

## THE NOMENCLATURAL HISTORY AND TYPIIFICATION OF *HYPODERMA* AND *LOPHODERMIIUM*

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### Summary

The changes in Art. 13 agreed at Sydney in 1981 mean that the lectotype of the genus *Hypoderma* DC. selected by Höhnelt (1917) is no longer acceptable. The identities of the original species of the genus are accordingly established, and the genus is correctly lectotypified. It unavoidably becomes an older name for *Lophodermium* Chev. As this last genus is large and contains species of economic importance, a conservation proposal is made to allow continued use of the two generic names as they are currently understood.

### Introduction

*Hypoderma* DC. and *Lophodermium* Chev. are two of the most familiar genera in the Rhytismatales. Although these fungi have received much attention both recently and in the early days of mycological classification, it is not generally realised that *Hypoderma* is now universally used in other than its original sense, and that *Lophodermium* is a synonym of *Hypoderma* as it was first circumscribed.

The best-known species presently included in *Hypoderma*, *H. rubi* (Pers.) DC. ex Chev., is a widespread weak parasite of a large number of herbaceous and woody plant genera, and, on the type host genus *Rubus* L., is frequently reported in foray lists and often described in texts on mycology. There are about seven other species in the genus (*vide* Powell, 1974). *Lophodermium* is a large genus, containing at least a hundred species, and is particularly prevalent on conifers and grasses. A number of species cause economically important pine diseases (Minter, 1980a) and are very frequently cited in the literature on forest pathology.

*Hypoderma* and *Lophodermium* are closely related. They share many morphological features, and species from both genera have been shown to have similar anamorphs, belonging to the genus *Leptostroma* Fr. (Kendrick and DiCosmo, 1979; Minter, 1980b). Their apothecia are immersed in plant tissue, either immediately below the cuticle or covered in addition by a layer of epidermis, and sometimes also hypodermis. The covering layer is blackened to form the so-called clypeus, and this splits longitudinally to expose the hymenium. When dry the two lips formed by the longitudinal split remain touching, but in conditions of high humidity the lips move apart allowing ascospores to be released. The asci are thin-walled (Minter and Cannon, 1983), and are accompanied by numerous gelatinised paraphyses which have swollen tips. The two genera are separated by ascospore characters, *Hypoderma* having cylindrical-clavate or cylindrical-fusiform spores arranged uni- or biserially, while in *Lophodermium* the spores are filiform and fasciculate, and often helically arranged. While the phylogenetic significance of this distinction may not be great, there appears to be a definite discontinuity between the two spore forms, and the two genera are at present universally regarded as separate. More intensive study may reveal further distinguishing characteristics.

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### Nomenclatural History

The genus *Hypoderma* was established by de Candolle (1805) to contain fungi superficially resembling *Hysterium* Pers.: Fr., but with immersed apothecia whose hymenia are exposed through a longitudinal split in the host tissue. Six species were included, *H. xylomoides* DC. (*nom. illegit.*, Art. 63; = *Xyloma hysterooides* Pers.), *H. pinastri* (Schrader) DC., *H. conigenum* (Pers.) DC., *H. arundinaceum* (Schrader) DC., *H. quercinum* (Pers.) DC. and *H. fraxini* (Pers.) DC. (this last in an appendix). No species was designated as type. De Candolle (1815) later added six more species and a number of infraspecific taxa to his genus, including *H. virgultorum* DC. (*nom. illegit.*, Art. 63; = *Hysterium rubi* Pers.).

Chevallier (1822) divided *Hypoderma* into two groups, *Hypoderma* and *Lophoderma*, giving short descriptions but including in these no obvious distinguishing characteristics. He left *H. arundinaceum*, *H. striiforme* (Pers.) DC. and *H. xylomoides* in the former assemblage and included in the latter three taxa, each of which was given an alternative name in *Hypoderma*. These were *Lophoderma scirpinum* (DC.) Chev. (*Hypoderma scirpinum* DC.), *L. rubi* (Pers.) Chev. (*H. rubi* (Pers.) DC. ex Chev.), and *L. nervisequum* (DC.) Chev. (*H. nervisequum* DC.). The rank of the new name *Lophoderma* is not clear, Chevallier stating "Ces caractères nous ont paru suffisans pour former, sinon un genre nouveau, du moins une section distincte et comparable, par les rapports qu'elle a avec celle des Hypodermes, aux genres *Xyloma* et *Polystigma*." This taxon is not validly published at generic rank as it was not definitely accepted as such by the publishing author (Art. 34), and it seems most prudent to treat it as an infrageneric division, presumably at sectional level. However, according to our interpretation of Art. 34.4, the name *Hypoderma rubi* is validly published as an alternative name, and so the combination dates from this work rather than that of De Notaris (1847), as is generally thought. *Lophoderma* has not been taken up by subsequent authors.

Four years later, Chevallier (1826) substantially altered his earlier treatment of these fungi. He abandoned *Hypoderma* entirely (possibly to avoid confusion with his 'ordre' Hypodermacées, a quite unrelated group), replaced three of de Candolle's original species of *Hypoderma* in *Hysterium*, and introduced a new generic name *Lophodermium* for the remaining original species of *Hypoderma*, as well as *H. virgultorum* DC. (= *H. rubi* (Pers.) DC. ex Chev.) and a number of others. *Lophoderma* Chev. was cited as a synonym of this new genus, but due to the major differences in circumscription and the change of the name, it seems best to treat *Lophodermium* as a new taxon rather than an old name raised to generic rank. No type species was designated for either *Lophoderma* or *Lophodermium*.

Fries (1823) divided the species of *Hypoderma* among various 'tribi' within the genus *Hysterium*, and Wallroth (1833) largely accepted Fries's treatment but erected the new genus *Colpoma* to include *Hysterium quercinum* Pers. (one of the original species of *Hypoderma*) and three other species.

De Notaris (1847) was the first to recognise the currently-accepted distinction between *Hypoderma* and *Lophodermium*, placing species with cylindrical to ellipsoidal spores in the former, and those with filiform spores in the latter genus. This, unfortunately, reversed the species arrangement favoured by Chevallier (1822). All subsequent authors, with the exception of Kuntze (1898) followed De Notaris. Kuntze considered (rightly) that *Lophodermium* was synonymous with *Hypoderma* as originally circumscribed, and proceeded to transfer the names of all the species of *Lophodermium* accepted at that time in Saccardo's compilation *Sylloge Fungorum* (vols 1-9, 1882-1891) to *Hypoderma* and erect a new genus *Hypodermopsis* for the species of *Hypoderma* accepted in the same work. Kuntze's treatment has since been universally rejected.

Rehm (1887) largely followed De Notaris's concept of *Hypoderma* and *Lophodermium*, mainly concentrating on a revision of the *Hypoderma rubi* complex. Höhnelt (1917) designated lectotypes for both genera, though the one he chose for *Hypoderma* must now be regarded as incorrect (see below). He attributed *Hypoderma* to Fries (who never in fact

accepted the genus) but actually adopted De Notaris's concept of the group. Hilitzer (1929), Nannfeldt (1932), Tehon (1935) and Terrier (1942) again largely accepted De Notaris's concept of the two genera, though Tehon accepted several additional segregate genera.

Darker (1932, 1967) worked extensively on this group of fungi, describing a number of new genera, and his classification of the Rhytismataceae is largely followed today. In his 1967 paper, he removed more than twenty conifericolous fungi from *Hypoderma*, reducing that genus to the relatively small assemblage currently recognised. Darker's concept of the two genera in question is in fact very similar to that proposed by De Notaris more than one hundred years previously.

A recent revision of *Hypoderma* (Powell, 1974) largely concurred with Darker's circumscription of the genus. Modern work on *Lophodermium* has concentrated on the conifer pathogens (Minter, 1977, 1980a; Minter, Staley and Millar, 1978) and has generally agreed with Darker's generic limits. A number of new taxa have been added to the genus.

#### *Typification: Hypoderma*

*Hypoderma* was not typified by its publishing author, and was first lectotypified by Höhnelt (1917) with *H. rubi* (Pers.) DC. ex Chev. This choice was endorsed by Clements and Shear (1931), Nannfeldt (1932) and Darker (1932). However, *H. rubi* was not included in *Hypoderma* until ten years after the original publication of the genus. Under the pre-Sydney Art. 13, this could be regarded as a legitimate choice for lectotype as it was one of the five species treated by Saint-Amans (1821), the first post-1821 validating author. He also included *H. quercinum*, *H. arundinaceum* and *H. fraxini* from the original treatment of the genus, and *H. crispum* from de Candolle's later contribution. However, with the adoption of 1753 as starting-point date for fungal nomenclature agreed at the Sydney Congress, *Hypoderma* dates from 1805 rather than 1821 and so must be typified by one of the original species of the genus.

Darker (1967) was of the opinion that *Hypoderma* had in effect been lectotypified by Chevallier (1822), since this author retained only one of the species treated by Saint-Amans in *Hypoderma*, *H. arundinaceum* (Schrad.) DC. (also one of de Candolle's original species). However, though he placed *H. rubi* in his group *Lophoderma* and *H. fraxini* in *Hysterium*, he did not treat the other two species included in Saint-Amans' work, *H. quercinum* and *H. crispum*. As he did not specifically exclude these from *Hypoderma*, he cannot be regarded as having unequivocally lectotypified the genus (Korf and Rogers, 1967). In any case, Chevallier was not working with an 1821 starting-point date, and so certainly took pre-1821 literature into account when preparing his manuscript. Three of the original species of *Hypoderma* were unaccounted for in his work.

Under the present Code, therefore, *Hypoderma* has not been correctly lectotypified. It is thus important to choose a lectotype according to the guidelines set out in the Code to fix the application of the name. The six original species of *Hypoderma* are now examined in turn.

#### *Hypoderma xylomoides* DC.

*Hypoderma xylomoides* DC. was published as an avowed substitute name for *Xyloma hysterooides* Pers., and is therefore automatically typified by the type of that name. Persoon did not designate a holotype, and as far as we can ascertain, no lectotype or neotype has previously been selected. The only specimen in Persoon's herbarium at Leiden (L.: 910263-705) cannot be designated as lectotype and would be an unsuitable choice for neotype as it is not on *Crataegus* L., the type host, and was only tentatively identified as this species by Persoon. The specimen was sent to Persoon by Mougeot, and consists of a single leaflet of a rosaceous tree, possibly a species of *Amelanchier* Medikus, containing a large number of apothecia which correspond well to modern concepts of *Xyloma hysterooides* (now generally regarded as belonging to *Lophodermium*). It is known today from a wide range of woody rosaceous genera.

Despite the absence of original material, the identity of Persoon's taxon is not in doubt. The illustration accompanying the description (Persoon, 1800) is of good quality, and does not conflict with modern concepts of the species. No other species of *Lophodermium* or similar fungus is known from *Crataegus*. The illustration will therefore serve well as lectotype, and we hereby formally designate it as such.

Fries (1819) introduced the name *Hysterium foliicola* (as '*foliicolum*') for this fungus, citing Persoon's name in synonymy, presumably avoiding the use of what he considered to be a tautonym, or at least an unsuitable name, '*Hysterium hysteroioides*.' The epithet *foliicola* is illegitimate at this stage, but it was also accepted in the *Systema* (Fries, 1823) and so must be used in preference to Persoon's name, though it must date from 1823 rather than 1819. A new combination is therefore required.

***Lophodermium foliicola*** (Fr. : Fr.) P. Cannon & Minter, comb. nov. Basionym: *Hysterium foliicola*

Fr. : Fr. (as '*foliicolum*'), Syst. Mycol. 2: 592. 1823.

*Xyloma hysteroioides* Pers., Ic. Descr. Fung.: 38, t. 10, f. 3, 4. 1800.

*Hypoderma xylomoides* DC., in Lam. & DC., Fl. Fr. 2: 305. 1805; *nom. illegit.* (Art. 63).

*Hysterium foliicola* Fr. (as '*foliicolum*'), Kongl. Vetensk. Acad. Handl. 40: 102. 1819; *nom. illegit.* (Art. 63).

*Lophodermium xylomoides* Chev., Fl. gén. env. Paris: 437. 1826; *nom. illegit.* (Art. 63).

*L. hysteroioides* (Pers.) Sacc., Syll. Fung. 2: 791. 1883.

*Lophodermellina hysteroioides* (Pers.) Höhnelt, Ber. dt. bot. Ges. 35: 422. 1917.

*Hypoderma pinastri* (Schrader) DC.

*Hypoderma pinastri* (Schrader) DC. (basionym *Hysterium pinastri* Schrader) is a synonym of *Lophodermium pinastri* (Schrader) Chev. No type specimen was designated in the original publication, and enquiries to the herbaria where Schrader's specimens are reputed to be housed (GOET, LE) have established that Schrader's material of this taxon is lost. Despite the lack of type material, the identity of this species is not in doubt, as the illustration accompanying Schrader's description, though inadequate at first sight, is quite sufficient for positive recognition. It shows a fungus with elliptical fruit bodies accompanied by prominent black zone lines on a two-needled pine, and the only European fungus with these characteristics is *Lophodermium pinastri* (Schrader) Chev. as currently circumscribed, on *Pinus sylvestris* L. Schrader cites the habitat of his fungus as 'in foliis dejectis Pini sylvestris, Abietis [= *Picea abies* (L.) Karsten] etc.' He therefore had a wider species concept than have modern authors, probably including many of the other Rhytismataceae found on conifer needles; *Lophodermium pinastri* as currently circumscribed is confined to *Pinus* spp. However, as its description agrees well with that of Schrader, it seems reasonable to take the fungus he illustrated as representing the essential concept of the species.

Various attempts have been made to designate a neotype for this species, most of which have not been acceptable. Prior to the Sydney Congress, when the 1821 starting-point date was in force, there was considerable ambiguity as to whether a fungus described before this date should be typified by reference to the original protologue or that of the validating author. With the 1753 starting-point date, however, it is clear that lecto- or neotypification should be carried out with reference to the original publication, though the question of sanctioning must still be considered.

Tehon (1935), under a misapprehension that *Lophodermium pinastri* (Schrader) Chev. should be typified by Chevallier's concept of the species rather than Schrader's, and mistaking an exsiccatum distributed by Roumeguère (*Fungi Gall. exs. no. 1661*) for Chevallier's type material, decided that *L. pinastri* occurred on *Picea* rather than *Pinus* and introduced a new name, *L. pinicola* Tehon for the species on *Pinus*. Tehon therefore designated Roumeguère's exsiccatum (cited above) as a neotype for *Hysterium pinastri*. This action was clearly incorrect, as Lundell and Nannfeldt (1936) and Terrier (1956) observed. For the fungus on *Pinus*, Tehon mentioned an exsiccatum distributed by Fries (*Scler. Suec.*



no. 30; mis-cited by Fries (1823) and Tehon as no. 50, *vide* Holm and Nannfeldt, 1962) in connection with typification, but he did not formally designate it as neotype.

Lundell and Nannfeldt (1936) also cited the Fries exsiccatum in connection with the typification of *Lophodermium pinastri*, but refrained from formally neotypifying the name. They considered that a specimen of Fries's should be cited in preference to any of Schrader's material, if this existed.

Petrak (1955) accepted Tehon's concept of the two species, using *L. pinicola* for the fungus on *Pinus*, but decided that Chevallier's name (*L. pinastri*) was confused and accepted the name *Lophodermellina piceae* (Fuckel) Höhnelt for the fungus on *Picea*. He did not attempt to neotypify Schrader's name.

Terrier (1956) also appeared to be under the impression that Chevallier's concept of *Lophodermium pinastri* was paramount rather than that of Schrader, and mentioned an exsiccatum cited by Chevallier (Mougeot and Nestler, *Stirp. crypt. Voges.-Rhen.* no. 76). The name was not however formally neotypified.

Staley (1975) formally designated the example of Mougeot and Nestler's exsiccatum (see above) in UC as neotype of *Hysterium pinastri*. This choice was approved of by Minter (1980a); the exsiccatum was widely distributed among the nineteenth century mycologists and is easily accessible today, and it conforms to modern concepts of the species.

Fries's concept of the species is now important because of the recently introduced sanctioning process. Although the specimens distributed in Fries's exsiccatum *Scler. Suec.* no. 30, issued under the name *Hysterium pinastri* in 1819, are *Lophodermium conigenum* (Brunaud) Hilitzer, the other elements of the protologue (Fries, 1823), (the description, two other exsiccata, including Mougeot and Nestler no. 76, and references to Schrader and other earlier authors) all refer to *L. pinastri*. The distinctions between these two taxa can only easily be discerned with microscopical equipment not available to Fries, and there is no evidence that Fries rejected the broad concept of *L. pinastri* accepted by Schrader and all mycologists of his era. The fungus can therefore correctly be cited as *L. pinastri* (Schrader : Fr.) Chev.

#### *Hypoderma conigenum* DC.

The name *Hypoderma conigenum* DC. is based on *Hysterium conigenum* Pers. *nom. illegit.* This is a neglected taxon, and the only modern published work referring to it (Darker, 1967) treated it as a doubtful species of *Hypoderma*, type material not being seen. However, Powell (1974) in his unpublished thesis examined Persoon's specimens of this fungus, and our findings concur with his conclusions.

Persoon (1796) described *Hysterium conigenum* from cone scales of *Picea abies*. The material on *Picea* in Persoon's herbarium contains a coelomycete now known as *Sirococcus strobilinus* Preuss. He later also identified as this species specimens on *Pinus sylvestris* cones sent to him by Mougeot; these are apparently identical with Mougeot and Nestler's exsiccatum *Stirp. crypt. Voges.-Rhen.* no. 75, issued as *Hysterium conigenum*. Both the examples seen by us (IMI, K) and Powell contain two elements, one a coelomycete belonging to the genus *Sclerophoma* Höhnelt, possibly *S. pythiophila* (Corda) Höhnelt, and the other an ascomycete with small hyaline two-celled ascospores belonging to the Amphisphaeriaceae. The material seen of this element was in poor condition.

Fries (1823) recognised that Persoon's fungus on *Picea* differed from the one(s) on *Pinus*. He therefore gave the name *Sphaeria strobilina* Holl and Schm. ex Fr. (based on *S. strobilina* Holl & Schm.; *nom. nud.*, 1815) to Persoon's fungus on *Picea* and established the homonym *Hysterium conigenum* Fr. for the fungus on *Pinus*, based on Mougeot and Nestler's exsiccatum. This reversal of application of the name *H. conigenum* has caused confusion ever since. However, due to the protected status of Fries's names, *H. conigenum* Fr. is not illegitimate and has priority over Persoon's name. Judging from Fries's description, he was referring to the coelomycete element of Mougeot and Nestler's exsiccatum, and Höhnelt (1929), the first author to recognise the two elements, also came to this conclusion since

he described the ascomycete as new, giving it the name *Didymella conigena* Höhnelt. He therefore in effect typified *Hysterium conigenum* Fr. with the coelomycete element of the type specimen.

A new combination is required for the fungus on *Picea* cone scales originally described by Persoon.

*Sirococcus conigenus* (DC.) P. Cannon & Minter, comb. nov. Basionym: *Hypoderma conigenum* DC. in Lam. & DC., Fl. Fr. 2: 305. 1805.

*Hysterium conigenum* Pers., Obs. Mycol. 1: 30. 1796, non *H. conigenum* Fr.: Fr., Syst. Mycol. 2: 586. 1823.

*Sphaeria strobilina* Holl & Schm., Deutschl. Schwämme no. 8. 1815; nom. nud.

*Sphaeria strobilina* Holl & Schm. ex Fr.: Fr., Syst. Mycol. 2: 495. 1823.

*Sporonema strobilinum* Desm., Ann. Sci. Nat., ser. 3, 18: 368. 1825 (non *Sphaeria strobilina* Holl & Schm. ex Fr.).

*Sirococcus strobilinus* Preuss, Linnaea 26: 716. 1853 (non *Sphaeria strobilina* Holl & Schm. ex Fr., nec *Sporonema strobilinum* Desm.).

*Sirococcus strobilinus* (Desm.) Petrak, Sydowia 1: 155. 1947, nom. illegit. (Art. 64).

Other synonyms may be found in Sutton (1980).

A specimen should now be chosen to represent *Hysterium conigenum* Pers. from the material in Persoon's herbarium. Designation of a lectotype is technically not possible as Persoon cited no specimens in his original publication of the name, and there are no collection dates or other indications of type material accompanying the specimens. The material in Persoon's herbarium may have been that on which the name is based, but there is no incontrovertible evidence supporting this hypothesis. The specimens are nevertheless important in determining Persoon's concept of the species, and it is advisable to choose a neotype from among them. There are three specimens in Persoon's herbarium containing fungi on *Picea* cone scales which correspond to his protologue. No. 910258-921 is annotated 'Hb. Pers.' and 'Sphaeria strobilina Holl Fries Syst. Mycol. 2. p. 495.' Though this specimen consists of a number of cone scales containing fungi, the material on the scales is sparse and in poor condition, and the name given to the specimen suggests that it was collected subsequent to the original publication. No. 910258-916 is annotated 'Hb. Pers.' and 'Hysterium conigenum,' and the material is also sparse and in poor condition. No. 910258-922 is annotated 'in squamis strobilinum Pini abietis Lin.,' 'Hb. Pers. mis. Mougeot' and 'Hysterium conigenum ? Pers.' The question mark probably indicates that Persoon was unsure of the identity of the fungus, though the label could conceivably date from previous to the original publication of the name, and suggest that Persoon was unsure as to what name to call it. This label is glued to the herbarium sheet independently of the sheet bearing the fungus. The specimen contains a large number of conidiomata.

It therefore follows that none of the three specimens can be demonstrated to be part of the material on which the name was based. Bearing in mind the relatively poor condition and lack of documentation of the first two specimens discussed, the last one seems to be the best choice for a neotype, despite the possible question as to its identity in the eyes of Persoon. This specimen agrees well with the protologue of *Hysterium conigenum*, and contains abundant material (this is important not only for practical reasons, but also because Persoon originally described the fungus as 'copiose in squamis strobili'). Additionally, in his unpublished thesis, Powell (1974) also chose this specimen, though he decided that it was a lectotype and not a neotype.

We hereby formally designate specimen L.: 910258-922 (Herb. Persoon, Leiden) as neotype of *Hysterium conigenum* Pers.

*Hypoderma arundinaceum* (Schrad.) DC.

*Hypoderma arundinaceum* (Schrad.) DC. (basionym: *Hysterium arundinaceum* Schrad.) is now generally known as *Lophodermium arundinaceum* (Schrad.) Chev., and is the

lectotype species of that genus (*vide* Höhnel, 1917). It is a common species occurring on a wide range of genera of the Gramineae. No type was designated in the original publication by Schrader (1799), and his herbarium is lost (see discussion under *Hypoderma pinastri*). Nevertheless, the original description and accompanying illustration are unambiguous, and Schrader's concept of this species is certainly the same as that of modern workers. As no holotype or lectotype material is available, it is prudent to designate a neotype, on *Phragmites australis* (Cav.) Steudel, the type host. This action was taken by Tehon (1935) who chose Mougeot and Nestler's exsiccatum *Stirp. crypt. Voges.-Rhen.* no. 655, without citing a specific example of the series. These specimens are widely available, and at least in the examples we have examined (IMI, K), are correctly identified. It seems therefore to be a good choice for neotype. In order to fix the application of the name finally, we hereby designate the example of the exsiccatum annotated by us in K as neotype. The example in IMI and others in K are not fully developed and do not contain mature ascospores.

Fries (1823) treated the species as *Hysterium arundinaceum*. The description fits that of Schrader, and he cites the Mougeot and Nestler exsiccatum referred to above, as well as *Scler. Suec.* no. 328, which we have not seen (it is apparently absent from K), but is correctly identified according to Tehon (1935). There is no reason to suspect that Fries's concept of the fungus differed from that of Schrader. It can therefore be referred to as *Lophodermium arundinaceum* (Schrader : Fr.) Chev.

#### *Hypoderma quercinum* DC.

This name is based on *Hysterium quercinum* Pers. (1796), and is today known as *Colpoma quercinum* (Fr. : Fr.) Wallr. This taxon has a number of early synonyms, and its nomenclature is complex. It was first described by Bulliard (1791) as *Variolaria corrugata* Bull., and in the same year Tode named it *Hysterium nigrum*. Persoon (1796) redescribed the fungus, giving it the name *Hysterium quercinum*, but as he cited Bulliard's and Tode's names in synonymy, he must be credited with introducing an illegitimate superfluous name. He also cited *Sphaeria vulvata* Latourette (1785) (as *Lycoperdon vulvatum*) as a synonym, but this name was published without a description and so is not valid. Sowerby (1802) gave yet another name for the fungus, *Sphaeria collapsa* Sow. Various authors after this time accepted Persoon's name for this fungus, including de Candolle (1805) and Fries (1819). All these uses of Persoon's name were illegitimate. However, Fries (1823) also accepted Persoon's name for the fungus, though in the genus *Cenangium* Fr. Fries's sanctioning of Persoon's epithet means that the earlier synonyms of *Hysterium quercinum* do not have priority, but as *H. quercinum* Pers. is an illegitimate name Fries's combination *Cenangium quercinum* must be regarded as a new name attributable to him only. The synonymy is set out below.

*Colpoma quercinum* (Fr. : Fr.) Wallr., *Crypt. Fl. Germ.* 2: 423. 1833.

? *Sphaeria vulvata* Latourette, *Chlor. Lugd.*: 41. 1785; *nom. nud.*

*Variolaria corrugata* Bull., *Hist. Champ. Fr.*: 187, t. 432. 1791.

*Hysterium nigrum* Tode, *Fung. Meck.* 2: 5. 1791.

*H. quercinum* Pers., *Obs. Mycol.* 1: 83. 1796; *nom. illegit.* (Art. 63).

*Sphaeria collapsa* Sow., *Col. Fig. Engl. Fung.*: t. 373. 1802.

*Hypoderma quercinum* DC., in Lam. & DC., *Fl. Fr.* 2: 306. 1805; *nom. illegit.* (Art. 63).

*Triblidium quercinum* Pers., *Mycol. Eur.* 1: 333. 1822; *nom. illegit.* (Art. 63).

*Cenangium quercinum* Fr. : Fr., *Syst. Mycol.* 2: 189. 1822 (= *Hysterium quercinum* Pers.).

The question of typification now arises. It is not entirely clear whether a neotype is best selected from Persoon's or Fries's herbarium, as though the species should be attributed to Fries, it was certainly primarily based on Persoon's illegitimate name. However, as Fries's use of the name is only allowable because of his power as a sanctioning author, and



as he certainly did not intend to set up a new name for this species in the *Systema*, we have decided to designate a neotype from Persoon's herbarium. In any case, the fungus is easily recognisable from its macroscopic details, and the synonymy cited above, though not backed up by type material, is not in doubt. Fries cited two exsiccata in the *Systema*, *Scler. Suec.* no. 130 and Kunze and Schm. *Deutschl. Schwämme* no. 63, and the examples of these we have seen are conspecific with Persoon's specimens, and agree with current concepts of the species.

There are six specimens in Persoon's herbarium bearing the name *Hysterium quercinum*. Specimen 910258-740 is annotated 'Hb. Pers.' and 'Hyst. quercinum Triblidium,' and consists of a piece of decorticated wood apparently containing no fungus. Specimen 910258-739 is annotated in the same fashion, but consists of a number of pieces of bark containing a fungus conforming to the original description and to current concepts of the species. However, as the label cites '*Triblidium*,' a genus not published by Rebentisch until 1805, it is unlikely to be type material. Specimen 910258-733 is annotated 'Hb. Pers.,' 'Commune in ramis exsiccatis quercinis,' and 'Hysterium quercinum Syn. Fung. p. 100. Triblidium quercinum Mycol. Europ. 1 p. 333.' It, too, is unlikely to be type material. Specimen 910258-741 is annotated 'Hb. Pers.' 'junior fungus' and 'Hysterium quercinum.' Although Persoon may have had this specimen to hand when he described the species, it is very immature, and its identification is doubtful. It should therefore not be chosen as neotype. Specimen 910258-742 is annotated 'Moug. mis. in Hb. Pers.,' 'ad ramoses juniores quercinos' and 'Hysterium quercinum Pers. syn. f p. 100.' Here, the reference to *Synopsis Fungorum* (1801) again suggests that this is not material on which the name *Hysterium quercinum* was based. Specimen 910258-745 is annotated 'Hb. Pers.' and 'Hysterium quercinum.' It is a possible lectotype, no indication to the contrary being given on the herbarium sheet. As there is ample material, it seems the most suitable choice for neotype.

We hereby designate specimen L.: 910258-745 (Herb. Persoon, Leiden) as neotype for the name *Hysterium quercinum* Pers.

#### *Hypoderma fraxini* (Pers.) DC.

This is based on *Hysterium fraxini* Pers. (1794), and is today normally referred to as *Hysterographium fraxini* (Pers.) De Not. Persoon designated no type material in his prologue, and as far as we have been able to ascertain, no lectotype or neotype has formally been chosen, though Zogg (1962) mentioned that the example of Fries's *Scler. Suec.* no. 249 that he had seen was typical of the species. There are five sheets bearing this name in Persoon's herbarium. Specimen 910258-310 is on *Populus* L. sp. and *Sambucus* L. sp., rather than the type host *Fraxinus excelsior* L., so it is obviously an unsuitable choice for neotype, as is specimen 910258-312, which is on *Quercus* L. sp. Specimens 910258-311 and 910258-320 are on *Fraxinus*, but are both in poor condition. Both are annotated 'Syn. Fung.' and so are likely to be other than type material. Specimen 910258-313 is in good condition. It is annotated 'Hb. Pers.' and 'Hysterium fraxini. Syn. Fung.' Although the *Synopsis* is again cited on this sheet, in this case the annotation is in a different hand, and is a probable later addition. There remains the possibility that this specimen constitutes type material. As it fits Persoon's description and agrees with current concepts of the species, it is a suitable neotype.

We hereby designate specimen L.: 910258-313 (Herb. Persoon, Leiden) as neotype for the name *Hysterium fraxini* Pers.

Fries's concept of *Hysterium fraxini* as set out in the *Systema* (1823) is similar to that of Persoon, and the exsiccatum he cites (*Scler. Suec.* no. 249) is conspecific with the neotype designated above. The epithet can therefore be regarded as sanctioned by Fries, and so the earlier synonym *Sphaeria sulcata* Bolton (1791) does not have priority over Persoon's name. The fungus can be referred to as *Hysterographium fraxini* (Pers. : Fr.) De Not.



*Hypoderma rubi* (Pers.) DC. ex Chev.

This was not one of the original species of *Hypoderma*, but de Candolle included it in his second (1815) treatment of the genus under the illegitimate substitute name *H. virgultorum* DC. It was accepted by Höhnelt (1917) as lectotype of the genus, and though this choice must now be regarded as unacceptable (see below), it is regarded as lectotype of the later homonym *Hypoderma* De Not., proposed for conservation in this paper. Its identity is therefore of importance. It was originally described as *Hysterium rubi* Pers. (1796). There are four specimens identified as this species in Persoon's herbarium, all of which correspond well both to the original diagnosis and to modern concepts of the species. Powell (1974) in his unpublished thesis chose specimen 910258-738 as neotype for *Hysterium rubi*, and we see no reason to depart from this choice. The specimen is annotated 'Hb. Pers. mis. Chaill.' and 'Hysterium rubi Pers. S. 100.'

We hereby formally designate specimen L.: 910258-738 (Herb. Persoon, Leiden) as neotype of *Hysterium rubi* Pers.

*Hypoderma* DC.

A lectotype for the generic name *Hypoderma* DC. must now be chosen. *H. fraxini* (Pers.) DC. was not included in the main body of the text, but in a section at the end devoted to addenda and corrigenda (de Candolle, 1805: 599–600). It can therefore be assumed that it was a later addition to the genus rather than one of the taxa on which its original concept was based. In any case, by de Candolle's own generic delineation, it bears more resemblance to *Hysterium* Pers. than to *Hypoderma*. Lectotypification with this species would therefore be clearly misguided.

*H. quercinum* DC. is an illegitimate name, but this does not preclude its consideration as lectotype of the genus. However, it is not a serious contender for the position as it does not conform to one of the major features of de Candolle's diagnosis, that of an oblong fruit body. Rather, it has an elongated irregular fruit body which branches not infrequently.

*H. conigenum* DC. is also an unsuitable choice for lectotype, as de Candolle only included it in *Hypoderma* with reservations, observing 'Cette plante qui, par sa petitesse, échappe à l'observation, seroit-elle une espèce d'uredo?' In any case, the fruit bodies do not open with a longitudinal slit as specified in the generic diagnosis.

There remain three species, *H. xylomoides* DC., *H. arundinaceum* (Schrader) DC. and *H. pinastri* (Schrader) DC., all of which are currently referred to the genus *Lophodermium*, and occur principally on non-woody substrates. Each of these agrees well with the generic diagnosis. It might be construed that *Hypoderma* should be typified with a corticolous species, as de Candolle noted that *Hypoderma* occurred 'sous l'écorce' when contrasting it with *Hysterium*, which grew 'sur les troncs morts,' but the French word for bark, 'l'écorce' is also applied to semi-herbaceous plants (such as *Rubus* L.). It seems most reasonable to take the observation in the diagnosis of *Hypoderma*, that 'ils naissent sous l'épiderme' as being more important in deciding on a lectotype for the genus. There is no obstacle, therefore, to choosing a species on a herbaceous substrate as lectotype. The identities of the three remaining species are all well-established, and as they are all currently referable to the same well-known genus, the nomenclatural effect of lectotypification will be the same whichever is chosen. *H. arundinaceum* (Schrader) DC. is a well-known species, and was regarded (though incorrectly) as lectotype of the genus by Darker (1967). We therefore formally designate this species as lectotype of *Hypoderma* DC. *Lophodermium*, typified with the same species (see below) therefore becomes an obligate synonym of *Hypoderma*.

*Typification: Lophodermium*

Chevallier (1826) did not designate a type species for his genus *Lophodermium* and it was lectotypified by Höhnelt (1917) with *L. arundinaceum* (Schrader) Chev. This is one of the original species of the genus, and its description agrees well with the admittedly im-

precise diagnosis. This choice has been approved by Clements and Shear (1931), Nannfeldt (1932), Darker (1932, 1967), Tehon (1935) (who subscribed to the outlawed 'first species' rule) and Terrier (1942). There is therefore agreement over the lectotypification of this genus, and we have found no reason to depart from this choice.

#### *Necessity for Conservation*

As it is not possible to avoid lectotypifying *Hypoderma* DC. with a species of *Lophodermium*, the circumscription of *Hypoderma* as currently understood alters radically, and *Lophodermium* becomes a superfluous name and a later synonym of *Hypoderma*. As *Lophodermium* contains at least one hundred species, including a number of serious plant pathogens, the resulting confusion would be considerable. Conservation to preserve current use of both generic names is therefore clearly in order.

Both *Hypoderma* and *Lophodermium* have previously been proposed for conservation, by Darker (1967). However, the conservation of *Hypoderma* DC. 'ex St.-Amans' was at that stage unnecessary and was rejected by the Special Committee (Petersen, 1980). That of *Lophodermium* was almost unanimously accepted by the Special Committee, but was rejected by the General Committee (Voss, 1982) over a procedural irregularity. With changes in the Code which were ratified in Sydney, the current use of *Hypoderma* is illegitimate, and it seems most desirable to present the case again, in a form complying with Art. 14.9, and with a modified argument for action.

In order to preserve current use of *Hypoderma*, it is necessary to reject the original use of the genus in favour of one including Höhnel's now unacceptable lectotype, *H. rubi*. Conservation of de Candolle's 1815 account of the genus, which includes this species (as *H. virgultorum*) would be a possible solution. But this treatment simply consisted of additions to the existing genus with no change in its avowed circumscription. Further, as the original concept of *Lophodermium* also included *H. rubi*, this genus would be superfluous and in need of protection against *Hypoderma* DC. (1815). This would lead to the novel problem of simultaneously conserving *Hypoderma* DC. (1815) against *Hypoderma* DC. (1805), and rejecting it in favour of *Lophodermium* Chev. The only solution to this conundrum would seem to be to conserve a later use of *Lophodermium* which excluded *H. rubi*. This is obviously best avoided.

Adoption of *Hypoderma* in the sense of De Notaris (1847), however, which specifically excludes de Candolle's original concept of the genus, and with the lectotype proposed by Höhnel (who accepted De Notaris's concept of the genus himself), would maintain current use of the generic name, and present a more satisfactory solution to the problem. However, it would be advisable to protect *Hypoderma* De Not. against the name *Lophoderma* Chev. (1822), if the Special Committee finds this necessary. The rank of this name is not clear (see above), though the consensus at the time of Darker's (1967) proposals for conservation (Korf, Weresub, *in litt.*), with which we concur, is that *Lophoderma* is a subgeneric division of uncertain rank. It would be of value to obtain a formal ruling from the Committee on this matter.

As *Lophodermium* Chev. is made illegitimate by the lectotypification of the earlier *Hypoderma* DC. *nom. rejic. prop.* with the same species as the type of this genus, it must also be proposed for conservation. It may also be necessary to protect it against *Lophoderma* Chev. (see above).

If these suggestions are not followed, the only nomenclaturally correct solution to this problem is to substitute the name *Hypoderma* for *Lophodermium*, and *Lophoderma* or *Hypodermopsis* Kuntze for *Hypoderma*. The resulting confusion among mycologists and plant pathologists would be considerable.

(716) Proposal to conserve **Hypoderma** De Not. over *Hypoderma* DC. and *Lophoderma* Chev. (Fungi).

- Hypoderma* De Notaris, *Giorn. Bot. Ital.* 2(7-8): 13. 1847, *nom. cons. prop.* T.: *H. rubi* (Persoon) A. P. de Candolle ex Chevallier (*Hysterium rubi* Persoon).
- (H) *Hypoderma* A. P. de Candolle in Lamarck et A. P. de Candolle, *Fl. Franç.* 2: 304. 1805, *nom. rej. prop.* [FUNGI] = *Lophodermium* Chevallier 1826, *nom. cons. prop.* (by LT, vide supra).
- (=) *Lophoderma* (Chevallier) Chevallier, *J. Phys. Chim. Hist. Nat. Arts.* 94: 31. 1822, *nom. rej. prop.* (Nom. ed. note: based on alternative, simultaneous *Hypoderma* [rankless] *Lophoderma* Chevallier) (by LT, here designated).

(716a) Proposal to conserve **Lophodermium** Chev. over *Hypoderma* DC. (Fungi).

- Lophodermium* Chevallier, *Fl. Gén. Env. Paris* 3: 435. 1826, *nom. cons. prop.* T.: *L. arundinaceum* (Schrader) Chevallier (*Hysterium arundinaceum* Schrader).
- (=) *Hypoderma* A. P. de Candolle in Lamarck et A. P. de Candolle, *Fl. Franç.* 2: 304. 1805, *nom. rej. prop.* (by LT, vide supra).

#### Acknowledgements

Dr. D. L. Hawksworth is thanked for his comments on the manuscript.

#### References

- Bolton, J. 1791. *A history of fungusses growing about Halifax*, pp. 139-182. Huddersfield.
- Bulliard, P. 1791. *Histoire des Champignons de la France . . .* Paris. 700 pp.
- Chevallier, M. F. F. 1822. Essai sur les Hypoxylons lichenoides. *Journ. Phys. Chim. Hist. Nat.* 94: 28-61.
- . 1826. *Flore générale des environs de Paris . . .*, Vol. 1. Paris. 676 pp.
- Clements, F. E. and C. L. Shear. 1931. *The genera of fungi*. New York. 496 pp., 58 pls.
- Darker, G. D. 1932. The Hypodermataceae of conifers. *Contr. Arnold Arbor.* 1: 1-131.
- . 1967. A revision of the genera of the Hypodermataceae. *Can. Jour. Bot.* 45: 1399-1444.
- de Candolle, A. P. 1805. *Flore Française . . .*, edn 3, vol. 2. Paris. 600 pp.
- . 1815. *Flore Française . . .*, edn 3, vol. 6. Paris. 660 pp.
- De Notaris, G. 1847. Prime linee di una nuova disposizione de' Pirenomiceti Isterini. *Giorn. Bot. Ital.* 2(7-8): 5-52.
- Fries, E. M. 1819. Uppställning af de i Sverige funne Vårtsvampar (Scleromyeci) (contd.). *Kongl. Vetensk. Acad. Handl.* 40: 87-112.
- . (1823). *Systema Mycologicum . . .*, vol. 2(2). Gryphiswaldiae.
- Hilitzer, A. 1929. Monographická studie o českých družích řádu Hysteriales a o sypavkách jimi působených. *Věd. Spisy čsl. Akad. Zeměd.* 3: 1-162.
- Höhnelt, F. von. 1917. System der Phacidiales v. Höhn. *Ber. dt. bot. Ges.* 35: 416-422.
- . 1929. Über *Hysterium conigenum* Fr. *Mitt. Bot. Lab. Techn. Hochsch. Wien* 6: 118-120.
- Holm, L. and J. A. Nannfeldt. 1962. Fries's "Scleromyeci Sueciae." A study on its editorial history with an annotated checklist. *Friesia* 7: 10-59.
- Kendrick, W. B. and F. DiCosmo. 1979. Teleomorph-anamorph connections in Ascomycetes. In: W. B. Kendrick (ed.), *The whole fungus* 1: 283-410. Ottawa.
- Korf, R. P. and J. K. Rogers. 1967. A new term, the schizotype, and the concept of implicit typification. *Taxon* 16: 19-23.
- Kuntze, O. 1898. *Revisio generum plantarum . . .*, vol. 3(2). Leipzig.
- Latourette, M. A. L. C. 1785. *Chloris Lugdunensis*. Lugduni. 43 pp.
- Lundell, S. and J. A. Nannfeldt. 1936. *Fungi exsiccati suecici, praesertim upsaliensis* no. 385. Uppsala.
- Minter, D. W. 1977. *Lophodermium on pines with special reference to species occurring on Pinus sylvestris in North-East Scotland*. Ph.D. thesis, University of Aberdeen.
- . 1980a. *Lophodermium* on pines. *Mycol. Pap.* 147: 1-54.
- . 1980b. *Leptostroma* on pine needles. *Can. Jour. Bot.* 58: 906-917.
- and P. F. Cannon. 1983. Ascospore discharge in some members of the Rhytismataceae. *Bot. Jour. Linn. Soc.*; in press.
- Minter, D. W., J. M. Staley and C. S. Millar. 1978. Four species of *Lophodermium* on *Pinus sylvestris*. *Trans. Br. Mycol. Soc.* 71: 295-301.



- Nannfeldt, J. A. 1932. Studien über die Morphologie und Systematik der nichtlichenisierten inoperculaten Discomyceten. *Nov. Act. Reg. Soc. Sci. Upsal.* 8(2): 1-368.
- Persoon, C. H. 1794. *Dispositio Methodica Fungorum*. *Römer Neues Mag. Bot.* 1: 81-128.
- . 1796. *Observationes Mycologicae* vol. 1. Lipsiae. 115 pp.
- . 1800. *Icones et descriptiones fungorum minus cognitorum* vol. 2. Lipsiae.
- . 1801. *Synopsis methodica fungorum . . .* Gottingae. 706 pp.
- Petersen, R. H. 1980. Report of the Special Committee for fungi and lichens. *Taxon* 29: 148-149.
- Petrak, F. 1955. Über *Phacidium infestans* Karst., einen gefährlichen Parasiten der Zirbelkiefer und einige andere in seiner Gesellschaft wachsende Pilze. *Sydowia* 9: 518-526.
- Powell, P. E. 1974. *Taxonomic studies in the genus Hypoderma (Rhytismataceae)*. Ph.D. thesis, Cornell University.
- Rehm, H. 1887. Ascomyceten: Hysteriaceen und Discomyceten. In: L. Rabenhorst (ed.), *Die Pilze von Deutschlands, Oesterreichs und der Schweiz* vol. 1(3): 1-64. Leipzig.
- Saccardo, P. A. 1882-1891. *Sylloge Fungorum omnium hucusque cognitorum* vols. 1-9. Patavii.
- Saint-Amans, J. F. B. 1821. *Flore Agenaise . . .* Agen. 632 pp.
- Schrader, H. A. 1799. *Plantae cryptogamicae novae, rariores aut minus cognitae*. *Schrader's Journal für die Botanik* 2: 55-80.
- Sowerby, J. 1802. *Coloured plates of English fungi or mushrooms*. London.
- Staley, J. M. 1975. The taxonomy of *Lophodermium* on pines with special reference to problems in North American christmas tree plantations. *Mitt. BundforschAnst. Forst.-u. Holzw.* 108: 79-85.
- Sutton, B. C. 1980. *The Coelomycetes. Fungi Imperfecti with pycnidia, acervuli and stromata*. Kew. 696 pp.
- Tehon, L. R. 1935. A monographic rearrangement of *Lophodermium*. *Illinois Biol. Monogr.* 13: 1-151.
- Terrier, C. A. 1942. Essai sur la systématique des Phacidiaceae (Fr.) sensu Nannfeldt. *Beitr. Krypt.-fl. Schweiz* 9(2): 1-99.
- . 1956. À propos de *Lophodermium pinicola* Tehon. *Phytopath. Z.* 27: 113-115.
- Voss, E. G. 1982. Report of the General Committee on Botanical Nomenclature to the Nomenclature Section, XIII International Botanical Congress. *Taxon* 31: 313-314.
- Wallroth, F. G. 1833. *Flora Cryptogamica Germaniae. Pars posterior*. Norimbergiae. 923 pp.
- Zogg, H. 1962. Die Hysteriaceae s. str. und Lophiaceae unter besonderer Berücksichtigung der mitteleuropäischen Formen. *Beitr. Krypt.-fl. Schweiz* 11(3): 1-190.