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*Dedicated to Professor Maria Ławrynowicz
on the occasion of the 45th anniversary
of her scientific activity*

***Pluteus aurantiorugosus* (Trog) Sacc. and *Coprinus patouillardii* Quél.
– new records of macrofungi for Romania**

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The paper gives a new contribution to the knowledge of macrofungi from Romania. *Pluteus aurantiorugosus* (Trog) Sacc. is considered a rare macrofungus throughout Europe and this is the first report of this species in Romania. *Coprinus patouillardii* Quél. is a coprinoid species which is rarely mentioned, probably due to its small size, being usually overlooked. The species was uncovered and identified during a larger research regarding the diversity and distribution of macrofungi in the areas near Bucharest, Romania.

Key words: rare fungi, endangered fungi, taxonomy, Bucharest area

INTRODUCTION

The paper contains some results of a larger research regarding the diversity and distribution of macrofungi in the areas near Bucharest. The scope of the research was to bring new information regarding some of these areas and to provide exclusive information on macrofungi diversity for some, up to present, unstudied areas.

In 2009 and 2011, during field trips in the areas surrounding the city of Bucharest, capital of Romania, we have collected some specimens of macrofungi. After careful analysis of the specimens collected, we have identified 2 taxa, namely *Pluteus aurantiorugosus* (Trog) Sacc. and *Coprinus patouillardii* Quél., which in the light of Romanian literature, are new records for Romanian mycota, thus the article provides new data on the Romanian's macrofungi biodiversity.

MATERIAL AND METHOD

The mycological material was gathered during field visits in the years 2009 and 2011. Identification was made using both written and online references (Cit erin 1992-1994; Breitenbach, Kr anzlin 1995; Ulj e 2001; Kuo 2004; Roux 2006). Also *in situ* photographs have been taken using a Canon S3 IS camera. The material collected was brought to analysis in the laboratory. The examinations included macroscopic as well as microscopic aspects. The macroscopic consisted in the analysis of the color (cap, gills, spore-print, stem), consistency, morphology, taste, odor.

The microscopic features that were observed are referring to the morphology of the spores and other structures (pleurocystidia). The observations under the microscope made were using the methods of staining with Congo Red and mounting in aqueous solution of potassium hydroxide 5%. The dried material is in the author's collection.

The scientific names and synonyms have been updated according to the *Index Fungorum* database 2013 – Kirk (2013).

SPECIES DIAGNOSES

Pluteus aurantiorugosus (Trog) Sacc., in Bivona-Bernardi, *Hedwigia*, Beibl. 35 (7): 5 (1896) (Fig. 1)

Agaricus aurantiorugosus Trog, *Mitt. naturf. Ges. Bern* 32: 388 (1857)

Pluteus caloceps G.F. Atk., *Annl. mycol.* 7(4): 373 (1909)

Pluteus coccineus (Masse) J.E. Lange, *Fl. Agaric. Danica*. 2: 88 (1937)

Pluteus leoninus var. *coccineus* Masse, *Brit. Fung.-Fl.* (London) 2: 291 (1893)

MACROSCOPIC FEATURES. *Cap*: 2 to 5.5 cm diameter, shape convex to flat, becomes depressed and sometimes slightly umbonate with age; consistency may vary from dry to moist; texture is smooth to slightly granular; margin is straight; color is bright scarlet to orange when young with bright red towards the apex, fading to bright yellow in age. *Stem*: 3 to 6 cm long; 1 cm thick; equal; with lengthwise fibers; whitish to yellowish above, flushed with the cap color below; basal mycelium white or yellowish. *Gills*: free from the stem; close; whitish, turning pinkish with age. Towards the margin the gills appear to be somewhat yellowish due to the stem (see Fig. 1). *Flesh*: pale yellow. *Odor and taste*: not distinctive.

MICROSCOPIC FEATURES. *Spores*: 6-7 × 4.5-5 µm; elliptical; smooth; spore print is pale pink to salmon. *Pleurocystidia*: 44-76 µm long, different shapes, without apical projections; *Pileipellis*: made up of (sub)globose to clavate elements, 25-35 × 20-40 µm.

OBSERVATIONS. Described first in 1896 as *Agaricus aurantiorugosus*, by Jakob Gabriel Trog in *Hedwigia*, Beibl. 35 (7): 5, the species is present on the red list of fungi from many countries of Europe such as Czech Republic (Holec, Beran 2006), The Netherlands (Arnolds, van Ommering 1996), Sweden (Dahlberg et al. 2010), Denmark (Vesterholt 1998), Germany (T aglich et al., 2004), Hungary (Rim oczy et al. 1999), Norway (K al as et al., 2010), Poland (Wojewoda, Ławrynowicz 2006), Slovakia (Lizon 2001), Switzerland (Senn-Irlet et al. 1997), and has also been found in U.S.A.

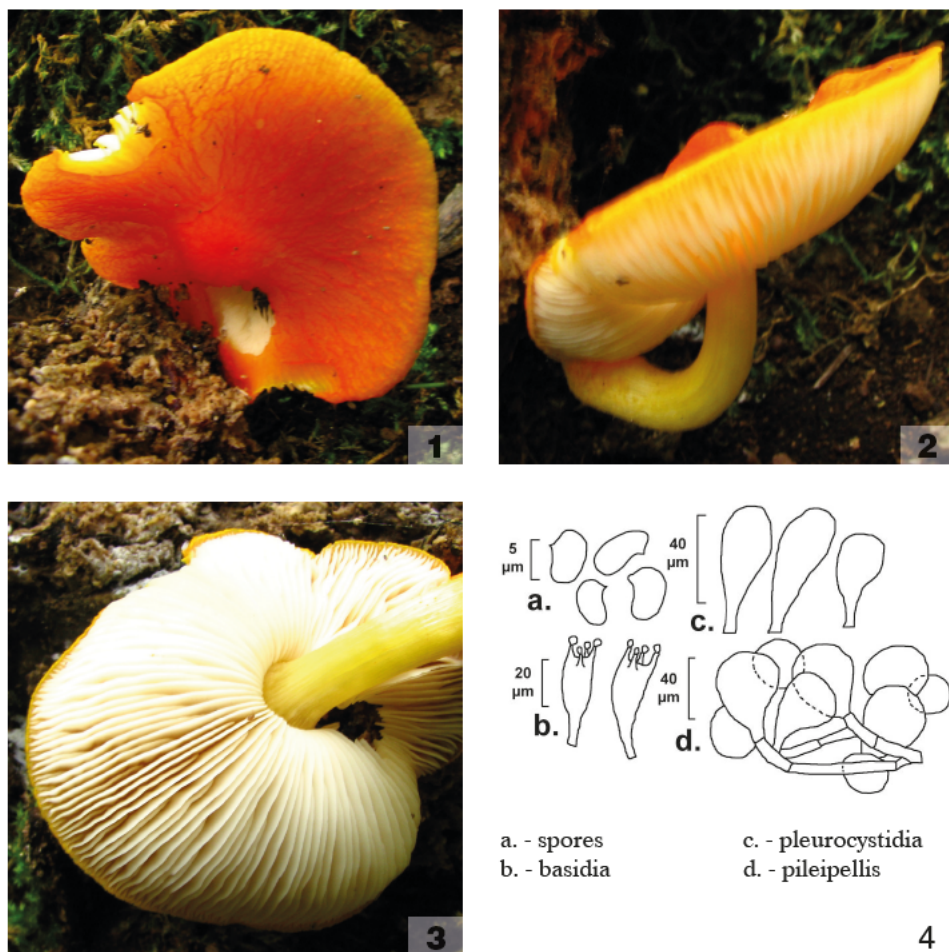


Fig. 1. *Pluteus aurantiorugosus* (Trog) Sacc. 1. Upper view; 2. Side view; 3. Bottom view; 4. Microscopical aspects. © Mihai-Iulian Radu.

(Vellinga 1990; Kuo 2004). Although not many European guides provide a complete description for this species, it is easy to identify due to its morphological characters, habitat and color of the spore print.

HABITAT. Saprotrophic fungi on decaying hardwood logs and stumps; solitary to gregarious; found in the summer.

CHOROLOGY. In Europe the species has been mentioned in Austria (Kreiss-Greilhuber 1992), Bulgaria (Assyov et al. 2006), Czech Republic and Slovakia (Kotlaba 1995), Denmark (Vesterholt 1998), France (Courtecuisse, Duhem 1994), Germany (Schnittler 1996), Hungary (Rimóczi et al. 1999), Italy (Vizzini, Ercole 2011), The Netherlands (Arnolds 1989), Norway (Kålås et al. 2010), Poland (Szczepkowski, Kujawa 2005), Spain (Justo, Castro 2007), Sweden (Gärdenfors 2000), Switzerland (Senn-Irlet et al. 1997), and Turkey (Sesli, Denchev 2008).

SPECIMENS EXAMINED. *Pluteus aurantiorugosus* (Trog) Sacc.● ad trunco amputatus – Bucharest county, Romania: Băneasa-Tunari forest, in *Carpino-Quercetum*, 44.52767° N, 26.13350° E, alt. 97 m, 18.VI.2011; leg. et det. Radu Mihai-Iulian.

Coprinus patouillardii Quél., *Tab. Analyt. Fung.* (Paris) (1): 107 (1884) (Fig. 2)

SYNONYMS. Some authors (Uljé 2001) indicate the variety *Coprinus patouillardii* var. *lipophilus* Heim & Romagn., *Bull. Soc. Mycol. Fr.* 50: 187 (1934) as having the similar macroscopic and microscopical characteristics, but the synonym has not yet been introduced into the *Index Fungorum* database. Some authors indicate *C. patouillardii* Quél. to be a synonym with *Coprinopsis cordispora* (T. Gibbs) P.M. Kirk ined. *Edinb. J. Bot.* 67(3): 406 (2010) (see Observations).

MACROSCOPIC FEATURES. *Cap* of younger specimens of 5–8 mm height and 4 mm diameter, globose, subglobose, ellipsoid or cylindrical ellipsoid, covered in a pale brownish powdery veil, produces small conical scales in the center and somewhat hairy-floccose on the margins; at maturity, the cap becomes conical then convex to campanulate and plane up to 15(22) mm in diameter; color is at first white-brownish, then whitish-grey, center pale cream colored; barely deliquescing. *Stem*: up to 50 mm height and 1 mm thick, white-translucent, fistulose, somewhat elastic but still snappable, surface smooth; cylindrical with clavate to bulbous base, up to 1.5 mm wide, white to light brownish, with white flocks, often forming a suggestion of an annular collar; surface of the stem is smooth, white-fibrillose when young. *Gills*: length – 16–22 mm and width – 1–1.5 mm free, white at first, then light grey with black edges (see Fig. 2). Odor and taste: odor absent and insignificant taste.

MICROSCOPIC FEATURES. *Basidia*: 15–30(33) × 7–8(11) µm, clavate, 4-spored, surrounded by 3–6 pseudoparaphyses, without basal clamp.

Spores: 6.0–8.9 (10) × 5.8–7(7.8) µm, Q = 1.00–1.35, av. Q = 1.05–1.30, av. L = 7.4–8.0, av. B = 6.6–7.0 µm, rectangular lemon-shaped, lentiform in frontal view, dark red-brown, with a central germ pore. *Pleurocystidia*: 30–45(50) × 15–35 µm, lageniform to ellipsoid (as opposed to the utriform, subglobose to ellipsoid or subcylindric pleurocystidia, measuring 40–80 × 16–28 µm for the taxa *Coprinopsis cordispora*). *Cheilocystidia*: 20–45 × 9–35 µm, subglobose to pyriform, lageniform. *Pileipellis*: made up of (sub)globose to ellipsoid elements, smooth to granular, up to 50 µm wide. Septa without clamp connections.

OBSERVATIONS. The species differs, according to the literature, from *Coprinopsis cordispora* (T. Gibbs) P.M. Kirk ined. by a smaller cap diameter (5–10 mm for *C. cordispora*), smaller spores dimensions (for *C. cordispora* 7.3–11.6 × 6.5–10.1 µm; Q = 0.95–1.25, av. Q = 1.05–1.20; av. L = 7.9–10.2, av. B = 7.1–9.4 µm, with a relative heart shape – thus its scientific name) and the presence of pleurocystidia. According to some authors (Orton, Watling 1979), the difference between the two species is also given by habitat (*C. patouillardii* on silage, straw and soil mixed with old dung and *C. cordispora* on fresh dung).

Arnolds (1982) accepted the taxa *C. cordispora* based on the presence or absence of pleurocystidia. In the same manner Michel Citérin accepted the two taxa based on the presence/absence of pleurocystidia but also on the spore's relative different

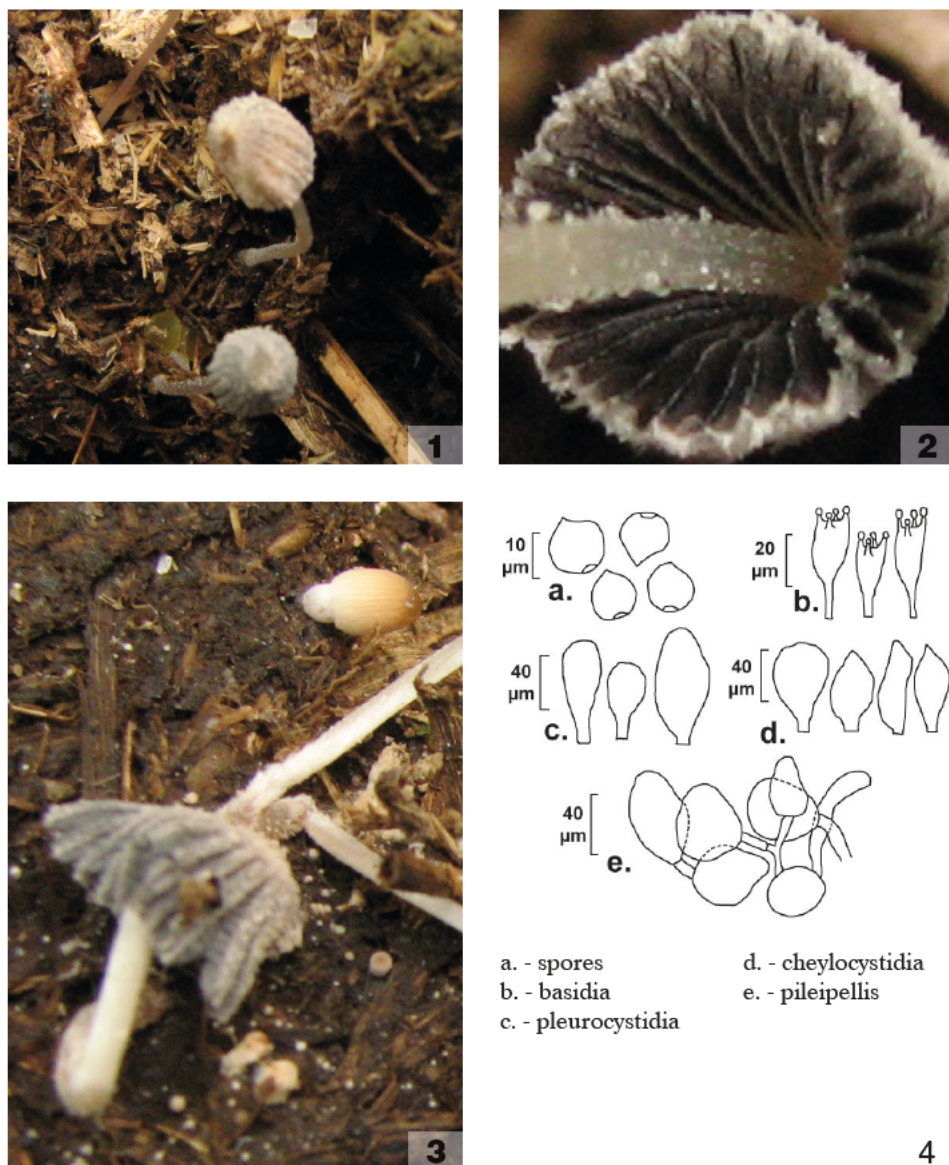


Fig. 2. *Coprinus patouillardii* Qué. 1. Upper view; 2. Bottom view; 3. Side view; 4. Microscopical aspects. © Mihai-Iulian Radu.

dimensions (Citérin 1992). In 2001, Kees Uljé presents for both species different measurements for the pleurocystidia and states that the size of the fruitbodies and spores is known as a variable in this complex, thus that the differences indicated above are not strong enough to warrant a distinction on specific level between *C. cordisporus* and *C. patouillardii* (Uljé 2001).

In relation with this, many authors consulted (Kühner, Romagnesi 1953; Enderle, Bender 1990; Krieglsteiner, Bender 1986; Breitenbach, Kränzlin 1995; Jordan

1995) consider the two species as synonyms, although, at this moment, the *Index Fungorum* database has not acknowledged this synonymy.

HABITAT. Saprotrophic fungi on compost heaps; solitary to gregarious; can appear all year when moisture is high, usually unnoticed due to its small size.

CHOROLOGY. The species was first described in France by Lucien Quélet in *Tabulae Analyticae Fungorum* (Paris) nr. 1, p.107 (1884) and was dedicated to French pharmacist and mycologist Narcisse Théophile Patouillard. The species has been mentioned in the consulted literature, in other Europe countries such as Germany (Welt, Heine 2006), Hungary (Nagya et al. 2010), The Netherlands (Uljé 2001), Poland (Wojewoda, Ławrynowicz 2006), Switzerland (Breitenbach, Kränzlin 1995) and United Kingdom (Legon et al. 2005). It can be easily mistaken with other small coprinoid species like *Coprinopsis cordispora* (T. Gibbs) P.M. Kirk or even *Coprinus ephemeroideus* (DC.) Fr.

SPECIMENS EXAMINED. *Coprinus patouillardii* Quel. ● ad fragmentis vegetalis putridos – Ilfov County, Romania: Tegheş forest, in *Tilio-Quercetum*, 44.3911° N, 25.8587° E, alt. 94 m, 16.V.2009; leg. et det. Radu Mihai-Iulian.

CONCLUSIONS

The discovery of two new records of macrofungi species for Romania, and also rare species throughout in Europe, indicating a great biodiversity that is yet to be discovered in this country moreover, the lack of specific studies in the given area. Given that one of the species is recorded as endangered in many European countries, this could also indicate that the Red List of Romanian Macrofungi species (Tănase, Pop 2005) might have new candidates.

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