

**Out of the dark: *Leptofaucha lucida* (Rhodymeniales: Faucheaceae),
a new red algal species from the Houtman Abrolhos,
Western Australia**

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SHORT COMMUNICATION

The red algal genus *Leptofaucha* Kylin has a vegetative anatomy akin to *Rhodymenia* Greville (i.e. with flattened branches and structurally with a pseudoparenchymatous medulla and cortex), but with cystocarps incorporating a *tela arachnoidea* (a web of stellate cells lining the inner wall of the pericarp). The genus was based on *L. nitophylloides* (J.Agardh) Kylin from Port Jackson, Australia, and currently includes ten species (Guiry & Guiry 2019).

Other than *L. nitophylloides*, two other species have been recorded for Australia, *L. cocosana* Filloramo & G.W.Saunders from the Cocos (Keeling) Islands (Filloramo & Saunders 2015) and *L. anastomosans* (Weber Bosse) R.E.Norris & Aken (currently *Asteromenia anastomosans* (Weber Bosse) G.W.Saunders, C.E.Lane, C.W.Schneider & Kraft), an Indonesian species recorded from the Houtman Abrolhos in Western Australia by Huisman (2000: 124). The latter record was queried by Dalen and Saunders (2007) and Filloramo and Saunders (2015), who sequenced material of *Leptofaucha* from the Houtman Abrolhos (as *L. sp._1WA*) and found that it was likely to represent an undescribed species. The sequence included in their respective analyses is linked to a voucher of a few dried thallus fragments (G0400) collected from the Houtman Abrolhos by one of us [GWS] and Gerry Kraft. These fragments display vegetative attributes consistent with *Leptofaucha* but with a strongly dorsiventral habit and thick cuticle (20 µm on the dorsal surface and up to 40 µm on the ventral surface). Dalen and Saunders (2007) suggested that this entity may be equivalent to *L. anastomosans sensu* Huisman (2000).

To test this assertion, we undertook a morphological examination of the '*L. anastomosans*' specimens at the Western Australian Herbarium (PERTH), of which there are several collected from the Houtman Abrolhos. Each conformed to the *L. sp._1WA* fragments as described by Dalen and Saunders (2007) and re-examined here, differing slightly in the less conspicuous cuticle. A thick cuticle (to 20 µm thick) was evident in some of the PERTH specimens, but was not consistently present. Given the otherwise agreement between the samples, it is possible that the preservation methods (silica gel versus formalin/seawater) might have caused the difference. Furthermore, one specimen (*J.M. Huisman* HA1381) was found to have been collected on the same date and at the same location as G0400 during a joint expedition. While these two specimens are not technically duplicates, we are confident that *L. sp._1WA*

and *L. anastomosans sensu* Huisman (2000) are conspecific and represent a new species, which we describe here as *L. lucida*.

Leptofaucha lucida Huisman & G.W.Saunders, *sp. nov.*

Type: Bynoe Island, Easter Group, Houtman Abrolhos, 5–15 m, Western Australia, 10 November 1995, *J.M. Huisman* HA1381 (*holo:* PERTH 06554954).

Thallus dorsiventral, forming a sprawling clump, epilithic, epiphytic (on *Lobophora* J.Agardh) or epizoic, spreading to 7 cm broad, attached at several points. Branching subdichotomous to irregular, at broad angles with rounded axils, often with prominent constrictions at branch bases, these subtending only upper branches or present to various degrees throughout the thallus, rarely absent. Anastomoses between branches common. Axes flattened, 1.5–2 mm broad and of relatively uniform width in portions of the thallus without constrictions, broadening to 7 mm and becoming irregularly shaped (often stellate) in portions with constrictions, 100–200 µm thick. Structure pseudoparenchymatous, the medulla of large hyaline cells 70–100 µm diam., grading to a cortex of 1–3 cell layers with peripheral cells 5–10 µm broad, broader than long in lateral view (except in fertile regions), subspherical to ellipsoid in surface view. Cortex at mature branch margins thickened, up to 6–10 cell layers. Spermatangia formed in nemathecial sori, arising from outer cortical cells, in mature regions with short anticlinal filaments bearing terminal spermatangia 2–4 µm diam. Cystocarps borne on blade surfaces, dome-shaped, to 900 µm diam. Gonimoblast borne on a central stalk spherical, to 350 µm diam. Pericarp to 150 µm thick, with a prominent ostiole and *tela arachnoidea* lining the inner wall. Tetrasporangia in nemathecial sori, primarily in ultimate branches that are subtended by a constriction, attached posteriolaterally to bearing cell, 36–42 × 12–20 µm, cruciately/decussately divided, associated with short, branched paraphyses. (Figure 1)

Diagnostic features. *Leptofaucha lucida* may be distinguished from other members of the genus by the following combination of morphological characters: a sprawling thallus; secondary anastomoses between branches common; a multi-layered cortex; and cystocarps on the blade surface. It is also characterised by unique COI-5P (HM915831), LSU (DQ873287) and *rbcL* (KR085194) barcode sequences (G0400; Dalen & Saunders 2007; Filloramo & Saunders 2015).

Other specimens examined. WESTERN AUSTRALIA: Wire Reef, Jurien Bay, 5 m, 28 May 2003, *J.C. Phillips* JCP139 (PERTH); [The] Coral Patches, Pelsaert Group, Houtman Abrolhos, 12–13 m, 3 Oct. 1995, *J.M. Huisman* HA1246 (PERTH); *loc. id.*, 12 m, 29 Sep. 1997, *J.M. Huisman* HA2004 (PERTH); *loc. id.*, to 16 m, 24 Sep. 1994, *J.M. Huisman* HA843 (PERTH); S end of Goss Passage, Traitors Is., Houtman Abrolhos, to 15 m, 6 July 1993, *J.M. Huisman* HA1440 (PERTH); Jackson Is., Houtman Abrolhos, 30 Sep. 1991, *J.M. Huisman s.n.* (PERTH); Snowies Is., Houtman Abrolhos, 18 m, 12 Nov. 1995, *J.M. Huisman* HA1401 (PERTH); Bynoe Is., Houtman Abrolhos, 14 m, 2 Oct. 1995, *J.M. Huisman* HA1158 (PERTH); *loc. id.*, 10 Nov. 1995, *G.W. Saunders* G0400 & *G.T. Kraft* (UNB); Coral Bay, 14 Apr. 1993, *J.M. Huisman s.n.* (PERTH); W of Hermite Is., Montebello Is., collected by epibenthic sled, 37.1 m, 18 June 2013, *CSIRO* 056533 (PERTH).

Phenology. Plants have been collected from late autumn to late winter. All reproductive phases have been recorded.

Distribution and habitat. Based on morphological congruence, *L. lucida* is currently known from Jurien Bay north to the Montebello Islands, Western Australia, growing on various substrata in the subtidal at depths of 5–37.1 m.

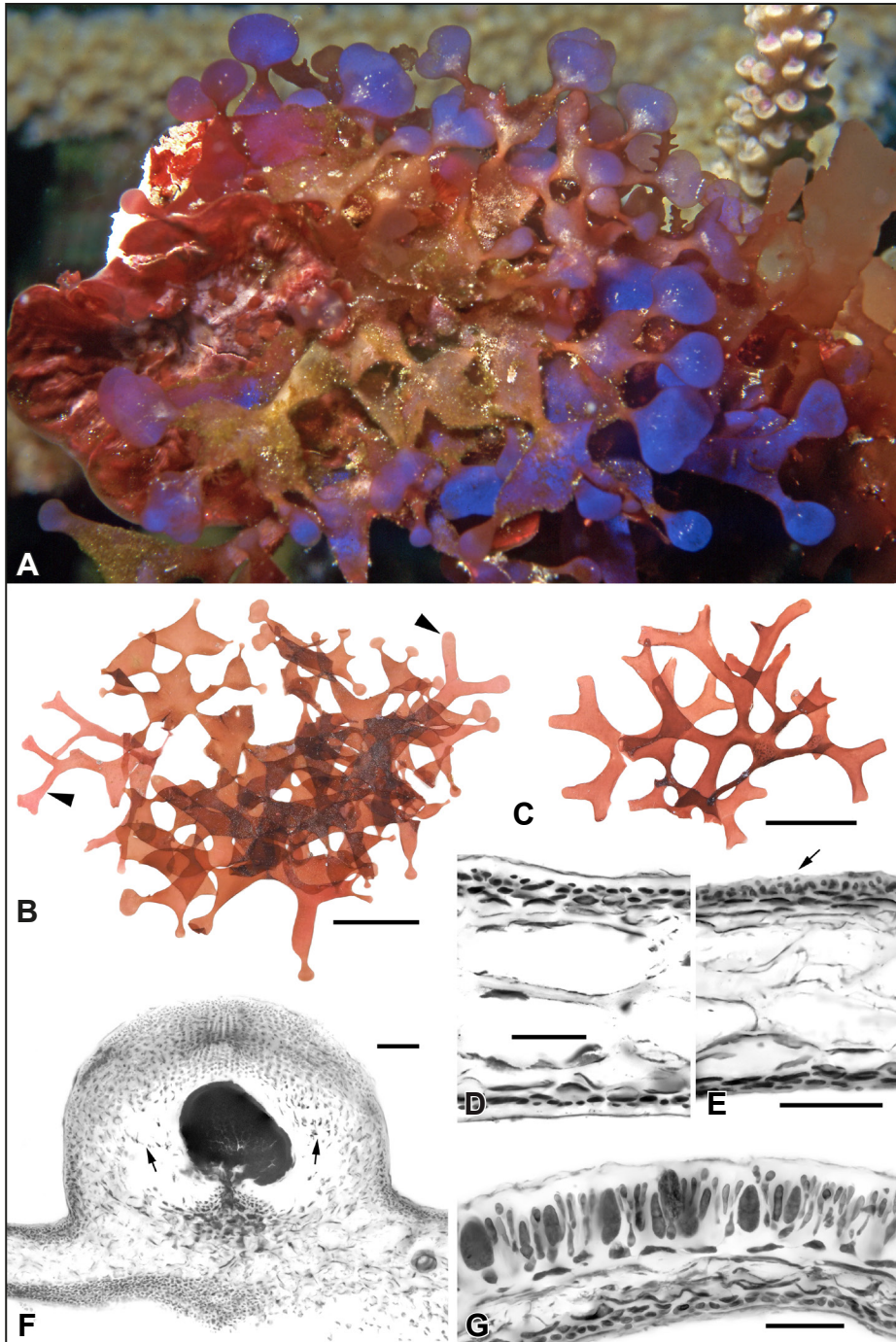


Figure 1. *Leptofaucheia lucida*. A – alga *in situ* at Jackson Island, Houtman Abrolhos, showing the spreading habit and iridescence; B – holotype specimen from Bynoe Island, Houtman Abrolhos, showing a mixture of linear branches (arrowheads) and those with constrictions; C – specimen from the type locality lacking constrictions; D – section of thallus showing pseudoparenchymatous medulla and cortex of several cell layers; E – section of holotype thallus, note upper cortex with immature spermatangial sorus (arrow); F – section of cystocarp with dome-shaped pericarp and gonimoblast on a central stalk. The *tela arachnoidea* stained only faintly but is visible (arrows) on the inner wall of the pericarp; G – section of tetrasporangial nemathecium with cruciate/decussate tetrasporangia. Scale bars = 5 mm (B, C); 50 μ m (D, E, G); 100 μ m (F). Images from PERTH 08958335 (A); PERTH 06554954 (B, E); PERTH 08958327 (C); PERTH 08923213 (D, F); PERTH 06554911 (G). Photographs by J.M. Huisman.

Conservation status. *Leptofaucheia lucida* is known from several collections from a broad latitudinal range, including several locations managed by the Department of Biodiversity, Conservation and Attractions, and is unlikely to be under threat.

Etymology. The epithet is from the Latin *lucidus* (shining) and refers to the iridescent habit of this species *in situ* (Figure 1A).

Vernacular name. Neon Leptofaucheia.

Affinities. Of the ten species of *Leptofaucheia* that are presently recognised, eight are currently represented in molecular libraries (Filloramo & Saunders 2015). Molecular analyses place *L. lucida* (as *L. sp.1_WA*) as sister to *L. leptophylla* (Segawa) Mas.Suzuki, Nozaki, R.Terada, Kitayama, Tetsu. Hashimoto & Yoshizaki, a species described originally from Japan but subsequently recorded from the Philippines (Silva *et al.* 1987), Korea (Boo & Ko 2012) and as a component of marine debris in the north-eastern Pacific (Hansen *et al.* 2018). This sister relationship is supported by morphological similarities between the two species, including a flattened, often dichotomous habit, a bluish iridescence (Suzuki *et al.* 2012), and constrictions subtending the ultimate branches (see Suzuki *et al.* 2012: Figure 3; Filloramo & Saunders 2015: Figure 10). Morphologically the two species differ in the frequency of constrictions (greater in *L. lucida*) and position of cystocarps on the thallus blade (on the surface in *L. lucida* and restricted to the margins in *L. leptophylla*).

The two species of *Leptofaucheia* as yet unrepresented in molecular libraries are *L. rhodymenioides* W.R.Taylor from the Caribbean and *L. auricularis* E.Y.Dawson from Baja California, Mexico. Taylor (1960), Gavio and Fredericq (2005) and Dalen and Saunders (2007) describe *L. rhodymenioides* as having marginal cystocarps. It differs further from *L. lucida* in its upright habit, lack of secondary anastomoses, and broader branches (to 9 mm) with seemingly fewer constrictions. *Leptofaucheia auricularis* is only known from the original description (Dawson 1963) and sterile type material, which could not be located by Hawkes and Scagel (1986). As described by Dawson (1963: 445), *L. auricularis* has some similarities with *L. lucida*, including being ‘horizontally disposed’ with the blades ‘occasionally forming secondary attachment discs to each other’. However, it differs from *L. lucida* in arising from a prominent stipe and having a cortex with only a single layer of pigmented cells. Moreover, Dawson’s illustration (1963: pl. 8, Figure 1) depicts a thallus with shallow branching angles and acute axils, unlike the broad branching angle and rounded axils of *L. lucida*.

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