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A FIND OF *ENTOLOMA NIGROVIOLACEUM* IN ITALY

Abstract

The macro-, microscopical and ecological features of Entoloma nigroviolaceum *(P.D. Orton) Hesler, a rare taxon, are reported, probably for the first time as far as the Italian territory is concerned, based on a collection from Latium, central Italy. A comparison with allied entities is carried out and colour photographs of basidiomata and some microscopic structures are provided. A detailed statistical analysis of the spore size and the distribution of the Q values is presented. Concise considerations about its ecology and distribution over the European continent conclude this work.*

Riassunto

Vengono riportate le caratteristiche macro-, microscopiche ed ecologiche di Entoloma nigroviolaceum *(P.D. Orton) Hesler, specie rara e molto probabilmente mai segnalata in precedenza per il territorio italiano, sulla base di una collezione effettuata nel Lazio, Italia centrale. Viene presentato un raffronto con specie simili, nonché forniti dei fotocolor dei basidiomi e di alcuni elementi microscopici. Un'analisi statistica dettagliata delle dimensioni sporali e della distribuzione dei valori del quoziente sporale Q viene altresì proposta assieme ad alcune sintetiche considerazioni sulla distribuzione di tale entità nel continente europeo.*

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

Introduction

Hereby the authors intend to contribute to improving the knowledge of rare or poorly investigated *Entoloma* in Italy, with the description of *Entoloma nigroviolaceum* found during the 6-9 November 2014 AMER convention, in the "Parco Naturale Regionale di Bracciano-Martignano", Rome.

Materials and Methods

The photographs of the basidiomata were taken *in situ* (Fig. 1, 2 and 3) by a Nikon D80 digital camera. The macromorphological characteristics 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, in L4 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 ($n = 70$) through the Mycomètre program (Fannechère, 2005) and observed also with a Nikon Eclipse E-400 equipped with a Motic digital camera Moticam 580. For each parameter, i.e. length, width and Q, the mean value ± 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 characteristics refer to Noordeloos & Gates (2012) and Vellinga (1998). Authors of fungal names were quoted according to the Index Fungorum website (www.indexfungorum.org/Names/AuthorsOfFungalNames.asp).Voucher specimens are conserved at the authors' herbaria (TL20151113-02). Noordeloos' systematic arrangement (1992, 2004, 2008) has been adopted.

Fig. 1. *E. nigroviolaceum* in habitat (TL20151113-02). Photo by Tomaso Lezzi

Fig. 2. *E. nigroviolaceum* in habitat (TL20151113-02). Photo by Tomaso Lezzi

Fig. 3. *E. nigroviolaceum* in habitat (TL20151113-02). Photo by Tomaso Lezzi

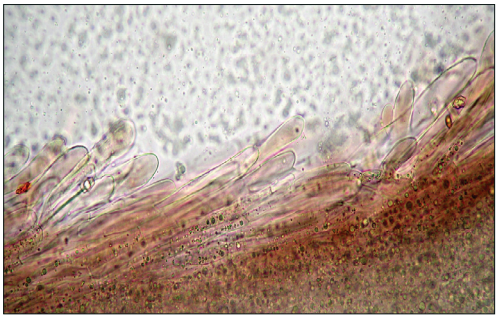

Fig. 4. *E. nigroviolaceum*. Pileipellis as a cutis with transition to a trichoderm (TL20151113-02). Photo by Eliseo Battistin

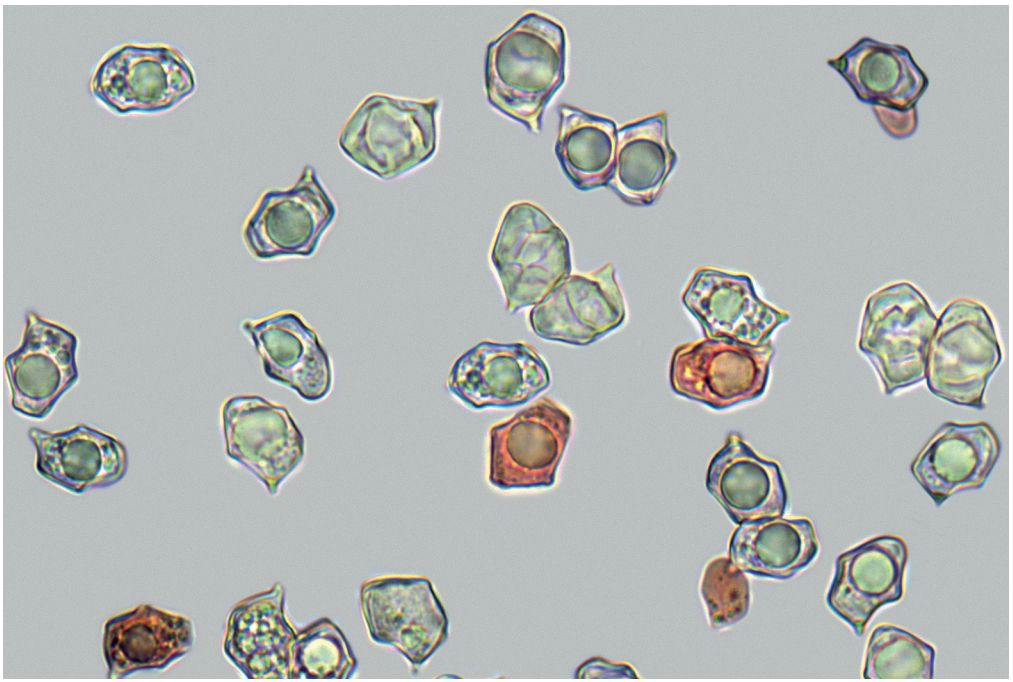

Fig. 5. *E. nigroviolaceum*. Spores in Congo red, 1000× (TL20151113-02). Photo by Mario Iannotti and Tomaso Lezzi

TAXONOMY

Macroscopic description

Habit collybioid.

Pileus up to 60 mm broad, convex to applanate, with slightly depressed centre or clearly umbilicate; surface dull, violet, almost blackish at centre with reflexed or adpressed dark blue scales radially arranged, often split and becoming radially separated; margin inflexed, sometimes wavy, rarely straight, not translucently striate.

Lamellae distant, ventricose, adnate with decurrent tooth, with lamellulae, at first whitish, then pink; edge entire, concolorous.

Table 1: values of descriptive and inferential statistics, D'Agostino & Pearson omnibus normality test plus percentage of iso-, subiso- and heterodiametrical spores (n = 70) of *Entoloma nigroviolaceum*.

	Lenght	Width	Q
Minimum	9.0 µm	6.1 µm	1.18
5% Percentile	9.8 µm	6.9 µm	1.25
25% Percentile	10.4 µm	7.3 µm	1.36
Median	10.8 µm	7.6 µm	1.41
75% Percentile	11.4 µm	8.0 µm	1.50
95% Percentile	12.2 µm	8.2 µm	1.63
Maximum	12.7 µm	9.0 µm	1.88
Mean	10.9 µm	7.6 µm	1.43
Std. Deviation	0.7 µm	0.5 µm	0.1
Coefficient of variation	6.5%	6.2%	8.3%
Skewness	0.1 µm	0.0 µm	0.8
Kurtosis	0.4 µm	1.5 µm	1.8
Lower 95% CI of mean	10.7 µm	7.5 µm	1.40
Upper 95% CI of mean	11.0 µm	7.7 µm	1.46

D'Agostino & Pearson omnibus normality test.

	Lenght	Width	Q
K2	1.0	4.1	11.8
P value	0.6	0.1	0.0
Passed normality test (alpha=0.05)?	Yes	Yes	No

Percentage of iso-, subiso- and heterodiametrical spores.

Tipology	Q range	Percentage
Isodiametrical	1.0 < Q < 1.09	0%
Subisodiametrical	1.10 < Q < 1.19	2%
Heterodiametrical H1	1.20 < Q < 1.29	10%
Heterodiametrical H2	1.30 < Q < 1.39	34%
Heterodiametrical H3	1.40 < Q < 1.49	23%
Heterodiametrical H4	1.50 < Q < 1.59	23%
Heterodiametrical H5	1.60 < Q < 1.69	7%
Heterodiametrical H6	1.70 < Q < 1.79	0%
Heterodiametrical H7	1.80 < Q < 1.89	1%
Heterodiametrical H8	1.90 < Q < 1.99	0%
Heterodiametrical H9	Q > 2	0%

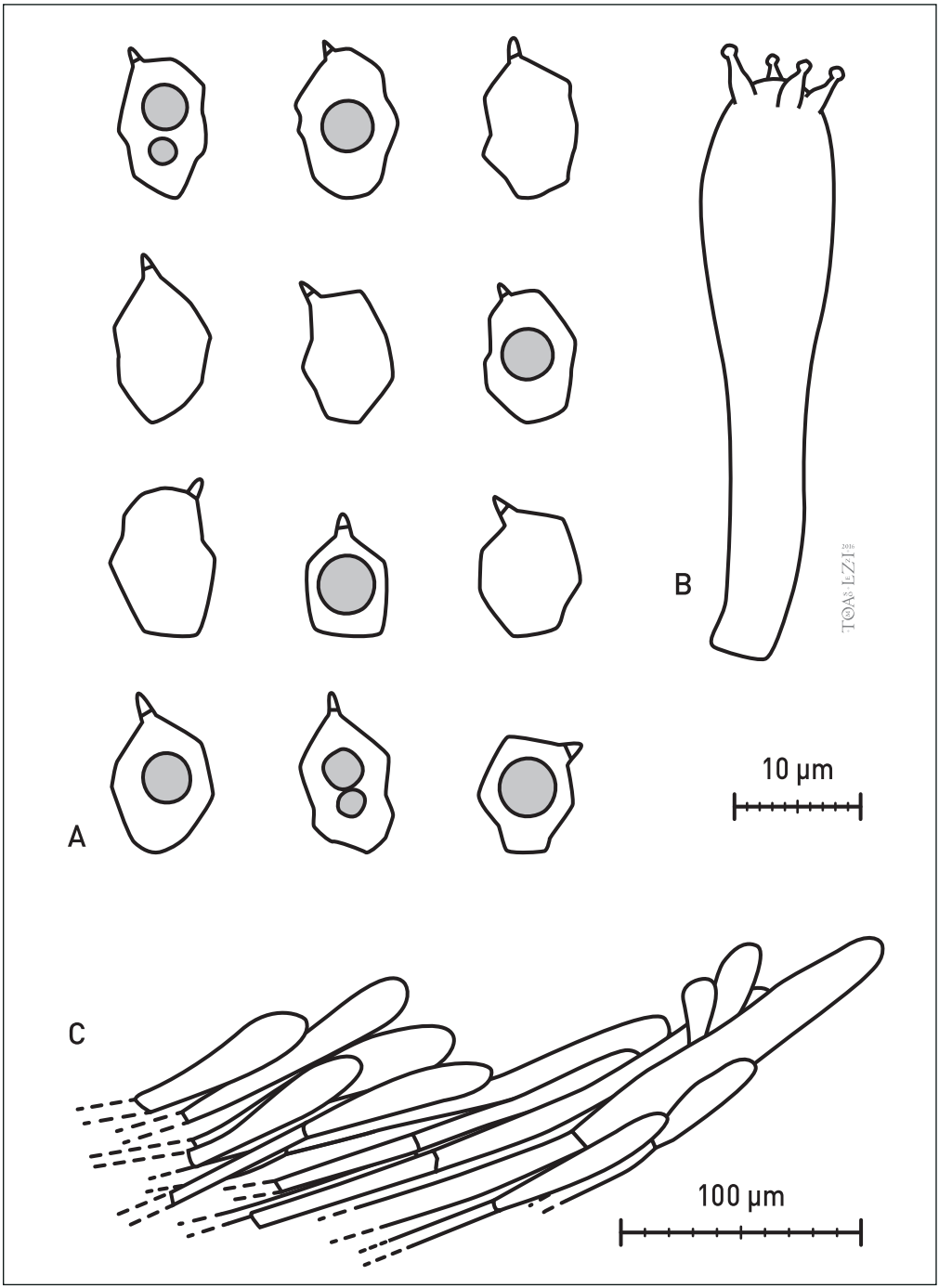

Fig. 6. *E. nigroviolaceum*. **A**. Spores; **B**. Basidia; **C**. Pileipellis as a cutis with transition to a trichoderm (TL20151113-02).
Drawing by Tomaso Lezzi

Stipe up to 100 × 7 mm, central, cylindrical, often compressed, equal or slightly enlarged at the base, fragile, smooth or finely fibrillose (lens) with tiny squamules, blue-violaceous, with a white band at apex and the base covered with a white tomentum.

Context scanty, odourless with mild taste.

Spore print not recorded.

Microscopic description

Spores (Fig. 5 and 6) (9.0-)10.9 ± 0.7(-12.7) × (6.1-)7.6 ± 0.5(-9.0) µm (*n* = 70). Q = (1.18-)1.43 ± 0.1(-1.88). They are almost exclusively heterodiametrical (98%), 5-7(8) angled in side view.

Basidia (Fig. 6) 40-50 × 10-15 µm, clavate, 4-spored.

Cheilocystidia absent.

Pleurocystidia absent.

Caulocystidia absent.

Pileipellis (Fig. 4 and 6) a cutis with transitions to a trichoderm. Terminal hyphae subclavate, 13.4-28.4 µm thick. Pigment intracellular, homogeneous, neither granular nor vacuolar.

Clamps absent in all tissues.

Ecology: in *Quercus cerris* L. and *Q. ilex* L. woods.

Phenology: 13 Nov. 2015.

Collections studied: Italy, Lazio, Bracciano (Rome), locality Monte Fagiolano, eight basidiomes, leg. T. Lezzi & M. Iannotti, det. T. Lezzi, M. Iannotti & E. Battistin.

Discussion

According to Noordeloos' taxonomic point of view (1992, 2004) *E. nigroviolaceum* falls within the subgenus *Cyanula* and is characterized by overall blue and violaceous colouring, a strongly scaly pileus, white to pink lamellae with concolorous edge, fibrillose-flocculose, non polished stipe, odourless context, quite large, heterodiametrical spores, absence of hymenial cystidia. It looks like *E. anatinum* (Lasch) Donk which shares several macro- and microscopic features like the absence of cheilocystidia and clamp-connections, size of the basidiomes, colour and aspect of the stipe, but differs especially in having a dark brown, squamulose pileus and *E. viiduense* Noordel. & Liiv. which can be distinguished by its polished stipe and more blue colouring.

According to Courtecuisse (1993) the species in question can reach a big size, in fact the diameter of the pileus can be as large as 75 mm and the stipe can be up to 120 mm long. To the best of our knowledge *E. nigroviolaceum* has been found in France (Courtecuisse, 1993), Scotland, Germany (Noordeloos, 2004), Greece (Noordeloos & Polemis, 2008) and according to the Internet in Denmark as well; our find should be one of the first records of such a species for the Italian territory.

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