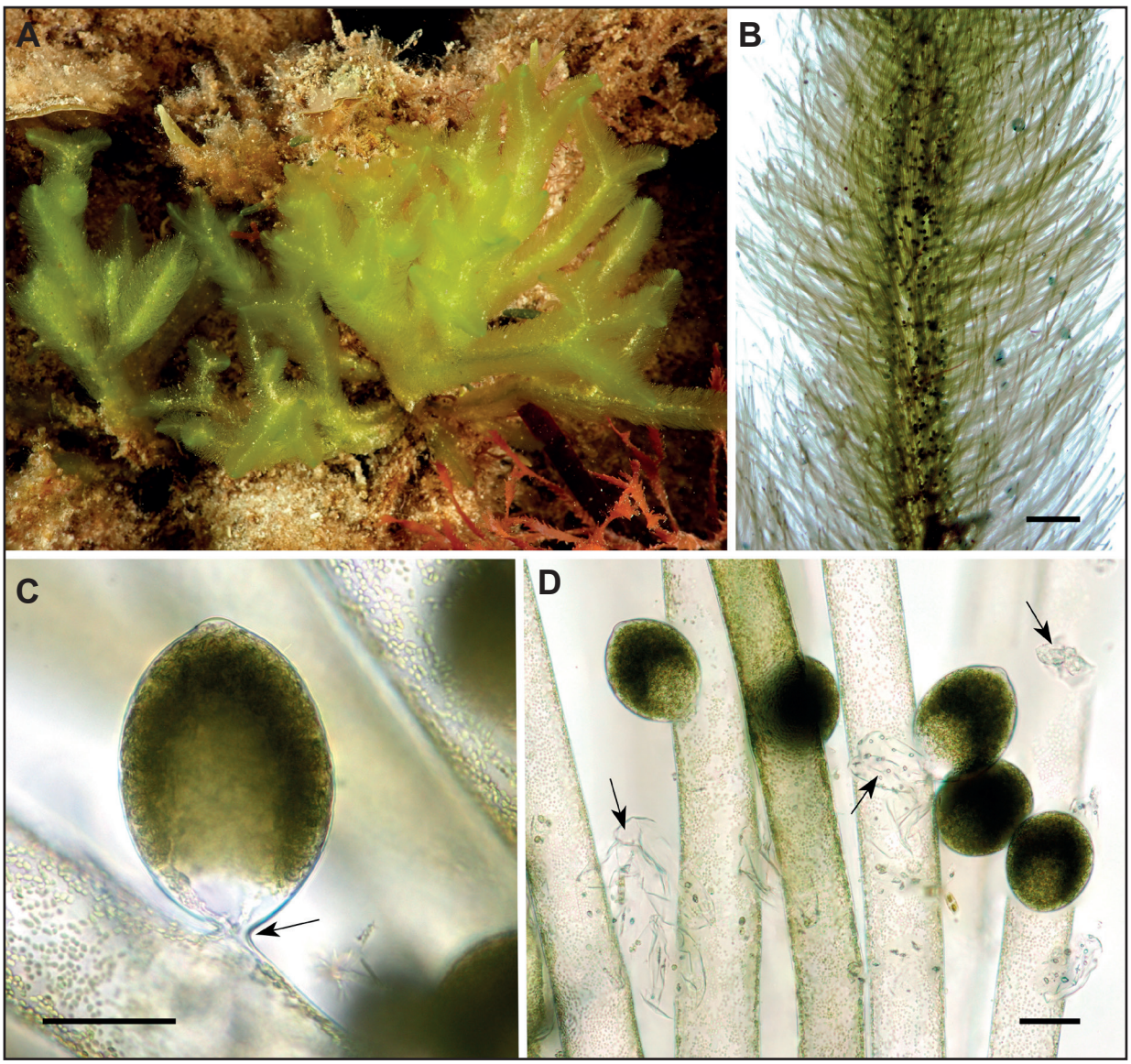

Figure 1. *Pseudobryopsis australis*. A – alga *in situ* showing branched upright axes; B – detail of branch with dense cover of ramelli; C – mature gametangium with occluded base (arrow); D – mature and spent gametangia (arrows), the latter persisting as 'ghost' walls. Scale bars = 1 mm (B); 50 µm (C, D). Images from PERTH 09316752 (A); PERTH 09184651 (B–D). Photographs by J.M. Huisman.

500 m south of Green Is., Rottnest Is., on the reef flat, 4 Dec. 1980, *R. Ricker & G.T. Kraft s.n.* (AD-A 51952); Roe Reef, Rottnest Is., 17 Dec. 2009, *H. Verbruggen* HV02592 (BR [ex GENT]); Groper Canyon, Rottnest Is., 17 Dec. 2009, *H. Verbruggen* HV02620 (BR [ex GENT]).

Phenology. Reproductive specimens have been collected during the austral spring and summer; however, this may reflect preferred conditions for collecting rather than seasonality.

Distribution and habitat. Known from Cape Peron, Rottnest Island, and the Houtman Abrolhos Islands, Western Australia, epilithic in the shallow subtidal.

Conservation status. The species is known from limited collections but is present in the conservation estate and is unlikely to be under direct threat.

Etymology. The epithet is from the Latin *australis* (southern), in reference to the southern hemisphere range of the known specimens.

Notes. *Pseudobryopsis* presently includes eight accepted species, mostly from tropical/subtropical locations in the northern hemisphere (Guiry & Guiry 2025), with only the New Zealand *P. planktonica* Cassie described from a southern hemisphere type locality. It is currently the sole genus in the recently erected family Pseudobryopsidaceae (Cremen *et al.* 2019). In the past it has been regarded as closely related to *Trichosolen* Mont., a genus currently placed in the Bryopsidaceae (Guiry & Guiry 2025) based on morphology but not yet represented in molecular libraries, and as such its true affinities are uncertain. The genera differ in *Pseudobryopsis* having mature gametangia with occluded bases that empty entirely (i.e. do not refill as in *Trichosolen*), and small chloroplasts lacking pyrenoids (Henne & Schnetter 1999). The presence of pyrenoids has been variously reported, with *P. hainanensis* C.K.Tseng described with (Tseng 1936) and without (Kraft 2007) pyrenoids, although both authors seemingly described similar chloroplasts, with the 'transparent bodies' (Tseng 1936) or 'clear central areas' (Kraft 2007) interpreted as pyrenoids by Tseng (1936) but not Kraft (2007). Kobara and Chihara (1978) describe *P. hainanensis* as lacking pyrenoids.

Pseudobryopsis australis displays each of the features regarded as distinguishing *Pseudobryopsis* and is clearly a member of the genus. South-west Australian specimens have previously been identified as *P. hainanensis* (e.g. Huisman 2023) but were re-examined in light of molecular analyses of the *tuf*A and *rbc*L genes (Figure 2), the results indicating that while closely allied, the taxon differs from that species and represents an undescribed species. As described by Tseng (1936), Chinese *P. hainanensis* is a considerably smaller plant, with correspondingly smaller branch diameters and gametangia. Tseng (1936) gave the diameter of primary axes as 500 µm at the base, and that of ramelli as 18–36 µm, whereas primary axes in *P. australis* are up to 1000 µm in diameter and ramelli are mostly 55–60 µm in diameter, only approaching the upper dimension (36 µm) of *P. hainanensis* near the apices. Kobara and Chihara (1978) described their Japanese specimens of *P. hainanensis* as having primary axes to 1000 µm diam., therefore similar to *P. australis*, but the ramuli only reaching 30 µm in diameter, only approaching 50 µm in the lower, inflated portion. It is possible that the specimens attributed to *P. hainanensis* by Kobara and Chihara (1978) represent a different species, but that cannot be ascertained here. Regarding overall dimensions, *P. australis* is similar to the generitype *P. myura* (J.Agardh) Berthold, a Mediterranean species, as described by Feldmann (1969) and Kanaan and Belous (2016). Gametangia in *P. myura* were described by Feldmann as 'showing rather large variations in shape' and gave dimensions of 110–123 µm long and 60–90 µm diameter, agreeing entirely with *P. australis*. However, *P. myura* was described as monoecious, with separate male and female gametangia that can be distinguished by their colour, as the female gametangia are dark green with a tinge of brown-orange due to the presence of a stigma in female gametes, and the male gametangia are a lighter green colour. A similar distinction was noted by Chihara and Kobara (1995). Gametangia in *P. australis* differ in being uniformly dark green. Wynne and Hoffman (2016) however, did not attach any 'great significance' to this apparent difference when they placed *P. papillata* Nasr in synonymy with *P. myura*. Nevertheless, dioecy would appear to be the only morphological difference between *P. myura* and *P. australis* and we have relied primarily on molecular data to distinguish the two species.

The paucity of molecular data for species of *Pseudobryopsis* limit the extent of our analyses; however, they do demonstrate the close relationship of *P. australis* to *P. hainanensis* and *P. oahuensis* Egerod, and more distantly to the generitype *P. myura*. Morphologically, *P. oahuensis* has generally simple primary axes and gametangia are more numerous (up to five per ramulus) and elongate (Egerod 1952; Abbott & Huisman 2004; Huisman *et al.* 2007). There are six species of *Pseudobryopsis* not represented in molecular libraries, of these *P. basiglabra* Cárdenas-Barón, Gavio & M.J.Wynne has gametangia borne directly on the primary axes and not on ramuli (Cárdenas-Barón *et al.* 2025), *P. planktonica* is, as the name suggests, planktonic (Cassie 1969) and should probably be excluded from the genus according to Henne and Schnetter (1999), *P. venezolana* (W.R.Taylor) K.-D.Henne & R.Schnetter has gametangia in series of 3–7 per ramulus (Taylor 1962, as *Trichosolen*), *P. blomquistii* Díaz-Piferrer is reported to have pyrenoids (Díaz-Piferrer 1965), although this was disputed by Henne and Schnetter (1999) who examined an isotype and found it to have extremely small chloroplasts that 'definitely lacked a pyrenoid', nevertheless, *P. blomquistii* has shorter and narrower ramuli than *P. australis*. Lastly, *P. thikkodiensis* Anil Kumar & Panikkar is reported to have pyrenoids (Anil Kumar & Panikkar 1993) and illustrations in the

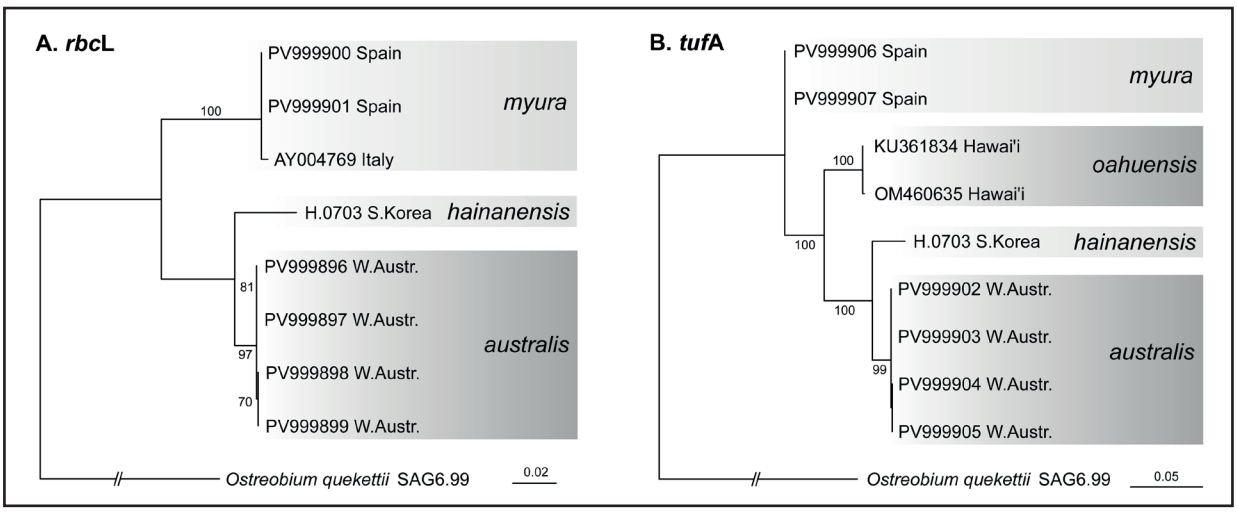

Figure 2. Molecular phylogenies of the *rbc*L (A) and *tuf*A (B) genes. Samples were subjected to high-throughput sequencing as described in Huisman *et al.* (2024) and the relevant gene sequences extracted and used alongside relevant reference sequences from GenBank to infer phylogenies with IQ-Tree 2.1.4 (Minh *et al.* 2020) using a GTR+I+G model and 1000 ultrafast bootstraps (shown if >70%). GenBank accession numbers PV999898, PV999904 = PERTH 09183507 (holotype) and PV999897, PV999905 = PERTH 09316752.

protologue suggest it has gametangia in open connection with the bearing branch, indicating it may be better placed in *Trichosolen*. Of the species currently in synonymy, *P. papillata*, treated as a taxonomic synonym of *P. myura* by Wynne and Hoffman (2016), differs in its smaller gametangia (Nasr 1944).

We are attributing south-western Australian specimens to the new species *P. australis*; however, we cannot with any certainty (lacking molecular data) ascertain the identities of two tropical specimens (PERTH 07150091 and an unaccessioned slide preparation) recorded as *P. hainanensis* by Huisman (2015). These were vegetatively smaller (primary axes to 500 µm diam., ramuli to 25 µm diam.) but with gametangia that are comparable in dimensions to those of *P. australis* but proportionally more elongate (see Huisman 2015: Fig. 11G). Further study incorporating molecular analyses of Australian tropical specimens and other potentially misidentified specimens (e.g. the *P. hainanensis* of Kobara and Chihara 1978 and Kraft 2007) is required.

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References

Abbott, I.A. & Huisman, J.M. (2004). *Marine green and brown algae of the Hawaiian Islands*. (Bishop Museum Press: Honolulu.)

Anil Kumar, C. & Panikkar, M.V.N. (1993). A new species of *Pseudobryopsis* Berthold (Siphonales, Chlorophyta) from Kerala. *Seaweed Research and Utilisation* 16: 135–138.

Cárdenas-Barón, F., Gavio, B. & Wynne, M.J. (2025). Notes on the marine algae of the International Biosphere Reserve Seaflower, Caribbean Colombia XI: *Pseudobryopsis basiglabra* sp. nov. (Pseudobryopsidaceae, Chlorophyta). *Acta Botanica Mexicana* 132: e2419. DOI: https://doi.org/10.21829/abm132.2025.2419

Cassie, V. (1969). A free-floating *Pseudobryopsis* (Chlorophyceae) from New Zealand. *Phycologia* 8: 71–76.

Chihara, M. & Kobara, T. (1995). Laboratory culture and life history of *Trichosolen* (=*Pseudobryopsis*) *myura* (J. Agardh) Taylor from Italy. *Journal of Japanese Botany* 70(2): 77–84.

Cremen, M.C.M., Leliaert, F., West, J., Lam, D.W., Shimada, S., Lopez-Bautista, J.M. & Verbruggen, H. (2019). Reassessment of the classification of Bryopsidales (Chlorophyta) based on chloroplast phylogenomic analyses. *Molecular Phylogenetics and Evolution* 130: 397–405. DOI: https://doi.org/10.1016/j.ympev.2018.09.009

Díaz-Piferrer, M. (1965). A new species of *Pseudobryopsis* from Puerto Rico. *Bulletin of Marine Science* 15: 463–474.

Egerod, L.E. (1952). An analysis of the siphonous Chlorophycophyta with special reference to the Siphonocladales, Siphonales and Dasycladales of Hawaii. *University of California Publications in Botany* 25: (i)-iv + 325–453.

Feldmann, J. (1969). *Pseudobryopsis myura* and its reproduction. *American Journal of Botany* 56: 691–695.

Guiry, M.D. & Guiry, G.M. (2025). *AlgaeBase*. World-wide electronic publication, University of Galway. https://www.algaebase.org/; searched on 26 June 2025.

Henne, K.-D. & Schnetter, R. (1999). Revision of the *Pseudobryopsis*/*Trichosolen* complex (Bryopsidales, Chlorophyta) based on features of gametangial behaviour and chloroplasts. *Phycologia* 38: 114–127.

Huisman, J.M. (2015). *Algae of Australia: marine algae of north-western Australia, 1. Green and brown algae.* (ABRS & CSIRO Publishing: Canberra & Melbourne.)

Huisman, J.M. (2023). *Marine plants of Australia.* Revised and updated edition. (UWA Publishing: Crawley.)

Huisman, J.M., Abbott, I.A. & Smith, C.M. (2007). *Hawaiian reef plants*. (University of Hawai'i Sea Grant College Program: Honolulu.)

Huisman, J.M., Verbruggen, H., Hossen, R., Rybalka, N. & Entwisle, T.J. (2024) Morphological and molecular analyses of *Vaucheria* section *Piloboloideae* (Xanthophyceae: Vaucheriaceae) indicate alternative species identities for broadly distributed taxa. *Phycologia* 63: 170–178.

Kanaan, H. & Belous, O. (2016). Marine algae of the Lebanese coast. (available at: https://www.researchgate.net/publication/321463079)

Kobara, T. & Chihara, M. (1978). On the taxonomy and sexual reproduction of the siphonous green alga *Pseudobryopsis hainanensis* Tseng. *Journal of Japanese Botany* 53: 341–352.

Kraft, G.T. (2007). *Algae of Australia. Marine benthic algae of Lord Howe Island and the southern Great Barrier Reef, 1. Green algae.* (Australian Biological Resources Study & CSIRO Publishing: Canberra & Melbourne.)

Minh, B.Q., Schmidt, H.A., Chernomor, O., Schrempf, D., Woodhams, M.D., von Haeseler, A. & Lanfear, R. (2020). IQ-TREE 2: New models and efficient methods for phylogenetic inference in the genomic era. *Molecular Biology and Evolution* 37: 1530–1534.

Nasr, A.H. (1944). Some new algae from the Red Sea. *Bulletin de l'Institut d'Égypte* 26: 31–42.

Taylor, W.R. (1962). Observations on *Pseudobryopsis* and *Trichosolen* (Chlorophyceae-Bryopsidaceae) in America. *Brittonia* 14: 58–65.

Tseng, C.K. (1936). Studies on the marine Chlorophyceae from Hainan. *Chinese Marine Biological Bulletin* 1: 129–200.

Wynne, M.J. & Hoffman, R. (2016). Evidence for the proposed merger of *Pseudobryopsis papillata* with *Pseudobryopsis myura* (Bryopsidaceae, Chlorophyta). *Botanica Marina* 59: 123–130.