# CHAPTER 15

# FAMILY LETROUITIACEAE

## Characteristics of the Family Letrouitiaceae

Thallus: corticolous, pale yellow, greenish yellow to yellow-orange or greenish to yellow-brown or pale orange, smooth to verrucose, continuous to areolate, 100.0-180.0 μm thick; epruina; Soralia and Isidia absent; Prothallus not visible; Photobiont chlorococcoid; **Apothecia**: common, dispersed to crowded and entire, sessile; disc plane, red-orange to orange or rusty brown or red-brown, brown-black to black and yellow-orange to reddish orange at margin; epruina, 0.5-2.0 mm diam.; with biatorine (proper exciple); Parathecium: weakly differentiated, composed of thin walled; Epihymenium: yellow-brown or red-brown, 4.0-7.5 μm thick; Hymenium: hyaline, 80.0-120.0 μm high; Subhymenium: indistinct; Hypothecium hyaline to yellow or pale brown, 15.0-29.5 μm high; Paraphyses: branched and anastomosing, apical not conspicuously swollen, 85.9-180.7 μm high; Asci: broadly clavate, *Letrouitia*-type, 15.0-30.0 μm high; **Ascospores**: 1 or 8 per ascus, hyaline, ellipsoid, transversely septate with 6-10 lens-shaped locules or submuriform, primarily transversely septate with 8-12 lens-shaped locules, (18.3)21.5-35.6-53.0(60.5) × (15.3)15.4-16.3-17.2(17.4) μm; **Pycnidia** and **Conidia** not observed.

## Description of the Genus *Letrouitia*

***Letrouitia*** Hafellner & Bellem., *Nova Hedwigia* 35: 281 (1982) (Elix, 2009, pp. 483-484).

Thallus: corticolous, pale yellow, greenish yellow to yellow-orange or greenish to yellow-brown or pale orange, smooth to verrucose, continuous to areolate, 100.0-180.0 μm thick; epruina; Soralia and Isidia absent; Prothallus not visible; Photobiont chlorococcoid; **Apothecia:** common, dispersed to crowded and entire, sessile; disc plane, red-orange to orange or rusty brown or red-brown, brown-black to black and yellow-orange to reddish orange at margin; epruina, 0.5-2.0 mm diam.; with biatorine (proper exciple); Parathecium: weakly differentiated, composed of thin walled; Epihymenium: yellow-brown or red-brown, 4.0-7.5 μm thick; Hymenium: hyaline, 80.0-120.0 μm high; Subhymenium: indistinct; Hypothecium hyaline to yellow or pale brown, 15.0-29.5 μm high; Paraphyses: branched and anatomizing, apical not conspicuously swollen, 85.9-180.7 μm high; Asci: broadly clavate, *Letrouitia*-type, 15.0-30.0 μm high; **Ascospores**: 1 or 8 per ascus, hyaline, ellipsoid, transversely septate with 6-10 lens-shaped locules or submuriform, primarily transversely septate with 8-12 lens-shaped locules, (18.3)21.5-35.6-53.5(60.0) × (15.5)15.4-16.3-17.2(17.5) μm; **Pycnidia** and **Conidia** not observed.

Chemistry: atranorin and unknown anthraquinone.

Habitats: on bark.

Distribution: eastern Queensland and northern, New South Wales, South America, Africa, Asia, Papua New Guinea, New Caledonia, Fiji, and the Hawaiian Islands.

***Key to Species of Letrouitia***

1a. Ascospores transversely 6-10-locular with lens-shaped locules..... *Letrouitia domingensis*

1b. Ascospores submuriform or muriform.....2

2a. Disc reddish brown to brown-black, asci 8-spored, ascospores submuriform or transversely septate with 8-12 lens-shaped locules.....*Letrouitia transgressa*

2b. Disc red-orange to orange or rusty brown, asci 2-spored, ascospores muriform..... *Letrouitia vulpina*

***Description of the Species***

1. ***Letrouitia domingensis*** (Pers.) Hafellner & Bellem., *Nova Hedwigia* 35: 281 (1982) (Elix, 2009, pp. 486-488).

*Patellaria* domingensis Pers., Ann. Wetterauischen Ges. Gesammte Naturk. 2: 12 (1811).

(see Figure 58)

Thallus: corticolous, pale yellow, greenish yellow to yellow-orange, verrucose, continuous to areolate, 100.0-180.0 μm thick; epruina; Soralia and

Isidia absent; Prothallus not visible; Photobiont chlorococcoid; **Apothecia**: common, dispersed to crowded and entire, sessile; disc plane, red-brown to brown-black and yellow-orange to orange at margin; epruina, 0.5-2.0 mm diam.; with biatorine (proper exciple); Parathecium: weakly differentiated, composed of thin walled; Epihymenium: red-brown, 4.5-7.5 μm thick; Hymenium: hyaline, 90.0-120.0 μm high; Subhymenium: indistinct; Hypothecium yellow to pale brown, 17.0-21.5 μm high; Paraphyses: branched and anatomizing, apical not conspicuously swollen, 86.9-180.7 μm high; Asci: broadly clavate, *Letrouitia*-type, 15.0-20.0 μm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, transversely septate with 6-10 lens-shaped locules, (18.3)21.5-35.6-60.2(63.0) × (9.4)10.4-12.8-16.3(17.6) μm; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus and apothecia P-, K+ purple, C-, KC-; containing atranorin and unknown anthraquinone.

Habitats: occurring on bark in lower montane scrub and lower montane rainforests at 923 m.

Distribution: eastern Queensland and northern, New South Wales, South America, Africa, Asia (Thailand), Papua New Guinea, New Caledonia, Fiji, and the Hawaiian Islands.

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province. Phuluang Wildlife Research Station, on trunk of an unidentified tree, 12 November 2008, Varaporn Sriprang—VC688 & CP504(RAMK); ibid., Seven Chanal Station, on trunk of an unidentified tree, 13 November 2008, Varaporn Sriprang—VC0749, VC0773, VC077-1 & VC0778(RAMK).

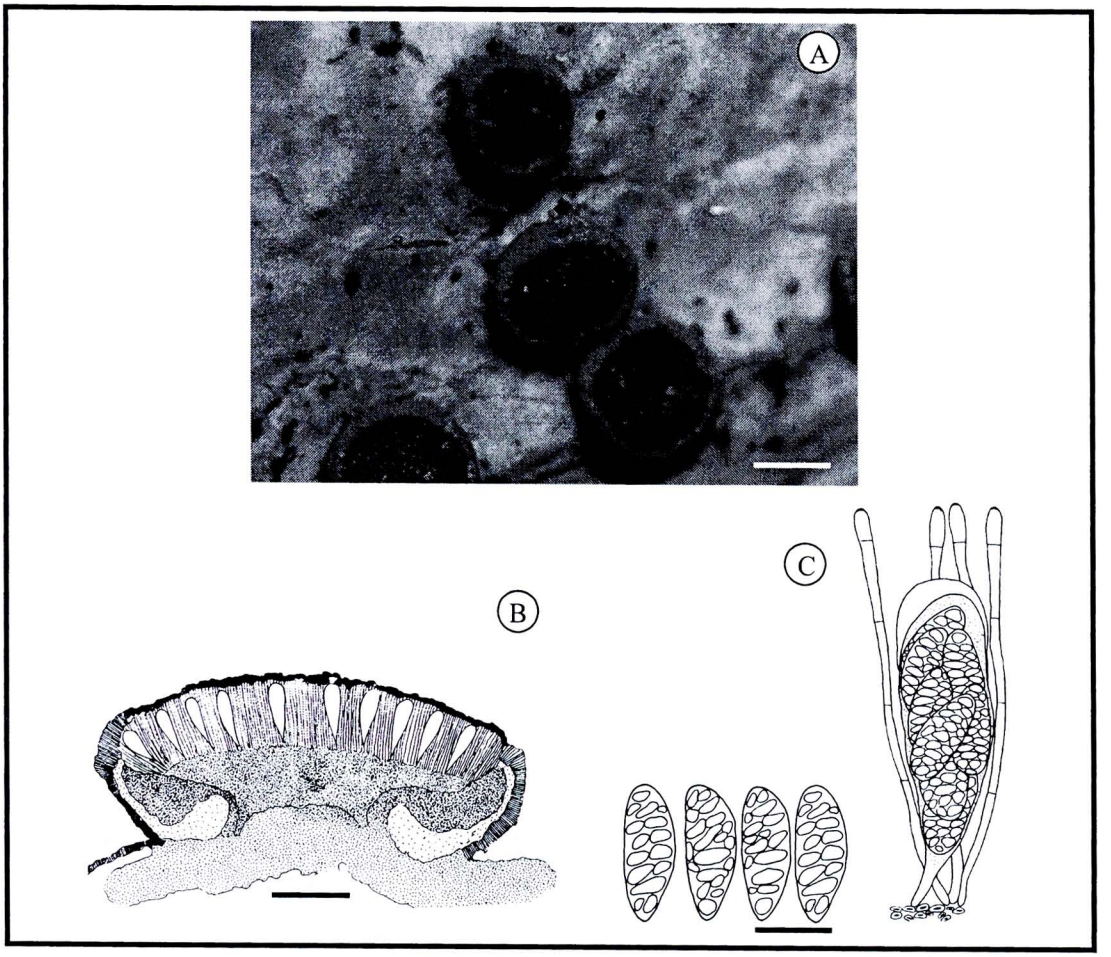


***Figure 58*** *Letrouitia domingensis* (Pers.) Hafellner & Bellem.

*Note.* A = Apothecia biatorine, sessile, red-brown [CP504(RAMK)] (scale = 1 mm)

B = Illustration of vertical section of apothecia [CP504(RAMK)] (scale = 11.42 μm)

C = Illustration of ascus with paraphyses and ascospores [CP504(RAMK)] (scale = 10.03 μm)

Observation: *Letrouitia domingensis* is characterized by the red-brown to black apothecia with yellow-orange margins, and transversely 6-10-locular ascospores with lens-shaped locules.

2. ***Letrouitia transgressa*** (Malme) Hafellner & Bellem., *in* J. Hafellner, *Nova Hedwigia* 55: 710 (1983) (Elix, 2009, pp. 492-493).

*Bombyliospora domingensis* f. transgessa Malme, Ark. Bot. 18A(12): 5 (1923).

(see Figure 59)

Thallus: corticolous, yellow, greenish yellow to yellow-orange, smooth to verrucose, continuous to areolate, 109.0-179.0 μm thick; epruina; Soralia and Isidia absent; Prothallus not visible; Photobiont chlorococcoid; **Apothecia**: common, dispersed to crowded and entire, sessile; disc plane, red-brown, brown-black to black and reddish-orange at margin; epruina, 0.5-1.5 mm diam.; with biatorine (proper exciple); Parathecium: weakly differentiated, composed of thin walled; Epihymenium: yellow-brown, 4.0-7.6 μm thick; Hymenium: hyaline, 90.0-110.0 μm high; Subhymenium: indistinct; Hypothecium hyaline, 15.0-29.5 μm high; Paraphyses: branched and anatomizing, apical not conspicuously swollen, 85.9-179.9 μm high; Asci: broadly clavate, *Letrouitia*-type, 15.0-30.0 μm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, submuriform, primarily transversely septate with 8-12 lens-shaped locules, (18.3)21.5-35.6-60.2(63.5) × (9.3)9.6-14.7-21.5(21.9) μm; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus and apothecia P-, K+ purple, C-, KC-; containing unknown anthraquinone.

Habitats: occurring on barks in dry evergreen forests, lower montane rainforests, lower montane scrub, mixed deciduous forests and Tropical

rainforests between 700 and 1,473 m.

Distribution: eastern Queensland and northern, New South Wales, South America, Africa, Asia (Thailand), Papua New Guinea, and New Caledonia.

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province. Head Quarter of Phuluang Wildlife Sanctuary, on trunk of an unidentified tree, 20 May 2009, Sanya Meesim and Kawinnat Buaruang—MSPL051, MSPL061, VC827, VC828, VC829, VC831, VC832, VC833, VC843, VC841 & VC844(RAMK); ibid., Head Quarter of Phuluang Wildlife Sanctuary, on trunk of an unidentified tree, 29 August 2005, Pornpet Pornphom—CH285 (RAMK); ibid., from Phuluang Wildlife Research Station to Huai Nam San, on trunk of an unidentified tree, 11 November 2008, Varaporn Sriprang—VC613, VC614, VC615, VC619, VC620, VC621, VC622, VC623, VC624, MS0144, MS0145 & MS0146(RAMK); ibid., Nam Chan Forest Ranger Station, on trunk of an unidentified tree, 28 July 2009, Chutamat Phraphuchamnong—CP767, SM79, SM82, SM83, SM85, VC895, VC899 & VC901(RAMK); ibid., the sideway to Lan Suriyan, on trunk of an unidentified tree, 25 June 2008, Varaporn Sriprang—VC453(RAMK); ibid., Huai Baeng Forest Ranger Station, on trunk of an unidentified tree, 24 June 2010, Varaporn Sriprang—VC965, VC966, VC968(RAMK); ibid., Huai Baeng Forest Ranger Station, on trunk of *Acacia farnesiana* (L.) Willd., 24 June 2010, Varaporn Sriprang—VC967(RAMK); ibid., Nam Tob Substation, on trunk of an unidentified tree, 23 June 2010, Varaporn Sriprang—VC969, VC970 & VC972(RAMK); ibid., Huai Lad, on trunk of an

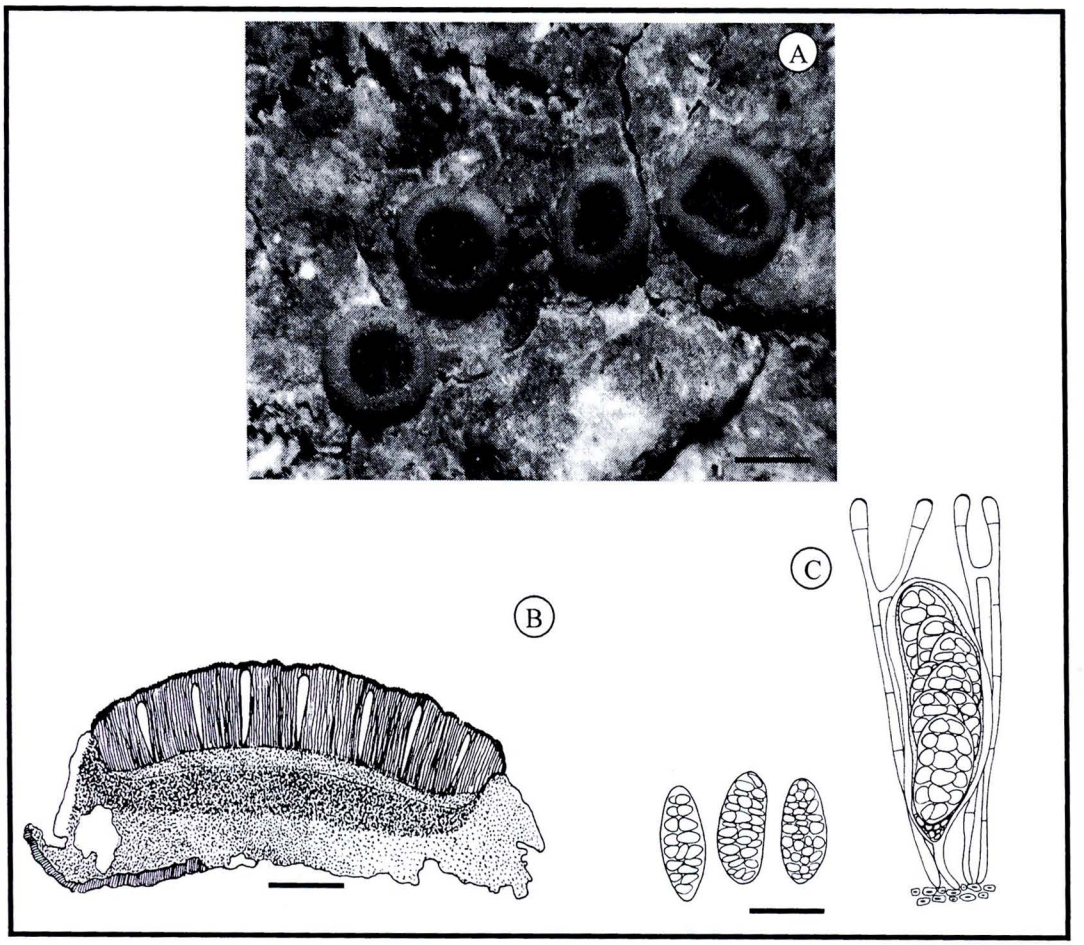


***Figure 59*** *Letrouitia transgressa* (Malme) Hafellner & Bellem.

*Note.* A = Apothecia biatorine, sessile, reddish brown to brown-black [VC829(RAMK)] (scale = 1 mm)

B = Illustration of vertical section of apothecia [VC829(RAMK)] (scale = 11.59 μm)

C = Illustration of ascus with paraphyses and ascospores [VC829(RAMK)] (scale = 10.03 μm)

unidentified tree, 30 July 2009, Varaporn Sriprang—VC920, VC921(RAMK).

Observation: *Letrouitia transgressa* is characterized by the reddish brown to brown-black apothecia with prominent reddish margins, and

submuriform ascospores.

3. ***Letrouitia vulpina*** (Tuck.) Hafellner & Bellem., *Nova Hedwigia* 35: 281 (1982) (Elix, 2009, p. 493).

*Lecidea vulpina* Tuck., *in* W.Nylander, *Ann. Sci. Nat., Bot.*, sér. 4, 19: 354 (1863).

(see Figure 60)

Thallus: corticolous, greenish to yellow-brown or pale orange, smooth, continuous to areolate, 100.0-180.0 µm thick; epruina; Soralia and Isidia absent; Prothallus not visible; Photobiont chlorococcoid; **Apothecia**: common, dispersed to crowded and entire, sessile; disc plane, red-orange to orange or rusty brown and yellow-orange to reddish orange at margin; epruina, 0.5-1.5 mm diam.; with biatorine (proper exciple); Parathecium: weakly differentiated, composed of thin walled; Epihymenium: red-brown, 4.5-7.0 µm thick, anthraquinone crystals, K+ purple; Hymenium: hyaline, 80.0-110.0 µm high; Subhymenium: indistinct; Hypothecium hyaline to yellow or pale brown, 15.0-25.9 µm high; Paraphyses: branched and anastomosing, apical not conspicuously swollen, 86.9-178.7 µm high; Asci: broadly clavate, *Letrouitia*-type, 15.0-30.0 µm high; **Ascospores**: 1 per ascus, hyaline, broadly ellipsoid, densely muriform, (18.3)21.5-35.6-53.2(63.0) × (15.5)15.6-16.3-17.2(17.5) µm; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus and apothecia P-, K+ purple, C-, KC-; containing unknown anthraquinone.

Habitats: occurring on barks in dry evergreen forests, lower montane scrub and lower montane rainforests at 360-1,468 m.

Distribution: North, Central and South America, Africa, Asia (Thailand), Papua New Guinea, Vanuatu, Australia (Northern Territory and north-eastern Queensland), New Caledonia, and Tonga.

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province. Phuluang Wildlife Research Station, on trunk of an unidentified tree, 11 November 2008, Varaporn Sriprang—VC616, VC617, VC618(RAMK); ibid., Num Tob Substation, on trunk of an unidentified tree, 23 July 2010, Varaporn Sriprang—VC971(RAMK); ibid., the sideway to Lan Suriyan, on trunk of an unidentified tree, 25 June 2008, Varaporn Sriprang—VC0453, VC0454, VC0455 & VC0456(RAMK).

Observation: *Letrouitia vulpina* is characterized by the red-orange to orange or rusty brown, and densely muriform ascospores.

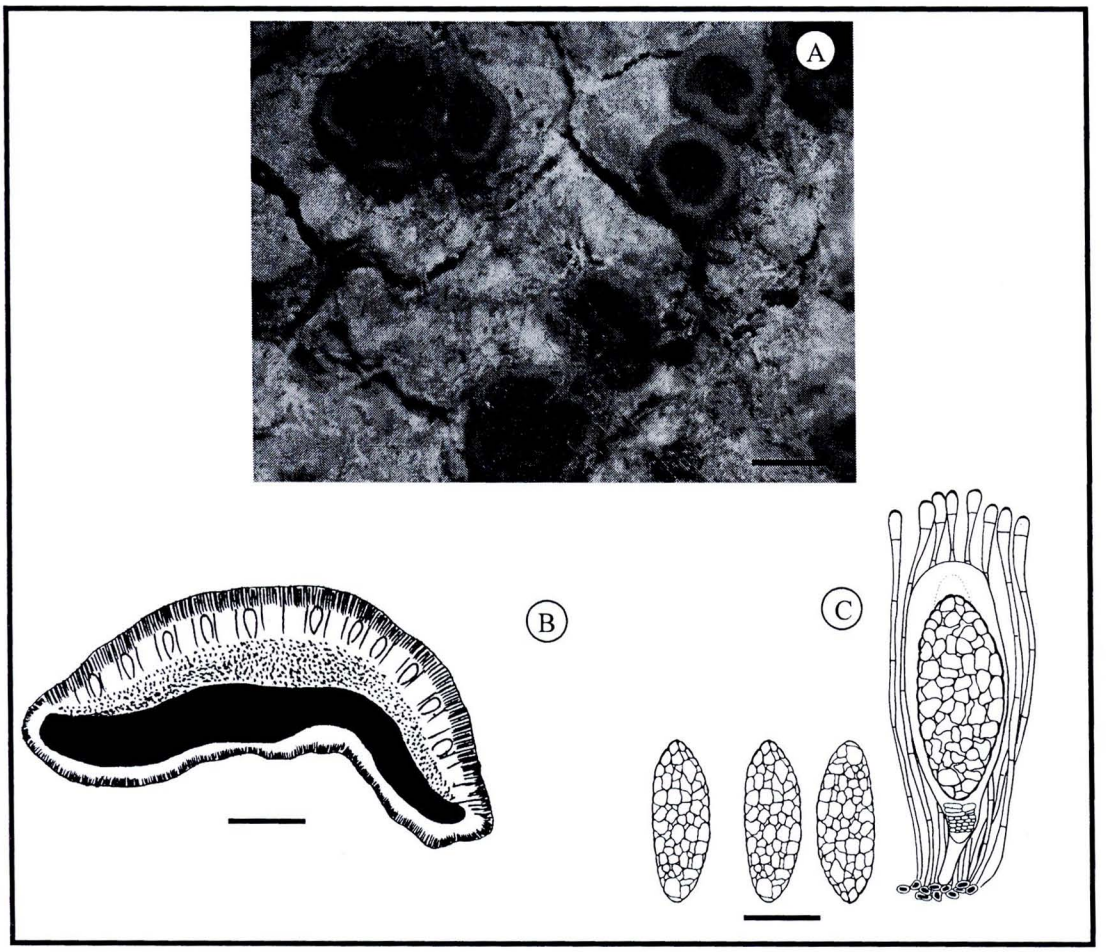


***Figure 60*** *Letrouitia vulpina* (Tuck.) Hafellner & Bellem.

*Note.* A = Apothecia biatorine, sessile, rusty brown [VC829(RAMK)] (scale = 1 mm)

B = Illustration of vertical section of apothecia [VC829(RAMK)] (scale = 11.29 μm)

C = Illustration of ascus with paraphyses and ascospores [VC829(RAMK)] (scale = 4.81 μm)