

## GASTROCYBE IN EUROPE

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ABSTRACT. *Gastrocybe lateritia* Watling, a secotiid member of the Bolbitiaceae, is recorded from Europe.

### INTRODUCTION

*Gastrocybe lateritia* Watling, originally described from North America (Watling, 1968), was based primarily on collections from Gratiot Co., Michigan, although collections were also cited from Utah, Illinois and Wyoming indicating the taxon's wide distribution. This has been confirmed over the years with collections coming to hand from as far afield as Houston, Texas (legit P. Boyer) and Ontario, Canada. Additional collections have come from Michigan (N of Lansing, Isabella Co., legit J. Lampky) and it was demonstrated to members of the American Institute of Biological Sciences when it grew on the lawns of the Campus at Iowa State University during their meeting there in 1983. Singer & de Leon (1982) have also recorded *G. lateritia* from Illinois.

The distribution of this fungus can now be extended to include Europe. Collections from both Italy and Spain are the subject of this communication.

### EUROPEAN COLLECTIONS

ITALY (Fig. 1 A&G).

*Pileus* 5-15(-22)mm high, 3-10(-12)mm broad, cylindric-campanulate to conico-campanulate not expanding at maturity,  $\pm$  striate, chocolate-brown, rapidly reduced to a shapeless mass. *Stipe* 70-100(-120)  $\times$  1.5-2(-2.5)mm, equal or sometimes slightly thickened towards base, white, flexuous, becoming limp. *Gills* rust-brown, strongly anastomosing. *Smell and taste* pleasant, slightly fungussy.

Habitat: on lawn of *Poa pratensis* L. ssp. *angustifolia* (L.) Gaudin, in garden after summer irrigation or rains, vii 1984, Watling 18099 (E) & Quadraccia 973 (HBR); from Fregene, W of Rome.

SPAIN (Fig. 1B&F).

*Pileus* 20-35mm high, 3-7mm broad, viscid, with surface irregularities, ochraceous tawny. *Stipe* 80-120  $\times$  2-3mm (-7mm at base), cylindric with bulbous base, white, fibrillose-silky. *Gills* 2mm broad, ochraceous-ferrugineous.

Habitat: on lawn, in newly-arranged garden, originally arid wasteland before recultivation, treating with sand, soil, turf and cow-dung, seeding and regular irrigation, vii 1984, Watling 18100 (E); from Barcelona.

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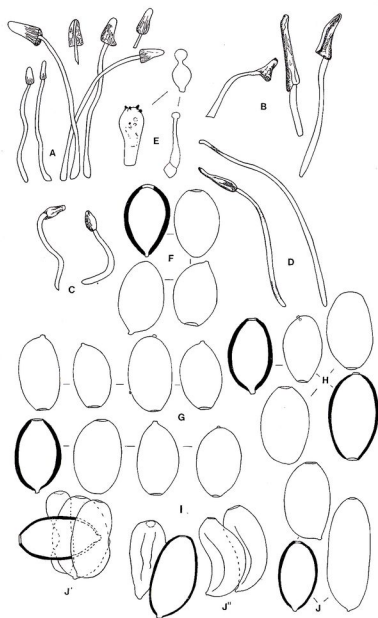


FIG. 1 *Gastrocybe lateritia* Watling. A-D Habitat sketches: A, Italian collection, Watling 18099; B, Spanish collection, Watling 18100; C & D, North American collections: C, legit Lampky (Texas); D, legit Schweitzer (Illinois). E, Cheilocystidium, basidium & pileocystidium from Watling 18098; F, four basidiospores of Watling 18100 (Spain); G, four basidiospores of Watling 18099 (Italy); H, five basidiospores of Watling 18096 (Canada); I, four basidiospores of Watling 18095 (Canada); J, two tetrads and three basidiospores of Watling 18098 (Canada), the former showing 'oculispora' effect.

The critical microscopic details for both European collections are given in Table 1 along with those of the Michigan collections and some more recent material (Senator O'Connor School and Daleena Drive, Don Mills, Ontario, Canada, 14 viii 1983, legit F. Bruski, *Watling* 18095-18098: Fig. 1E,H-J). There is little doubt that these are all conspecific, and in all respects agree with the material described by Singer & de Leon (1982). The last two authors expanded Watling's original data by having fresh material to hand. Comparisons with all collections mentioned in the text have been made by one of us (RW); Tabarès has also compared his collection with Canadian material, and coloured illustrations of the N American material figured in Fig. 1 C&D have been viewed by both junior authors.

### DISCUSSION

The occurrence of *G. lateritia* in Europe is of great interest. In fact one might have always speculated that with such an adventitious species, apparently associated with irrigated turf, it might be found outside the New World. Certainly the two localities noted above have been disturbed by man and represent two sites at which there may have been the possibility of introduction. The fungus is apparently induced to fruit only by abundant rain or in more recent years by irrigation. One of us (L.Q.) has observed in the Italian collection that the basidiomata appeared especially when the irrigation or rain followed an extremely hot and dry period (e.g. in high summer with maximal temperature c.39°C).

*Gastrocybe* Watling has been placed by Singer in the Galeropsidaceae along with *Galeropsis* Vel. & Dvořák, *Weraroa* Singer (including *Clavogaster* Henn.?), and *Tympanella* Horak, but the senior author believes this family to be an artificial assemblage of bolbitiaceous and strophariaceous elements. The natural position for *Gastrocybe* is as a secotioid member of the Bolbitiaceae. Certainly the two known species, *G. lateritia* Watling and the 2-spored *G. incarnata* (Peck) Baroni, are superficially similar to *Bolbitius* spp. and members of the *Conocybe lactea* complex (*Bolbitius tener* Berk.; *Conocybe lateritia* auct. pl.). *G. incarnata* is based on a variety of *B. tener* described from Kansas and assigned to Peck in Bartholomew (1927), Baroni (1981) and Watling & Gregory (1981).

*Bolbitius rogersii* Heim 'ad int.' (1968) may be conspecific with *G. lateritia* or possibly a closely related taxon, although it is much paler in overall colour; Singer & de Leon (1982) when describing collections of *G. lateritia* from the Chicago area synonymized the two. In support of this, one of us (RW) has examined several collections from Ontario, which, within a single population, range from cream to red-brown. The cream-coloured basidiomata are apparently suffering from abnormal spore-formation similar to that seen in *Conocybe oculispora* Locq. (Watling, 1975), where spore-wall thickness is reduced and basidiospores collapse together in tetrads. Marcel Locquin (pers. comm.) has indicated to the senior author that he believes he has seen a 'pale' *Gastrocybe* in France. Perhaps, therefore, the fungus has already been seen in Europe, yet the significance of the record was not realised at the time, and indeed it could well have been the paler 'form'.

TABLE I  
Comparison of European and North American collections of *Gastrocybe lateritia*

	Italy Fregene (Rome) Fig. 1 A&G	Spain Suburban part of Barcelona Fig. 1 B&F	Michigan	North America Ontario Fig. 1 E, H-J
BASIDIA	4-spored; 21-24 x 11-12 $\mu$ m claviform with short, prominent sterigmata	4-spored; 25-30 x 9.5-12 $\mu$ m claviform, with very short sterigmata	4-spored; 22-27.5 x 9.5-13.5 $\mu$ m claviform, with broad prominent sterigmata	4-spored; 20-22 x 12.5-14 $\mu$ m claviform, with prominent sometimes darkened sterigmata
BASIDIOSPORES	11-13.5 x 7-8 $\mu$ m, rust brown in KOH, broadly ellipsoid, smooth, thick-walled; germ- pore prominent (c. 2.5 $\mu$ m broad); apiculus ( $\leq 4 \mu$ m long).	13.5-15(-16.8) x 7.2-10.8 $\mu$ m, broadly ellipsoid, smooth; germ-pore small but prominent.	(9.5-10.5-12(-14) x (6-7-8 $\mu$ m, broadly ellipsoid, smooth, rich honey brown, darker in alkaline solutions; germ-pore, prominent, broad; apiculus prominent.	(8.4-10.5-14.5(-15.8) x (6.3-7.8-8.3(-9.7) $\mu$ m, broadly ellipsoid, smooth, rich tawny, thick walled; germ-pore central, distinct; apiculus prominent, often ragged.
CHEILOCYSTIDIA	lecythiform 19-26.5 x 6.5-10.5 $\mu$ m with capitulum 3.7-4.5(-5) $\mu$ m diam. (neck 4.3-5 x 1.3-2 $\mu$ m).	Not observed.	tibiiform-irregularly lecythiform x 7.5 $\mu$ m with capitulum $\leq 4 \mu$ m diam. (neck 4.5 x 1.75 $\mu$ m).	lecythiform 20-22 x 10-13.75 $\mu$ m with capitulum 5.5-6 $\mu$ m diam.
PLEUROCYSTIDIA	Absent	Not observed	Absent	Absent
PILEIPELLIS	Palisadoderm, hymeniform of pyriform cells 14-21.5 x 10-12.5 $\mu$ m, weakly encrusted.	Palisadoderm of rounded cells (celluliform) 12-30 $\mu$ m diam.	Palisadoderm of irregularly pyriform cells $\leq 18 \mu$ m with mucilaginous layer.	Ixopalisadoderm, hymeniform of pyriform cells often with long pedicel 13.5-22 $\mu$ m broad with some tibiiform dermatocystidia 27.5-42.5 $\mu$ m long.
STIPIPOPELLIS	filamentous, hyaline hyphae 12.5 $\mu$ m broad.	filamentous units 12-17 $\mu$ m broad.	cylindric hyaline parallel hyphae $\leq 15 \mu$ m with hair- like cystidia.*	cylindric, hyaline parallel hyphae 8.25-14 $\mu$ m, brown with some crystals in NH <sub>4</sub> OH.

\*In the original description Watling described these as pilocystidia (viz. hair-cystidia) to which Singer & de Leon (1982) took exception; Watling, however, did use this term erroneously (see Patrick & Barrows, 1979) for hair-like cells similar to those found in the *Conocybe pubescens* (Gillet) Kühner group in order to distinguish them from more differentiated elements which he termed caulocystidia. The latter are found only at the very apex of the present taxon above where the pileus clasps the stipe, with hair-like cells irregularly scattered elsewhere, especially towards base.

Now that *G. lateritia* can definitely be added to the list of European fungi it is difficult not to draw attention to the illustration of '*Agaricus lateritius* Fr.' in Fries' *Icones selectae Hymenomycetum nondum delineatorum* (1878, Tab. 127 fig. 2 right). Here a similar coloured basidioma to *G. lateritia* is depicted by v. Post & Akerlund (dell) alongside a very pale coloured basidioma; the latter has been said to be the same as *Bolbitius tener* (i.e. *Conocybe lateritia* (Batt.: Fr.) Kühner s. auct. pl.), but the former resembles *Gastrocybe*; Watling (1968) tried to draw a parallel between the two in using the epithet '*lateritia*' but habitat details and morphology differ from one to the other. Singer & de Leon (1982) thought the use of the term '*lateritius*' was, however, ill-advised. *Conocybe lateritia* cannot be used for the element known as *Bolbitius tener* (see Watling & Gregory, 1981, p.166); the correct name for this pale coloured *Conocybe* with lecythiform cheilocystidia is *C. lactea* (J. E. Lange) Métrod.

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