

CHAPTER 17

FAMILY TELOCHISTACEAE

Characteristics of the Family Telochistaceae

Thallus: corticolous, pale-yellow, orange-yellow to greenish-yellow or gray, smooth, rimose or verruculose, continuous or areolate, 110.9-270.5 mm thick; epruina; Soralia and Isidia absent or coralloid, laminal or globose; Prothallus not visible or black; Photobiont chlorococcoid; **Apothecia**: scattered and entire, immersed or adnate; disc plane or slightly convex, orange-yellow to brownish-orange or dark reddish orange and persistent, thalline margin, concolorous at margin; epruina, 0.1-1.5 mm diam.; with lecanorine (thalline exciple), paraplectenchymatic tissue; Parathecium: hyaline, consisting of radiating hyphae or cellular (paraplectenchymatous), 10.0-15.0 μm thick; Epihymenium: golden, 10.0-15.1 μm thick; Hymenium: hyaline, 60.0-100.0 μm high; Subhymenium: hyaline, 50.0-70.0 μm high; Hypothecium amorphous, 27.5-50.7 μm high; Paraphyses: unbranched or with few branched, apical cells not swollen or 2-3 apical cells slightly swollen, 40.0-55.3 μm high; Asci: cylindrical, *Teloschist*-type, 2.5-10.5 μm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, spore end wall thin, polarilocular, (10.2)10.3-12.8-15.4(16.3) $\times$ (5.1)5.2-6.7-8.6(8.9) μm ; **Pycnidia** and **Conidia** not observed.

Description of the Genus *Caloplaca*

Caloplaca Th. Fr., *Lich. Scand.* 1: 167 (1871) (Wetmore, 2007, p. 179).

Thallus: corticolous, pale-yellow, orange-yellow to greenish-yellow or gray, smooth, rimose or verruculose, continuous or areolate, 110.9-270.5 mm thick; epruina; Soralia and Isidia absent or coralloid, laminal or globose; Prothallus not visible or black; Photobiont chlorococcoid; **Apothecia**: scattered and entire, immersed or adnate; disc plane or slightly convex, orange-yellow to brownish-orange or dark reddish orange and persistent, thalline margin, concolorous at margin; epruina, 0.1-1.5 mm diam.; with lecanorine (thalline exciple), paraplectenchymatic tissue; Parathecium: hyaline, consisting of radiating hyphae or cellular (paraplectenchymatous), 10.0-15.0 μm thick; Epihymenium: golden, 10.0-15.1 μm thick; Hymenium: hyaline, 60.0-100.0 μm high; Subhymenium: hyaline, 50.0-70.0 μm high; Hypothecium amorphous, 27.5-50.7 μm high; Paraphyses: unbranched or with few branched, apical cells not swollen or 2-3 apical cells slightly swollen, 40.0-55.3 μm high; Asci: cylindrical, *Teloschist*-type, 2.5-10.5 μm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, spore end wall thin, polarilocular, (10.2)10.3-12.8-15.4(16.3) $\times$ (5.2)5.3-6.7-8.6(8.9) μm ; **Pycnidia** and **Conidia** not observed.

Chemistry: various anthraquinones.

Habitat: on bark and rock.

Distribution: Cosmopolitan, especially abundant in arid habitats.

Key to Species of Caloplaca

- 1a. Thallus saxicolous.....*Caloplaca testaceorufa*
- 1b. Thallus corticolous.....2
- 2a. Thallus with isidia.....3
- 2b. Thallus without isidia4
- 3a. Isidia granular, disc dark reddish orange.....
.....*Caloplaca* PL.1
- 3b. Isidia coralloid,, disc orange*Caloplaca bassiae*
- 4a. Disc dark reddish orange*Caloplaca* aff. *ferruginea*
- 4b. Disc orange-yellow to brownish-orange
..... *Caloplaca flavorubescens*

Description of the Species

1. *Caloplaca bassiae* (Ach.) Zahlbr., *Cat. Lich. Univ.* 7: 78 (1931)

(Kärnefelt, 1990, pp. 309-310).

(see Figure 62)

Thallus: corticolous, gray, smooth, continuous, 120.0-190.0 mm thick; epruina; Soralia absent, Isidia: coralloid, laminal; Prothallus not visible; Photobiont chlorococcoid; **Apothecia**: scattered and entire, adnate; disc plane, orange and persistent, thalline margin, concolorous at margin; epruina, 0.3-1.0 mm diam.; with lecanorine (thalline exciple), paraplectenchymatic tissue; Parathecium: hyaline, consisting of radiating hyphae, 10.0-15.0 µm thick;

Epihymenium: golden, 10.0-15.0 μm thick; Hymenium: hyaline, 80.0-100.0 μm high; Subhymenium: hyaline, 50.0-70.0 μm high; Hypothecium cellular (paraplectenchymatous), 29.5-45.5 μm high; Paraphyses: with frequently branched, apical cells not swollen, 40.0-47.9 μm high; Asci: cylindrical, *Teloschist*-type, 2.5-9.5 μm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, spore end wall thin, polarilocular, $(18.7)18.9\text{-}20.4\text{-}22.3(23.2) \times (10.3)10.6\text{-}11.6\text{-}12.0(12.7) \mu\text{m}$; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus P-, K-, C-, KC-; apothecial margin K+ purple, C-; containing parietin and unidentified anthraquinones.

Habitats: on barks in dry evergreen forests at 355 meter from sea level.

Distribution: Thailand, Mexico, and Sonoran (Baja California Sur).

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province.

Num Ki Substation, on trunk of an unidentified tree, 22 June 2010, Varaporn Sriprang—VC963(RAMK).

Observation: *Caloplaca bassiae* is characterized by the continuous, gray, smooth thallus with coralloid, laminal isidia, adnate, lecanorine apothecia with orange discs and 2-locular, ellipsoid ascospores.

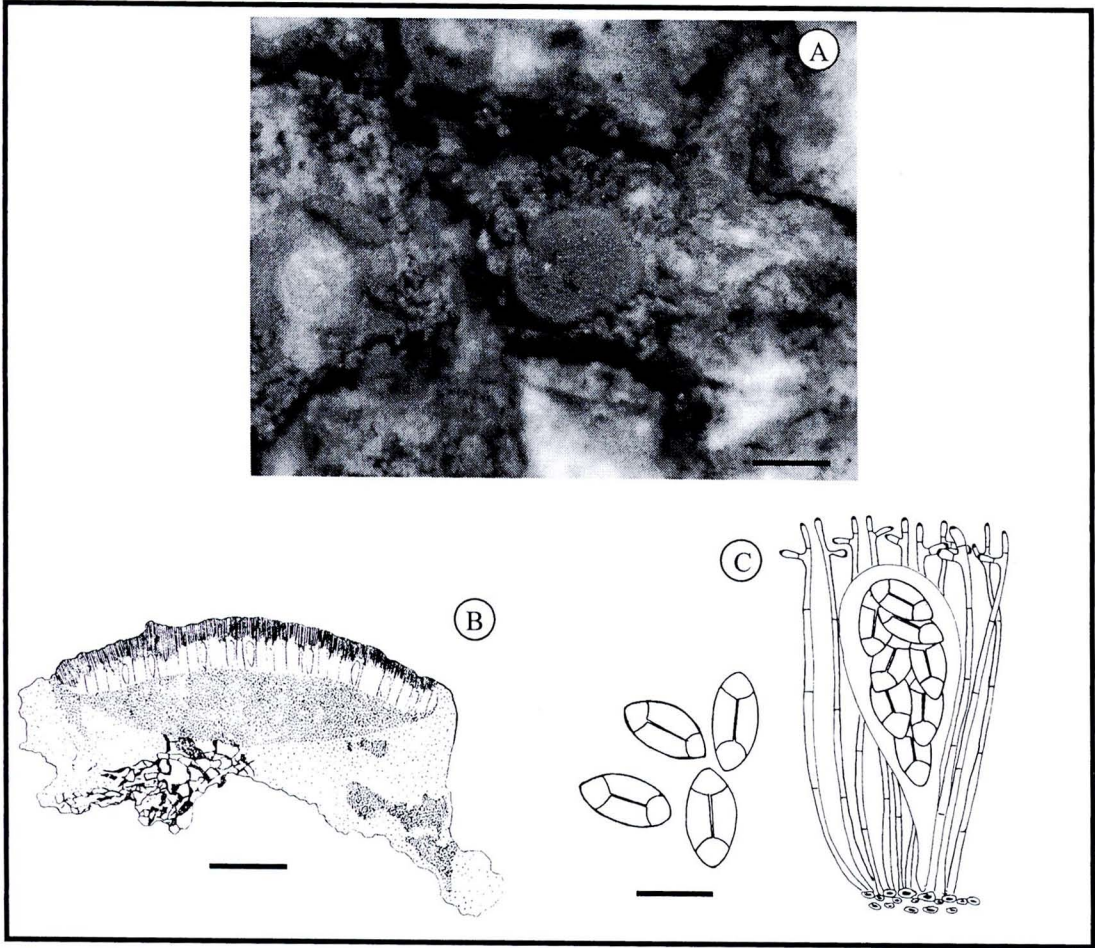


Figure 62 *Caloplaca bassiae* (Ach.) Zahlbr.

Note. A = Apothecia lecanorine, sessile, orange [VC963(RAMK)]

(scale = 0.83 mm)

B = Illustration of vertical section of apothecia [VC963(RAMK)]

(scale = 12.85 μ m)

C = Illustration of ascus with paraphyses and ascospores

[VC963(RAMK)] (scale = 14.8 μ m)

2. *Caloplaca aff. ferruginea* (Huds.) Th. Fr., *Nova Acta Reg. Soc. Sci.*

Ups. 3: 223(1861) (Wetmore, 2007, p. 198).

Lichen ferrugineus Huds., *Fl. Angl.*: 444 (1762).

(see Figure 63)

Thallus: corticolous, gray, smooth, areolate, 125.0-190.5 mm thick; epruina; Soralia and Isidia absent; Prothallus black; Photobiont chlorococcoid; **Apothecia**: scattered and entire, adnate; disc plane, dark reddish orange and persistent, proper margin, concolorous at margin; epruina, 0.3-.0.5 mm diam.; with lecideine (proper exciple), paraplectenchymatic tissue; Parathecium: hyaline, consisting of radiating hyphae, 10.0-15.0 µm thick; Epihymenium: golden, 10.0-14.5 µm thick; Hymenium: hyaline, 60.0-100.0 µm high; Subhymenium: hyaline, 50.0-70.0 µm high; Hypothecium amorphous, 29.5-35.5 µm high; Paraphyses: with some branching, 2-3 apical cells slightly swollen, 40.5-45.9 µm high; Asci: cylindrical, *Teloschist*-type, 2.5-8.9 µm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, spore end wall thin, polarilocular, (14.1)15.0-16.0-17.8(20.0) × (7.0)8.0-8.7-9.5(10.0) µm; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus P- , K-, C+ red, KC-; apothecial margin C+ red; containing parietin.

Habitats: on rocks in lower montane scrub at 1,507 m.

Distribution: Europe, N-America, Sonoran Desert, (Arizona, Baja California Sur, western Chihuahua, Sonora, and northern Sinaloa), and Thailand.

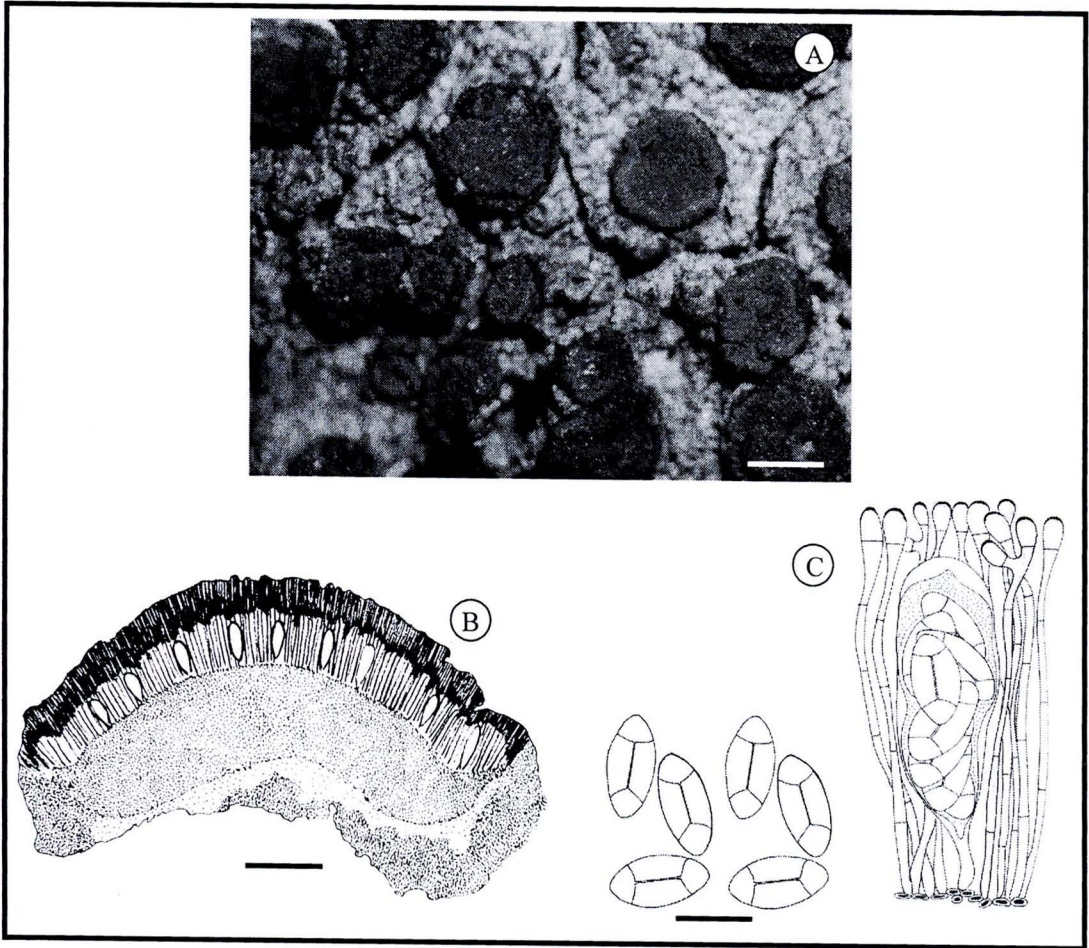


Figure 63 *Caloplaca* aff. *ferruginea* (Huds.) Th. Fr.

Note. A = Apothecia lecideine, sessile, reddish orange [VC786(RAMK)]
(scale = 0.5 mm)

B = Illustration of vertical section of apothecia [VC786(RAMK)]
(scale = 12.85 μ m)

C = Illustration of ascus with paraphyses and ascospores
[VC786(RAMK)] (scale = 11.76 μ m)

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province.

Seven Channal Station, on trunk of *Acacia farnesiana* (L.) Willd.,

13 November 2008, Varaporn Sriprang—VC786(RAMK).

Observation: *Caloplaca* aff. *ferruginea* is characterized by the smooth, areolate, gray, thallus, adnate, lecideine apothecia with dark reddish orange discs and 2-locular, ellipsoid ascospores.

3. *Caloplaca flavorubescens* (Huds.) J. R. Laundon, *Lichenologist* 8(2): 147 (1976) (Awasthi, 1991, pp. 88-89).

Caloplaca aurantiaca (Lightf.) Th. Fr.

(see Figure 64)

Thallus: corticolous, rimulose, pale-yellow, orange-yellow to greenish-yellow, smooth. soralia, isidia, phyllidia, or lobules absent. prothallus black.

Apothecia adnate, lecideine, 0.3-1.5 mm diam. disc orange-yellow to brownish-orange. margin persistent, proper margin, concolorous with disc. parathecium consisting of radiating hyphae, exciple below hypothecium amorphous. epihymenium golden, K+red. Hymenium hyaline 60-100 μm . paraphyses 2-3 tip cells slightly swollen, with some branching. subhymenium hyaline. Asci cylindrical 8 spored. **Ascospores** hyaline, 2 locules, ellipsoid, (12.8)12.9-16.5-20.5(21.3) x (6.1)6.25-7.3-8.6(8.4) μm . spore end wall thin.

Pycnidia not observed.

Chemistry: thallus P- , K-, C+ red, KC-; apothecial margin C+ red; containing parietin.

Habitats: on rocks in lower montane scrub at 1,507 m.

Distribution: Europe, N-America, Sonoran Desert (Arizona, Baja

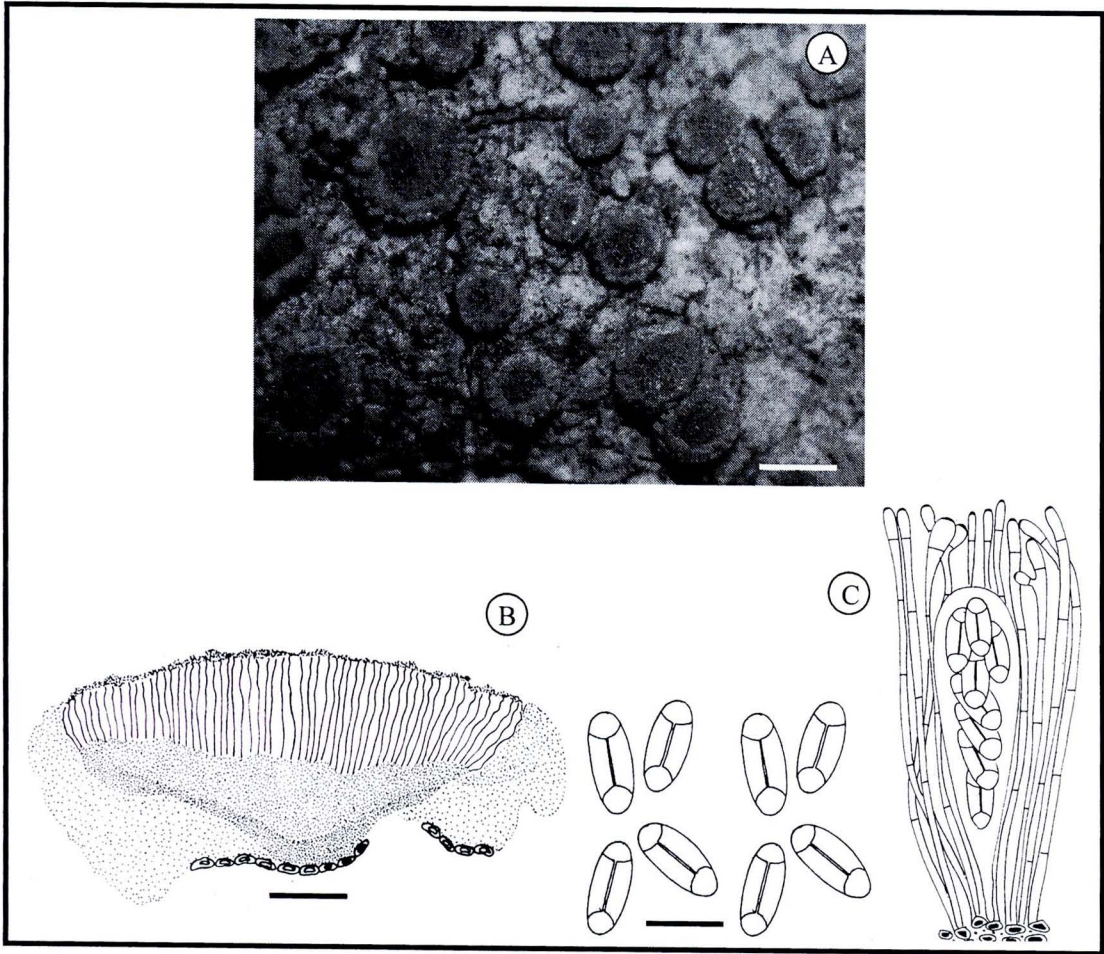


Figure 64 *Caloplaca flavorubescens* (Huds.) J. R. Laundon

Note. A = Apothecia lecideine, sessile, orange-yellow [VC787(RAMK)]
(scale = 1 mm)

B = Illustration of vertical section of apothecia [VC787(RAMK)]
(scale = 13.43 μm)

C = Illustration of ascus with paraphyses and ascospores
[VC787(RAMK)] (scale = 16.66 μm)

California Sur, western Chihuahua, Sonora, and northern Sinaloa), and
Thailand.

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province.

Seven Channal Station, on trunk of *Acacia farnesiana* (L.) Willd.,
13 November 2008, Varaporn Sriprang—VC723, VC747, VC781, VC782,
VC787, VC788, VC813(RAMK).

Observation: *Caloplaca flavorubescens* is characterized by the
rimulose, pale-yellow, orange-yellow to greenish-yellow thallus, adnate,
lecideine apothecia with orange-yellow to brownish-orange discs and
ascospores 2-locules, ellipsoid.

4. *Caloplaca testaceorufa* Vain., *Hedwigia* 46: 170 (1907).

Placodium testaceorufum Vain.

(see Figure 65)

Thallus: saxicolous, orange, smooth, areolate, 205.0-270.5 mm thick;
epruina; Soralia and Isidia absent; Prothallus not visible; Photobiont
chlorococcoid; **Apothecia**: scattered and entire, immersed; disc plane, orange
and disappearing, thalline present at margin; pruina, 0.1-0.4 mm diam.; with
lecanorine (thalline exciple), paraplectenchymatic tissue; Parathecium:
hyaline, cellular (paraplectenchymatous), 10.0-15.0 μm thick; Epihymenium:
golden, 10.0-15.0 μm thick; Hymenium: hyaline, 40.0-60.0 μm high;
Subhymenium: hyaline, 50.0-70.0 μm high; Hypothecium amorphous,
28.0-50.7 μm high; Paraphyses: unbranched or with few branched, not
swollen or 1-2 apical cells slightly swollen, 42.5-53.5 μm high; Asci:
cylindrical, *Teloschist*-type, 2.7-10.5 μm high; **Ascospores**: 8 per ascus,
hyaline, ellipsoid, spore end wall thin, polarilocular, (7.3)7.4-8.9-10.5(10.9)



× (3.2)3.6-4.3-5.1(5.4) μm ; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus P+ yellow, K+ red, C-, KC-; apothecial margin K+ red; containing parietin.

Habitats: on rocks in dry dipterocarp forests and lower montane scrub at 700-1,507 m.

Distribution: Thailand.

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province. Phu Khon Substation, on rocks, 21 May 2009, Chutamat Phraphuchamnong —RU010676, CP007, CP008, CP051(RAMK); *ibid.*, Pha Chang Phan, on rocks, 24 June 2008, Varaporn Sriprang —VC051, VC052, VC053, VC054, VC055(RAMK).

Observation: *Caloplaca testaceorufa* is characterized by the smooth, areolate, orange, thallus, immersed, lecanorine apothecia with orange discs and ellipsoid ascospores with 2-locules.

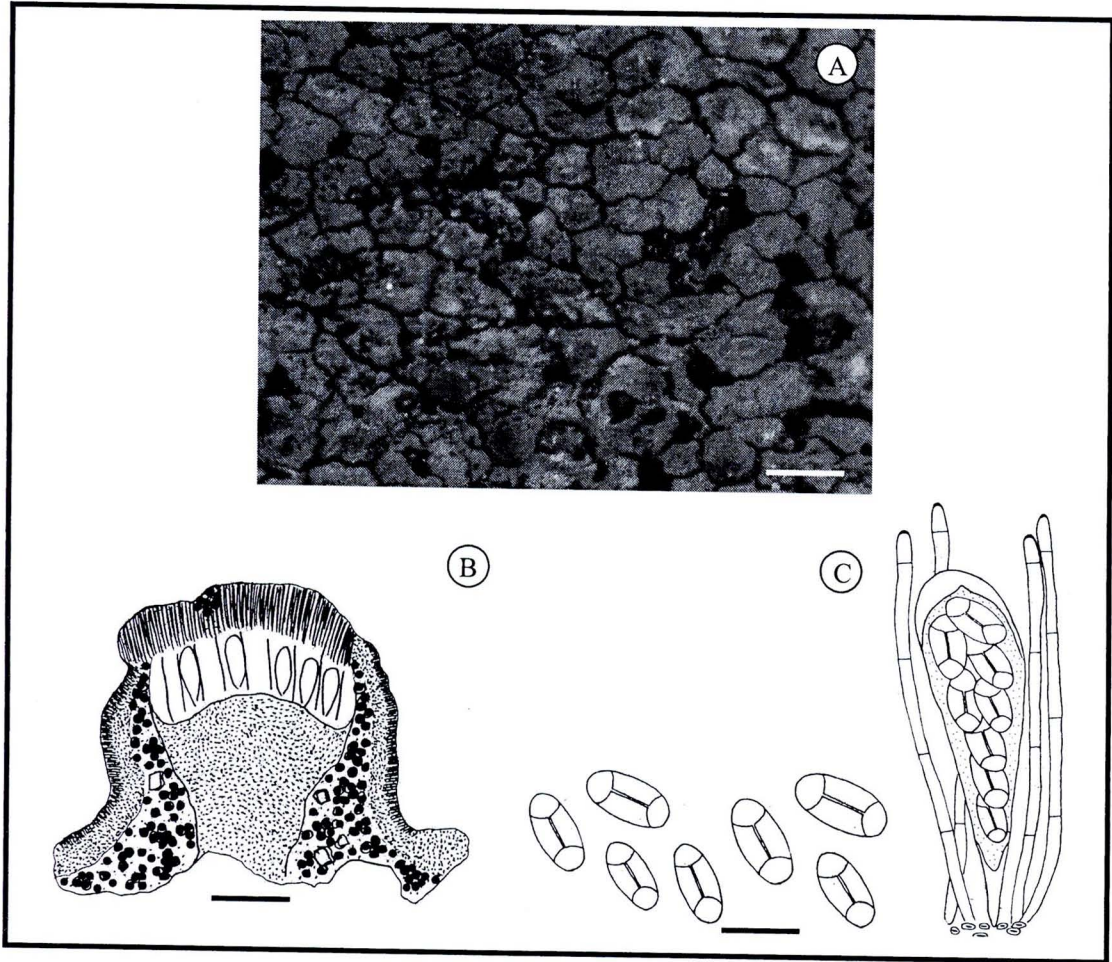


Figure 65 *Caloplaca testaceorufa* Vain.

Note. A = Apothecia lecanorine, immersed, orange [RU010676(RAMK)]
(scale = 1 mm)

B = Illustration of vertical section of apothecia [RU010676 (RAMK)]
(scale = 16.04 μm)

C = Illustration of ascus with paraphyses and ascospores
[RU010676 (RAMK)] (scale = 6.56 μm)

5. *Caloplaca* PL.1

(see Figure 66)

Thallus: corticolous, gray or blue-gray, verruculose, continuous, 128.9-169.3 mm thick; epruina; Soralia absent, Isidia globose; Prothallus not visible; Photobiont chlorococcoid; **Apothecia**: scattered and entire, adnate; disc plane or slightly convex, dark reddish orange and persistent, thalline margin, concolorous at margin; epruina, 0.4-0.8 mm diam.; with lecanorine (thalline exciple), paraplectenchymatic tissue; Parathecium: hyaline, consisting of radiating hyphae, 10.0-15.0 μm thick; Epihymenium: golden, 10.0-15.0 μm thick; Hymenium: hyaline, 60.0-65.0 μm high; Subhymenium: hyaline, 50.0-70.0 μm high; Hypothecium amorphous, 29.0-49.5 μm high; Paraphyses: with few branches, 1-2 apical cells slightly swollen, 45.9-55.3 μm high; Asci: cylindrical, *Teloschist*-type, 2.5-10.5 μm high; **Ascospores**: 8 per ascus, hyaline, ellipsoid, spore end wall thin, polarilocular, (10.2)10.3-12.8-15.3(16.4) $\times$ (5.2)5.3-6.7-8.6(8.9) μm ; **Pycnidia** and **Conidia** not observed.

Chemistry: thallus P- , K-, C-, KC-; apothecial margin K-, C-;
No lichen substance.

Habitats: on barks in lower montane rainforests and lower montane scrub at 923-1,485 meter from sea level.

Distribution: North America and Europe, widely distributed in Arizona, and Thailand.

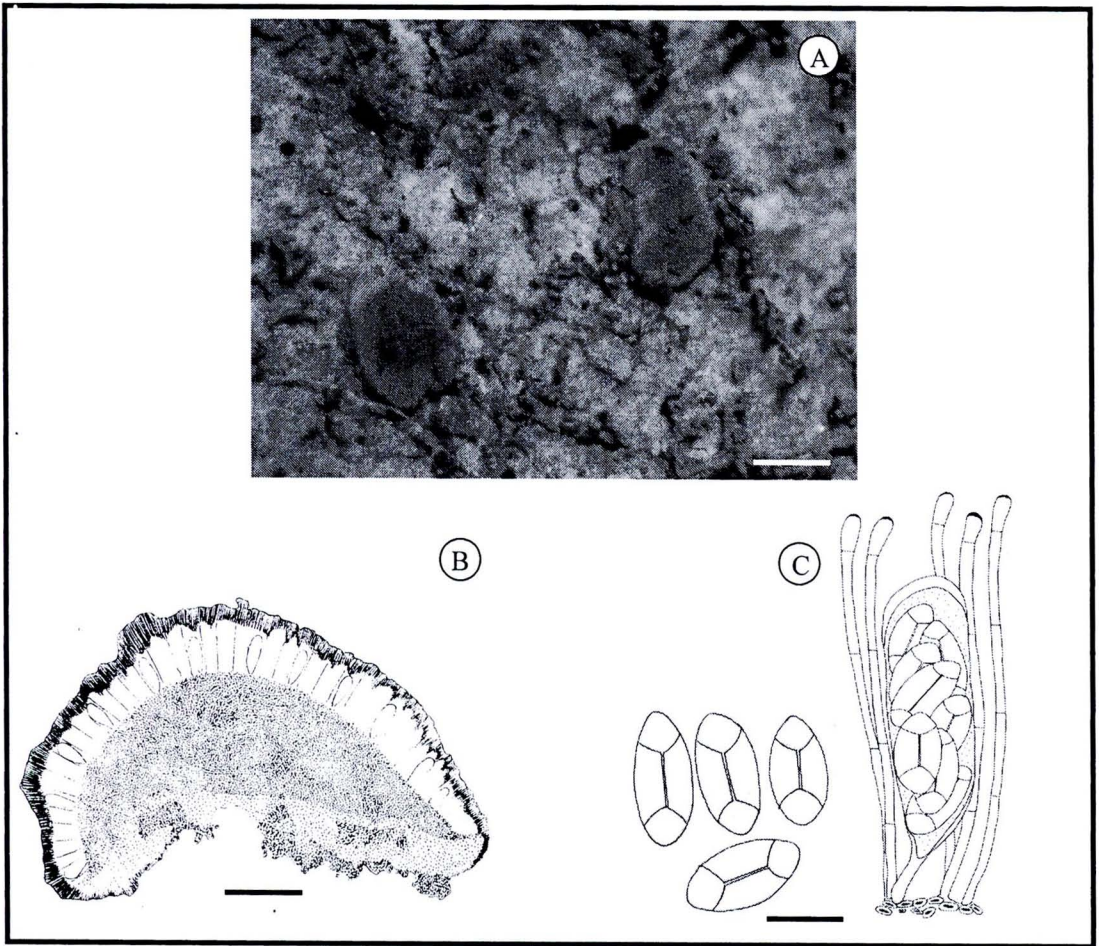


Figure 66 *Caloplaca* PL.1

Note. A = Apothecia lecanorine, sessile, dark reddish orange

[VC648(RAMK)] (scale = 1 mm)

B = Illustration of vertical section of apothecia [VC648(RAMK)]

(scale = 15.78 μ m)

C = Illustration of ascus with paraphyses and ascospores

[VC648(RAMK)] (scale = 10.26 μ m)

Specimens examined: Phu Luang Wildlife Sanctuary, Loei Province.

Phuluang Wildlife Research Station, on trunk of an unidentified tree,

12 November 2008, Varaporn Sriprang—VC646, VC647, VC648, VC689 &

VC049-5(RAMK); *ibid.*, around the Khok Nok Grabra Forest Protection Unit, on trunk of an unidentified tree, 13 November 2008, Varaporn Sriprang—VC742(RAMK).

Observation: *Caloplaca* PL.1 is characterized by the areolate, isidiate or lobulate thallus; isidia granular, gray or blue-gray, apothecia lecanorine, adnate, with dark reddish orange, flat or slightly convex disc, and 2-locular, ellipsoid ascospores.