

***Paralepistopsis amoenolens*: First Record of A Rare and Poisonous Taxon in Turkey**

***Paralepistopsis amoenolens*: Nadir ve Zehirli Bir Taksonun Türkiye'deki İlk Kaydı**

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Abstract

In this study, the rare and poisonous species *Paralepistopsis amoenolens* (Turkish: *Kokulu felceden*, English: *Paralysis funnel*) is reported from Turkey for the first time. Microscopic images and descriptions of the species are given together with macroscopic photographs.

Key Words: Toxic species, erythromelalgia, taxonomy, *Tricholomataceae*.

Öz

Bu çalışmada, nadir ve zehirli bir tür olan *Paralepistopsis amoenolens* (*Kokulu felceden*) Türkiye'den ilk kez rapor edilmektedir. Türün fotoğrafı ile birlikte mikroskopik görüntüsü ve deskripsiyonu verilmektedir.

Anahtar Kelimeler: Zehirli tür, eritromelalji, taksonomi, *Tricholomataceae*.

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1. Introduction

Paralepistopsis Vizzini (2012) is a new genus introduced as a consequence of molecular studies: it belongs to the family *Tricholomataceae* Lotsy and encompasses a couple of taxa previously inserted in the genus *Clitocybe* (Fr). Members of the aforementioned genus have generally a clitocyboid habit and are characterized by umbrella-shaped pilei with pruinose surface, decurrent lamellae, cylindrical stipe with no trace of veil, whitish to cream spore print, inamyloid, smooth spores and cylindrical, clamped hyphae (Vizzini and Ercole 2012). In the past *Paralepistopsis acromelalga* (Ichimura) Vizzini (formerly known as *Clitocybe acromelalga*) in Japan and *P. amoenolens* (Malençon) Vizzini (formerly known as *Clitocybe amoenolens*) in France and Italy, caused significant mushroom poisoning syndromes known as erythromelalgia, erythermalgia or acromelalgia. These syndromes, unlike better known kinds of mushroom poisoning, do not show symptoms such as stomach upsets, vomiting and diarrhea, so that their identification can be very problematic. The commonest and best known symptoms of this syndrome are edema especially of the feet with a pain like electric shocks, and a skin rash (Nakamura et al. 1987; Bresinsky and Besl 1990; Saviuc et al. 2001; Saviuc and Danel 2006; Nakajima et al. 2013). In recent years some surveys have added many new records and taxa new to science have been described for the Turkish territory (Intini et al. 2003; Işıloğlu et al. 2009; Işıloğlu et al. 2010; Watling et al. 2010; Çolak et al. 2015; Sesli et al. 2015; Vizzini et al. 2015; Akata et al. 2016;

Doğan and Kurt 2016; Kaygusuz et al. 2016; Topcu-Sesli and Sesli 2016; Sesli et al. 2016; Şen et al. 2016; Çolak et al. 2017; Işık and Türkekel 2017; Kaygusuz and Çolak 2017a; Kaygusuz and Çolak 2017b; Türkekel 2017; Uzun et al. 2017). Likewise, the aim of this study is to contribute to increase the knowledge of fungal diversity in Turkey and make it easier for toxicologists to obtain important information from the literature.

2. Materials and Methods

In the autumn of 2017, some fungal samples were collected from Gölcük Lake Nature Park in Isparta Province. The specimens were photographed in the field, and the morphological and ecological characteristics were noted in the field notebook. Afterwards, each specimen was packaged by wrapping in aluminium foil and brought to the laboratory, where the specimens were dried after spore prints were taken. Microscopical structures were observed with a light microscope using KOH and Congo Red. The following abbreviations are used in the descriptions: L^m for the average length of all the measured basidiospores, W^m for the average width of all the measured basidiospores, Q for the quotient of length and width of all the measured basidiospores, and Q^m for the average of all calculated Q values for all basidiospores measured. Identification of the samples was conducted according to Contu et al. (1999), Moreau et al. (2001), Martínez et al. (2010) and Vizzini and Ercole (2012). The

dried samples are conserved in the personal fungarium of the first author at Süleyman Demirel University. The names of taxa and authors are quoted according to MycoBank (www.mycobank.org) and Index Fungorum (www.indexfungorum.org).

3. Results

Tricholomataceae Lotsy

Paralepistopsis Vizzini / *Felceden*

Paralepistopsis amoenolens (Malençon) Vizzini, *Mycotaxon* 120: 257 (2012) / *Kokulu felceden* **Figs:** 1–4
Syn.: *Clitocybe amoenolens* Malençon, in Malençon & Bertault, *Trav. Inst. Sci. Chérifien*, Sér. Bot. Biol. Veg. 33: 141 (1975)

Turkish etymology: As stated above, fungi of the genus *Paralepistopsis* cause the syndrome erythromelalgia, and because this syndrome causes physiological disorders to the feet which are similar to stroke, they have been called *felceden* in Turkish (Turkish *felç*: paralysis or stroke; *felceden*: paralyser). The Latin name *amoenolens* means aromatic, and so the species *Paralepistopsis amoenolens* has been given the Turkish name of *Kokulu felceden* (Turkish *kokulu*: aromatic) (Menemen et al. 2016). Also, this species has been called the “paralysis funnel” in English (Evans and Kibby 2004).

Pileus 2.8 – 6 cm in diameter, at first hemispherical, then applanate, fleshy and elastic, margin partially wavy, inflexed. Surface viscid when wet, generally whitish-cream, pinkish to faded orange especially in the center, partially wrinkled-areolate. **Lamellae** decurrent, sometimes furcate, paler than the pileus, whitish to yellowish ocher or pinkish. **Stipe** 2.5 – 6 × 0.6 – 1.6 cm, central to slightly eccentric, more or less cylindrical, curved, hollow, slightly paler than the pileus. **Taste** mild to slightly bitter after prolonged chewing. **Odour** distinctly aromatic. **Spore print** whitish to pale cream.

Basidiospores (4.8-) 5.1 – 6.4 (-6.8) × (3.0-) 3.2 – 4.0 (-4.5) μm , $L^m \times W^m = 5.6 \times 3.6 \mu\text{m}$, $Q = (1.3-) 1.4 – 1.8 (-1.9)$, $Q^m = 1.6 \mu\text{m}$, widely ellipsoid, hyaline, thin-walled, smooth and inamyloid, and containing a single droplet. **Basidia** (30.0-) 39.3 – 44.00 × 4.3 – 5.6 μm , cylindrical to clavate, 4-spored, rarely 2-spored. **Basidioles** scattered, similar to basidia, (25.5-) 38.5 – 42 × 4.2 – 5.1 μm , cylindrical to subfusiform, mostly arcuated and twisted, occasionally forked at apex, hyaline and thin-walled. **Cheilocystidia** absent. **Pleurocystidia** absent. **Pileipellis** composed of cylindrical, hyaline, thin-walled hyphae 3 – 7 μm broad, embedded in a 140 – 300 μm thick gelatinous matrix. **Stipitipellis** a cutis made up of cylindrical to subfusiform, flexuous, hyaline, thin-walled, 3 – 6 μm wide hyphae. **Clamp connections** present in all tissues.



Fig. 1. *Paralepistopsis amoenolens* (ÖFÇ 1371): basidiomata



Fig. 2. *Paralepistopsis amoenolens* (ÖFÇ 1372): basidiomata



Fig. 3. *Paralepistopsis amoenolens* (ÖFÇ 1373): basidiomata

Habitat: Forests of *Cedrus libani* A. Rich.

Specimen examined: TURKEY. Isparta Province, Gölcük Lake Nature Park, approximately 1400 m above sea level, 15 November 2017 (ÖFÇ 1371, 1372, 1373).

4. Discussion

Paralepistopsis amoenolens was first reported from Morocco and later from France, Spain and Italy, while *P. acromelalga* has been reported only from Japan and South Korea. To our knowledge Turkey is the fifth country where *P. amoenolens* has been found (Ichimura 1918; Moreau et al. 2001; Saviuc et al. 2001; Leonardi et al. 2002; Martínez et al. 2010; Vizzini and Ercole 2012).

P. amoenolens can be distinguished from *P. acromelalga* on account of its paler pileus and stipe, more distant lamellae, larger spores and a peculiar odour (Ichimura 1918; Moreau et al. 2001; Leonardi et al. 2002; Vizzini and Ercole 2012). Misidentifications are possible with morphologically similar entities like *Clitocybe gibba* (Pers.) P. Kumm., *Lepista lentiginosa* Maire, *Lepista irina* (Fr.) H.E. Bigelow, *Paralepista flaccida* (Sowerby) Vizzini and

Paralepista gilva (Pers.) Raitelh. Cases of poisoning have been reported from various European countries as a result of wrong identifications of fungi (Moreau et al. 2001; Saviuc et al. 2001; Leonardi et al. 2002; Vizzini and Ercole 2012).

Detailed descriptions of *P. amoenolens* have been provided in previous studies (Contu et al. 1999; Moreau et al. 2001; Leonardi et al. 2002; Martínez et al. 2010; Vizzini and Ercole 2012). A comparative analysis of the Turkish specimens and data provided by other authors are presented in Table 1: it shows that the size of macroscopic and microscopic structures of our samples are compatible with previous findings.

P. amoenolens has previously been reported growing in woods of *Cedrus atlantica* (Endl.) Manetti ex Carrière, *C. deodara* (Roxb. ex D. Don) G. Don, *Picea abies* (L.) Karst, *Pinus nigra* Arnold, *P. pinaster* Ait., *P. sylvestris* L., *Quercus ilex* L., *Q. petraea* (Matt.) Liebl., *Cupressus arizonica* Greene, *Ilex aquifolium* L., *Larix decidua* Mill., *Cistus ladanifer* L. and *Daphne gnidium* L. (Leonardi et al. 2002; Martínez et al. 2010; Vizzini and Ercole 2012). In this study *P. amoenolens* was picked up under *Cedrus libani* and that is an ecological news for this fungus.

Table 1. Comparison of macroscopic and microscopic features of *P. amoenolens*.

Country	Size of pileus (mm)	Size of stipe (mm)	Size of spores (µm)	Size of basidia (µm)	Width of pileipellis (µm)	References
Italy	20–65	25–70 × 10–20	4.5–6.0 × 3.0–4.0	30–38 × 6.0–7.0	3.0–7.5	Contu et al. (1999)
France	40–70	20–50 × 4–12	4.3–5.6 × 3.0–4.0	23–30 × 5.0–7.5	3.0–6.0	Moreau et al. (2001)
* Morocco	—	—	3.8–5.3 × 3.0–3.9	18–30 × 3.5–4.5	2.0–3.5	
Italy	—	—	4.0–6.0 × 3.0–4.0	21–32 × 4.0–6.0	—	Leonardi et al. (2002)
Spain	30–90	15–45 × 4–13	4.4–5.8 × 2.7–3.9	33–45 × 4.5–6.5	3.4–6.4	Martínez et al. (2010)
** Morocco	25–90	25–65 × 5–13	5.0–6.0 × 3.0–4.0	30–40 × 6.0–7.0	—	
France and Italy	20–80	25–50 × 7–13	3.8–5.6 × 2.3–4.3	25–38 × 5.0–7.0	4.0–6.0	Vizzini and Ercole (2012)
Turkey	28–60	25–60 × 6–16	4.8–6.8 × 3.0–4.5	30–44 × 4.3–5.6	3.0–7.0	This study

* Examination of Malençon's original fungarium material by P.A. Moreau

** Description of original material

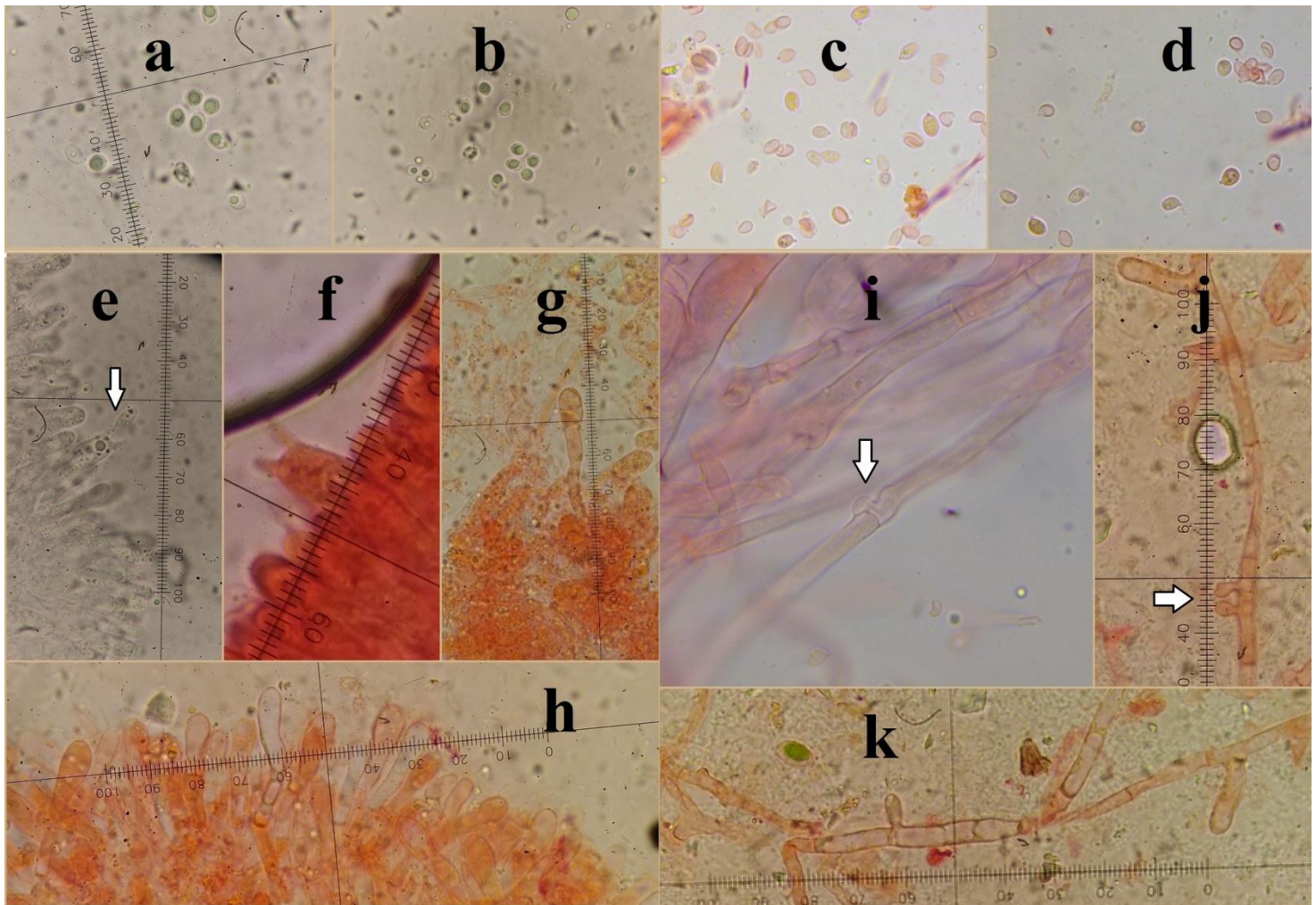


Fig. 4. *Paralepistopsis amoenolens* a-b: basidiospores (in KOH), c-d: basidiospores (in Congo red), e: basidia (in KOH), f: basidia (in Congo red), g-h: basidioles (in Congo red), i: pileipellis; clamp connections (in Congo red), j-k: pileipellis (in Congo red).

5. Conclusions

According to the literature (Sesli and Denchev 2008; Sesli et al. 2016; Sesli and Topcu-Sesli 2017; Solak et al. 2015) twenty genera of the family *Tricholomataceae* have been reported from Turkey so far (*Arrhenia* Fr., *Clitocybe* (Fr.) Staude, *Clitolyophyllum* E. Sesli, Vizzini & Contu, *Collybia* (Fr.) Staude, *Delicatula* Fayod, *Fayodia* Kühner, *Gamundia* Raithelh., *Infundibulicybe* Harmaja, *Lepista* (Fr.) W.G. Sm., *Leucocortinarius* (J.E. Lange) Singer, *Leucopaxillus* Boursier, *Melanoleuca* Pat., *Myxomphalia* Hora, *Omphalina* QuéL., *Phyllotopsis* E.-J. Gilbert & Donk ex Singer, *Pseudoclitocybe* (Singer) Singer, *Pseudoomphalina* (Singer) Singer, *Resupinatus* Nees ex Gray, *Tricholoma* (Fr.) Staude and *Tricholomopsis* Singer). In this study the poisonous and very rare species *Paralepistopsis amoenolens* is reported as a new record for the mycobiota of Turkey becoming the 21st genus of the *Tricholomataceae* occurring in this country.

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