

## A new species of *Hypoderma* (Ascomycota) from Italy

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*Hypoderma ferulae* sp. nov., collected on remnants of *Ferula communis* L.  
(*Apiaceae*) in central Sicily is described, illustrated and discussed.

Keywords: *Leotiomyces*, *Rhytismataceae*, taxonomy, Sicily.

During several excursions in the Vallone Piano della Corte, a large nature reserve in the Agira (Enna) territory, central Sicily, a fungus belonging to the genus *Hypoderma* De Not. was found on decaying remnants of *Ferula communis* L. (*Apiaceae*).

At first it seemed to show close relations to *Hypoderma alpinum* Spooner, but a deeper examination of the macro- and micromorphological characters pointed out some essential differences, enough to consider it a new taxon, which is described and illustrated here as *Hypoderma ferulae*.

### Material and methods

#### Sampling

The study has been based on some collections from March 2004, made in an area extending between 400 m and 700 m of altitude, classified as *Thapsio-Feruletum communis* (Brullo 1984). This plant association grows on a marly-argillaceous ground in quite arid environments where *F. communi* is, among other herbaceous, perennial plants, typical for steppe grasslands of the *Lygeo-Stipetea* (Rivas Martinez 1978).

Morphologic and microscopic examinations were executed always on fresh material; spore size was obtained from the measurement of 50 spores, examining only opened, mature ascomata. Microscopic analysis was carried out using water as mounting fluid.

Spores and other microscopic elements from dried ascomata of the various collections stated in the paragraphs “Material examined” were measured in water also, using an Optika optical microscope (model BK 1301) with 40x or 100x (oil immersion) objectives. Measurements with

minimum/maximum values in parentheses are given as follows: (21) 22–24 x 2.5–3 µm (n = 50).

Further analyses for the validation of the new taxon have been executed also on the holotype of *H. alpinum* and other material deposited in K(M), the mycological collection of the herbarium of the Royal Botanic Gardens Kew, where, after this study, also the specimens of *H. ferulae* were deposited.

## Results and Discussion

***Hypoderma ferulae* Lantieri sp. nov.** – Figs. 1–5.  
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Latin diagnosis. – Ascomata 0.8–1 x 0.5 mm, ambitu elliptico vel naviculari, paene mersa in contextu hospitis. Ante apertionem ascomata parietibus nigricantibus, zona griseola secundum futuram lineam apertionis. Ascomata aperta unica rima longitudinali praedita, jove valde pluvio se aperientia et hymenium praebentia. Hymenium luteo-melleum leviter virescenti colore suffusum. Asci clavati, 80–90 x 10–11 µm, attenuati ad basim, haud caerulescentes ope iodii, octaspori, sporis collocatis in asci superiore parte. Paraphyses tenues, cylindricae, 0.5–1 µm diam., emergentes 15–30 µm ultra ascos, incurvae, crispulae vel valde inflexae ad apicem, haud septatae. Ascosporae cylindricae vel tenuiter ellipticae, (21) 22–24 x 2.5–3 µm, nonnullae leviter curvatae vel leviter sigmoideae, partibus extremis rotundatis, laeves, hyalinae, saepe septo transverso in mediana parte praeditae. Subhymenium haud distinctum ab excipulo medullari. Medullare excipulum sine structura cellulari recte definita, hyphae confusae, nonnullis cellulis subglobosis circa 10 µm diam., haud manifestis. Ectale excipulum textura incomposite epidermoidea, inaequalibus elementis 10–15 x 3–7 µm, varie elongatis vel lobatis, nonnullis plus minusve angularibus, polygonalibus, brunneonigricantibus, crassitunicatis, clarioribus et tenuioribus versus basim ascomatum.

Habitatio. – Supra reliqua putrescentia *Ferulae communis*, vere.

Holotypus. – Hic designatus K(M) 162697, supra reliqua putrescentia *Ferulae communis*, 24 Mar 2004, leg. A. Lantieri.

Description. – Ascomata 0.8–1 x 0.5 mm, elliptical or navicular in outline, semi-immersed in the host tissues; closed ascomata with blackish walls, with greyish zone along the future line of opening. Ascomata open by a single, longitudinal slit, spreading and showing the hymenium with high humidity (Fig. 1). Hymenium yellow-honey with weak greenish reflexes. Asci clavate, 80–90 x 10–11 µm (n = 50), tapered at the base, not bluing in iodine, 8-spored, spores arranged in the upper part of ascus (Fig. 2–3). Paraphyses thin, cylindrical, 0.5–1 µm diam., protruding 15–30 µm beyond asci (n = 50) (Fig. 3), curved, curled or remarkably bent at the apex, without septa. Ascospores cylindrical or narrowly elliptical, (21) 22–24 x 2.5–3 µm (n = 50), some slightly curved or weakly sigmoid, with rounded ends, smooth, hyaline, often with a transversal septum near the middle (Fig. 3–4). Subhymenium undistinguishable from the medullar excipulum. Medullar excipulum without a well definite cellular structure, hyphae entangled, with a few subglobose cells, about 10 µm in diam., barely

visible. Ectal excipulum of an irregular textura epidermoidea; elements 10–15 x 3–7 µm, variously elongated or lobed, some more or less angular, polygonal (Fig. 5), blackish-brown, thick-walled, paler and thinner near the ascomatal base.

**Etymology.** – The name refers to the debris of *Ferula communis* L., on which the ascomata of this *Hypoderma* have been found.

**Habitat.** – On decaying remnants of *Ferula communis*, spring.

**Distribution.** – Known only from the type locality.

**Material examined.** – *Hypoderma ferulae* Lantieri: ITALY, Sicily, near Agira (Enna), all collections come from the type locality Natural Oriented Reserve Vallone Piano della Corte, on decaying remnants of *Ferula communis*: ibidem, 26 Mar 2004, leg. A. Lantieri, det. A. Lantieri K(M) 162698; ibidem, 28 Mar 2004, leg. A. Lantieri, det. A. Lantieri K(M) 162699; ibidem, 30 Mar 2004, leg. A. Lantieri, det. A. Lantieri K(M) 162700.

**Holotypus.** – K(M) 162697, on decaying remnants of *Ferula communis*, 24 Mar 2004, leg. A. Lantieri.

**Other material examined.** – *Hypoderma alpinum* Spooner: GREAT BRITAIN, Scotland, Perthshire, Ben More, on leaves of *Carex bigelowii*, alt. 760 m, from 1895\* and 21 Jul 1938, leg. E. Nelmes, det. B. M. Spooner, holotype [K(M) 157846]. [\* Notes: Material not declared among the studied specimens. Dimensions of spores and asci larger than those of the 1938 sample, but paraphyses and excipulum of similar appearance and size. Very likely, these specimens belong to *Hypoderma caricinum* Kirschst. [nom. illegit.; (Jaap 1922)], described with spores 27–28 x 3 µm and asci up to 145 µm long.]; Scotland, Invernesshire, Glen Affric, An Tudair (W side), on leaves of *Carex bigelowii*, alt. 760 m, 14 Jul 1947, leg. E. Milne Redhead, det. B. M. Spooner [K(M) 157847]. [Notes: Ascomata small and not mature, asci containing only outlines of spores.]; Scotland, South Aberdeen, Glas Maol, on leaves of *Carex aquatilis*, alt. 760 m, 7 Jul 1935, leg. E. C. Wallace, det. B. M. Spooner [K(M) 157848]. [Notes: ascomata small, spores not mature, all within asci].

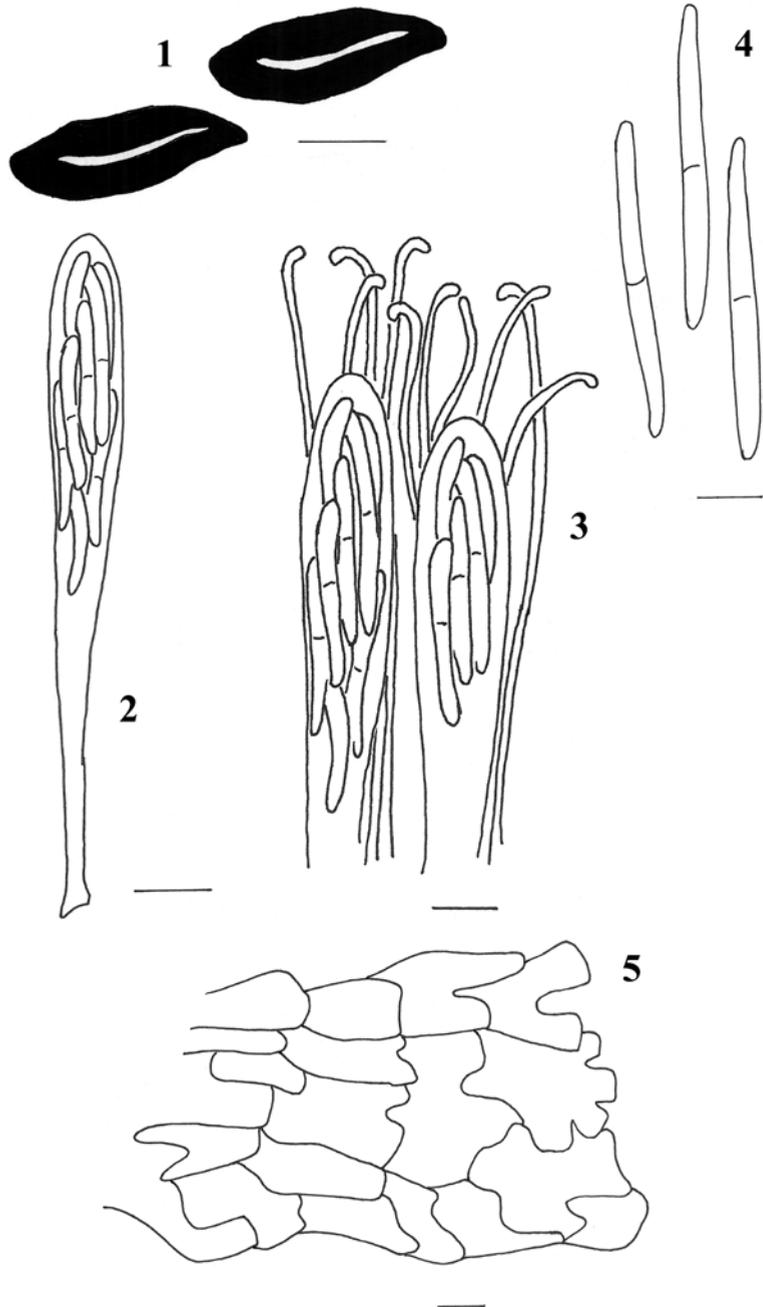
## Discussion

The peculiar habitat on decaying remnants of *Ferula communis*, the period of growth falling within the beginning of the springtime, the yellow-honey hymenium with greenish reflexes contrasting with the blackish-gray outside, as well as shape and length of the spores allow the delimitation of *H. ferulae* from similar taxa summarized below:

*Hypoderma commune* (Fr.) Duby differs from *H. ferulae* in having ascomata up to 2.5 mm long, the yellow-greenish hymenium, smaller, non-septate spores (17–20 x 3–4 µm), and by its habitat on marsh herbaceous stems.

*Hypoderma hederæ* (T. Nees ex Mart.) De Not. is a common fungus with greenish-gray hymenium and similarly sized spores (20–23 x 3.5–4.5 µm), but the latter usually contain oil droplets. Its habitat is diverse; it grows on degraded leaves of *Hedera* species.

*Hypoderma rubi* (Pers.) DC. grows mainly on stems of *Rubus* species. It differs from *H. ferulae* in having longer ascomata (up to 2 mm), by a greenish-gray hymenium, and larger spores [20–25 (26.5) x 3–4 µm], which are fusiform-navicular in shape, containing two oil droplets.



**Figs. 1-5.** – *Hypoderma ferulae* (holotype). 1. Ascomata (Bar = 0.4 mm). 2. Ascus (Bar = 10  $\mu$ m). 3. Apical section of the hymenium with asci and paraphyses (Bar = 10  $\mu$ m). 4. Released ascospores (Bar = 5  $\mu$ m). 5. Ectal excipulum with irregularly shaped elements (Bar = 5  $\mu$ m). (Drawings: A. Lantieri).

Initially, for the spore size and the excipular structure, we considered *H. ferulae* closely related to *H. alpinum*, which was described by Spooner (1981) and has been rarely reported (Clark 1982; Ellis & Ellis 1985). It resulted from a revision of some Scottish collections of *Hypoderma* sp. found on *Carex bigelowii* Torrey and *C. aquatilis* Wahlenb. (Collections in the Herbarium of Kew.)

With reference to the description published by Spooner (1981) (*loc. cit.*): "... Hysterothecia 200–500 µm, black, elliptical, scattered over veins on the inner side of the leaf blade ... ascospores 20 x 25 µm, cylindrical-clavate, rounded above, tapered below to an acutely rounded point, non septate, hyaline..." [to which the description of Ellis & Ellis (1985) can be traced back], our specimens exhibit some noteworthy morphological differences, for example, in shape, colour and size of the ascomata, and spores with a median septum.

The material published as *typus* of *H. alpinum* [K(M) 157846], actually consists of two collections, one from 1938 and one from 1895, the latter not mentioned by the author. Both of them with immature or partially deteriorated ascomata; therefore, spore measurements have been carried out on spores which were still inside the asci, considering only the more mature ones.

In the material from 1938, spores and asci were only slightly smaller than reported in the original description, whereas the spores from the 1895 collection were larger (24–27 (29) x 2.5–3 µm), and as well their asci (up to 85 x 9–10 µm) with a more developed basal portion. After prolonged re-hydration of the samples, some characters not reported in the original description (or rather concise) were also noted, e.g., the dark yellow-honey colored hymenial surface with gelatinous appearance, and shape and size of both the paraphyses and the elements constituting the excipulum, even if the latter is well represented in the original iconography on page 282 (Fig. 18C) (Spooner 1981). Moreover, most spores (although inside the asci) had a more or less centrally located, transversal septum.

On the basis of the above-mentioned characters, *H. ferulae* can be distinguished from *H. alpinum* by the habitat, by ascoma size and shape and, microscopically, by ascospore size and shape, length of both asci and paraphyses. Table 1 summarizes the main characteristics and differences between the two species.

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**Tab. 1.** – Comparison between the morphologic characters of *H. ferulae* and *H. alpinum* (A. o. = ascomata in outline; A. u. = ascomata unopened; n. d. = no data).

Morphological characters	<i>H. ferulae</i> sp. nov.	<i>H. alpinum</i> Spooner (1981)	<i>H. alpinum</i> (Holotype 1938)
A. o.	Elliptical or navicular, 0.8–1 × 0.5 mm	Elliptical, 300–500 µm long	Ellipsoidal, 0.3–0.5 mm
A. u.	Blackish walls, with greyish zone along the future line of opening	Black	Black walls
Hymenium	Yellow-honey with weak greenish reflexes	n. d.	Dark yellow-honey, appearance gelatinous
Spores	(21) 22–24 × 2.5–3 µm, cylindrical or narrowly elliptical, smooth, hyaline, often 1-septate	20–25 × 2.5 µm, cylindric-clavate, hyaline, non-septate	18–22 × 2.5–3.5 µm, clavate-fusiform, smooth, weakly yellowish, often 1-septate
Asci	80–90 × 10–11 µm, clavate, tapered at the base, 8-spored, spores arranged in the upper part of the ascus	50–70 × 8–9 µm, sessile, apex acutely conical, 8-spored	55–65 × 9–10 µm, clavate, 8-spored, spores arranged in the upper part of ascus
Paraphyses	0.5–1 µm diam., thin, cylindrical, protruding 15–30 µm beyond asci, curved, curled or remarkably bent at the apex, 0-septate	n. d.	Up to 2 µm diam., thin, protruding 10–12 µm beyond asci, curved or curled at the apex, some forked, 0-septate
Medullar excipulum	Without a definite cellular structure with few sub-globose cells about 10 µm in diam.	n. d.	Without a definite cellular structure with few sub-globose cells about 10 µm in diam.
Ectal excipulum	Textura epidermoidea with irregularly shaped elements, 10–15 × 3–7 µm, blackish-brown	n. d.	Textura epidermoidea with irregular elements, 10–15 × 3–7 µm, blackish-brown
Habitat	On decaying remnants of <i>Ferula communis</i> . March	On degraded leaves of <i>Carex bigelowii</i> . July	On degraded leaves of <i>Carex bigelowii</i> . July

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