

The lichen genera *Phaeographis* and *Phaeographina* (Graphidaceae) in Australia 2: *Phaeographina* — new reports and new species

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Abstract

Archer, Alan W. (Royal Botanic Gardens Sydney, Mrs Macquaries Road, Sydney 2000, Australia) 2001. *The lichen genera Phaeographis and Phaeographina (Graphidaceae) in Australia 2: Phaeographina — new reports and new species*. *Telopea* 9(2) 329–344. An account is given of the species in the lichen genus *Phaeographina* (Graphidaceae) in Australia, other than those taxa based on Australian type specimens. An additional 14 species are recognised and of these seven are described as new species: ***Phaeographina atromaculata*** A.W. Archer, ***P. fuscescens*** A.W. Archer, ***P. hadrospora*** A.W. Archer, ***P. impudica*** A.W. Archer, ***P. litoralis*** A.W. Archer, ***P. montiscalvi*** A.W. Archer and ***P. wilsonii*** A.W. Archer. *Phaeographina arechavaletae* Müll. Arg., *P. caesioradians* (Leight.) Redinger, *P. exilior* (Vain.) Zahlbr. and *P. montagnei* (v.d. Bosch) Müll. Arg. are reported as new to Australia. *Phaeographina banksiae* Müll. Arg. is reported as a synonym of *P. arechavaletae* Müll. Arg. and *Phaeographina contexta* (Pers.) Müll. Arg. is shown to belong to the genus *Graphina*. The epithets '*chrysentera*' and '*quassiaecola*' have been corrected to '*chrysenteron*' and '*quassiiicola*' respectively. A key to all the *Phaeographina* species in Australia is given.

Introduction

Part 1 (Archer 2000) dealt with species in the genera *Phaeographis* and *Phaeographina* that were based on Australian type specimens. The two genera were created by Müller to segregate species with brown ascospores from the genus *Graphis* (Müller 1882); the two genera are distinguished from each other by the septation in the ascospores, simple in *Phaeographis* and muriform in *Phaeographina*. Three new species of *Phaeographina* have recently been described (Archer & Elix 1999; Archer 2000; Archer 2001) and an additional 14 species found in Australia are described here, seven of which are new species. A key to the genus *Phaeographina* in Australia is provided.

Material and methods

This account is based on the chemical and morphological examination of type and other specimens from B, BM, BRI, CHR, GZU, H, MEL, NSW and TUR, and in particular the recent collections made by J.A. Elix, H. Streimann and D. Verdon (CANB). In addition specimens from the private herbaria of J. Hafellner (Graz), H.T. Lumbsch (Essen) and K. Kalb (Neumarkt) were examined. The techniques used were described previously (Archer 1999, 2000).

Key to the lichen genus *Phaeographina* in Australia

- 1 Ascospores densely muriform, > 75 µm long 2
 1* Ascospores not densely muriform, < 75 µm long 10
 2 Carbonised proper exciple absent 3
 2* Carbonised proper exciple present 4
 3 Lichen compounds absent; ascospores 155–212 µm long ***P. hadrospora***
 3* Norstictic acid present; ascospores 100–135 µm long ***P. atromaculata***
 4 Proper exciple partly carbonised 5
 4* Proper exciple completely carbonised, concealed in thalline margin 8
 5 Proper exciple laterally carbonised 6
 5* Proper exciple apically carbonised; ascospores 1/ascus, 145–180 × 30–40 µm
 ***P. muelleri***
 6 Exciple exposed; lichen compounds absent 7
 6* Exciple concealed in thalline margin; ascospores 162–200 µm long; echinocarpic acid
 present ***P. echinocarpica***
 7 Exciple sulcate; ascospores 125–180 µm long ***P. impudica***
 7* Exciple not sulcate; ascospores 75–100 µm long ***P. caesiopruinosa***
 8 Hymenium red; disc red; ascospores 125–155(–175) µm long ***P. montagnei***
 8* Hymenium hyaline 9
 9 Lirellae open; ascospores 75–100 µm long; lichen compounds absent
 ***P. quassiicola***
 9* Lirellae closed; ascospores 102–130 µm long; hirtifructic acid present ***P. elixii***
 10 Carbonised proper exciple present 11
 10* Carbonised proper exciple absent 13
 11 Proper exciple apically carbonised; ascospores 13–18 µm long, 4 × 2 locular
 ***P. fuscescens***
 11* Proper exciple laterally carbonised or completely carbonised; ascospores > 25 µm
 long 12
 12 Proper exciple completely carbonised; ascospores 38–53 µm long, 8–10 × 4–5
 locular; stictic acid present ***P. wilsonii***
 12* Proper exciple laterally carbonised; ascospores 25–35 µm long, 6 × 2–3 locular lichen
 compounds absent ***P. archavaletae***
 13 Ascospores 40–60 µm long, 10–14 × 2–3 locular 14
 13* Ascospores < 40 µm long 15
 14 Proper exciple absent; lirellae open, with white pruinose disc; thalline margin thick,
 lichen compounds absent ***P. litoralis***
 14* Proper exciple red-brown, complete; lirellae closed; thalline margin thin; stictic acid
 present ***P. chrysenteron***
 15 Ascospores 16–18 µm long, 4 × 2 locular ***P. exilior***
 15* Ascospores 23–35 µm long, 6–8 × 2–3 locular 16
 16 Lirellae open; lichen compounds absent ***P. caesioradians***
 16* Lirellae closed; stictic acid present ***P. montiscalvi***

Phaeographina* species.**Phaeographina arechavaletae* Müll. Arg.** (Fig. 1a, 2a)

(Müller 1888a: 5).

Type: Uruguay. Montevideo, *J. Arechavaleta, s.n.*, no date (lecto G, *fide* Hayward 1977)*Phaeographina banksiae* Müll. Arg.

(Müller 1893a: 59).

Type: Australia. Victoria: Maffra, on *Hymenanthera banksii*, F.R.M. Wilson 879, 1892 (holo G; iso NSW).

Thallus pale greenish grey, thin, corticolous, surface smooth and slightly shiny; apothecia lirelliform, black, numerous, conspicuous, sessile to slightly immersed, lips closed, becoming slightly open, straight or curved, rarely branched, 1–3(–4) mm long, 0.2–0.3(–0.4) mm wide, with a thin evanescent thalline margin; proper exciple laterally carbonised; hymenium 125–150 µm tall; ascospores 8 per ascus, pale brown, ellipsoid, (20–)24–31(–39) µm long, (10–)12–15(–17) µm wide, 4–6 × 2–3 locular.

Chemistry: no compounds found.

Distribution: occurs in Uruguay, Paraguay, Argentina, New Zealand and eastern Australia. Reported substrates in Australia include *Bursaria*, *Grevillea* and *Hymenanthera*.

Notes: A comparison of the holotype of *P. arechavaletae*, the isotype of *P. banksiae*, and specimens of *P. banksiae* from Australia and *P. arechavaletae* from New Zealand (Hayward 1977) showed them to be identical. The species is characterised by a laterally carbonised proper exciple, small muriform ascospores and the absence of lichen compounds.

Specimens examined: Queensland: Upper Coomera, Wilson 1547, no date (NSW 438672); Goomburra Forest Park, Everett L 603, Sep 1984 (NSW 438469).

New South Wales: Jenolan Caves, Wilson *s.n.*, Sep 1897 (NSW 38688); Buckenbowra River estuary, 7.5 km W of Batemans Bay, Elix 10963, May 1983 (CANB).

Victoria: Maffra, Wilson *s.n.* (NSW 438683); Sale, Wilson 879, Sep 1886 (NSW 438682); bank of Yarra River, Kew, Wilson *s.n.*, Dec 1884 (NSW 438686).

New Zealand. South Island: Kaikoura, Healy 64/99 (CHR 378244); Peel Forest, Rangitata River, Healy 64/94 (CHR 378242); between Winchester and Geraldine, Healy 64/504 (CHR 378243).

***Phaeographina atromaculata* A.W. Archer, sp. nov.** (Fig. 1b, 2b)*Phaeographina nilgiriensi* similis sed lirellis apertis et acido norstictico praesenti differt.

Type: Australia. New South Wales: track to Dangar falls, ca. 2 km N of Dorrigo, 30°19'30"S, 152°42'E, alt. c. 700 m, A.W. Archer G 319, Oct 1998 (holo NSW).

Thallus off-white, thin to evanescent, corticolous, surface smooth and dull; apothecia lirelliform, black, conspicuous, scattered, sessile, open, with a conspicuous thalline margin, elongate to substellate, 0.5–1(–1.5) mm wide; disc matt black, epruinose; proper exciple absent; hymenium 120–150 µm tall; ascospores 1 per ascus, ellipsoid, pale brown, (hyaline when immature), 100–135 µm long, 30–45 µm wide, densely muriform.

Chemistry: norstictic acid.

Distribution: the species is so far known only from the type specimen collected in New South Wales.

Notes: *Phaeographina atromaculata* is characterised by conspicuous, black, open lirellae with conspicuous thalline margins, asci with one ascospore and the presence of norstictic acid. The species somewhat resembles *P. nilgiriensis* K. Singh & Awasthi (1978) but that species has closed lirellae and lacks norstictic acid.

Etymology: The epithet *atromaculata*, is from the Latin *atro*, black and *maculata*, spotted, a reference to the conspicuous, black, scattered apothecia on the thallus.

Phaeographina caesiopruinosa (Fée) Müll. Arg. (Fig. 1c, 2c)

(Müller 1887: 49)

Arthonia caesiopruinosa Fée

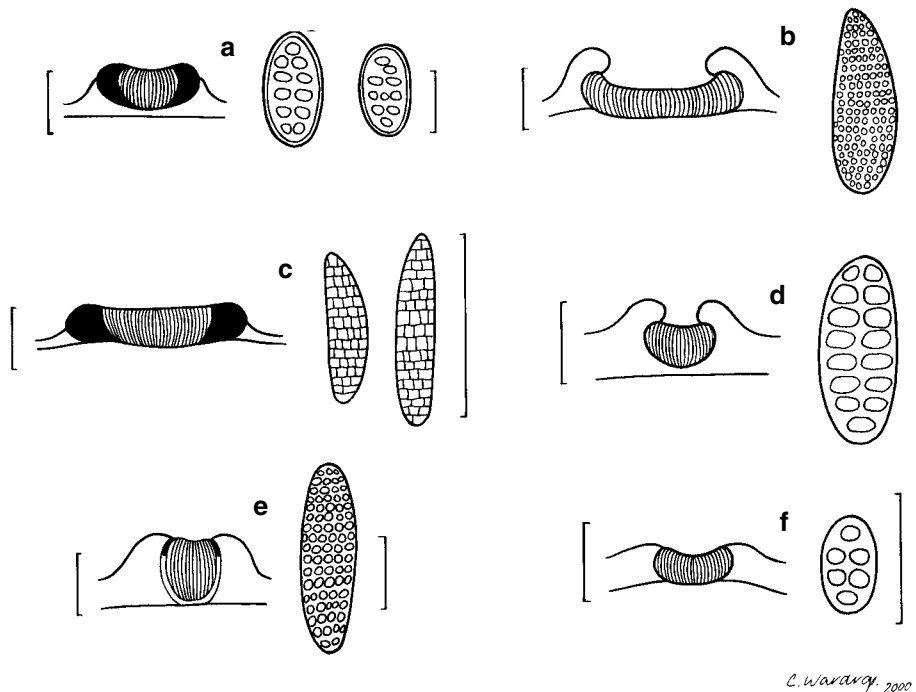
(Fée 1837: 36)

Type: South America. *s. loc.*, no collector (lecto G, *fide* Wirth & Hale 1978).

Thallus pale fawn to pale greenish fawn, thin, corticolous, surface smooth and shiny; apothecia lirelline, conspicuous, scattered or clustered, sessile, open, linear to oval or irregular in outline, 1–4 mm long, 0.3–0.6 mm wide, lacking a thalline margin; proper exciple laterally carbonised; hymenium 150–200 µm tall; disc black, densely white pruinose; ascospores elongate ellipsoid, pale brown (sometimes remaining hyaline), 75–100 µm long, 16–22 µm wide, densely muriform.

Chemistry: no lichen compounds found.

Distribution: occurs in Brazil, Mexico and Dominica, and in Australia, in Queensland. Reported substrates in Australia are *Acacia* and *Flindersia*.



C. Warburg, 2000

Fig.1. Cross-sections of lirellae and ascospores. **a**, *Phaeographina arechavaletae*; **b**, *P. atromaculata*; **c**, *P. caesiopruinosa*; **d**, *P. caesioradians*; **e**, *P. chrysenteron*; **f**, *P. exilior*; lirellae: scale bar = 200 µm; ascospores: scale bar = 20 µm (a, d, e, f); scale bar = 100 µm (b, c).

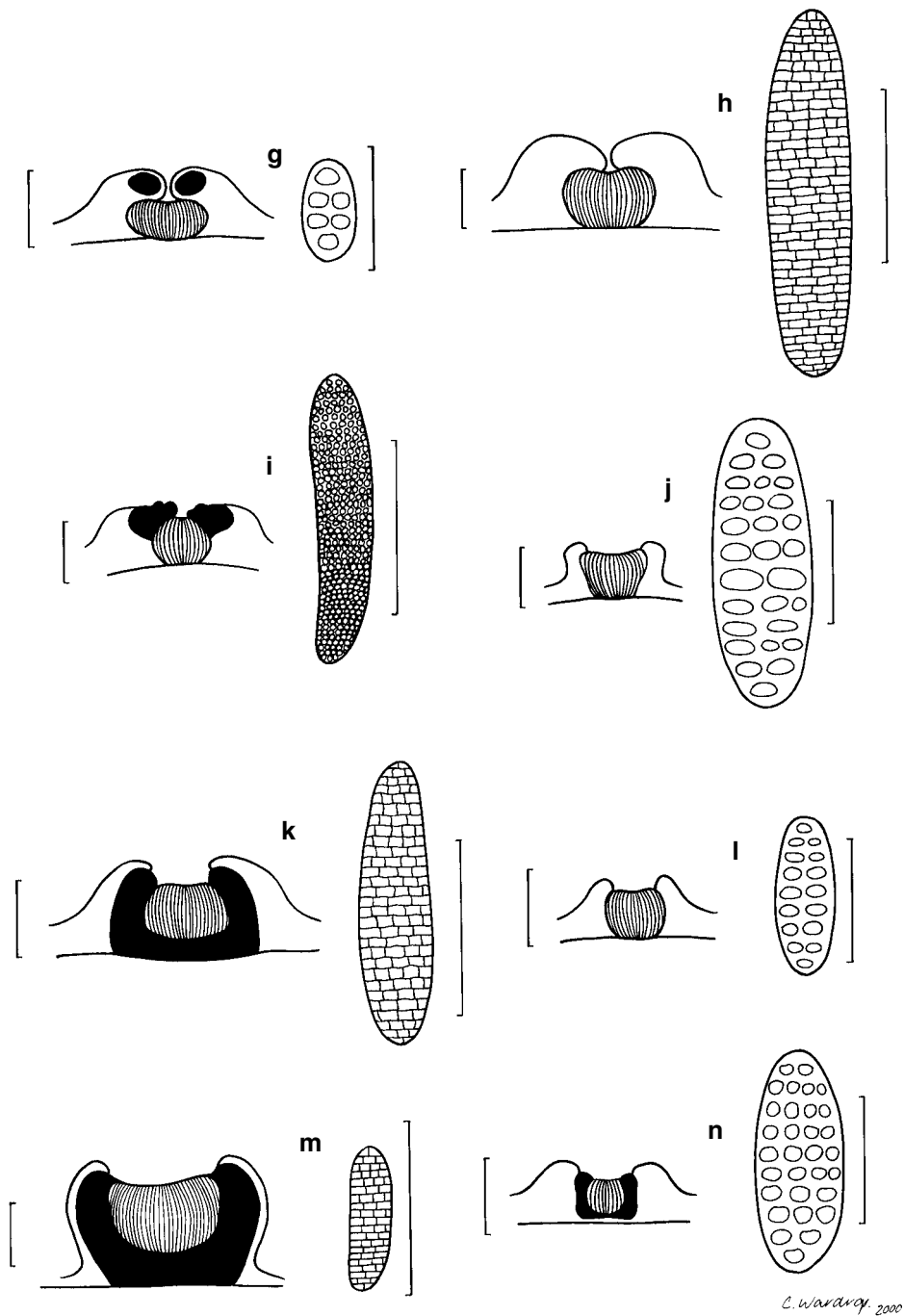


Fig. 1. cont. Cross-sections of lirellae and ascospores. **g**, *P. fuscescens*; **h**, *P. hadrospora*; **i**, *P. impudica*; **j**, *P. litoralis*; **k**, *P. montagnei*; **l**, *P. montiscalvi*; **m**, *P. quassicola*; **n**, *P. wilsonii*. lirellae: scale bar = 200 µm; ascospores: scale bar = 20 µm (g, j, l, n); scale bar = 100 µm (h, i, k, m).

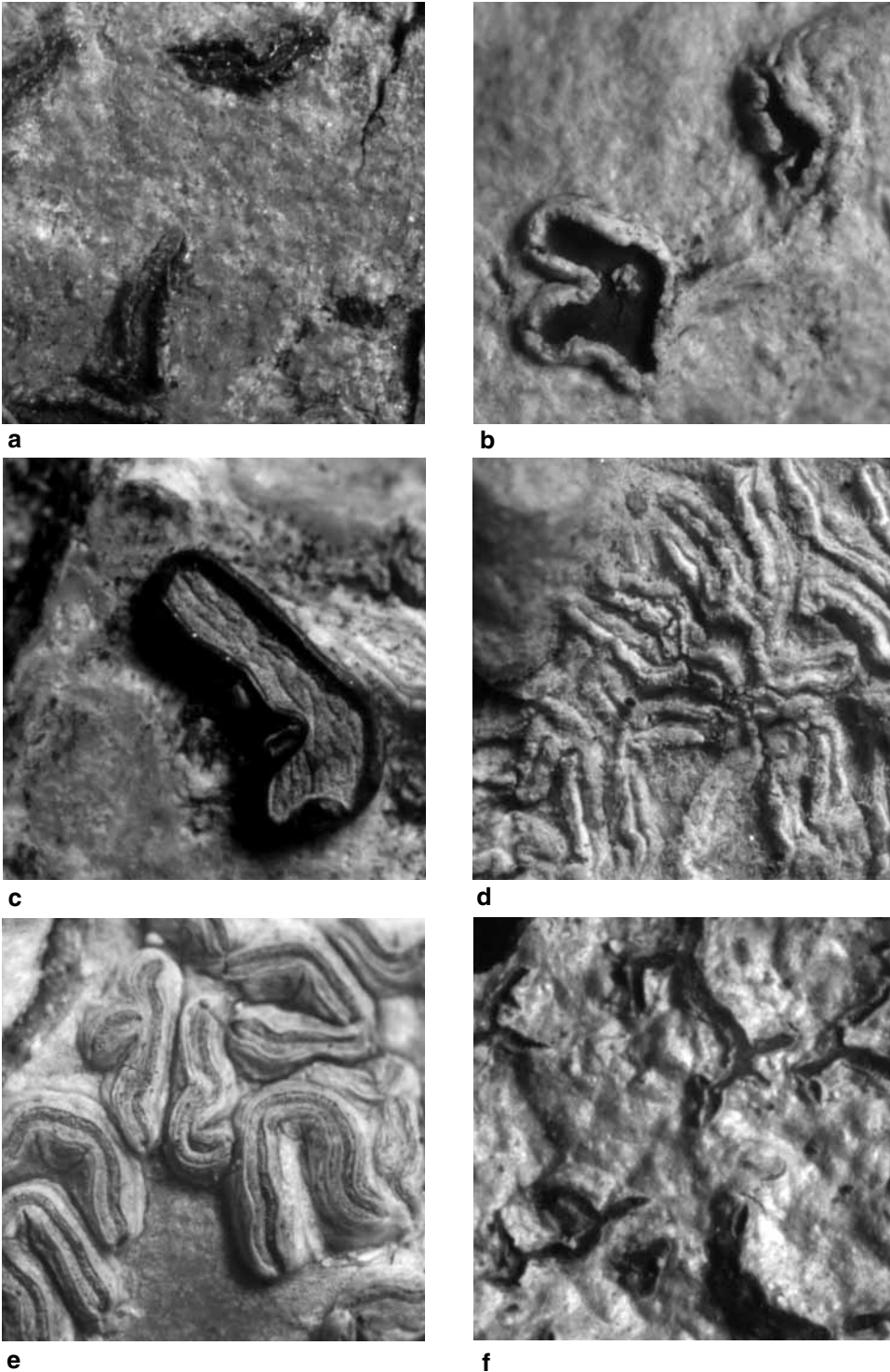


Fig. 2. **a**, *Phaeographina archavaletae* Mull. Arg., lectotype (G); **b**, *Phaeographina atromaculata* A.W. Archer, holotype (NSW); **c**, *Phaeographina caesiopruinosa* (Fée) Müll. Arg., Elix 17548 (CANB); **d**, *Phaeographina caesioradians* (Leight.) Redinger, holotype (BM); **e**, *Phaeographina chrysenteron* (Mont.) Müll. Arg., Elix 17505 (CANB); **f**, *Phaeographina exilior* (Vain.) Zahlbr., holotype (TUR-V 27142). All $\times 17$.

Notes: *Phaeographina caesiopruinosa* is characterised by conspicuous open lirellae with white pruinose discs bordered by the black exciple, the large muriform ascospores and the absence of lichen compounds. The ascospores are initially hyaline and may remain so for sometime (Redinger 1933) before becoming pale brown to brown. Specimens with hyaline muriform ascospores may be mistaken for *Graphina* species but old, brown, shrivelled ascospores are also usually present in *Phaeographina* specimens. The recent specimen from Brisbane (cited below) has hyaline ascospores but the older specimens from Kuranda and Mt French have pale brown ascospores; otherwise the three specimens are morphologically and chemically identical. *Phaeographina caesiopruinosa* was first reported from Australia by Müller (1891). In a recent examination of Bailey's specimen (BRI 492631), on which Müller based his report, no ascospores were found although the specimen superficially resembled *P. caesiopruinosa*.

Specimens examined: Queensland: Mt French, 6 km SW of Boonah, *Verdon 5181*, Jan 1983 (CANB); Black Mountain, 25 km NW of Kuranda, *Elix 17548*, Jul 1984 (CANB); Ennogara Dam, c. 10 km WNW of Brisbane, *Stevens s.n.*, Nov 1999 (herb. Stevens).

***Phaeographina caesioradians* (Leight.) Redinger (Fig. 1d, 2d)**

(Redinger 1933: 99).

Graphina caesioradians (Leight.) Mull. Arg.

(Müller 1894: 92).

Graphis caesioradians Leight.

(Leighton 1869: 176).

Type: Ceylon [Sri Lanka]: Central Province, *G.H.K Thwaites CL 71* (holo BM).

Phaeographina caesiohians (Nyl.) Redinger

(Redinger 1936a: 100).

Graphis caesiohians (Nyl.) Zahlbr.

(Zahlbruckner 1923: 296).

Fissurina caesiohians Nyl.

(Nylander 1891: 13).

Type: North Borneo. Labuan: *s. loc. E. Almquist s.n.* (holo H-NYL).

Thallus pale olive green, thin, corticolous, surface smooth and shiny; apothecia lirelliform, conspicuous, numerous, scattered, straight, curved or sinuous, often branched, sessile, lips open, disc white pruinose, with a conspicuous thalline margin, 1–4 mm long, 0.3–0.4 mm wide; carbonised proper exciple absent, or rarely weakly apically carbonised; hymenium 75–100 µm tall; ascospores 8 per ascus, pale brown, ellipsoid, 23–35 µm long, 10–13 µm wide, 6–8 × 2–3 locular.

Chemistry: no lichen compounds found.

Distribution: occurs in Brazil, Labuan, Sri Lanka and Hawaii; in Australia it is found in the Northern Territory and northern Queensland. The only reported substrate in Australia is *Alphitonia*.

Notes: *Phaeographina caesioradians* is characterised by open lirellae with a conspicuous thalline margin, small ascospores and the absence of both a carbonised exciple and any lichen compound. These features distinguish the species from the new species *P. montiscalvi* which has closed lirellae and contains stictic acid. The species resembles

Graphina mendax (Nyl.) Müll. Arg. but that species has larger hyaline ascospores and contains norstictic acid.

Specimens examined: Northern Territory: Wangi Road, Walker Creek, 68 km SSW of Darwin, *Streimann 8800*, Jan 1985 (CANB); Melville Island, Conder Point, *Streimann 42494*, Apr 1989 (CANB).

Queensland: 2 km S of Forrest Beach, 15 km SE of Ingham, *Elix 15975 p.p.*, June 1984 (CANB).

Phaeographina chrysenteron (vide infra) (Mont.) Müll. Arg. (Fig. 1e, 2e)

(Müller 1891: 52).

Graphis chrysenteron Mont.,

(Montagne 1842: 268).

Type: Guyana Gallica: s. loc., *Leprieur 23*; (holo P) *fide* K. Kalb, *in litt.*

Thallus pale olive green, corticolous, surface smooth and shiny; apothecia lirelliform, white, numerous, conspicuous, crowded, sessile, straight, curved or sinuous, sometimes branched, 1–3(–5) mm long, 0.5–0.6 mm wide; proper exciple complete, reddish brown; hymenium 150–200 µm tall; ascospores 8 per ascus, brown, 50–60 µm long, 12–16 µm wide, 10–12 × 2–6 locular.

Chemistry: stictic acid (*fide* K. Kalb *in litt.*)

Distribution: occurs in New Caledonia, Indonesia, Hawaii and Brazil and, in Australia, in Queensland. The only reported substrate in Australia is *Acacia*.

Notes: *Phaeographina chrysenteron* is characterised by the conspicuous lirellae, the large brown muriform ascospores and the presence of stictic acid. The species was first reported from Australia by Müller (Müller 1891) who based his report on specimens collected on Mt Bellenden Ker and sent to him by the Colonial Botanist F.M. Bailey. A recent examination of Bailey's specimen (BRI 492632) found it to contain stictic acid but no ascospores were seen. Another older specimen from Queensland labelled *Phaeographina chrysenteron* [J. Shirley AQ 721319 (BRI)] lacked lichen compounds and is identified as *Graphina repleta* (Stirt.) Shirley. *Phaeographina chrysenteron* resembles *Graphina repleta* var. *stictica* A.W. Archer (Archer 1999) but is distinguished from that taxon by the smooth lirellae and the pale brown ascospores.

Müller's epithet 'chrysentera' has been corrected to 'chrysenteron' as chrysenteron is a Greek noun in apposition and does not change.

Specimen examined: Queensland: Black Mountain, 25 km NW of Kuranda, *Elix 17505*, Jul 1984 (CANB).

Phaeographina exilior (Vain.) Zahlbr. (Fig. 1f, 2f)

(Zahlbruckner 1923: 438).

Graphis exilior Vain.

(Vainio 1920: 200).

Type: Philippines. Luzon, Bataan Province: Lamao River, Mount Mariveles, *H.N.*

Whitford 1089, Feb 1905, on *Shorea polysperma* (holo TUR-V 27142).

Thallus pale greyish-white, thin, corticolous, surface smooth and dull; apothecia lirelliform, numerous, crowded, inconspicuous, immersed, lips open with a thin conspicuous thalline margin, curved or sinuous, much branched, 1–2 mm long, 0.1 mm wide; proper exciple absent; hymenium 75–100 µm tall; disc pale reddish brown,

epruinose; ascospores 8 per ascus, irregularly 2-seriate, ellipsoid, pale brown, 15–18 µm long, 7–9 µm wide, 4 × 2 locular.

Chemistry: no lichen compounds found.

Distribution: occurs in the Philippines and, in Australia, in Queensland. The only reported substrate in Australia is *Acacia*.

Notes: *Phaeographina exilior* is characterised by the inconspicuous, immersed, brown, epruinose lirellae, the small ascospores and the absence of lichen compounds. The species resembles *Graphina brachyspora* Mull. Arg. but the lirellae are smaller and less conspicuous and less well-defined than those in the *Graphina* species.

Specimen examined: Queensland: Big Tableland, 26 km S of Cooktown, *Streimann 30884*, Jul 1984 (CANB).

Phaeographina fuscescens A.W. Archer, **sp. nov.** (Fig. 1g, 3a)

Phaeographina isidiosa similis sed acido norstictico deficienti differt.

Type: Australia. Norfolk Island: Mount Pitt Reserve, track from Red Road to Mount Bates, 29°0'40"S, 167°56'40"E, alt. 220 m, on treelet stem, *H. Streimann 34499*, Dec 1984 (holo CANB).

Thallus pale to dark fawn, thin, corticolous, surface smooth and somewhat shiny; apothecia lirelliform, brown, numerous, crowded, initially fissurine and indicated by a thin brown line on the thallus surface, becoming sessile to sessile, straight, curved or sinuous, sometimes branched, lips closed, 1–3(–4) mm long, 0.15–0.3 mm wide; proper exciple apically carbonised, covered by a thin thalline layer; hymenium 125–150 µm tall; ascospores 8 per ascus, ellipsoid, pale brown, 13–18 µm long, 6–10 µm wide, 4 × 2 locular.

Chemistry: no lichen compounds found.

Distribution: endemic; known only from north-eastern Queensland and Norfolk Island.

Notes: *Phaeographina fuscescens* is characterised by the fawn thallus, the brown lirellae, the apically carbonised proper exciple, the small brown muriform ascospores and the absence of lichen compounds. The apically carbonised exciple is covered with a thin thalline margin as in the more conspicuous *P. quassicola*. The new species is distinguished from the similar *P. insidiosa* (Vain.) Zahlbr. by the absence of norstictic acid, present in *P. isidiosa* (Wirth & Hale 1963), and is distinct from *P. exilior* (Vain.) Zahlbr. which has immersed open, black lirellae.

Etymology: The epithet *fuscescens*, becoming brown, refers to the brown colour of the thallus and lirellae.

Specimen examined: Queensland: W of Palm Cove, ca. 25 km N of Cairns, *Kalb 19966*, Aug 1988 (herb. Kalb).

Phaeographina hadrospora A.W. Archer, **sp. nov.** (Fig. 1h, 3b)

Phaeographina tumulata similis sed ascosporiis majoribus differt.

Type: Australia. Queensland: Goodna, *F.R.M Wilson s.n.*, no date (holo NSW 426677).

Thallus pale greenish fawn, thin, corticolous, surface subtuberculate, cracked and shiny; apothecia lirelliform, inconspicuous, scattered, concolorous with the thallus, sessile, short, straight or curved, unbranched, lips closed, 1–2(–3) mm long, 0.5–0.8 mm wide, with a conspicuous, swollen thalline margin; proper exciple lacking; hymenium 250–300 µm tall; ascospores 1 per ascus, elongate-ellipsoid, pale brown, 155–225 µm long, 40–65 µm wide, densely muriform.

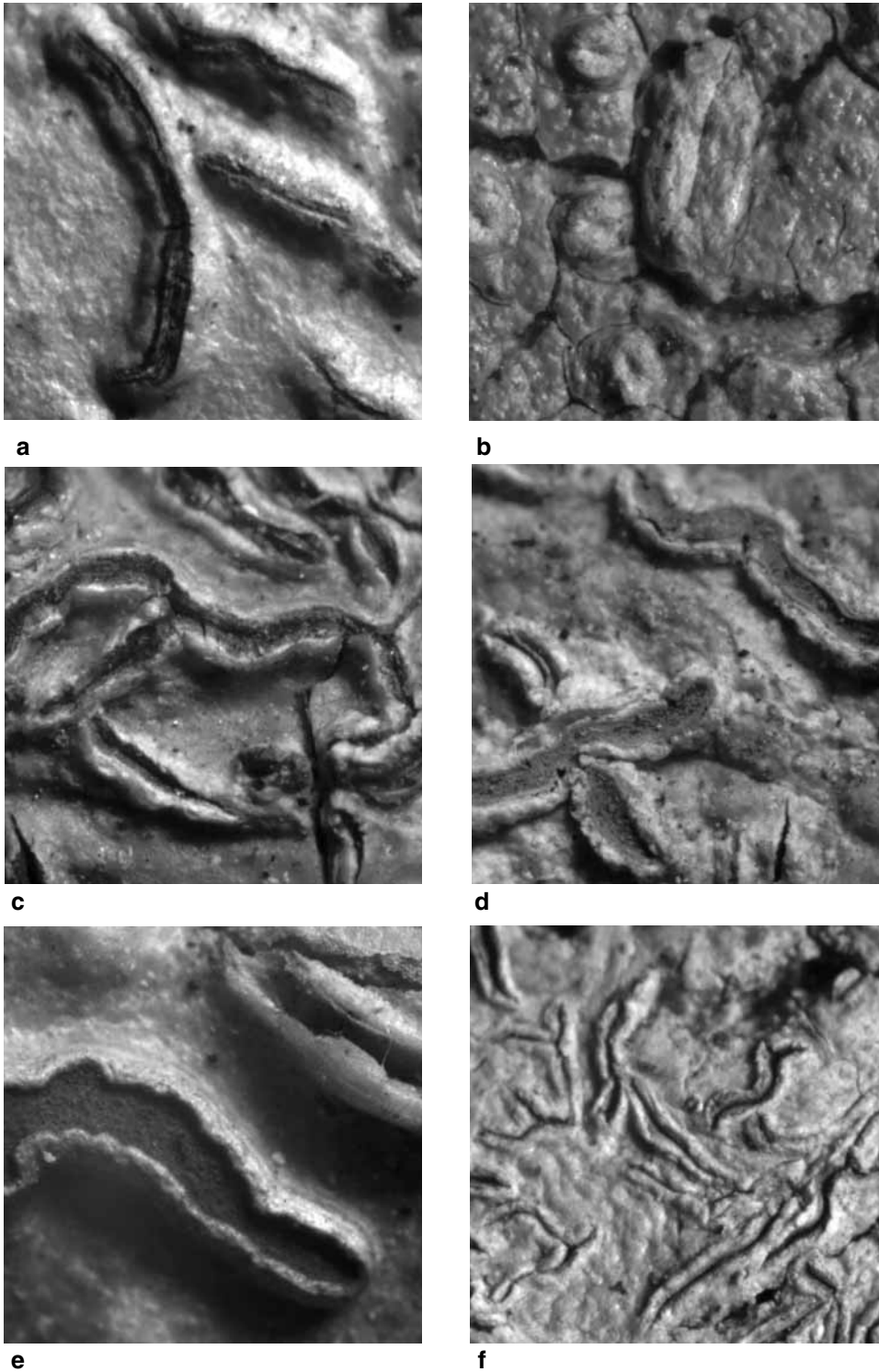


Fig. 3. **a**, *Phaeographina fuscescens* A.W. Archer, holotype (CANB); **b**, *Phaeographina hadrospora* A.W. Archer, holotype (NSW); **c**, *Phaeographina impudica* A.W. Archer, holotype (CANB); **d**, *Phaeographina litoralis* A.W. Archer, holotype (CANB), **e**, *Phaeographina montagnei* (Bosch) Müll. Arg., Elix 18807 (CANB); **f**, *Phaeographina montiscalvi* A.W. Archer, holotype (CANB). All $\times 17$.

Chemistry: no lichen compounds found.

Distribution: endemic; known only from north-eastern Queensland.

Notes: *Phaeographina hadrospora* is characterised by the inconspicuous lirellae (hidden by the large thalline margins), the absence of lichen compounds and the large pale brown, muriform ascospores. Immature ascospores are smaller and hyaline. This new species resembles *P. tumulata* (Nyl.) Müll. Arg. but the ascospores in that species are 14–18 µm long, 9–11 µm wide and 4 × 1–3-locular (Nylander 1868).

Large ascospores (c. 200 µm long) are uncommon in the genus *Phaeographina*; one species with large ascospores, *P. balfourii* Müll. Arg., was described from Socotra (Müller 1888b), but that species has much-branched, immersed lirellae and a reddish brown proper exciple. *Phaeographina hadrospora* is thus distinct from this species.

Etymology: The epithet *hadrospora* is from the Greek, *hadros*, large, well-developed, a reference to the large ascospores.

Specimens examined: Queensland: Kirrima State Forest, 26 km WNW of Cardwell, *Elix* 15665 Jun 1984 (CANB); Windsor Tableland, 45 km NW of Mossman, *Streimann* 29656 Jun 1984 (CANB, US); Cardwell Range, Blencoe Creek, 48 km NW of Cardwell, *Streimann* 36868 Jun 1986 (CANB); Clarke Range, 46 km SSW of Proserpine, *Elix* 20872, Jun 1986 (CANB).

***Phaeographina impudica* A.W. Archer, sp. nov.** (Fig. 1i, 3c)

Phaeographina platyloma similis sed ascosporis majoribus et lirellis sulcatis differt.

Type: Queensland: McIlwraith Range, Lankelly Creek, 11 km from Coen, 13°57'S, 145°15'E, *G. Butler* 562A, Aug 1978 (holo CANB).

Thallus pale greyish green, thin, corticolous, surface subtuberculate and slightly shiny; apothecia lirelliform, conspicuous, scattered, sessile, black, lips closed, slightly sulcate, straight, curved or sinuous, rarely branched, 1–4 mm long, 0.4–0.6 mm wide, to 0.4 mm tall, with a conspicuous thalline margin; proper exciple laterally carbonised; hymenium 180–220 µm tall; ascospores 1 per ascus, pale brown, elongate-ellipsoid, (125–)135–180 µm long, (25–)30–40 µm wide, densely muriform.

Chemistry: no lichen compounds found.

Distribution: endemic; known only from north-eastern Queensland. The only reported substrate is *Alphitonia*.

Notes: *Phaeographina impudica* is characterised by conspicuous lirellae with the proper exciple laterally carbonised, exposed and sulcate, the large ascospores and the absence of lichen compounds. The species is thus distinguished from *P. pudica* (Mont. & Bosch) Zahlbr., described from Indonesia, which has barely exposed lirellae (hence the epithet) which are not sulcate (Redinger 1936a; Nakanishi 1977). The ascospores in that species are reported to be 100–150(–180) µm long and 20–32(–40) µm wide. *Phaeographina platyloma* Müll. Arg. (Müller 1882) resembles *P. impudica* but the lirellae in that species are not sulcate and the ascospores are smaller, 78–117 µm long, 26 µm wide (Nakanishi 1977). *Phaeographina muelleri* A.W. Archer (Archer 2000) has similar ascospores and lacks lichen compounds but that taxon has conspicuously open lirellae with an apically carbonised proper exciple.

Specimens examined: Queensland: Big Tableland, 26 km S of Cooktown, *Elix* 17284, July 1984 (CANB); Eungella National Park, *Day* 87.13, July 1987 (CANB); Atherton Tableland, between Ravenshoe and Atherton, *Lumbsch* 5432a, Aug 1987 (herb. Lumbsch).

***Phaeographina litoralis* A.W. Archer, sp. nov.** (Fig. 1j, 3d)

Phaeographis dendroide similis sed ascosporiis majoribus muriformisque, et acido stictico deficienti differt.

Type: Australia. Queensland: Forrest Beach, 15 km SE of Ingham, 18°42'S, 145°18'E, alt. 2 m, on *Alphitonia*, *H. Streimann* 28868, June 1984 (holo CANB).

Thallus pale greenish fawn, corticolous, surface subtuberculate and shiny; apothecia lirelliform, conspicuous, scattered, straight, curved or sinuous, sometimes branched, sessile, open, often with conspicuous thalline margins, 1–3 mm long, 0.4–0.5 mm wide; disc fine white pruinose; proper exciple absent; hymenium 120–150 µm tall; ascospores 8 per ascus, irregularly 2-seriate, ellipsoid, pale brown, 40–60 µm long, (12–)15–17 µm wide, 10–14 × 2–3 locular.

Chemistry: no lichen compounds found.

Distribution: endemic; known only from one specimen from north-eastern Queensland.

Notes: *Phaeographina litoralis* is characterised by conspicuous lirellae with pruinose epithecium and the absence of lichen compounds. The species resembles *Phaeographis dendroides* but that species has smaller locular ascospores and contains stictic acid. The new species is so far known only from the type specimen.

Etymology: The epithet *litoralis*, pertaining to the sea shore, refers to the type locality, Forest Beach.

Phaeographina montagnei (Bosch) Müll. Arg. (Fig. 1k, 3e)

(Müller 1882: 399).

Graphis montagnei Bosch,

(van den Bosch 1855: 472)

Type: Indonesia. Java, s.loc., *F.W. Junghuhn* 112 (syntype L, *fide* Nakanishi 1977).

Thallus dull green, thin, corticolous, surface smooth and somewhat shiny; apothecia lirelliform, numerous, conspicuous, scattered, initially fissurine, becoming sessile with a conspicuous thalline margin, straight, curved or sinuous, rarely branched, 1–5(–8) mm long, 0.5–1.0 mm wide; proper exciple completely carbonised, concealed in thalline margin; hymenium pale red, 200–300 µm tall; disc bright red; ascospores 1 per ascus, ellipsoid, initially hyaline, becoming pale brown, 125–155(–175) µm long, 35–45(–50) µm wide, muriform.

Chemistry: no lichen compounds found; isohypocrelline, a red perylene quinone (Mathey et al. 1994) is reported to be present (Staiger & Kalb 1999).

Distribution: occurs in Japan, the Philippines and Indonesia, and in Australia, in Queensland and New South Wales and also on Norfolk Island, where it is not uncommon. The only reported substrates are *Citrus*, *Elaeodendron* and *Nestigia* on Norfolk Island.

Notes: *Phaeographina montagnei* is characterised by the conspicuous lirellae with bright red discs, the large ascospores and the absence of lichen compounds other than the red pigment; the species is unlikely to be confused with any other *Phaeographina* species. Montagne (1856: 346) described the species as “species splendidissima cum nulla confundenda”. The species is illustrated in colour by Yoshimura, Plate 44, Fig. 469 (Yoshimura 1979).

Specimens examined: Queensland: Mount Stewart, 10 km SSW of Townsville, *Streimann* 31305, Jul 1984 (CANB); Mount Fox, 43 km S of Ingham, *Elix* 20354, Jun 1986 (CANB); Clarke Range, 46 km SSW of Proserpine, *Elix* 20902, Jun 1986 (CANB). New South Wales: Broken Head, 8 km S of Byron Bay, *Archer* G 270, Nov 1998 (NSW). Norfolk Island. Mt Pitt Reserve, just S of the summit of Mt Pitt, *Elix* 18807, Dec 1984 (CANB); *ibid.*, track at end of Selwyn Pine Road, *Elix* 18446, Dec 1984 (CANB); *ibid.*, Filmy Fern Trail, *Streimann* 32195, Dec 1984 (CANB); track between Mt Pitt and Mt Bates, *Elix* 27385, Jun 1992 (CANB).

***Phaeographina montiscalvi* A.W. Archer, sp. nov.** (Fig. 1l, 3f)

Phaeographina caesioradianti similis sed labiis convergentibus et acido stictico praesenti differt.

Type: Australia. Queensland: Great Dividing Range, Mount Baldy, 4 km SW of Atherton, 17°17'S, 145°27'E, alt. 1080 m, on fallen tree branch, *H. Streimann* 29212, June 1984 (holo CANB; iso US).

Thallus off-white, thin, corticolous, surface smooth and slightly shiny; apothecia lirelliform, conspicuous, dark brown, numerous, scattered or crowded, sessile, lips closed, with a conspicuous thalline margin, straight, curved or sinuous, sometimes repeatedly branched, 1–4(–6) mm long, 0.15–0.25 mm wide; proper exciple ill-defined, pale yellowish brown; hymenium 120–150 µm tall; disc pale brown to brown; ascospores 8 per ascus, ellipsoid, pale brown, 25–35 µm long, 8–10 µm wide, 6–8 × 2–3 locular.

Chemistry: stictic acid.

Distribution: endemic; known only from the type specimen from north-eastern Queensland.

Notes: *Phaeographina montiscalvi* is characterised by the conspicuous, dark brown lirellae, the small ascospores and the presence of stictic acid. The new species is so far known only from the type specimen. It is distinguished from the similar *P. caesioradians* by the closed lirellae and the presence of stictic acid. The species is so far known only from the type specimen.

Etymology: The epithet *montiscalvi* is from the Latin, *mons*, mountain, *calvus*, bald, a reference to the type locality, Mount Baldy.

***Phaeographina quassiicola* (vide infra) (Fée) Mull. Arg.** (Fig. 1m, 4a)

(Müller 1887: 47)

Thecaria quassiicola Fée as '*quassiaecola*' (vide infra)

(Fée 1824: 97)

Graphis quassiaecola (Fée) Vain.

(Vainio 1920: 197)

Type: Madagascar, *s. loc.* Abel Aubert du Petit-Thouars, no date, *fide* Mull. Arg. 1887 (holo G).

Phaeographina exserta (Nyl.) Müll. Arg.,

(Müller 1882: 398)

Graphis exserta Nyl.

(Nylander 1868: 73)

Type: New Caledonia. Lifu, *Deplanche s.n.*, 1864 (holo H-NYL 7537).

Graphina pyelodes F. Wilson

(Wilson 1891: 32)

Type: Australia. Queensland, Blackall Range, *F. Wilson s.n.*, no date (not found).

Thallus pale fawn, thin, corticolous, surface smooth and shiny; apothecia lirelliform, conspicuous, pale grey, numerous, scattered, conspicuously sessile, straight, curved or sinuous, rarely branched, 0.5–3(–4) mm long, 0.5–0.8 mm wide, 0.5–0.6 mm tall, lips initially closed, becoming open to reveal a white pruinose disc; proper exciple thick,

completely carbonised with a thin, complete thalline margin; hymenium 150–200(–250) μm tall; ascospores 8 per ascus, irregularly 2-seriate, ellipsoid, pale brown, (65–)75–100 μm long, (18–)22–28 μm wide, 18–23 \times 2–6 locular.

Chemistry: no lichen compounds found.

Distribution: Sri Lanka, Japan, Indonesia, New Caledonia and Fiji. In Australia it occurs in Queensland and is also found on Norfolk Island. Reported substrates, in Australia and Norfolk Island, include *Citrus*, *Mallotus* and mangroves.

Notes: *Phaeographina quassiicola* is characterised by the conspicuous pale grey, raised, open (cup-like) lirellae, the completely carbonised proper exciple, the large ascospores and the absence of lichen compounds. The colour of the lirellae is due to the thin thalline exciple covering the thick black proper exciple. The species is illustrated in colour by Yoshimura, Plate 44, Fig. 468 (Yoshimura 1979). *Graphina pyelodes* F. Wilson was described by Wilson (Wilson 1891) who referred to a specimen collected in the Blackall Ranges but the only specimen seen labelled 'G. pyelodes Wils.' [AQ721316 (BRI)] had no further information on the label and may not be the specimen referred to by Wilson. *Graphina pyelodes* was reported as a synonym of *P. quassiicola* by Müller (1893b).

Fée's epithet '*quassiaeicola*' has been corrected to '*quassiicola*' cf ICBN (Tokyo Code) Article 60.8, example 11.

Specimens examined: Queensland: Russell River, *Sayer L37*, 1886 (MEL 515683); Korunda [Kuranda], *Wilson s.n.*, July 1893 (NSW 438711); Brisbane, Chiefswood, *Wilson s.n.*, Aug 1896 (NSW 438712); Brisbane, Peacheys Scrub, *Wilson s.n.*, Aug 1896 (NSW 438706); Edmonton, 9 km S of Cairns, *Elix 17614*, Jul 1984 (CANB); Bloomfield River, 56 km N of Mossman, *Streimann 45730*, Dec 1990 (CANB); Eungella National Park, *Lumbsch 11057b*, Jul 1996; (herb. Lumbsch); Wooroonooran National Park, Henrietta Creek Camping area, *Lumbsch 11114d*, Jul 1996 (herb Lumbsch).

Norfolk Island. Mt Pitt Reserve, S of the summit of Mt Pitt, *Elix 18805*, Dec 1993 (CANB); *ibid.*, Mt Bates summit trail, *Elix 18589*, Dec 1984 (CANB); *ibid.*, Red Road track to Mt Bates, *Elix 18607*, Dec 1984 (CANB); *ibid.*, track leading W from Mt Bates, *Streimann 34299*, Dec 1984 (CANB, US).

Fiji: Suva, *Wilson s.n.*, Aug 1892 (NSW 438692).



a



b

Fig. 4. **a**, *Phaeographina quassiicola* (Fee) Müll. Arg., Lumbsch 11057b (herb. Lumbsch); **b**, *Phaeographina wilsonii* A.W. Archer, holotype (NSW). All $\times 17$.

***Phaeographina wilsonii* A.W. Archer, sp. nov.** (Fig. 1n, 4b)

Phaeographina stramineoglauca similis sed lirellis sessilibus conspicuisque, et acido stictico praesenti differt.

Type: Australia. Queensland: Upper Coomera, *F. Wilson s.n.*, no date [c. 1890] (holo NSW 439104).

Thallus pale greenish brown, thin, corticolous, surface smooth and shiny; apothecia lirelliform, conspicuous, scattered, black, sessile, lips closed, straight, curved or sinuous, often branched, with conspicuous thalline margin, the carbonised exciple becoming white pruinose, 1–5 mm long, 0.3–0.5 mm wide; proper exciple thin, completely carbonised, very thin at the base; hymenium 100–130 µm tall; ascospores ellipsoid, pale brown, muriform, 36–53 µm long, 15–22 µm wide, 8–11 × 2–5 locular.

Chemistry: stictic acid.

Distribution: endemic; known only from the type specimen from south-eastern Queensland.

Notes: *Phaeographina wilsonii* is characterised by black lirellae with conspicuous white thalline margins, the completely carbonised proper exciple and the presence of stictic acid.

The species resembles *P. stramineoglacuca* (Vain.) Zahlbr. (Vainio 1920) as the lirellae in both species have a completely carbonised proper exciple and the ascospores are of similar size, 45–52 × 18–25 µm in *P. stramineoglacuca*. However, the lirella in this species are somewhat immersed and the thallus contains no lichen compounds. The species also superficially resembles *P. caesioradians* (Leight.) Redinger but that species also lacks lichen compounds and has smaller ascospores.

Etymology: The species is named after F.R.M. Wilson (1832–1903), an early collector of lichens in Australia.

Excluded Species

***Phaeographina contexta* (Pers.) Müll. Arg.**

(Müller in Balfour 1888b: 379)

Emblemia contexta Pers.

(Persoon in Gaudichaud 1826: 184)

This species has hyaline, muriform ascospores (Nylander 1868; Leighton, 1869; Vainio 1920) and is more properly placed in the genus *Graphina*. The combination *Graphina contexta* (Pers.) Redinger was made (Redinger 1936b) but erroneously attributed to Müller (Müll. Arg.). The species was reported from Australia by Müller (1891) but his specimen lacked ascospores.

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