

## CALICIALES

### Natural Key

After Tibell (1984)

Rev. 2/94

1. **Thallus dactyliform, fruticose, or foliose.** .....2
1. **Thallus crustose.** .....3
  2. **Thallus dactyliform, very small.** .....Tholurna (dissimilis)
  2. **Thallus fruticose (to foliose), larger.** .....Sphaerophorus
3. **Spores spherical or subglobose.** .....4
3. **Spores ellipsoidal to cylindrical.** .....10
  4. **Spores hyaline (or yellowish?).** ..... 5
  4. **Spores pale to dark brown.** .....6
5. **Photobiont Stichococcus, "Protococcus", or Trentepohlia.** ..... Coniocybe
5. **Photobiont Trentepohlia.** .....Sclerophora
  6. **Ascocarps stalked.** .....7
  6. **Ascocarps sessile or immersed.** .....9
7. **Asci formed single or in chains; ascogenous hyphae with croziers.** .....8
7. **Asci formed in chains; ascogenous hyphae without croziers.** .....Chaenotheca (gracilentia)
  8. **Spores pale brown to medium brown.** .....Chaenotheca
  8. **Spores blackish brown.** .....Sphinctrina
9. **Ascocarps immersed.** .....Thelomma
9. **Ascocarps sessile.** (If photobiont Trentepohlia, apothecia with thick, pale corona-like exciple, exciple strongly developed at edge, and spores 1-septate, see Nadvornikia). .....Sphinctrina
  10. **Spores maturing within the asci; spore dispersal active; mazaedium not present.** .....11
  10. **Asci disintegrating early; spores maturing outside the asci; spore dispersal passive; mazaedium present.** .....15
11. **Ascocarps sessile. Often parasitic.** .....Chaenothecopsis
11. **Ascocarps stalked.** .....12
  12. **Spores non-septate or 1-septate.** .....13
  12. **Spores (partly) with more than two transverse septa.** .....Stenocybe
13. **Ascus apex uniformly thickened.** .....14
13. **Ascus apex unevenly thickened; a canal penetrating the ascus at least in semi-mature stages.** .....Chaenothecopsis
  14. **Spores less than 10 um long, simple, allantoid. Usually on wood.** .....Mycocalicium
  14. **Spores more than 10 um long, simple or 1-septate, with rounded ends. Usually on bark.** .....Phaeocalicium
15. **Ascocarps stalked.** .....16
15. **Ascocarps sessile.** .....19

16. Mazaedium pale brown to blackish brown. ....17
16. Mazaedium with an aeruginose (bluegreen) tinge. ....Microcalicium
17. Mazaedium blackish brown. ....18
17. Mazaedium pale brown to medium brown. ....Chaenotheca
18. Spores simple, the wall in semi-mature stages with gelatinous coat. Asci disintegrating at a rather late stage. Thallus usually absent, parasitic or commensalistic on lichens. ....Sphinctrina
18. Spores 1-septate, the wall without gelatinous coat. Asci dissolving at an early stage. Thallus verruculose-granular or immersed (usually not on other lichens). ....Calicium
19. Mazaedium blackish brown. ....20
19. Mazaedium with an aeruginose (blue-green) tinge. ....Microcalicium
20. Photobiont Trebouxia. ....21
20. Photobiont Trentepohlia or none. ....23
21. Spores less than 30 um long, without secondary wall of interwoven cells. ....22
21. Spores more than 30 um long, with secondary wall consisting of interwoven cells. On soil. ....Texasporium (sancti-jacobi)
22. Excipulum laterally reduced, forming a basal collar at the edge of the hypothecium, pale. ....Thelomma
22. Excipulum laterally usually well developed, forming a distinct raised rim, not reduced, blackish brown. ....Cyphelium
23. Spores 1-septate. ....Tylophoron (moderatum)
23. Spores more than 1-septate. ....24
24. Ascocarps differentiated into upper and lower parts. Spores 3(-5)-septate. Ascocarps perithecioid. ....Pyrgillus
24. Ascocarps not differentiated into upper and lower parts. Spores 2(-3)-septate. ....Heterocyphelium (leucampyx)

ADD (Cross-Reference):

(THELOTREMATACEAE): Nadvornikia

## Artificial Keys to Crustose Caliciales

### I. Ascocarps stalked.

1. On rock or lichens over rock, or on soil. .... 2
1. On bark or wood or lichens over those substrates. .... 5
  2. Thallus well developed,  $\pm$  bright yellow-green, leprose, C-, without xanthones. .... 3
  2. Thallus immersed (if parasitic on yellowish lichens, then host lichen sometimes sorediate but not leprose, and C+ orange, containing xanthones). .... 4
3. Spores ellipsoid, 12-16 x 4-6  $\mu$ m. Apothecia  $\pm$  sessile or short-stalked, 0.2-1 mm high, black, slightly pruinose on lower part of exciple. Thallus containing rhizocarpic and ?usnic acids). On siliceous rock underhangs in very humid habitats; parasitic? on Lepraria spp. Canada. .... Calicium corynellum
3. Spores 2-3  $\mu$ m, globose. Apothecia on slender stalk, 1.6-2.7 mm tall; head and stalk covered by a yellowish green pruina, black beneath. Thallus containing vulpinic acid, pulvinic acid and pulvinic acid dilactone. On soil or on roots, on surfaces protected from precipitation, in shaded humid crevices among tree roots and in rock underhangs, on soil banks sheltered by overhanging roots, or on upturned bases of large old coniferous trees in moist forests. Not parasitic. .... (Chaenotheca furfuracea)
  4. Mazaedium with an aeruginose (bluegreen) tinge. Saprobic or parasitic. .... Microcalicium
  4. Mazaedium not aeruginose. Parasitic, often on yellowish, C+ orange lichens. .... Sphinctrina
5. Spores spherical or subglobose. .... 6
5. Spores ellipsoidal to cylindrical. .... 10
  6. Spores hyaline (or yellowish?). .... see Sclerophora and Coniocybe
  6. Spores pale to dark brown. .... 8
7. Spores blackish brown. .... Sphinctrina
7. Spores pale brown to medium brown. .... (see Chaenotheca and Cybebe)
  8. Mazaedium not present (surface of apothecium smooth). .... 9
  8. Mazaedium present (surface of apothecium powdery, the powder rubbing off). .... 12
9. Spores more than 10  $\mu$ m long. .... 10
9. Spores less than 10  $\mu$ m long. .... 11
  10. Spores simple or 1-septate, with rounded ends. .... Phaeocalicium
  10. Spores with more than two transverse septa. .... Stenocybe
11. Spores forming a dry mass; hamathecium of paraphyses. Ascus apex uniformly thickened, without canal. Stalk dark brown to blue-green. Exciple  $\pm$  well-developed, pseudoparenchymatous or radiating. Saprobic, without algae and not parasitic. Spores allantoid, simple. .... Mycocalicium
11. Spores not forming a dry mass; no hamathecium. Ascus apex unevenly thickened; a canal penetrating the ascus at least in semi-mature stages. Stalk pale inside. Exciple poorly developed, of periclinal or interwoven hyphae. Often with photobiont, or parasitic. Spores ellipsoid to oblong-or fusiform-ellipsoid, simple or 1-septate. .... Chaenothecopsis
12. Mazaedium pale brown to blackish brown. .... 13

12. Mazaedium with an aeruginose (bluegreen) tinge. ....Microcali-  
cium
13. Mazaedium blackish brown. ....14
13. Mazaedium pale brown to medium brown. ...Chaenotheca
14. Spores 1-septate, the wall in semi-mature stages with gelatinous  
coat. ....Sphinctrina
14. Spores simple, the wall without gelatinous coat. ....Calicium

## II. Ascocarps sessile or immersed.

1. On bark, wood, rock, or other lichens. .... 2
1. On soil. Spores more than 30 um long, with secondary wall consisting of interwoven cells. Photobiont Trebouxia. Mazaedium present. .... Texasporium (sancti-jacobi)
  2. On rock or lichens on rock. .... 3
  2. On bark or wood or lichens on those substrates. .... 5
3. Spores spherical or subglobose. Mazaedium blackish brown. Mostly western. .... 4
3. Spores ellipsoidal to cylindrical. Mazaedium with an aeruginose tinge. Apothecial sessile. Inland areas. .... Microcalicium
  4. Apothecia sessile. .... Sphinctrina
  4. Apothecia immersed. .... see Thelomma and Cyphelium
5. Spores spherical or subglobose, pale to dark brown. .... 5
5. Spores ellipsoidal to cylindrical. .... 6
  6. Ascocarps immersed. Spores more than 10 um diameter, 8 per ascus. .... Thelomma
  6. Ascocarps sessile. .... Sphinctrina
7. Mazaedium not present. Ascocarps sessile, apothecioid, with blackish brown, convex disc. Often parasitic on other lichens. Spores 5-10 x 2-4 um. .... Chaenothecopsis
7. Mazaedium present. .... 7
  8. Mazaedium blackish brown. .... 9
  8. Mazaedium with an aeruginose tinge. ... Microcalicium
9. Photobiont Trebouxia. .... see Thelomma and Cyphelium
9. Photobiont Trentepohlia or none. Spores less than 30 um long, without secondary wall of interwoven cells. .... see Tylophoron, Pyrgillus, and Heterocyphelium