

# Tropical Lichen Guides

## Graphidaceae Lichens of the World

Robert Lücking, Eimy Rivas Plata, Sittiporn Parmen, Klaus Kalb, Armin Mangold & H. Thorsten Lumbsch

Photos by Robert Lücking, Armin Mangold, Eimy Rivas Plata & Klaus Kalb. Production by R. Lücking, H. T. Lumbsch, T. Wachter, R. Foster, J. Philipp, with support from the National Science Foundation, Andrew Mellon Foundation, Ellen Hyndman Fund, and Connie Keller.

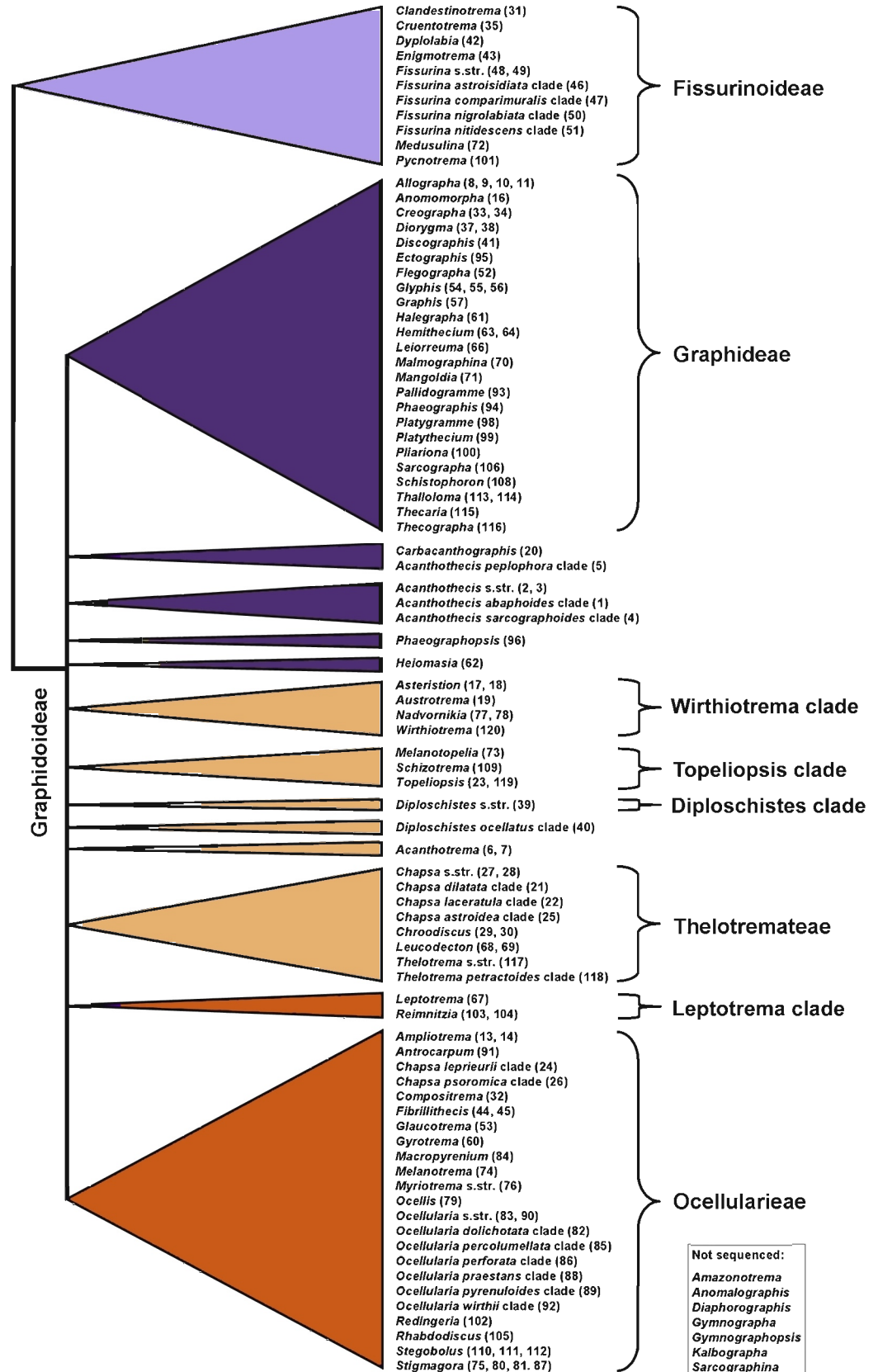
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Graphidaceae is the largest family of tropical lichens and, in its current circumscription, including the Thelotremataceae, Gomphillaceae, and Asterothyriaceae, possibly the largest family of lichenized fungi. Some 1800 species are currently accepted, 1500 of which belong to the core Graphidaceae (excluding subfamily Gomphilloideae). However, at the current rate of new species discoveries and considering the implementation of refined species concepts based on molecular evidence, it is predicted that the family actually comprises more than 2000 species in the core group alone.

Graphidaceae are characteristic elements of tropical forest ecosystems, being most diverse in lowland rain forests but also common in montane rain forest and extending into alpine vegetation, dry forest and thornbush, and Cerrado and savanna vegetation. Few species extend into temperate regions but several taxa are exclusive to these regions, such as the *Graphis scripta* complex. Graphidaceae are most commonly found on bark in shaded to exposed microsites, with each genus having its particular niche preferences. Most thelotremoid genera are excellent indicators of ecosystem health and can be used in standardized protocols to assess the conservation status of forest fragments in the tropics.

The current classification of Graphidaceae is very different from previous versions, distinguishing over 50 genera in the core group alone, whereas previous treatments recognized 12-14 genera. Growing evidence from molecular data continuously increases the number of clades recognized at the genus level, and the actual number of genera is predicted to be possibly close to 90. Some genera are now well-known and well-supported, but others such as *Chapsa*, *Fissurina*, and *Phaeographis*, require more studies to resolve their classification with confidence. A few genera have not yet been sequenced at all.



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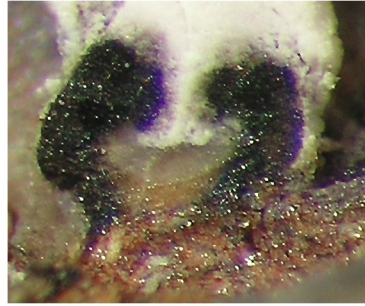
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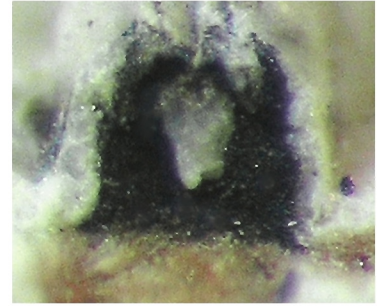
**Pseudostroma (not carbonized)**



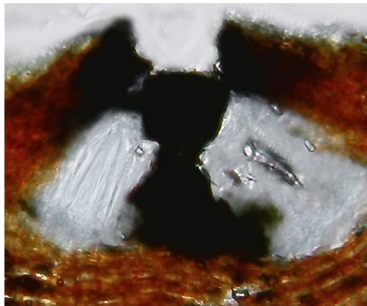
**Stroma (carbonized)**



**Excipulum laterally carbonized**



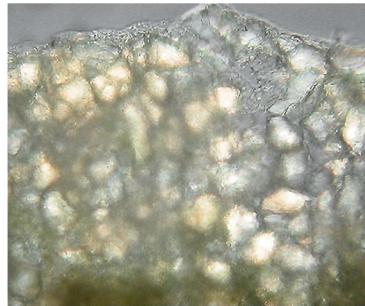
**Excipulum completely carbonized**



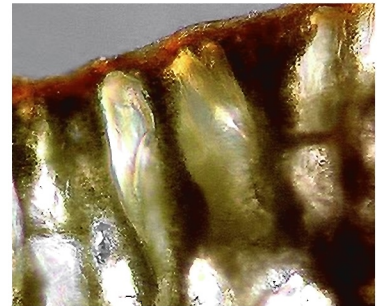
**Columella (carbonized)**



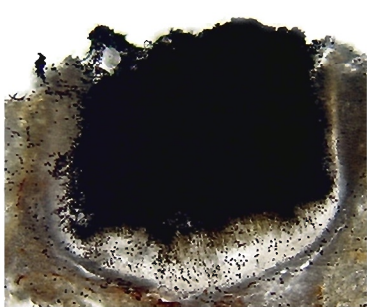
**Double margin (excipulum free)**



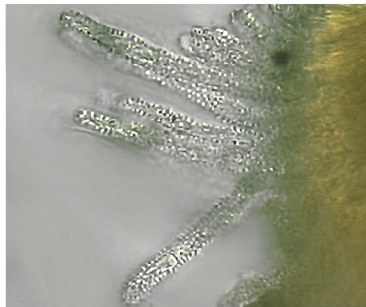
**Thallus crystals irregular**



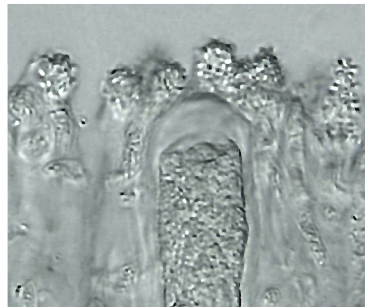
**Thallus crystals columnar**



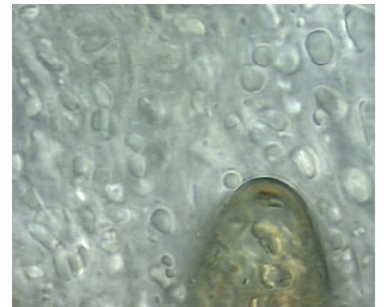
**Mazaedium**



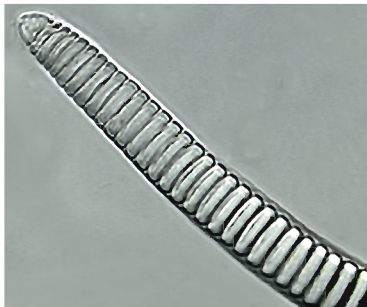
**Spinulose periphysoids**



**Spinulose paraphyses**



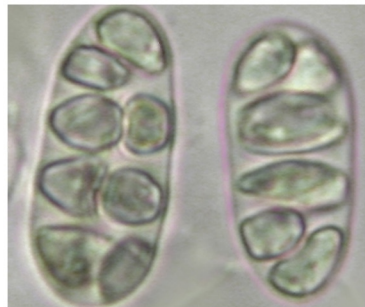
**Inspersed hymenium**



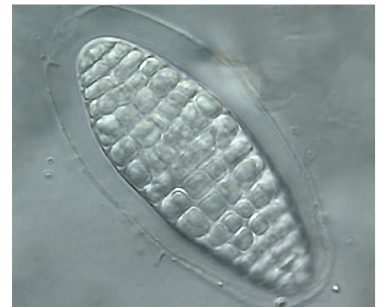
**Transversely septate, thin-walled**



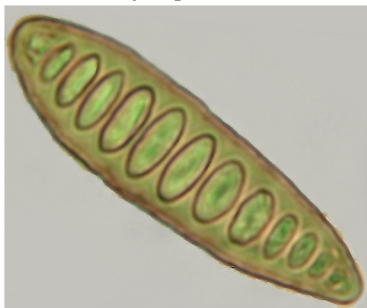
**Transversely septate, lenticular**



**Submuriform, astrothelioid**



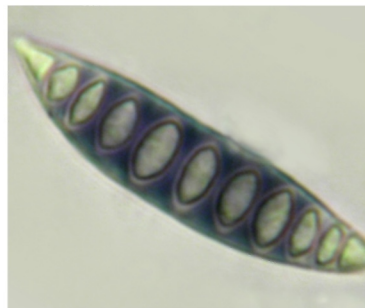
**Muriform, with halo**



**Transversely septate, brown**



**Muriform, brown**



**I+ blue-violet (amyloid)**



**I- (yellow iodine color in lumen)**

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1 *Acanthothecis abaphoides*



2 *Acanthothecis clavulifera*



3 *Acanthothecis sanguinoloba*



4 *Acanthothecis sarcographoides*



5 *Acanthothecis subclavulifera*



6 *Acanthotrema brasilianum*



7 *Acanthotrema brasilianum*



8 *Allographa adpressa*



9 *Allographa chrysoarpa*



10 *Allographa flavominiata*



11 *Allographa rhizocola*



12 *Amazonotrema nigrum*



13 *Ampliotrema amplius*



14 *Ampliotrema megalostoma*



15 *Anomalographis madeirensis*



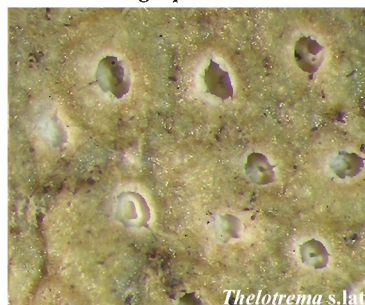
16 *Anomomorpha tuberculata*



17 *Asteristion leucophthalmum*



18 *Asteristion platycarpum*



19 *Austrotrema bicinctulum*



20 *Carbacanthographis marcescens*

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21 *Chapsa dilatata*



22 *Chapsa laceratula*



23 *Chapsa lamellifera*



24 *Chapsa leprieurii*



25 *Chapsa mastersonii*



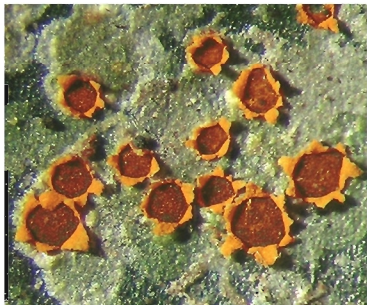
26 *Chapsa psoromica*



27 *Chapsa pulchra*



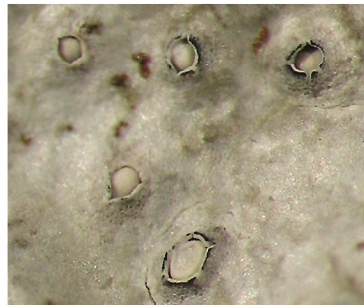
28 *Chapsa subilacina*



29 *Chroodiscus coccineus*



30 *Chroodiscus mirificus*



31 *Clandestinotrema stylothecium*



32 *Compositrema cerebriforme*



33 *Creographa haematites*



34 *Creographa intricans*



35 *Cruentotrema cruentatum*



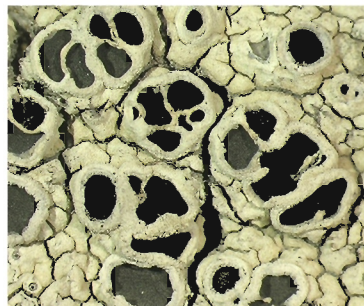
36 *Diaphorographis neocaledonica*



37 *Diorygma reniforme*



38 *Diorygma tibellii*



39 *Diploschistes cinereo-caesius*



40 *Diploschistes ocellatus*

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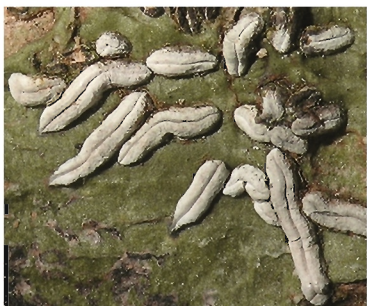
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41 *Discographis spondaica*



42 *Dyptolabia afzelii*



43 *Enigmatrema rubrum*



44 *Fibrillithecis argentea*



45 *Fibrillithecis confusa*



46 *Fissurina astroisidiata*



47 *Fissurina comparimuralis*



48 *Fissurina dumastii*



49 *Fissurina globulifica*



50 *Fissurina nigrolabiata*



51 *Fissurina nitidescens*



52 *Flegographa lepreurii*



53 *Glaucotrema glaucophaenum*



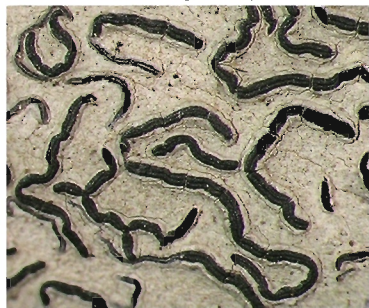
54 *Glyphis cicatricosa*



55 *Glyphis scyphulifera*



56 *Glyphis substriatula*



57 *Graphis intricata*



58 *Gymnographa eludens*



59 *Gymnographopsis chilena*



60 *Gyrotrema sinuosum*

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61 *Halegrapha intergrapha*



62 *Heiomasia sipmanii*



63 *Hemithecium chlorocarpum*



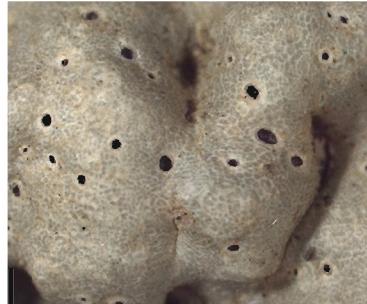
64 *Hemithecium implicatum*



65 *Kalbographa caracasana*



66 *Leiorreuma exaltatum*



67 *Leptotrema wightii*



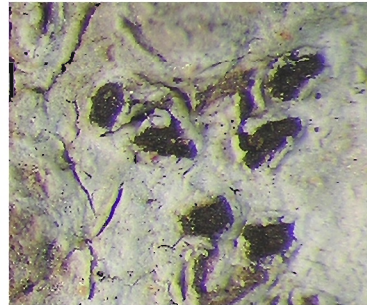
68 *Leucodecton bisporum*



69 *Leucodecton glaucescens*



70 *Malmographina plicosa*



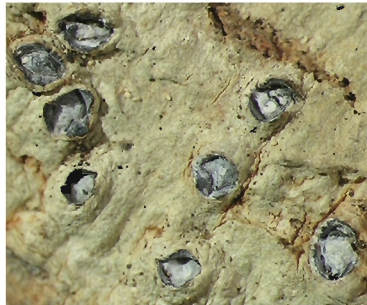
71 *Mangoldia australiana*



72 *Medusulina pseudostromatica*



73 *Melanotopelia rugosa*



74 *Melanotrema meiospermum*



75 *Myriotrema laeviusculum*



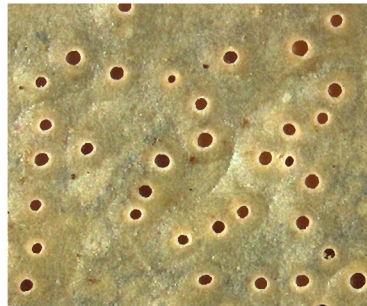
76 *Myriotrema olivaceum*



77 *Myriotrema peninsulae*



78 *Nadvornikia hawaiiensis*



79 *Ocellis alba*



80 *Ocellularia auberianoides*

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81 *Ocellularia bahiana*



82 *Ocellularia dolichotata*



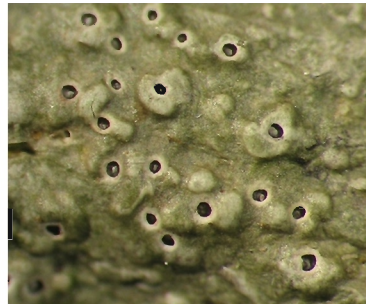
83 *Ocellularia gracilis*



84 *Ocellularia massalongoi*



85 *Ocellularia percolumellata*



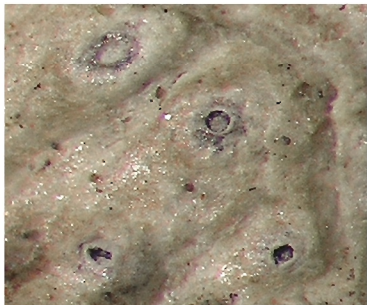
86 *Ocellularia perforata*



87 *Ocellularia permaculata*



88 *Ocellularia praestans*



89 *Ocellularia pyrenuloides*



90 *Ocellularia rhodostroma*



91 *Ocellularia subpraestans*



92 *Ocellularia wirthii*



93 *Pallidogramme chlorocarpoides*



94 *Phaeographis dendritica*



95 *Phaeographis sculpturata*



96 *Phaeographopsis neotropica*



97 *Platygramme impudica*



98 *Platygramme caesiopruinosa*



99 *Platythecium grammitis*



100 *Pliariona montagnei*

*Thecaria* s.lat.

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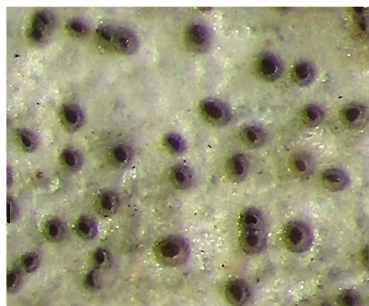
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101 *Pycnotrema pycnoporellum*



102 *Redingeria glaucoglyphica*



103 *Reimnitzia santensis*



104 *Reimnitzia santensis*



105 *Rhabdodiscus auberianus*



106 *Sarcographa heteroclita*



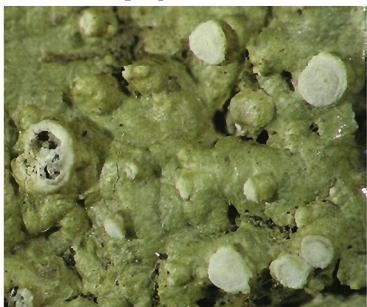
107 *Sarcographa cyclospora*



108 *Schistophoron tenue*



109 *Schizotrema schizoloma*



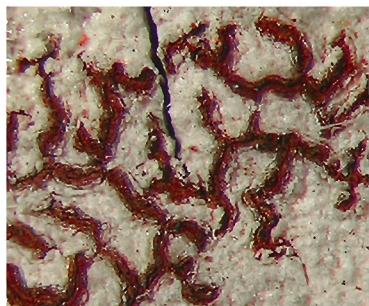
110 *Stegobolus berkeleyanus*



111 *Stegobolus radians*



112 *Stegobolus subwrightii*



113 *Thalloloma buriticum*



114 *Thalloloma hypoleptum*



115 *Thecaria quassicola*



116 *Thecographa prosiliens*



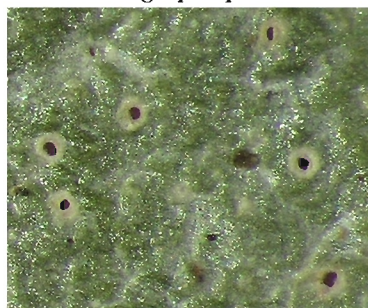
117 *Thelotrema lepadinum*



118 *Thelotrema petractoides*



119 *Topeliopsis muscigena*



120 *Wirthiotrema glaucopallens*