

NECTRIACEAE Tul. & C. Tul., Sel. Fung. Carpol. 3: 3. 1865

Type: *Nectria* (Fr.) Fr., *nom. cons.*

[= *Ophionectriaceae* Locq., *Taxia Fungorum* p. 29. 1974, *nom. inval.*, Art. 41.1].

[= *Xenonectriellaceae* Locq., *Taxia Fungorum* p. 29. 1974, *nom. inval.*, Art. 41.1].

In this work the family *Nectriaceae* is narrowly circumscribed to include only those hypocrealean species having uniloculate ascomata that are generally orange-red to purple, KOH+, yellow in lactic acid, and not immersed in a well-developed stroma. The *Nectriaceae* include 20 genera. Traditionally *Nectria* has been defined to include all hypocrealean species that have uniloculate, superficial ascomata and one-septate, non-apiculate ascospores not disarticulating at the septum. Most of the type species of genera now recognized in the *Nectriaceae* were placed in *Nectria sensu lato* at some time. Major genera within the *Nectriaceae* include *Calonectria* with *Cylindrocladium* anamorphs, *Gibberella* with *Fusarium* anamorphs, *Nectria sensu stricto* with *Tubercularia* anamorphs, and *Neonectria* with *Cylindrocarpon* anamorphs. *Haematonectria* is

established to include species previously recognized in the complex of species referred to as *Nectria haematococca*, having anamorphs in *Fusarium* sect. *Martiella*. Although both have *Fusarium* anamorphs, *Gibberella* and *Haematonectria* represent separate clades within the *Nectriaceae* and are phylogenetically distinct from the core group of *Nectria*. The genus *Cosmospora* includes species having anamorphs placed in *Fusarium* sect. *Eupionnotes* as well as several other anamorph genera.

Although most members of the *Nectriaceae* have orange, red to purple, KOH+ ascomata, a few members having pallid ascomata are connected with the *Nectriaceae* based on other characteristics, particularly of the anamorph. The genus *Albonectria* includes species having white to pale yellow ascomata; however, the fast-growing *Fusarium* anamorphs indicate a relationship with the *Nectriaceae*. The type of *Pseudonectria*, *P. rousseliana*, has yellow to orange ascomata while the second species, *P. pachysandricola*, has orange to scarlet ascomata.

KEY TO THE GENERA OF THE NECTRIACEAE

1. Ascomata dark brick red, bluish-purple to purple, macroscopically appearing black; anamorph, where known, fast-growing *Fusarium* 2
1. Ascomata red, red-orange, or orange, rarely white to pale yellow, not dark blue or purple; anamorphs slow- or fast-growing *Fusarium* or other phialidic genera 5
2. Ascospores muriform; on woody fruits of *Calamus* **Pleogibberella**
2. Ascospores (0-)1-3-septate 3
3. Ascomata dark brick-red; on dark stroma of *Phyllachora* on living leaves of bamboo **Allonectella**
3. Ascomata bluish purple to purple; on plants 4
4. Densely aggregated on an extensive stroma covering a gall-like formation; ascospores usually 1-septate; on *Serjania* (*Sapindaceae*) in Brazil **Stalagmites**
4. Solitary or gregarious, non- or sparsely stromatic; ascospores usually 3-septate, rarely 0-1-septate; on monocotyledonous and dicotyledonous plants, generally in temperate regions **Gibberella**
5. Ascomata white to pale yellow, or greyish yellow, KOH- 6
5. Ascomata red, red-orange, or orange, KOH+ 7
6. Ascomata warty, thick-walled, white to pale yellow; anamorph fast-growing *Fusarium* .. **Albonectria**
6. Ascomata smooth- and thin-walled, yellow to orange or scarlet; anamorph *Volutella* **Pseudonectria**

7. Ascomata with yellow or golden, spinulose, rarely smooth, hairs; ascospores striate; anamorphs *Actinostilbe*, sporodochial or synnematosus, conidia usually 1-septate, yellow **Lanatonectria**
7. Ascomata without yellow, spinulose hairs; ascospores striate, tuberculate or smooth; anamorphs other than above, conidia not yellow **8**
8. Ascomata immersed in thalli of lichens; ascospores transversely septate to muriform **Xenonectriella**
8. Ascomata superficial, not immersed in lichen thalli; ascospores non- to multiseptate, or muriform **9**
9. Ascomata globose, small, less than 350 μm high, with a white to yellow, furfuraceous outer coating; ascospores ellipsoid, non-septate, hyaline, smooth; known on decaying leaves and fruits of *Clusia* sp.; anamorph *Gliocephalotrichum* **Leuconectria**
9. Ascomata without a white to yellow, furfuraceous outer coating, or, if with furfuraceous outer coating, then ascomata ovoid or obpyriform, large, more than 350 μm high; ascospores non-septate to one- or multiseptate; anamorph not *Gliocephalotrichum* **10**
10. Ascomata ovoid-elongate, walls with warts to 100(–300) μm high; ascospores long, up to 250 μm , multiseptate, hyaline, finely striate; anamorph *Antipodium* or unknown **Ophionectria**
10. Ascomata globose to pyriform, sometimes elongate; ascospores less than 100 μm long; anamorph not *Antipodium* **11**
11. Ascomata small, generally less than 300 μm diam; ascomatal wall smooth to slightly warted, usually less than 20 μm thick; ascospores smooth to tuberculate or coarsely striate, often yellow-brown, or if green, then smooth, rarely hyaline; fungicolous on other ascomycetes, corticolous or isolated from roots and soil **12**
11. Ascomata medium to large, generally more than 300 μm diam; ascomatal wall smooth to coarsely warted, more than 20 μm thick; ascospores smooth, striate-punctate or tuberculate, hyaline or yellow-brown; usually corticolous **17**
12. Ascomata smooth, non-stromatic or on an inconspicuous basal stroma, pyriform, collapsing laterally; ascomatal wall of thin-walled cells **13**
12. Ascomata slightly warted, non-stromatic, subglobose to globose, not collapsing; ascomatal wall of globose, thick-walled cells **14**
13. Ascospores non-septate, hyaline, smooth-walled; anamorph *Volutella*; on leaves and twigs of *Buxaceae* **Pseudonectria**
13. Ascospores one- or multiseptate, yellow-brown and tuberculate, less frequently striate, or hyaline and smooth-walled; anamorphs *Acremonium*-like, *Chaetopsina*, *Cylindrocladiella*, *Fusarium* sect. *Eupionnotes*, *Stilbella*, *Volutella*; fungicolous on ascomycetes, rarely on Aphyllophorales; herbicolous or, less often, corticolous, or insecticolous .. **Cosmospora**
14. Ascospores non-septate, rarely one-septate, globose to ellipsoid, yellow to yellow-brown, ornamented; isolated from warm soil or as a plant pathogen; anamorphs, where known, *Acremonium*-like **Neocosmospora**
14. Ascospores one-septate, rarely non-septate, ellipsoid to fusiform, not globose, yellow-brown with coarse striations or green, smooth; generally corticolous; anamorphs, where known, *Fusarium* or *Penicillifer*, not *Acremonium*-like **15**
15. Ascospores green, smooth; ascomata scattered, not obviously stromatic; anamorph, where known, *Penicillifer* **Viridispora**

15. Ascospores yellow-brown, smooth, spinulose or striate; ascomata scattered or caespitose; anamorph, where known, *Fusarium*, or sporodochial with verticillate conidiophores . 16
16. Ascospores coarsely striate; anamorph sporodochial with verticillate conidiophores **Rubrinectria**
16. Ascospores smooth to spinulose or faintly striate, rarely disarticulating; anamorph, where known, *Fusarium* **Haematonectria**
17. Ascomata subglobose to globose, often becoming cupulate when dry, wall warted, rarely smooth, ascospores non-, 1- to multiseptate or muriform, in some species ascospores budding within the asci; usually corticolous, on dying or recently dead woody branches; rarely on tough monocotyledonous leaves (*N. miltina*); anamorphs sporodochial, pycnidial, or synnematos, conidiomata always some shade of red, *Tubercularia*..... **Nectria**
17. Ascomata globose to obpyriform, collapsing laterally or not collapsing, wall smooth when dry, sometimes shining, scaly or warted; ascospores 1- to multiseptate, never budding in the asci; on all kinds of organic material; anamorphs *Calostilbella*, *Cylindrocarpon*, *Cylindrocladium*, *Fusarium*, *Rhizostibella* 18
18. Ascomata ovoid, very large, more than 800 µm high, apex often mammiform, orange, with white to straw, furfuraceous covering; ascospores hyaline or yellow-brown, 1-septate, coarsely striate; corticolous; anamorph *Calostilbella*, i.e. synnematos with 1-septate, yellow-brown conidia **Calostilbe**
18. Ascomata globose to obpyriform, apex acute to constricted, then distinctly knobby; smooth and shining or scaly to coarsely warted; ascospores hyaline or yellow-brown, smooth, striate or tuberculate; corticolous; anamorphs not *Calostilbella* 19
19. Ascomata globose to ovoid, with concolorous warts, solitary, often with blackened base; ascospores hyaline, smooth, ellipsoid to long fusiform, one- to multiseptate; corticolous or herbicolous; anamorph *Cylindrocladium*, i.e. with penicillate conidiophores with a sterile elongation and strictly cylindrical conidia **Calonectria**
19. Ascomata globose to obpyriform or broadly pyriform, smooth and shining to scaly or warted; ascospores hyaline or yellow-brown, smooth, warted or striate; corticolous or herbicolous; anamorphs not *Cylindrocladium* 20
20. Ascomata broadly obpyriform, smooth, slightly roughened to warted; ascospores hyaline, smooth, spinulose or striate; anamorph *Cylindrocarpon*, with or without microconidia **Neonectria**
20. Ascomata subglobose to obpyriform, smooth, scurfy or warted; cells at ascomatal surface non-descript or circular to angular, with > 1.5 µm thick walls and often much thicker; ascospores generally yellow-brown, smooth, warted, or striate; anamorphs *Fusarium* or *Rhizostilbella* 21
21. Ascomata typically caespitose in groups or at the tips of rhizomorph-like strands, pyriform, papillate, smooth or covered with white scurf; ascospores yellow-brown, smooth or roughened; anamorphs synnematos *Fusarium* or *Rhizostibella* **Corallomycetella**
21. Ascomata solitary to aggregated, subglobose to globose, non-papillate or with an indistinct acute apex, with concolorous warts; ascospores hyaline or yellow-brown, smooth, spinulose or faintly striate, rarely disarticulating; anamorphs, where known, *Fusarium* sect. *Martiella* **Haematonectria**