

Thelidium Massal.
(VERRUCARIALES: VERRUCARIACEAE)

After various authors

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Thallus crustose, immersed or superficial, continuous or rimose-cracked, pale gray-green to dark brown, uniform, ecorticate; soralia rarely present. Perithecia simple (or compound according to Galloway), sessile on the thallus (or immersed in the substrate, forming pits in limestone, in many species sometimes treated under segregate genera), horny, carbonaceous; involucrellum present or absent; hymenium without algae, I+ red; paraphyses absent (deliquescent); periphyses present; asci clavate or inflated, unitunicate, thick walled, wall thickened above when young, I-, with small ocular chamber, lacking apical apparatus, discharge fissitunicate; spores 8, ellipsoid to ovoid or oblong-ellipsoid, transversely 1-3(-5)-septate, sometimes with 1-2 spurious longitudinal septa, often with a large oil droplet, hyaline (to brown according to Galloway), smooth, without a thick perispore. Photobiont chlorococcoid (Pleurococcus and others?). No substances by TLC; many species have a dark brown to greenish brown pigment in the exciple and involucrellum, which is \pm K-. On rock (limestone, sandstone, mica-schist, etc.) or rarely soil.

The genus is poorly known and understood. Species with both thallus and perithecia immersed in calcareous substrates can be extremely difficult to detect.

Polyblastia differs in the consistently submuriform to muriform ascospores, and Verrucaria has persistently simple ascospores.

1. On soil. Perithecia nearly immersed in either the thallus or the substratum with only the tip showing (or semi-immersed, according to ?); without separate involucrellum, to 0.2 mm wide, black; exciple dark above, slightly paler below, gelatin I-. Spores hyaline, simple to 1-septate (according to Thomson 1997; 3-septate according to ?), 16-25 x 7-8 μ m (according to Thomson 1997; 20-36 x 9-15 μ m according to ?). Thallus white-gray, thin or quite thin but warty-uneven. On soil in calcareous habitats. Arctic.T. velutinum (Bernh.) Körber

1. On rock.2

2. Perithecia \pm completely immersed, sometimes forming well-defined pits in limestone; involucrellum absent. (If paraphyses persistent see "Paraphysothele" viride).
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2. Perithecia \pm projecting, not forming pit; involucrellum often present.
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3. Spores 3-septate (to 5-septate, very rarely with 1 longitudinal septum). Thallus \pm immersed, forming a pale gray to dirty cream-colored stain, continuous or finely cracked, smooth and somewhat uneven. Perithecia 0.15-0.45 mm diam., almost completely immersed in pits, the apex separated from side of pit by a fine crack; exciple black; involucrellum absent; centrum rounded, 0.19-0.36 mm wide. Spores usually subcylindrical, (28-)33-48(-53) x (10-) 11.5-17(-

21.5) μm , (1-)3(-4)-septate, occasionally with 1(-2) longitudinal septa. On sun-exposed, weathered cracks in hard limestones. Canada. The relationships between this species and Polyblastia dermatodes, which has consistently submuriform spores, is in need of critical evaluation. T. incavatum Nyl. ex Mudd

3. Spores mostly 1-septate, rarely 3-septate. T. decipiens s. lato. 4

4. Perithecia 0.15-0.25 mm wide, entirely immersed or the apex \pm projecting. Thallus yellowish, brownish, whitish gray to bluish. Hymenium I+ red. Spores (15-)17-30(-35) \times 7-15 μm . Apex of perithecia 0.1-0.2 mm diam. Thallus very thin, semi-immersed, often finely punctate/spotted. Black prothallus often surrounding or dividing the areoles. Spores mostly 1-septate. On limestone. Arctic. See Thomson 1997 for fuller description. T. absconditum (Hepp) Rabenh.

4. Perithecia 0.25-0.5 mm diam. almost completely immersed in pits. Thallus gray-white. Hymenium I+ blue or blue then red. Spores (20.5-)25-38 \times (10-)13-16(-18) μm , 1-septate, often shrivelled. Perithecia immersed, when young only visible through minute openings, when fully developed whole pit visible; apex separated from side of pit by a fine crack. Involucrellum absent. Excipulum dark below, black, ca. 30 μm thick, thickened at apex. Centrum rounded, 0.22-0.46 mm wide; gel 0.3% I+ red (partly blue), 1% I-. Thallus immersed, light, usually grayish yellow, or pale grayish to pale brownish (similar in color to substratum), continuous or finely cracked, with even, smooth, usually powdery surface, with or without dark prothallus surrounding thallus. On limestone, marble or calcareous schist, on N-exposed vertical surfaces and weathered cracks montane regions. T. decipiens (Nyl.) Krempelh.

5. Mature spores mostly 3-septate. 6

5. Mature spores mostly 1-septate. 7

6. Perithecia 0.1-0.3 mm wide. Spores (23-)26-32(-36) \times (9-)12-14.5 μm , 3-septate, ovoid-ellipsoid. Thallus olive to gray-white, thin, minutely granular to areolate. Perithecium with the superficial portion depressed-subhemispherical, black. Involucrellum present. On rocks, Ohio and southern California. T. microbolum (Tuck. in Drummond) Hasse

6. Perithecia (0.2-)0.4-0.65(-0.75) mm diam. Spores (28-)31-55(-61) \times 13-21 μm . Thallus immersed and grayish, to superficial and gray-brown to light brown or medium brown (whitish according to Fröberg), often cracked. Perithecia forming conspicuous projections; ostiole often visible as a paler spot, often in a depression; involucrellum conspicuous, forming a thick cap, or reaching half-way down perithecium, rarely reaching almost to its base. Hymenial gel 0.3% I+ red. Spores 3(-4)-septate, occasionally with 1(-2) longitudinal septa. On limestone, mica-schist, calcareous sandstone, and on acidic rocks, often in damp situations, especially on steep slopes and vertical surfaces, mostly shaded. Variable in size of spores and thallus, and in degree of development of thallus. [If spores mostly 1-septate, see T. pyrenophorum]. T. papulare (Fr.) Arnold

7. Perithecia without separate involucrellum, mostly to 0.2 mm wide. 8

7. Perithecia with separate involucrellum. 10

8. Spores 8-11 x 5-8 μ m. Thallus \pm immersed, making pale yellow-gray spots on the substrate around the perithecia. Perithecia small, 0.2-0.3 mm broad, adnate on the substratum; exciple dark above, paler below; involucrellum black, covering exciple for the most part and slightly spreading below; gelatin I+ red; spores hyaline, ellipsoid, 1-septate. On calcareous rocks, arctic. T. microsporum Lynge

8. Spores over 11 μ m long. 9

9. Spores 11.5-17 x 7-10 μ m. Thallus gray, P+ orange. On seashore rocks. T. areolatum J. W. Thomson

9. Spores (15-)-17-21(-29) x 6-8(-12) μ m. Thallus superficial, pale gray-green, brown-gray, or dark brown (greenish when wet), occurring either as numerous small patches or \pm continuous and then often cracked, thin, 30-160 μ m thick, membranaceous, with poorly developed hypothallus. Perithecia (0.08-)-0.1-0.16(-0.25) mm diam., very prominent or to half-immersed in thallus, flattened-spherical, almost adnate, the base slightly immersed, the upper part bare; ostiole inconspicuous; involucrellum absent; excipulum pale below, brown dimidiate above. Asci saccate! hymenial gel I+ red. Spores 1-septate or sometimes partly simple. On limestone, chalk, sandstone, mica-schist and brick, often on pebbles and usually in shaded situations; rarely on soil. Arctic-Alpine. Alaska; Newfoundland. Variable. T. minutulum Körber

10. Perithecia 0.1-0.3 mm diameter. 11

10. Perithecia 0.3-1 mm diameter. 14

11. On \pm calcareous rock. 12

11. On siliceous rock, Washington. Perithecia 0.2-0.3 mm diam. 13

12. Spores 10-15 x 3-6 μ m. Thallus dirty brown-gray. Perithecia ca. 0.1 mm diam. Thallus thin, from powdery to somewhat chinky, sooty brown to gray. Perithecia hemispherical, in raised portions of the thallus; exciple pale; involucrellum black, at upper part of perithecium or extending downward halfway; gelatin I+ red; spores hyaline, ellipsoid or ovoid, sometimes with one end more pointed than the other, rarely simple, mainly 1-septate. On shaded limestones. Arctic. T. minimum (Massal. ex Körber) Arnold

12. Spores 22-26 x 6-10 μ m, Thallus greenish gray, thin to very indistinct. Perithecia hemispherical, projecting, not covered by thallus, to 0.2 mm diam.; involucrellum not reaching halfway down. Spores 2(-4)-celled. On weakly to strongly calcareous, mostly granular, rocks (sandy dolomite, calcareous sandstones, etc.). T. parvulum Arnold

13. Spores 19-21 x 8-10 μ m, hyaline. Thallus blackish, scurfy. T. sp. 1

13. Spores 15-18 x 7-8 μ m, \pm brownish. Thallus dark brown, smooth. T. (?) sp. 2

14. Thallus usually superficial, thin, gray-white to pale brownish gray, continuous or somewhat cracked. Perithecia (0.25-)0.4-0.65(-1.0) mm wide. Spores 18-29(-32) x (9-)12-14(-17) μ m, 1-septate (to 3-septate according to Fink). Perithecia semi-immersed to sessile, forming conspicuous projections, not covered by thallus; ostioles sometimes in a depression; involucrellum conspicuous, forming a well-developed apical cap, overarching up to half-way down perithecium, rarely almost to base. On limestone and mica-schist. Boreal to temperate, Alaska and southward, widely distributed over much of North America (Vermont to Florida, and Illinois and Iowa according to Fink). T. pyrenophorum (Ach.) Mudd

14. Thallus green, brown or black. On calcareous rock.15

15. Spores 16-22(-34) x 7-12(-14) μ m. Thallus dirty olive brown (olive-black when wet). Perithecia to 0.4 mm diam., hemispherical, projecting, only the base immersed; apex to 0.2 mm wide, \pm distinctly raised above thallus; involucrellum reaching to the middle or deeper. Spores 1-septate. Excipulum pale below. Thallus thin, somewhat rimose. On limestone.T. olivaceum (Schaerer) Körber

15. Spores (24-)30-40(-44) x 12-18 μ m. Thallus grayish to red-brown to nearly rust colored, superficial, diffuse, thin, almost membranaceous, continuous to finely chinky; upper cortex with a hyaline and a brown layer present. Perithecia adnate, hemispherical, 0.3-0.5 mm broad; involucrellum extending with a thick, black layer extending to the base or halfway down the perithecium, the margin spreading and thickening at the base; excipulum spherical, thin, entire; hymenial gel I+ red. Spores ellipsoid, hyaline, 1-septate, occasionally slightly curved. Otherwise rather similar to T. pyrenophorum. On \pm wet calcareous rocks. Arctic-alpine. Alaska; Greenland. T. aeneovinosum (Anzi) Arnold

ADD:

T. circumspersellum (Nyl.) Zschacke (Syn. Verrucaria circumspersella)

T. transsylvanicum Zsch.

Thallus a thin layer on the stone, ocher-yellow, without a black border, with globose cells in the hypothallus.

Perithecia immersed, only the tip projecting, 0.17-0.3 mm broad; exciple brown-black; involucrellum black, present at the upper part of the perithecium and spreading a short distance only; gelatin I+ red; spores hyaline, ellipsoid, 1-septate, one end smaller than the other, the center often narrowed, 32-42 x 14-23 μ m. Arctic.

several unknowns

1. Thallus epilithic, \pm continuous to areolate, greenish; ascomata globose, sessile, ca. 0.2 mm diam., wall brown-black; ascospores 2-celled, 20-23 x (8-)9-11(-13.5) μ m. On natural limestone and cement rubble, Florida. T. sp. (Harris 1995)

1. Thallus mostly endolithic, greenish?; ascomata immersed, subglobose, clypeate; exciple colorless; ascospores 2-celled, 17-20 x 7.5-8.5 μ m. Florida. T. sp. (Harris 1995)

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