

Lichenicolous hyphomycete genera

Paul Diederich

Musée national d'histoire naturelle, 25 rue Munster, L-2160 Luxembourg.

paul.diederich@education.lu

Lichen thalli are hosts to a series of genera and species of hyphomycetes that are not found elsewhere. We have included references only to figures of species known to occur on lichens. These fungi are morphologically and phylogenetically diverse and their illustrations are scattered in the plates. We have not referred to illustrations for some genera that are not exclusively lichenicolous, where the lichenicolous species might be morphologically different from the illustrated species.

1. Colonies producing sterile bulbils or sclerotia; clamp connections often present 2
1. Colonies without bulbils or sclerotia; clamps absent 4
2. Sclerotia brownish, frequently > 500 µm diam, often associated with superficial white mycelium or thin, resupinate, basidioma; on bark-inhabiting lichens and algae sclerotial anamorph of *Athelia arachnoidea*
2. Sclerotia pinkish, 1–3 mm diam, on ground-inhabiting thalli of *Stereocaulon* or *Cladonia* sclerotial anamorph of *Leucogyrophana lichenicola*
2. Producing whitish, yellowish, orange or reddish bulbils < 250 µm diam 3
3. Bulbils orange (carrot-red), without hairs, 50–150 µm diam bulbilliferous anamorph of *Marchandiobasidium aurantiacum*
3. Bulbils pastel to coral-red, without hairs, either 30–50 µm or 100–200 µm diam *Marchandiomyces* (380B)
3. Bulbils yellow to ochraceous or orange or honey-coloured, without hairs, 60–110 µm diam *Burgella*
3. Bulbils whitish, without hairs, surface uneven, often slightly to distinctly angular, 100–250 × 80–160 µm diam *Burgoa*
3. Bulbils pale coloured, entirely covered by radially oriented ‘hairs’ with a ± pointed apex and a relatively broad, swollen base, 60–80 µm diam *Minimedusa*
4. Conidiogenous apparatus aspergilloid, white, ca 200 µm diam, with an elongate, unicellular, hyaline stalk, 1–1.5 mm tall, 30–50 µm wide; conidia hyaline, aseptate, ellipsoidal *Gliocephalis*
4. Conidiogenous apparatus ± aspergilloid, blackish, 20–40 µm diam, on an elongate, 1–5-celled, red-brown stalk, 15–25(–45) µm tall, 3–3.5(–4.5) µm wide; conidia greyish brown, (0–)1-septate, elongate *Calongia*
4. Conidiophores not aspergilloid 5
5. Producing synnematous conidiomata; conidia pale to dark brown or greenish, aseptate 6
5. Conidiophores not in synnemata; conidia hyaline or brown 7
6. Conidia pale brown, smooth-walled, single, produced in slime; conidiogenous cells percurrent *Graphium*
6. Conidia greenish, in basipetal chains, truncate at both ends; conidiogenous cells phialidic *Arborillus* (89D)
6. Conidia dark brown to black, rough-walled, single, dry; conidiogenous cells percurrent *Leightoniomyces* (89B)
7. On leaf-inhabiting lichens 8
7. Not on leaf-inhabiting lichens 14
8. Conidiomata sporodochial; conidia aseptate; conidiogenous cells phialidic or percurrent 9
8. Conidiophores single; conidia aseptate to phragmoseptate or dictyoseptate, brown to dark brown; conidiogenous cells not phialidic or percurrent 10
9. Conidia tetraradiate, arms with filiform extensions, pale olivaceous; conidiogenous cells percurrent *Choreospora* (339C)
9. Conidia ellipsoidal, hyaline; conidiogenous cells phialidic *Lambinonia* (72D)
10. Conidia in acropetal chains, 0–3-septate, cells concolorous *Ampullifera* (132B)
10. Conidia single, phragmoseptate or dictyoseptate, apical cell often elongate and paler 11

11. Conidiophores reduced to integrated, intercalary conidiogenous cells in prostrate assimilative hyphae	12
11. Conidiophores or conidiogenous cells differentiated, arising vertically from repent hyphae	13
12. Conidia dictyoseptate, rostrate; hyphopodia with apical appendage often present	<i>Dictyophrynella</i> (236C)
12. Conidia phragmoseptate, rostrate; hyphopodia absent	<i>Sessiliospora</i> (236A)
13. Conidiogenous cells percurrent; conidia tetraradiate; hyphopodia absent	<i>Teratosperma</i> (348B)
13. Conidiogenous cells not percurrent; conidia dictyoseptate; rounded hyphopodia often present	<i>Hansfordiellopsis</i> (286D)
14. (7) Conidia cheiroid, hyaline or pale brown	<i>Psammina</i> (363D)
14. Conidia not cheiroid	15
15. Conidia pale to dark brown	16
15. Conidia hyaline	40
16. Conidiophores tightly aggregated in sporodochial or stromatic conidiomata	17
16. Conidiophores scattered or loosely grouped	32
17. Conidia aseptate, irregularly lobed, the outer wall becoming unevenly thickened and darker ..	<i>Milospium</i> (32A)
17. Conidia septate or not, not lobed, most species with uniformly thickened cell wall	18
18. Conidia multicellular or dictyoseptate, with > 3 cells	19
18. Conidia 0–1-septate, rarely minimally dictyoseptate, with 3 cells	22
19. Conidia botryose, bulbilloid, composed of globose cells constricted at septa, released at maturity by irregular fracture in the upper conidiomatal layer; conidiomata stromatic	<i>Phaeosporobolus</i> (296A)
19. Conidia and conidiogenesis not as above	20
20. Conidia in chains; conidiogenous cells integrated, hardly distinct from conidia	<i>Sclerococcum</i> (296B)
20. Conidia single; conidiogenous cells distinct	21
21. Conidia warty, subglobose or pyriform, dark golden-brown, often with pale stalk cell	<i>Epicoccum</i> (274A)
21. Conidia smooth, ellipsoidal or clavate, brown, stalk cell absent	<i>Berkleasmium</i> (298C)
22. Conidiophores loosely aggregated, sometimes resembling sporodochia, usually erect and straight, branched or unbranched; conidiogenous cells monoblastic, integrated, terminal; conidia usually in chains, in most lichenicolous species 0–1(–2)-septate	<i>Taeniolella</i> (5B)
22. Conidiophores in compact sporodochial conidiomata; conidiogenesis not as above	23
23. Conidiogenous cells integrated, intercalary, phialidic, with sessile collarettes; conidia pale brown, aseptate, smooth, with irregularly formed central paler zone	<i>Fenestroconidia</i> (79B)
23. Conidiogenous cells and conidia not as above	24
24. Conidia in basipetal chains, 1-septate, septum thick and dark at maturity	<i>Nigromacula</i> (153C)
24. Conidia not as above	25
25. Conidiomata pycnidial, with irregular wide opening and colourless wall, easily mistaken for sporodochia; conidiogenous cells indistinct; conidia dark brown, rounded to cylindrical or polyhedral	<i>Coniambigua</i> <small>See Flechten Follmann, Contributions to Lichenology in Honour of Gerhard Follmann, Cologne, p. 208, 1995.</small>
25. Conidiomata and conidia not as above; conidiogenous cells usually distinct	26
26. Conidiomata with a well-defined (excipulum-like) margin; conidiogenous cells percurrent; conidia mostly 1-septate, smooth, base truncate	<i>Minutoexcipula</i> (180B)
26. Conidiomata without a discrete, well-defined margin	27
27. Conidiogenous cells elongate; conidia coarsely warty, single	28
27. Conidiogenous cells short, or conidia smooth to finely roughened; conidia in chains or single	29

28. Conidiogenous cells percurrent, wall warty, scaly, mono- to polyblastic; conidia subglobose, aseptate, base truncate	<i>Clauzadeomyces</i> (67C)
28. Conidiogenous cells sympodial, smooth or unevenly warty; conidia mainly ellipsoidal and 1-septate, rarely aseptate or minimally dictyoseptate (3 cells), base not distinctly truncate	<i>Deichmannia</i> (272A)
29. Conidia single, smooth-walled, truncate at base	<i>Feltgeniomycetes</i> (67B)
29. Conidia in chains, base truncate or rounded	30
30. Conidia coarsely warty, 0(–1)-septate, in branching acropetal chains	<i>Spilodochium</i> (181D)
30. Conidia smooth or finely roughened	31
31. Conidia 0(–1)-septate, base truncate	<i>Zevadia</i>
31. Conidia 0–dictyoseptate, cells globose, constricted at septa, base not distinctly truncate ..	<i>Sclerococcum</i> (296B)
32. (16) Conidia dictyoseptate, ellipsoidal, single	<i>Monodictys</i> (277C)
32. Conidia aseptate or phragmoseptate, rarely dictyoseptate, but then either with few cells, or elongate with few longitudinal septa	33
33. Conidiophores short, 1–3-celled; conidia formed singly	34
33. Conidiophores elongate, multiseptate; conidia formed singly or in chains	35
34. Conidiogenous cells phialidic, with distinct collarettes; conidia aseptate	<i>Xanthoriicola</i> (67D)
34. Conidiogenous cells percurrent, globose, cupulate with flared collarette-like extensions; conidia 1-euseptate	<i>Codonmyces</i> (181A)
34. Conidiogenous cells percurrent, more or less cylindrical, with collarettes; conidia 0–1-distoseptate	‘ <i>Sporidesmiella</i> ’ <i>lichenophila</i>
35. Conidiophores little differentiated	36
35. Conidiophores well-differentiated, with well-differentiated conidiogenous loci	38
36. Conidia in basipetal chains, smooth-walled, 0–1-phragmoseptate or dictyoseptate with up to 4 cells; conidiophores immersed in host hymenium or thallus, pale brown, smooth-walled	<i>Intralichen</i> (177A)
36. Conidia in basipetal chains, often warty, 1-phragmoseptate or rarely dictyoseptate, and then elongate with often more than 4 cells; conidiophores partly immersed or more often superficial, medium brown, smooth or more often warty	<i>Trimmatostroma</i>
36. Conidia in acropetal chains, smooth to warty, 0–1-phragmoseptate	37
37. Conidia branched	<i>Taeniolina</i>
37. Conidia unbranched, 0–1(–rarely more)-septate, in persistent chains in most species	<i>Taeniolella</i> (5B)
	Including <i>Cladosporium arthoniae</i> and <i>Talpapellis peltigerae</i>
38. Conidiogenous cells sympodial; conidiogenous loci difficult to see; conidiophores and conidia smooth or slightly warty; conidia 1–3-euseptate, solitary	<i>Pseudocercospora</i>
38. Conidiogenous cells sympodial; conidiogenous loci conspicuous; conidiophores and conidia smooth; conidia aseptate, solitary	<i>Ramichloridium</i>
38. Conidiogenous cells sympodial; conidiogenous loci conspicuous; conidiophores and conidia smooth or slightly warty; conidia 1–3-euseptate, solitary	<i>Pseudospiropes</i>
38. Conidiogenous cells sympodial; conidiogenous loci conspicuous; conidiophores and conidia smooth; conidia 0–1-euseptate, in branched acropetal chains	<i>Cladosporium</i>
38. Conidiogenous cells sympodial; conidiogenous loci conspicuous; mycelium, conidiophores and conidia rough-walled, coarsely warty; conidia 0–1-euseptate, in branched chains	<i>Verrucocladosporium</i>
38. Conidiogenous cells monotretic; conidia solitary or occasionally in short chains, 1–4-distoseptate	<i>Corynespora</i>
38. Conidiogenous cells determinate; conidia single, not in chains	39
39. Conidia 2-phragmo-distoseptate; conidiogenous cells percurrent	<i>Ellisembia</i>
39. Conidia 2-phragmo-euseptate; secession schizolytic; conidiogenous cells percurrent or not	<i>Sporidesmium</i>
39. Conidia 1–2-euseptate; secession rhexolytic; conidiogenous cells percurrent	<i>Endophragmiella</i> (164A)

40. (15) Conidiophores arranged in compact, brown to black sporodochial conidiomata	41
40. Conidiophores either not arranged in sporodochial conidiomata, or if so, conidiomata colourless or pale	44
41. Conidiomata cupulate, discoid, concave, with an elevated margin; conidia aseptate (rarely euseptate with an indistinct septum), filiform	Hainesia (70B)
41. Conidiomata convex sporodochia, without an elevated margin; conidia distoseptate	42
42. Conidia tetrahedral or star-like, with 4 short, tapered arms	Lichenostella (343C)
42. Conidia phragmoseptate	43
43. Sporodochia flat; conidiogenous cells filiform, <i>ca</i> 1 µm wide, thin-walled; conidia thin- walled	Lichenobactridium (253C)
43. Sporodochia strongly convex; conidiogenous cells wider, thick-walled; conidia thick-walled, especially the distal cell	Lichenopuccinia (253D)
44. Conidiogenous cells phialidic	45
44. Conidiogenous cells not phialidic	50
45. Conidiophores brown, single; conidia cylindrical, aseptate, in tubular-necked phialides	Chalara (43A)
45. Conidiophores colourless, in sporodochia or not	46
46. Macroconidia falcate, phragmoseptate	Fusarium (252A) (incl. <i>Galloea cladoniicola</i>), <i>Microcera</i>
46. Conidia not falcate	47
47. Conidia fusiform to subcylindrical, 4–11-septate	acremonium-like anamorph of <i>Trichonectria hirta</i>
47. Conidia 0(–1)-septate	48
48. Conidiophores aggregated in compact flat sporodochia	<i>Dendrodochium</i> auct.
48. Conidiophores not aggregated in sporodochia	49
49. Conidiogenous cells entirely thin-walled	<i>Acremonium</i> (incl. <i>Cephalosporiopsis epiparasitaster</i>)
49. Conidiogenous cells apically thin-walled, thick-walled at base	<i>Monocillium</i> (44A)
50. (44) Conidiophores aggregated in compact sporodochia	51
50. Conidiophores not aggregated in sporodochia	54
51. Conidia more or less helically coiled, single	52
51. Conidia not helicoid, in chains	53
52. Sporodochia grey; conidial wall irregularly thickened and warty; growing on <i>Peltigera</i> ... <i>Hobsoniopsis</i> (376B)	
52. Sporodochia pink; conidial wall thick, smooth; growing on bark-inhabiting lichens	<i>Illosporiopsis</i> (376C)
53. Conidia elongate, (0–)1-septate, basally and usually apically truncate; conidiophores more or less distinct; initially facultatively lichenicolous on bark-inhabiting lichens with <i>Trentepohlia</i> as photobiont, later becoming lichenized	<i>Blarneya</i> (183B)
53. Conidia subglobose, aseptate; conidiophores reduced to conidiogenous cells; lichenicolous on <i>Peltigera</i> spp., non-lichenized	<i>Illosporium</i> (297D)
54. (50) Conidia in persistent chains, wall thick, wrinkled; conidiophores erect, forming a dense whitish tomentum on <i>Usnea</i> thalli	<i>Kalchbrenneriella</i> (5A)
54. Conidia single or in easily separating chains, smooth-walled; conidiophores not as above	55
55. Conidia fusiform to obclavate, (2–)3(–5)-septate, arising on long denticles, apex rostrate ... <i>Trichoconis</i> (233B)	
55. Conidia 0–multiseptate, apical cell not rostrate	56
56. Conidia in chains, 1-septate, fusoid, both ends tapered and narrowly truncate	<i>Patriciomycetes</i> (173C)
56. Conidia single	57
57. Conidiogenous cells subcylindrical, percurrent with distinct terminal annellations	<i>Refractohilum</i> (201A)
57. Conidiogenous cells ampulliform, not percurrent, lacking annellations	<i>Hawksworthiana</i> (102C)