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COLLYBIOID FUNGI (AGARICALES, TRICHOLOMATACEAE) IN IRANIAN PARTS OF THE CAUCASUS

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КОЛЛИБИОИДНЫЕ ГРИБЫ (AGARICALES, TRICHOLOMATACEAE) ИРАНСКОЙ ЧАСТИ КАВКАЗА

Abstract. Given the fact that the mycobiota of the Iranian part of the Caucasus (in the north and north-western part of Iran) is insufficiently studied, we present detailed information on the distribution of collybioid fungi, which belong to agaricales. It is established that the Iranian part of the Caucasus offers six species of basidiomycetes [*Collybia ocellata* (Fr.) P. Kumm., *Collybia tuberosa* (Bull.) P. Kumm., *Gymnopus confluens* (Pers.) Antonín, *Gymnopus dryophilus* (Bull.) Murrill, *Gymnopus erythropus* (Pers.) Antonín., and *Rhodocollybia prolixa* var. *distorta* (Fr.) Antonín], which belong to collybioid fungi. All the species are characterized by macroscopic (shape, color, and basidioma size) and microscopic (shape and basidiospore size) features, which differ only in quantitative terms. It is established that *C. ocellata* is a new species for micobiota inherent in Iran.

Key words: collybioid fungi, species, Iranian part of the Caucasus, macroscopic and microscopic characteristics.

Аннотация. Учитывая тот факт, что микобиота Иранской части Кавказа (в северной и северо-западной части ИР Ирана) изучена недостаточно, в представленной работе было исследовано распространение коллибиоидных грибов, которые относятся к агарикальным грибам (порядок Agaricales). В результате проведенных исследований установлено, что в Иранской части Кавказа распространены шесть видов базидиомицетов (*Collybia ocellata* (Fr.) P. Kumm., *Collybia tuberosa* (Bull.) P. Kumm., *Gymnopus confluens* (Pers.) Antonín, *Gymnopus dryophilus* (Bull.) Murrill, *Gymnopus erythropus* (Pers.) Antonín. и *Rhodocollybia prolixa* var. *distorta* (Fr.) Antonín), относящихся к коллибиоидным грибам. Обнаруженные виды были охарактеризованы по макроскопическим (форма, цвет и размеры плодового тела) и микроскопическим (формы и размеры базидиоспор) признакам, которые отличались между собой только по количественным показателям. Установлено, что вид *C. ocellata* является новым для микобиоты, присущей природе Ирана.

Ключевые слова: коллибиоидные грибы, виды, Иранская часть Кавказа, микроскопическая и макроскопическая характеристика.

Collybioid fungi are a group of small to medium sized agarics with white to cream spore print, exannulate cartilaginous stipe and incurved cap margin. Genera such as, *Collybia*, *Dendrocollybia*, *Gymnopus* and *Rhodocollybia* are mushroom genera that rested in collybioiod group [1]. Despite biological importance of Caucasus region, known about occurrence and distribution of agaric fungi in this area was scarce. Some recent studies on biodiversity and taxonomy of macrofungi in Iranian part of Caucasia have provided data on the diversity of fungi in Caucasus hot spot [2-6].

Materials and methods

Samples were collected during the 2004 to 2009 from different sites of Iranian parts of Caucasus in North and North West Iran. The description of the species is based on fresh as well as dried collections. Microscopic analysis generally involved the mounting of basidiocarp fragments in 10% potassium hydroxide (KOH) solution. Spore range was obtained by measuring about 30-40 spores. The type of spore ornamentation and identification are given after Singer [15], Largent [8], Largent, Johnson & Watling [9], Largent & Timothy [10], Pegler [12-14] and Moser [11]. Amyloidy of spores were tested using Melzer reagent. Terminology of microscopic and macroscopic features follows Kirk et al. [7]. Specimens were deposited in fungus reference collection of the ministry of Agriculture in Department of Botany, Iranian Research Institute of Plant Protection (Iran).

Results

Collybia ocellata (Fr.) P. Kumm., Führ. Pilzk. (Zwickau): 114 (1871)

Pileus 1-2 cm, convex becoming umbonate to depressed, often wavy at margin, whitish. Color whitish, crown brownish.

Stipe 40-60 x 2-5 mm, bald, whitish, base brownish. Flesh white. Lamellae free, white to pale buff.

Spores smooth; elliptical, inamyloid, 7-8.5 x 4.5-5 µm. Spore print white.

Collybia tuberosa (Bull.) P. Kumm., Führ. Pilzk. (Zwickau): XXVIII, 119 (1857) (Syn.: *Agaricus tuberosus* Fr., Herb. Fr.: pl. 552; *Collybia sclerotipes* (Bres.) S. Ito, Mycol. Fl. Japan 2(5): 123 (1950); *Gymnopus tuberosus* (Bull.) Gray, Nat. Arr. Brit. Pl. (London) 1: 611 (1821); *Marasmius sclerotipes* Bres., Fung. trident. 1(1): 12 (1881); *Microcollybia tuberosa* (Bull.) Lennox, Mycotaxon 9(1): 196 (1979));

Pileus 1-1.5 cm, convex with a somewhat in-rolled margin when young, becoming broadly convex to flat, with a central depression, dry or moist, more or less smooth, sometimes lined on the margin, whitish.

Lamellae attached to the stipe, close or almost distant, whitish or pale pinkish.

Stipe 10-50 x 1 mm, more or less equal, dry, often minutely dusted at the apex and/or base, whitish to pinkish, becoming hollow, attached to sclerotia which are elliptical, reddish brown, and measure 3.0-12 x 2.0-5.0 mm. Context whitish, thin.

Spores 4.0-6.0 x 3.0-3.5 µm, smooth, more or less elliptical, inamyloid. Pleurocystidia absent. Cheilocystidia present but scattered and inconspicuous, 20-35 µm long, cylindrical, with occasional lobes or projections. Pileipellis a cutis of hyphae 2.0-5.0 µm wide, pileocystidia absent. Spore print white (Fig. 1D).

Gymnopus confluens (Pers.) Antonín, Halling & Noordel., Mycotaxon 63: 364 (1997) (Syn.: *Agaricus archyropus* Pers., Mycol. eur. (Erlanga) 3: 135 (1828); *Agaricus confluens* Pers., Observ. mycol. (Lipsiae) 1: 8 (1796); *Chamaeceras archyropus* (Pers.) Kuntze, Revis. gen. pl. (Leipzig) 3: 455 (1898); *Collybia confluens* (Pers.) P. Kumm., Führ. Pilzk. (Zwickau): 117 (1871); *Marasmius confluens* (Pers.) P. Karst., Bidr. Känn. Finl. Nat. Folk 48: 102 (1889)).

Pileus 2-6 cm, convex with incurved margin, soon flattened, thin, often wavy margin; reddish brown fading to pale buff; glabrous. Lamellae almost free, very crowded, narrow; pallid. Stipe 50-100 x 2-5 mm, often flattened; reddish beneath a dense whitish pubescence; tough; base densely hairy.

Spores ellipsoid, smooth, 6-8 x 2-4 µm. Spore print white (Figs. 1A, 2B).

Gymnopus dryophilus (Bull.) Murrill, N. Amer. Fl. (New York) 9(5): 362 (1916) (Syn.: *Agaricus dryophilus* Bull., Herb. Fr. 10: tab. 434 (1790); *Collybia dryophila* (Bull.) P. Kumm., Führ. Pilzk. (Zwickau): 115 (1871); *Marasmius dryophilus* var. *auratus* (Qué.) Rea, Brit. basidiomyc. (Cambridge): 524 (1922); *Omphalia dryophila* (Bull.) Gray, Nat. Arr. Brit. Pl. (London) 1: 612 (1821)).

Pileus 1-7 cm, when young convex with an incurved margin, becoming broadly convex to flat; moist, smooth, dark reddish brown to brown when young, becoming tan to orangish brown. Lamellae attached to the stipe or free; whitish to pinkish, crowded.

Stipe 50-100x 2-7 mm, equal, dry; fibrous and smooth, whitish above, light buff below, becoming darker, usually with thin, whitish rhizomorphs attached to the base. Flesh whitish and thin. Odor and taste not distinctive.

Spores: 5-6 x 2-3.5 μm ; smooth; elliptical, inamyloid. Cheilocystidia 10-55 x 2-5 μm , clavate, cylindrical to irregular, often with lobes or coralloid projections. Pileipellis of branched and swollen, interwoven hyphae 2-13 μm wide. Spore Print white to creamy (Figs 1B, 2A).

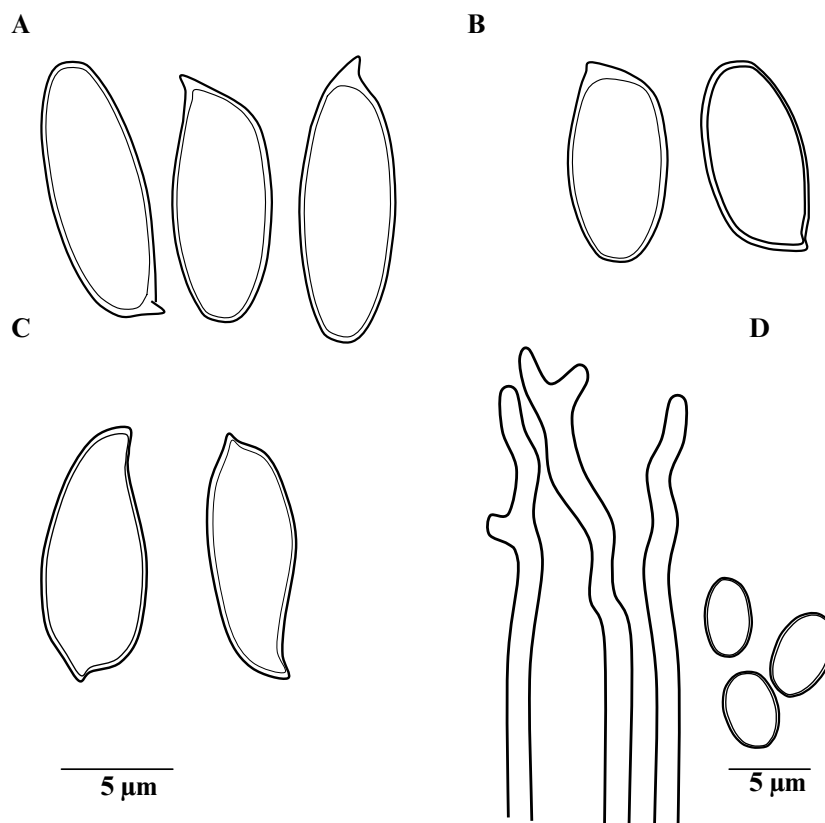


Fig. 1. Spores of A. *Gymnopus confluens* B. *G. dryophilus* C. *G. erythropus* D. Cheilocystidia and spores of *Collybia tuberosa*



Fig. 2. Basidiocarps of A. *Gymnopus dryophilus* B. *G. confluens* C. *G. erythropus*

***Gymnopus erythropus* (Pers.) Antonín, Halling & Noordel., Mycotaxon 63: 364 (1997)** (Syn.: *Agaricus erythropus* Pers., Syn. meth. fung. (Göttingen) 2: 367 (1801); *Agaricus marasmioides* Britzelm., Bot. Zbl. 73(5): 208 (1893); *Chamaeceras erythropus* (Pers.) Kuntze, Revis. gen. pl. (Leipzig) 3: 456 (1898); *Collybia badia* Bres., Atti Imp. Regia Accad. Rovereto, ser. 3 8: 129 (1902); *Collybia bresadolae* Sacc. & D. Sacc., Syll. fung. (Abellini) 17: 17 (1905); *Collybia erythropus* (Pers.) P. Kumm., Führ. Pilzk. (Zwickau): 115 (1871); *Collybia kuehneriana* Singer, Persoonia 2(1): 24 (1961)).

Pileus 1-3 cm, convex becoming flattened and often wavy at margin, pale tan when moist drying to pale buff or cream and wrinkled but remaining tan at the centre which is sometimes depressed. Stipe 40-60 x 2-5 mm, dark red becoming paler towards the apex, the base covered in dark pink woolly hairs. Flesh white in the cap, reddish-brown in the stem. Smell mushroomy or slightly rancid. Lamellae free, white to pale buff.

Spores pip-shaped, 6-8 x 3.5-4 µm. Spore print white (Figs. 1C, 2C).

***Rhodocollybia prolixa* var. *distorta* (Fr.) Antonín, Halling & Noordel., Mycotaxon 63: 365 (1997)** (Syn.: *Agaricus distortus* Fr., Epicr. syst. mycol. (Upsaliae): 84 (1838) [1836-1838]; *Collybia distorta* (Fr.) QuéL., Mém. Soc. Émul. Montbéliard, Sér. 2 5: 93 (1982); *Marasmius distortus* (Fr.) P. Karst., Bidr. Känn. Finl. Nat. Folk 48: 101 (1889); *Rhodocollybia distorta* (Fr.) Singer, Annl. mycol. 41(1/3): 88 (1943)).

Pileus 3-7 cm, convex becoming flattened with a broad umbo, reddish brown. Stipe 40-55 x 4-8 mm, whitish flushed with cap colour, often grooved and twisted. Flesh pale tan. Taste and smell not distinctive.

Lamellae crowded, adnate with a slightly uneven edge, whitish becoming stained reddish brown.

Spores globose, 3-4.5 µm. Spore print white. Habitat in small tufts in coniferous woods.

REFERENCES:

1. Antonin V., Halling R.E. & Noordeloos M.E. Generic concepts within the groups of *Marasmius* and *Collybia* sensu lato. // Mycotaxon, 1997, v.63, p. 359-368.
2. Asef M.R. Agaric flora of North West forests of Iran. / Abstracts of XV congress of European Mycologists. SPb(Russia), 2007, p.112-113.
3. Asef M.R. Macrofungi flora of Arasbaran 1. *Cortinarius* subgenus *Myxacium* // Rostaniha., 2008, v. 8(2), p. 178-185.
4. Asef M.R. Macrofungi flora of Arasbaran 2. Bolete fungi (Families Boletaceae and Suillaceae) // Rostaniha, 2008, v. 9 (2), p. 210-229.
5. Asef M.R., Muradov P.Z. and Sadiqov A. The genus *Hypholoma* in Iranian part of Caucasia. // Transaction of the Institute of Microbiology of Azerbaijan National Academy of Sciences. Baku: "Elm", 2007, v. 5, p. 267-271.
6. Asef M.R., Muradov P.Z. and Sadiqov A. Taxonomy and distribution of genus *Crepidotus* in Iranian part of Caucasia. // Transaction of the Institute of Microbiology of Azerbaijan National Academy of Sciences. Baku: "Elm", 2008, v.6, p.261-266.
7. Kirk P. M. Cannon, P.F., David, J. C., Stalpers, J. A. 2001. Ainsworth & Bisby's dictionary of the fungi. 9th ed. United Kingdom, Wallingford: CAB International
8. Largent D.L. How to identify Mushrooms to Genus I: Macroscopic Features. 3rd. Ed. Eureka, CA: Mad River Press., 1986, 166p.
9. Largent D.L., Johnson D. and Watling R. How to identify Mushrooms to Genus III: Microscopic Features. Eureka, CA: Mad River Press., 1977, 148p.
10. Largent D.L. and Timothy B. How to identify Mushrooms to Genus VI: Modern Genera. Eureka, CA: Mad River Press., 1988, 277p.
11. Moser M. Keys to Agarics and boleti (Polyporales, Boletales, Agaricales, Russulales). 4th edition, translated to English by Simon Plant. R. Phillips Publ. London, 1978, 535p.
12. Pegler D.N. A preliminary agaric flora of East Africa. Kew Bull., 1977, 615 p.
13. Pegler D.N. 1983. Agaric flora of the Lesser Antilles. Kew Bull., 1982, 668 p.
14. Pegler D.N. Agaric Flora of Sri Lanka. London: H.M.S.O., 1986, 456p.
15. Singer R. The Agaricales in modern taxonomy. Koenigstein, Germany: Koeltz Scientific Books, 1986, 320 p.