

ELISEO BATTISTIN, EMANUELE CAMPO, MARINA CECILIA MAGNOZZI

ENTOLOMA FRIDOLFINGENSE NOORDEL. & LOHMEYER,
A POORLY KNOWN *ENTOLOMA* IN ITALY

Abstract

The macro- and microscopical features of Entoloma fridolfingense, a taxon recently described and poorly known, are reported based on a collection from northern Italy. A comparison with allied entities is carried out and colour photographs of basidiomata, spores and a black and white plate of the microscopical structures are provided. A detailed statistical analysis on the spore size and the distribution of the Q values is presented. Concise considerations about its ecology and distribution over the Italian and European territory conclude this work.

Riassunto

Vengono riportate le caratteristiche macro- e microscopiche di Entoloma fridolfingense, specie recentemente descritta e poco nota, sulla base di una raccolta effettuata in Italia settentrionale. Viene presentato un raffronto con specie simili, nonché forniti dei fotocolor dei basidiomi, delle spore ed una tavola in bianco e nero dei microcaratteri. Viene altresì proposta un'analisi statistica dettagliata delle dimensioni sporiali e della distribuzione dei valori del quoziente sporale Q. Concludono il lavoro brevi considerazioni sull'ecologia della specie e sulla sua distribuzione sul territorio italiano ed europeo.

Key words: *Entoloma, fridolfingense, Italy, taxonomy.*

Introduction

Hereby the authors intend to contribute to improving the knowledge of poorly investigated *Entoloma* in Italy. During a winter foray, one of us (M.C.M.) found a few specimens of a small *Entoloma*, which in the field seemed to belong to the section *Undata* (Romagn.) Noordel. After microscopical analyses we were able to identify it as *E. fridolfingense*. It was collected on dry and sandy grassland, mostly consisting of *Graminaceae*, on calcareous soil not far from a wood of *Pinus pinea* L. and *Fraxinus ornus* L., about a hundred meters away from the sea shore.

Materials and methods

The photographs of the basidiomata were taken in situ (Fig. 1) by a Nikon 5100 digital camera. The macromorphological characters were observed in fresh specimens, while the microscopic analyses were made from sections of fresh or revived tissues that were mounted in distilled water, in a saturated, aqueous solution of NaCl or in 5% KOH (Titolchimica, Rovigo, Italy). Congo red (Titolchimica, Rovigo, Italy) also was used to stain hyaline structures. Spores were first displayed on a 22" Samsung led monitor by a DCM 510 camera (La Nuova Didattica, Milan, Italy) inserted into the top end of the eyepiece tube of a Nikon Eclipse E-200 light microscope and the ScopePhoto software (La Nuova Didattica, Milan, Italy) and then measured ($n = 50$) through the Mycomètre program (Fannechère, 2005). For each parameter, i.e. length, width and Q, the mean value \pm standard deviation and the extreme values (in brackets) were calculated by the GraphPad Prism 5.0 program (GraphPad Inc., San Francisco, U.S.A). Other descriptive and inferential statistics parameters, the D'Agostino & Pearson omnibus normality test plus the percentage of iso-, subiso and heterodiametrical spores were specified in Tab. 1. Technical terms used for describing the morphological characters refer to Vellinga (1998). Authors of fungal names were quoted according to the Index Fungorum website (www.indexfungorum.org/Names/AuthorsOfFungalNames.asp). Voucher specimens were deposited in MCVE (28283). Noordeloos' systematic arrangement (1992, 2004, 2008) was followed.

Table 1. Values of descriptive and inferential statistics, D'Agostino & Pearson omnibus normality test, plus percentage of iso-, subiso- and heterodiametrical spores of *Entoloma fridolfingense*.

	Lenght	Width	Q
Number of values	50	50	50
Minimum	7.4 µm	6.0 µm	1.06
5% Percentile	8.8 µm	6.2 µm	1.27
25% Percentile	9.8 µm	6.6 µm	1.43
Median (µm)	10.4 µm	6.9 µm	1.47
75% Percentile	10.9 µm	7.4 µm	1.53
95% Percentile	11.7 µm	7.8 µm	1.71
Maximum	11.88 µm	10.44 µm	1.72
Coefficient of variation	8.2%	9.6%	8.1%
Skewness	-0.7	2.7	-0.5
Kurtosis	1.8	13.1	2.3
Lower 95% CI of mean	10.1 µm	6.8 µm	1.44
Upper 95% CI of mean	10.5 µm	7.2 µm	1.51

D'Agostino & Pearson omnibus normalità test

K2	9.1	53.0	8.1
P value	0,0	< 0,0001	0,0
Passed normality test (alpha=0.05)?	No	No	No

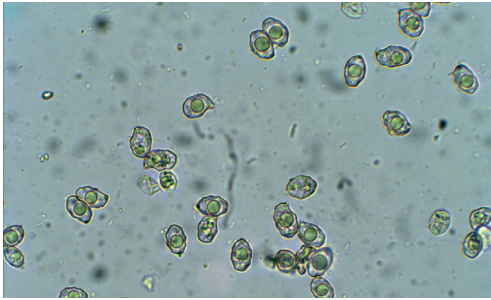
Percentage of iso-, subiso- and heterodiametrical spores

Tipology	Q range	Percentage
Isodiametrical	1.0 < Q < 1.09	2%
Subisodiametrical	1.10 < Q < 1.19	0%
Heterodiametrical H1	1.20 < Q < 1.29	4%
Heterodiametrical H2	1.30 < Q < 1.39	14%
Heterodiametrical H3	1.40 < Q < 1.49	42%
Heterodiametrical H4	1.50 < Q < 1.59	24%
Heterodiametrical H5	1.60 < Q < 1.69	8%
Heterodiametrical H6	1.70 < Q < 1.79	6%
Heterodiametrical H7	1.80 < Q < 1.89	0%
Heterodiametrical H8	1.90 < Q < 1.99	0%
Heterodiametrical H9	Q > 2	0%



Entoloma fridolfingense

Photo by Marina Cecilia Magnozzi



E. fridolfingense. Spores.

Photo by Eliseo Battistin

TAXONOMY

Entoloma fridolfingense Noordel. & Lohmeyer

Habitus collybioid to clitocyboid.

Pileus up to 27 mm broad, convex with more or less strongly depressed centre, grey-brown in wet conditions, hygrophanous, paler on drying; surface dull, weakly fibrillose (lens); margin inflexed, rarely straight, not or just a little translucently striate.

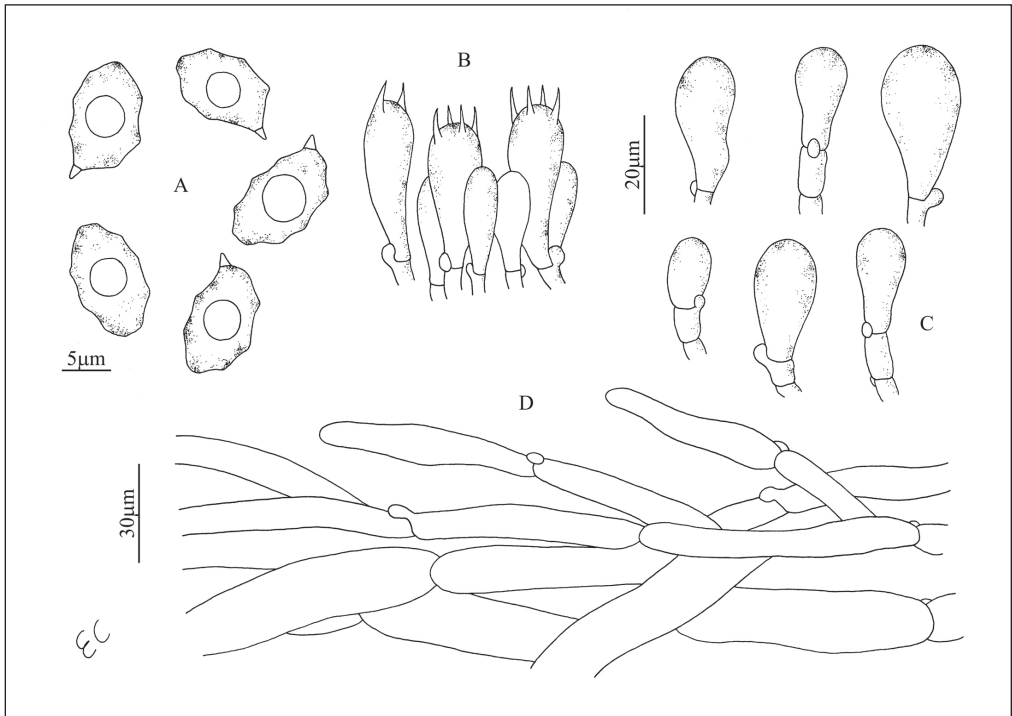
Lamellae distant, segmentiform, adnate with decurrent tooth, at first withish or grey-withish, then grey-brown; edge entire, concolorous.

Stipe up to 25 mm × 2.5 mm, cylindrical, equal or slightly enlarged at apex, rather rigid then fragile, smooth or finely fibrillose (lens), subconcolorous with the pileus.

Context scanty, greyish, odourless with mild taste.

Spore print not recorded.

Spores (7.4-) 10.3 ± 0.8 (-11.9) × (6.0-) 7.0 ± 0.7 (-10.4) μm (*n* = 50). *Q* = (1.06-) 1.48 ± 0.1 (-1.72). They are 7-9 angled in side view, mainly heterodiametrical; the predominant tipologies are H3 and H4.



E. fridolfingense. Microcharacters. A. Spores; B. Basidia; C. Cheilocystidia; D. Pileipellis.

Drawing by Emanuele Campo

Basidia 23-35 × 8-13 µm, clavate, 2- and 4-spored.

Cheilocystidia up to 35 × 9-20 µm, basidioliform, clavate or pyriform, with 0 to 1 septa, clamped.

Pileipellis cutis of radially arranged hyphae 10-15 µm wide. Subpellis composed of cylindrical cells 18-30 µm wide. Intracellular pigment.

Clamps present in all tissues.

Ecology in grasslands on sandy soil near *Pinus pinea* L. and *Fraxinus ornus* L.

Collections studied: 02.23.2014, Italy, Friuli Venezia Giulia, Udine, Aquileia, St. Marco's cemetery, five basidiomes, leg. M. C. Magnozzi, det. E. Campo & E. Battistin.

Discussion

According to Noordeloos' taxonomic point of view (1992, 2004) *E. fridolfingense* Noordel. & Lohmeyer, found for the first time in the town of Salzachdamm bei Fridolfing (Baviera, Germany) in dry grassland on sandy soil, is placed in the section *Polita* Noordel. of Subgenus *Entoloma* on account of his depressed pileus, the pileipellis with a cutis structure and the short and inflated cells of the hymenophoral trama.

It is characterized by a small size and clitocyboid habit, pilei provided with shortly translucently striate margin and depressed centre. The lamellae are rather high and adnate with decurrent tooth. Microscopically it is well recognizable on the field it can be confused with *E. sericeoides* (J.E. Lange) Noordel., *E. opacum* Noordel. and *E. undulatosporum* Arnolds & Noordel.,

all sharing a similar phenology and overall colorations, but the presence of cheilocystidia in *E. fridolfingense* permit to separate them easily.

In Italy, HAUSKNECHT & ZUCCHERELLI (1996) reported some collections of this entity from the region Emilia Romagna (Italy). To our knowledge apart from these ones, our find in Friuli Venezia Giulia and a collection of the mycologist F. Padovan in Veneto, it seems there are no further records of *E. fridolfingense* from other Italian regions, probably because of lack of interest in small-sized *Entoloma* or misidentifications.

Regarding the distribution of such a taxon over the European continent, thus far it has been recorded from Austria (HAUSKNECHT A. & ZUCCHERELLI, 1996), Germany (NOORDELOOS, 2004), Sweden and the United Kingdom (www.britmycolsoc.org.uk/files/2913/1774/3647/Pembrokeshire%20Fungus%20Recording%20Group%20Newsletter%20No%204-2011.pdf). VILA & CABALLERO (2006) collected it in Spain twice in a broadleaved wood at an altitude of 780 m. Thanks to these data, we think that *E. fridolfingense*, although localized, is a widely distributed species in Europe.

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Authors' addresses

ELISEO BATTISTIN

Natural History Museum, Corso Italia 63, 36078 Valdagno (VI).

E-mail: eliseo_battistin@yahoo.it

EMANUELE CAMPO

Via dei Gelsi 8, 33077 Sacile (PN).

E-mail: ecampo@alice.it

MARINA CECILIA MAGNOZZI

Via S. Giorgio 9, 33097 Tauriano di Spilimbergo (PN).

E-mail: marinacecilia@hotmail.it

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Web Pages

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