

## Revisiones Generum Obscurorum Hyphomycetum: a revision of the *Selenosporium* species described by A. C. J. Corda

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The interpretation of the generic name *Selenosporium* Corda by numerous authors as a synonym of *Fusarium* Link : Fr. is confirmed. The typification of the genus is discussed and *Selenosporium tubercularioides* Corda is designated as lectotype. All species described by Corda are revised. To stabilize present usage of the names, neotypification is proposed for *Fusarium equiseti*, and an epitype for *F. tricinctum* is designated, because of the impossibility of interpreting the preserved material. The remaining 15 taxa described in or transferred to *Selenosporium* by authors other than Corda are listed with their present interpretation.

Keywords: *Fusarium equiseti*, *Fusarium tricinctum*, nomenclature, typification, neotype, epitype.

***Selenosporium* Corda, Icon. Fung. 1: 7, 1837.**

Lectotype species (designated here): *S. tubercularioides* Corda, l.c., p. 7, Tab. II, Fig. 111.

Lectotype specimen: Holotype of *S. tubercularioides*, Czech Republic, Bohemia, Liberec (= Reichenberg), leg. Corda, s.d., PRM No. 155625.

In his genus *Selenosporium*, Corda classified hyphomycetes with *Fusarium*-like macroconidia produced from immersed or erumpent stromata. He included species from three known genera and mentioned them in brackets in Icon. Fung. 1, p. 7: „*Selenosporium*. Corda (*Fusarium* Nees in part. *Volutella* Fries non Tode. *Atractium* Link. part.)“ . His complete generic diagnosis in Icon. Fung. 5, p. 39

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emphasized the presence of a stroma: „Stroma immersum, erumpens vel libere evolutum, carnosum, celluloso-corneum, vel floccosum, supra hymenio et strato sporidiorum conglobatorum tectum. ...“.

For a long time, *Selenosporium* has been regarded a synonym of *Fusarium* Link : Fr. Wollenweber, in his monumental work on *Fusarium* (Wollenweber & Reinking, 1935; and other publications) examined many type specimens of species presumed to belong to this genus, but he did not study the material preserved by Corda. Subsequently, this material has remained almost unexplored. Upon critical re-examination, some of the synonymies postulated by Wollenweber cannot be upheld. Subramanian (1971) proposed the nomenclatural changes that would be correct according to Wollenweber's listings of synonyms, but he also failed to re-examine all the extant type specimens. Booth (1971) followed Wollenweber's conclusions about synonymy and started examining type specimens only in the later years of his career.

Originally two species were described in *Selenosporium*, *S. pallens* (Nees) Corda and *S. tubercularioides* Corda (Corda, 1837), and five species were described by the same author subsequently. Carmichael & al. (1980) listed *S. pallens* (Nees) Corda as the type species without any further indication about the designating authority. Because we did not find any type material of *S. pallens*, we designate *S. tubercularioides* as the lectotype species of the genus *Selenosporium*, the morphology of which, both in the well-preserved material and in the original description and illustration, corresponds closely with Corda's concept of the genus.

*Selenosporium* was widely accepted by nineteenth century authors and a total of 22 taxa were described in or transferred to it, most now considered species of or synonyms of species of *Fusarium*. The seven species described by Corda in *Selenosporium* are considered below. At the same time we note that no type material of any species described by Corda in *Fusarium* is preserved at PRM; specimens preserved under *Fusisporium* still have to be examined.

### 1. *Selenosporium pallens* (T. F. L. Nees) Corda, Icon. Fung. 1: 7. 1837.

- = *Atractium pallens* T. F. L. Nees [: Fr.], Nova Acta Acad. Caes. Leop. Carol. 9: 237. 1818.
- = *Fusarium pallens* (T. F. L. Nees : Fr.) Link, Sp. Pl. 2: 104. 1825.
- = *Volutella pallens* (T. F. L. Nees : Fr.) Fr., Syst. mycol. 3: 468. 1832.
- = *Fusarium pallens* (T. F. L. Nees : Fr.) Sacc., Michelia 2: 295. 1881 (superfluous combination).

No material of this species that might have been studied by Corda is preserved in PRM. We did not succeed in tracing the type material of Nees in STR, B or L.

*Fusarium pallens* (Nees) Link was considered a possible synonym of *Cylindrocarpon ianthothele* Wollenw. var. *majus* Wollenw. by Wollenweber & Reinking (1935) and Booth (1971). Neither author examined a type specimen.

**2. *Selenosporium tubercularioides*** Corda, Icon. Fung. 1: 7, Tab. II, Fig. 111. 1837.

= *Fusarium tubercularioides* (Corda) Sacc., Syll. Fung. 4: 697. 1886.

Holotype specimen. - Czech Republic, Bohemia, Liberec (= Reichenberg), leg. Corda, s.d., PRM No. 155625. - Fig. 1.

This specimen consists of five twig fragments of *Rubus idaeus*, collected by Corda in Hamrštejn near Liberec in north Bohemia. Pale, orange-coloured sporodochia, some covered by a thin epidermis layer, were noted, with masses of *Fusarium*-like macroconidia occurring on the branches. The sporodochia consist of a dense layer of phialides. The macroconidia are 3-7-septate, mostly 5-6-septate, fusiform, more or less curved, with an attenuated, elongated and slightly bent apical cell and with (sometimes indistinctly) pedicellate basal cell, (24-) 40-55(-59) x (3-) 3.5-4.5(-5)  $\mu\text{m}$  (Fig. 1).

*Selenosporium tubercularioides* Corda was regarded as a synonym of *Fusarium avenaceum* (Corda : Fr.) Sacc. by Wollenweber & Reinking (1935) and Booth (1971). This identification may be correct, as the morphology of the macroconidia matches isolates of this species grown in darkness. Otherwise our observations suggest it may be identical with *Fusarium lateritium* C. G. Nees : Fr. var. *majus* Wollenw. Neither reidentification would threaten the stable nomenclature of the older species and the epithet *tubercularioides* is not further needed.

**3. *Selenosporium urticearum*** Corda, Icon. Fung. 2: 7, Tab. IX, Fig. 30. 1838.

= *Fusarium urticearum* (Corda) Sacc., Syll. Fung. 4: 698. 1886.

None of Corda's specimens of this species are preserved in PRM. Only a secondary collection was traced in Preuss' herbarium in B (No. 620, on paper) which seems now to be devoid of a comparable fungus.

*Selenosporium urticearum* was identified as a synonym of *Fusarium lateritium* C. G. Nees : Fr. var. *mori* by Wollenweber & Reinking and its f. sp. *mori* (Desm.) Matuo & Sato by Booth (1971), obviously without having seen any authentic material. The original

substratum, dead twigs of *Ficus elastica* and *Morus nigra*, are consistent with this identity.

**4. *Selenosporium hippocastani*** Corda, Icon. Fung. 2: 7, Tab. IX, Fig. 31. 1838.

= *Fusarium hippocastani* (Corda) Sacc., Syll. Fung. 4: 703. 1886.

None of Corda's material of this species is preserved in PRM.

*Selenosporium hippocastani* was identified as a synonym of *Fusarium acuminatum* Ellis & Everhart by Wollenweber & Reinking (1935) [as *F. scirpi* Lamb. var. *acuminatum* (Ellis & Everhart) Wollenweber] and Booth (1971). This name was treated as the correct one for *F. acuminatum* by Subramanian (1971), based on Wollenweber & Reinking's synonymy, because of priority. Revival of this obscure taxon here by neotypification is undesirable as it would unnecessarily destabilize nomenclature.

**5. *Selenosporium equiseti*** Corda, Icon. Fung. 2: 7, Tab. IX, Fig. 32. 1838.

= *Fusarium equiseti* (Corda) Sacc., Syll. Fung. 4: 707. 1886.

Holotype specimen. - Czech Republic, Bohemia, Chuchle (Kuchelbad) near Praha, leg. Corda, s.d., PRM No. 155622. - Fig. 2. Neotype CBS 307.94.

The holotype specimen consists of a piece of an *Equisetum* stem and some fragments; it is labelled „*Selenosporium equiseti* Ca Wiskočilka vis a vis“. This material was collected by Corda in spring 1836 in the locality of Vyskočilka in Chuchle village (Kuchelbad) near Praha.

The material is poorly preserved. Booth (unpublished, paper read to *Fusarium* workshop, Sydney, Aug. 1983) examined the type and could not find any *Fusarium* conidia and stated that the type contained only a few grains of soil. The senior author succeeded in discovering one small pale orange-coloured sporodochium on the surface of the stem. No conidiophores were seen, but aggregated or single *Fusarium*-like macroconidia were observed. Macroconidia are falcate, 5-7-septate, with an attenuated and hooked apical cell and sometimes with a distinctly pedicellate basal cell, 41-59.5 x 2.5-4 µm (5-septate) or up to 65 x 3.2-3.5 µm (7-septate) (Fig. 2). Material on a slide prepared by V. H.-J. was identified as *F. avenaceum* (normal morphology of the fungus as shown when grown in light). Following this study, W.G. did not succeed in discovering any further *Fusarium* material on the specimen.

Saccardo's interpretation of Corda's species as a *Fusarium* is obviously correct. Corda's description may equally point to *F.*

*avenaceum* as to *F. equiseti* in the sense of Wollenweber. Because this material does certainly not justify a reliable identification of *F. equiseti* in the sense of the older *F. avenaceum*, we designate here a neotype in order to stabilize the concept of the species developed by Wollenweber & Reinking (1935), and adopted by Booth (1971), Gerlach & Nirenberg (1982), and Nelson & al. (1983).

***Selenosporium equiseti* Corda**

Neotype. – A dried culture of CBS 307.94 (= BBA 68556), isolated by H. I. Nirenberg from soil in Braunschweig, Germany; preserved in PRM (with isoneotypes in B, CBS, IMI, DAOM).

This isolate has been chosen as neotype because it originates from Central Europe like the material seen by Corda. Its morphology most closely corresponds with that of *F. equiseti* var. *equiseti sensu* Wollenweber & Reinking, so that a possible recognition of infraspecific taxa will not be affected by this choice.

**6. *Selenosporium tricinctum* Corda, Icon. Fung. 2: 7, Tab. IX, Fig. 33.**

1838 (on page 7 misspelled „*tricinctum*“ but correctly spelled under Fig. 33 of the same issue).

= *Fusarium tricinctum* (Corda) Sacc., Syll. Fung. 4: 700. 1886.

Holotype specimen. – Czech Republic, Bohemia, Chuchle near Praha, leg. Corda, s.d., PRM No. 155623. – Fig. 3.

This species was described from dead, dry stems of Umbelliferae and stems of a thistle collected by Corda in Vyskočilka in Chuchle near Praha in autumn 1836. The type specimen is labelled „*Selenosporium tricinctum* Ca Wiskotzilka“ and contains a piece of stem of Umbelliferae. The surface of the stem is covered in some places by dry white mycelium with distinct ochraceous to pale orange sporodochia. Macroconidia are falcate, sometimes strongly curved, mostly 3-septate, with a distinctly foot-shaped basal cell and with an attenuated apical cell, measuring 27–36(–40) x 3.5–4 µm (Fig. 3). The basal layer of the sporodochia is composed of densely arranged phialides, on compactly branched conidiophores.

Corda collected this fungus again in 1841 on a dead branch (probably of *Sambucus nigra*) in Lobkowitz Garden in Praha. This sample labelled „*Selenosporium tricinctum* Ca Lobk. G. 1841“ is preserved as PRM 155624. Ochraceous sporodochia with masses of macroconidia were found on the surface of the bark. The macroconidia are falcate, mostly 3-septate, occasionally 1–4-septate, with a distinctly foot-shaped basal cell, an attenuated, hooked apical cell, distinctly smaller than in the type specimen, 27–30(–38.5) x



3–3.5(–4)  $\mu\text{m}$ . Scanty microconidia were seen in this specimen, 0-septate, ovate to pyriform with basal apiculi, 4.8–10  $\times$  3–4  $\mu\text{m}$ .

The type specimen seems to match the concept of the species developed by Wollenweber & Reinking (1935) and Seemüller (1968), and adopted by Booth (1971), Gerlach & Nirenberg (1982) and Nelson & al. (1983). The second specimen matches *F. lateritium* Nees : Fr. Reliable identification of the fungus on the type specimen is not possible because the formation of pyriform microconidia, essential to the present species concept, could not be established. In order to stabilize the nomenclature of the well-known species, we deposit representative material for the species to serve as epitype (Art. 9.7 ICBN).

#### ***Selenosporium tricinctum* Corda**

Epitype. – A dried culture of BBA 64485 = CBS 393.93, isolated by H. I. Nirenberg from a culm base of *Triticum aestivum*, Berlin, 1984, preserved in PRM (with duplicates in B, CBS, IMI, DAOM).

**7. *Selenosporium herbarum* Corda**, Icon. Fung. 3: 34, Tab. VI, Fig. 88. 1839.

= *Fusarium herbarum* (Corda) Fr., Summa Veg. Scand.: 472. 1849.

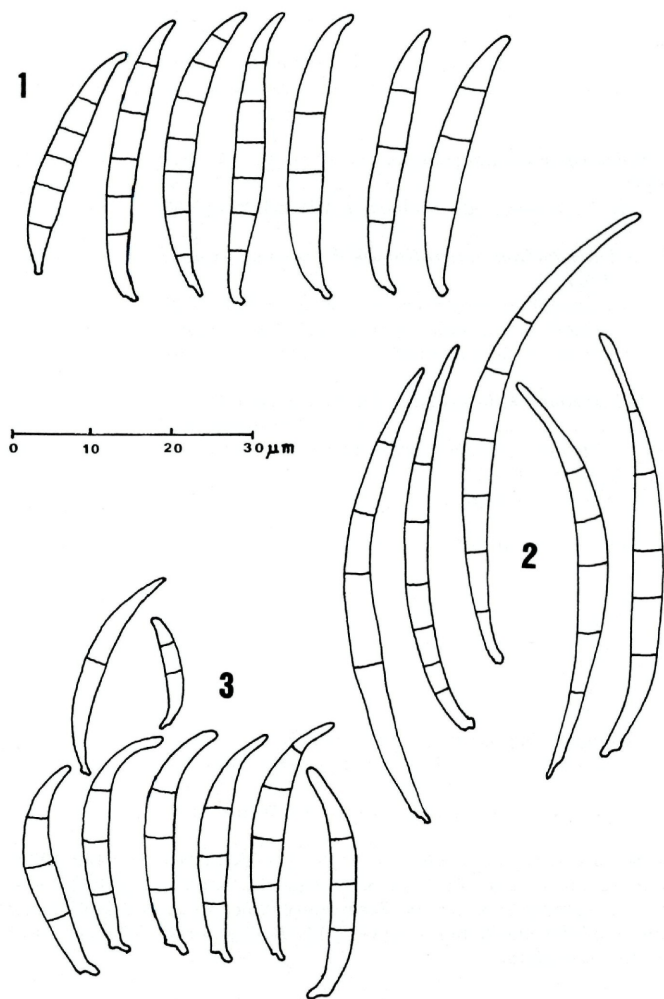
Holotype specimen. – Czech Republic, Bohemia, Praha, leg. Corda, s.d., PRM No. 155731.

Corda described the fungus from dead stems of Boraginaceae in a public garden in Praha in 1838. The fungus is no longer present on the deposited material and the preserved twigs do not look Boraginaceous. In the description of the fungus, Corda noted that the colonies were „... gregarium, carneo-roseum, subeffusum“ and the conidia were „... longis, quinque-septatis, curvatis, utrinque acuminatis, hyalinis, pallidis. Long. spor. 0,001470; Crass. spor. 0,000150. p.p.p.“ These characters clearly correspond to a *Fusarium* species, the conidia of which would measure appr. 41  $\times$  4  $\mu\text{m}$ .

Wollenweber & Reinking (1935) considered the species a synonym of *Fusarium avenaceum* (Corda : Fr.) Sacc. and this opinion has been followed by all subsequent authors.

### **Appendix**

Most of the remaining 15 species included in *Selenosporium* may be attributable to *Fusarium* but not all type specimens have yet been examined.



Figs 1-3. - Macroconidia from sporodochia of *Selenosporium* specimens described by Corda. - 1. From type of *S. tubercularioides*, PRM 155625. - 2. From type of *S. equiseti* Corda, PRM 155622. - 3. From type of *S. tricinatum*, PRM 155623.

1. *Selenosporium aquaeductuum* Radlk. & Rabenh., Hedwigia 2: 73. 1863.

≡ *Fusarium aquaeductuum* (Radlk. & Rabenh.) Lagerh.

Type examined by Wollenweber, *Fusaria autographice delineata* (FAD): 185. 1916.

2. *Selenosporium asperifoliorum* West., Bull. Ac. Belg. 2, Sér. 11: 652. 1861.

A *Cercospora*, *vide* Wollenweber & Reinking (1935).

3. *Selenosporium aurantiacum* Bonorden; Abhandl. Geb. Mykol. p. 97. 1864.

≡ *Fusarium bonordenii* Sacc. Syll. Fung. 4: 699. 1886.

Considered a possible synonym of *Fusarium dimerum* Penzig by Wollenweber & Reinking (1935). Type not preserved.

4. *Selenosporium brassicae* Libert mscr. in herb.

≡ *Fusarium brassicae* Lib. ex Cooke, Grevillea 8: 83. 1880.

= *Fusarium avenaceum* (Corda : Fr.) Sacc., *vide* Wollenweber & Reinking (1935).

Type not examined.

5. *Selenosporium bufonicola* Speg., An. Mus. nac. B. Aires 20: 459. 1910.

≡ *Fusarium bufonicola* (Speg.) Sacc. & Trotter, Syll. Fung. 22: 1486. 1913

= *Fusarium graminearum* Schwabe, *vide* Wollenweber & Reinking (1935).

Type not examined.

6. *Selenosporium caeruleum* Libert in herb.

≡ *Fusarium caeruleum* Libert ex Sacc., Syll. Fung. 4: 705. 1886 [often spelled *coeruleum*].

Type examined by Wollenweber, FAD: 408. 1916.

7. *Selenosporium cuticola* R. Blanch., C. r. Acad. Sci. 111: 479. 1890.

≡ *Fusarium cuticola* (R. Blanch.) Guéguen, Champ. paras.: 262. 1904.

A possible synonym of *Fusarium orthoceras* Appel & Wollenw. *vide* Wollenweber & Reinking (1935) (= *F. oxysporum* Schlecht. : Fr.). Type not examined.

8. *Selenosporium cydoniae* Schulzer, Verh. zool. bot. Ges. Wien 21: 1240. 1871

≡ *Fusarium cydoniae* (Schulzer) Sacc. & Trav., Syll. Fung. 22: 1480. 1913



= *Fusarium lateritium* C. G. Nees : Fr., *vide* Wollenweber & Reinking (1935).

Type not examined.

9. *Selenosporium fuscum* Bonorden, Handb. Mykol.: 135, Fig. 220. 1851.

= *Fusarium fuscum* (Bon.) Sacc., Syll. Fung. 4: 699. 1886.

= *Fusarium solani* var. *martii* (Appel & Wollenw.) Wollenw. *vide* Wollenweber & Reinking (1935).

Type not preserved.

10. *Selenosporium gloeosporioides* Speg., An. Mus. nac. B. Aires 20: 458. 1910.

= *Fusarium gloeosporioides* (Speg.) Sacc. & Trotter, Syll. Fung. 22: 1482. 1913 [not *F. gloeosporioides* Speg. 1899].

= *Fusarium lateritium* C. G. Nees : Fr. *vide* Wollenweber & Reinking (1935).

Type not examined.

11. *Selenosporium lateritium* (C. G. Nees. : Fr.) Desm. in Kickx, Fl. crypt. Fland. 2: 99. 1867 (*vide* Lindau 1909).

Basionym: *Fusarium lateritium* C. G. Nees : Fr., Syst. Pilze Schw.: 31. 1816 : Fries, Syst. mycol. 3: 470. 1832.

Type not examined.

12. *Selenosporium minutissimum* Desm., Ann. Sci. nat., Bot., Sér. 3, 8: 8. 1847.

= *Fusarium minutissimum* (Desm.) Sacc., Syll. Fung. 4: 703. 1886.

= *Ramularia geranii* (Westend.) Lindau *vide* Wollenweber & Reinking (1935).

13. *Selenosporium pyrochroum* Desm., Ann. Sci. nat., Bot., Sér. 3, 14: 111. 1850.

= *Fusarium pyrochroum* (Desm.) Sacc., Michelia 1: 534. 1879.

= *Fusarium lateritium* C. G. Nees : Fr. *vide* Wollenw. (FAD: 587; Wollenweber & Reinking, 1935).

Type not examined.

14. *Selenosporium rosae* Preuss, Linnaea 24: 150. 1851.

= *Fusarium rosae* (Preuss) Sacc., Syll. Fung. 4: 697. 1886.

Type not preserved in B.

15. *Selenosporium sarcochroum* Desmazières, Ann. Sci. nat., Bot., Sér. 3, 14: 111. 1850.

- ≡ *Fusarium sarcochroum* (Desm.) Sacc., *Michelia* 1: 534. 1879.  
Type not examined.

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