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Records of *Aureobasidium harposporum*, *Sarcophoma miribelii*, and *Stigmina dothideoides* from Turkey

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Abstract—During field studies on the microfungi in Mucur District of Kırşehir Province, *Aureobasidium harposporum*, and *Stigmina dothideoides* were revealed as new records for Turkey; and *Sarcophoma miribelii*, previously recorded from northeastern Turkey, is reported from central Turkey. Distinguishing morphological characters of these species are described, and their photographs are provided.

Key words—*Ascomycota*, *Dothideales,* leaf pathogenic fungi, *Mycosphaerellales,* SEM

Introduction

Aureobasidium Viala & G. Boyer (*Saccotheciaceae*, *Dothideales*) contains 24 species (Index Fungorum 2018). The genus is characterized by synchronous conidium production on hyaline conidiogenous cells. Species of *Aureobasidium* produce variously shaped one-celled conidia from terminal, lateral, or intercalary hyaline conidiogenous cells. Members of this genus occur as saprophytes on a variety of substrates or as parasites on phanerogams (Hermanides-Nijhof 1977).

Sarcophoma Höhn. (*Dothioraceae, Dothideales*) was proposed by Höhnel in 1906 as a monotypic genus, but four species are now accepted (Index Fungorum 2018).

Stigmina Sacc. (*Mycosphaerellaceae*, *Mycosphaerellales*) was established by Saccardo in 1880; c. 80 species are currently accepted in the genus (Index Fungorum 2018). In Turkey, the *Stigmina* species are poorly known and have not yet been intensively studied; of the four species reported from Turkey—*S. carpophila*, *S. compacta*, *S. obtecta*, *S. platani*—(Göbelez 1964, Hüseyin & al. 2003, Çimen & Ertuğrul 2007, Erdoğdu & Hüseyin 2008), two have been transferred to other genera: *S. compacta* [≡ *Thyrostroma compactum*] and *S. platani* [≡ *Pseudocercospora platanigena*].

Materials & methods

Host specimens were prepared following conventional herbarium techniques. Host plants were identified using the Flora of Turkey and East Aegean Islands (Davis 1965–85). Thin fungal sections prepared from host tissue were examined under a Leica DM E light microscope and measured from mounts in tap water. Infected host surfaces were photographed using a Leica EZ4D stereomicroscope. The fungi were identified using relevant literature (for *Aureobasidium*: Saccardo 1892 (as *Gloeosporium*), Hermanides-Nijhof 1977; for *Sarcophoma*: Saccardo 1884 (under *Phoma*), Morgan-Jones 1971, Aa 1975; for *Stigmina*: Ellis 1959, Shoemaker & Egger 1982). All examined specimens were deposited in the Mycology Laboratory of Ahi Evran University, Department of Biology, Kırşehir, Turkey (AEUT).

For scanning electron microscopy (SEM), 8–10 mm square pieces of infected leaf were mounted on aluminium stubs with double-sided adhesive tape. They were coated with gold using Polaron SC 502 Sputter Coater and were examined with Jeol JSM 6060 scanning electron microscope operated at 5–10 kV in the Electron Microscopy Unit, Faculty of Science, Gazi University, Ankara, Turkey.

Taxonomy

Aureobasidium harposporum (Bres. & Sacc.) Herm.-Nijh.,
Stud. Mycol. 15: 151 (1977) PLATE 1

SPOTS visible on both sides of leaves and twigs, generally leaves beginning to dry from the tip, brown on the upper surface, fuscous chestnut on the lower surface, spots margin dark brown; infected leaves dropping prematurely from the shrub. CONIDIOMATA acervular, subepidermal, yellowish, broadly elliptical, 196–330 µm diam. CONIDIOGENOUS CELLS erect, densely packed, clavate to subcylindrical, 10–20 × 3.5–6.5 µm, forming conidia simultaneously at the apex. CONIDIA one-celled, falcate, sometimes elliptical or slightly curved, oil droplet, smooth-walled, 13.7–19.3(–21.8) × 4.4–5.4 µm, hyaline.

SPECIMEN EXAMINED—**TURKEY, KIRŞEHIR, Mucur District**, Tekken Village, 39°02′13″N, 34°13′08″E, 977 m asl, on living leaves and stems of *Viscum album* L. subsp. *album* (*Santalaceae*), 19.06.2013, M. Ulukapı (AEUT MU1050).

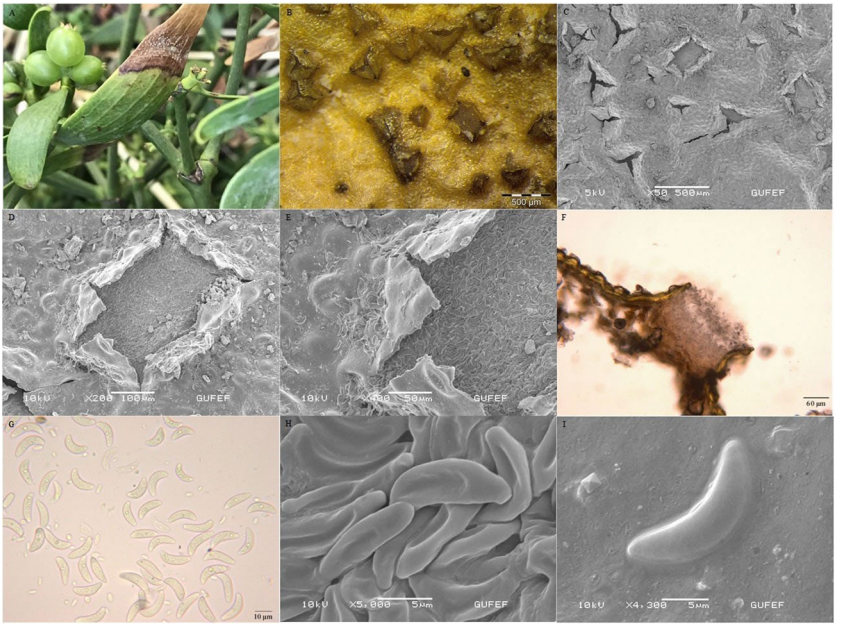


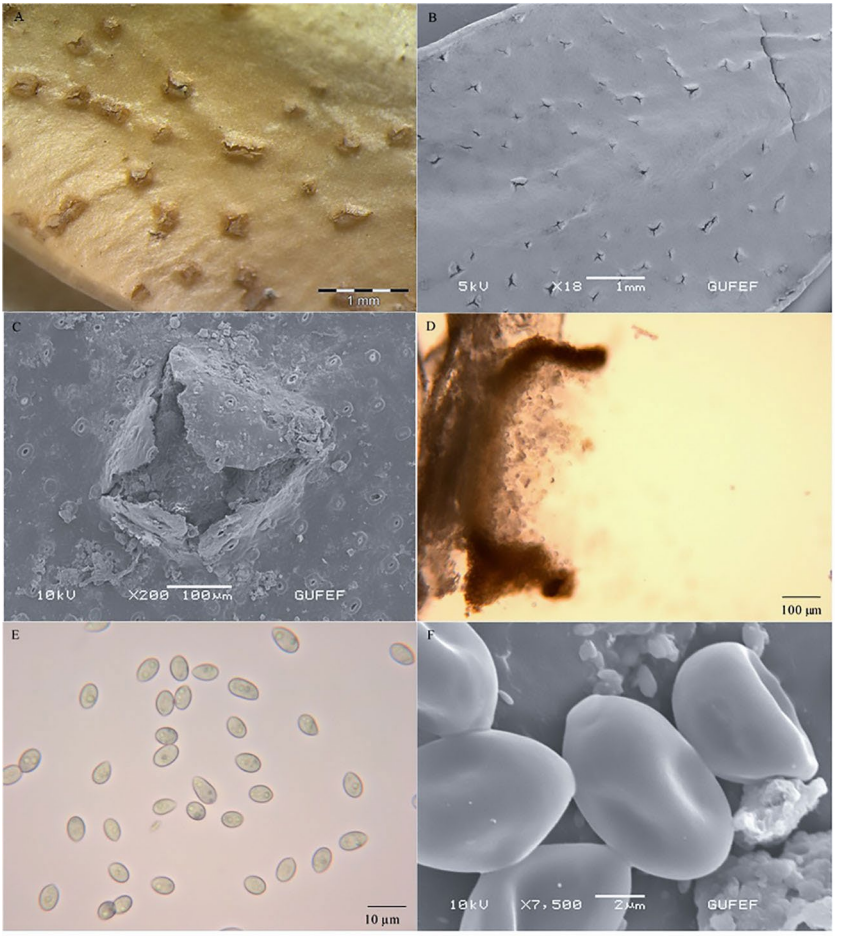
Plate 1. *Aureobasidium harposporum* (AEUT MU1050). A. leaf spots; B. acervuli on leaf; C. acervuli on leaf (SEM); D, E. acervulus on leaf (SEM); F. acervulus, vertical section; G. conidia; H, I. conidia (SEM).

Notes: *Viscum album* (European mistletoe) is an evergreen, perennial, epiphytic, hemiparasitic shrub that lives on a wide range of woody plant species (Zuber 2004). European mistletoes can affect their host trees in many ways. Known effects from mistletoe infection include lowering the vigor of the host, inducing premature mortality, reducing quality and quantity of wood grown, reducing fruit production, and predisposing trees to secondary infection by other agents, such as insects or decay fungi (Hawksworth 1983).

Biological control of parasites by using plant pathogens has gained acceptance as a practical, safe, and environmentally beneficial management method applicable to agro-ecosystems (Charudattan 2001). The use of biological control agents for weed control has attracted increased attention (Özaslan & al. 2013; Özaslan 2016), and diagnosing host weeds and their natural enemies is the foundation stone of a successful biological control program (Özaslan 2016). Control of European mistletoe is an important consideration for the forest service in Turkey (Yüksel & al. 2005). Over 20 microscopic fungi live on European mistletoe, but only a few of them cause major damage to the plant

(Karadžić & al. 2004). Of these, *Aureobasidium harposporum*, which causes leaf spot disease of European mistletoe, appears to have potential as a biological control agent against of this semi-parasite. In this study, *Aureobasidium harposporum* on living leaves and stems of *Viscum album* subsp. *album* is reported as new to the mycobiota of Turkey.

The Turkish specimen agrees with other reports of *Aureobasidium harposporum* in conidiomata and conidia morphology, the only observable difference being the smaller dimensions of acervuli and conidia. Saccardo (1892) describes 200 µm diam. acervuli and 18–20 × 4–5 µm conidia, while Hermanides-Nijhof (1977) cites 250–500 µm acervuli and (16–)17–21(–23) × 3.5–5 µm conidia.



Sarcophoma miribelii (Fr.) Höhn., Hedwigia 60: 133 (1918) Plate 2

≡ *Macrophoma miribelii* (Fr.) Berl. & Voglino, Atti Soc. Veneto-Trent. Sci. Nat.10(1): 179 (1886)

Pycnidia numerous, hypophyllous (rarely epiphyllous), at first covered by the epidermis, later becoming erumpent, scattered, 143–289 µm diam., yellowish or brown. Conidia single-celled, ovoid, rounded at apex, attenuate at the base, smooth-walled, (8.4–)10–13.6(–14.3) × 6.2–8.7 µm, hyaline, with granular contents.

Specimen examined—**TURKEY, Kırşehir**, **Mucur District**, Seyfegölü, 39°06′58″N, 34°12′11″E, 1135 m asl, on living leaves and stems of *Buxus sempervirens* L. (*Buxaceae*), 16.04.2014, M. Ulukapi (AEUT MU1099).

Notes: Our Turkish specimen is morphologically similar to *Sarcophoma miribelii* specimens described in the literature (Saccardo 1884, Morgan-Jones 1971, Aa 1975). *Sarcophoma miribelii* has previously been reported (without description or illustration) from Rize Province in coastal northeastern Turkey (Göbelez 1964, Hüseyin & al. 2005; both as *Macrophoma mirbelii* [sic]), whereas our new record is from Kırşehir Province in central Turkey at c. 1100 m asl. *Sarcophoma miribelii* is found worldwide, wherever the *Buxus* host occurs (Aa 1975).

Stigmina dothideoides (Ellis & Everh.) M.B. Ellis, Mycol. Pap. 72: 53 (1959) Plate 3

Sporodochia erumpent through epidermis, pustulate, 1–4 mm diam., circular to elliptical, blackish. Conidiophores densely crowded, arising from stromatic hyphae, pale brown to medium brown, cylindrical to lageniform, 1–2- septate, often branched at the base. Conidia blastic, solitary and terminal, elliptical to obovoid, at first one-celled, becoming 3–septate, non-constricted or slightly constricted at the septum, rounded at apex, truncated to obtusely rounded at the base, smooth-walled, 25–38 × 11.8–13.9(–14.5) µm, golden brown.

Specimen examined—**TURKEY, Kırşehir**, **Mucur District**, Gümüşkümbet Village, 39°05′52″N, 34°12′26″E, 1180 m asl, on stems of *Artemisia* sp. (*Asteraceae*), 16.04.2014, M. Ulukapı (AEUT MU1087).

Notes: The species was first described by Ellis & Everhart (1891, as *Clasterosporium dothideoides*), who observed symptoms on stems of *Artemisia cana* and *Shepherdia argentea* in Montana, USA; and it has

Plate 2 (left). *Sarcophoma miribelii* (AEUT MU1099). A. pycnidia on leaf; B. pycnidia on leaf (SEM); C. pycnidium on leaf (SEM); D. pycnidium, vertical section; E. conidia; F. conidia (SEM).

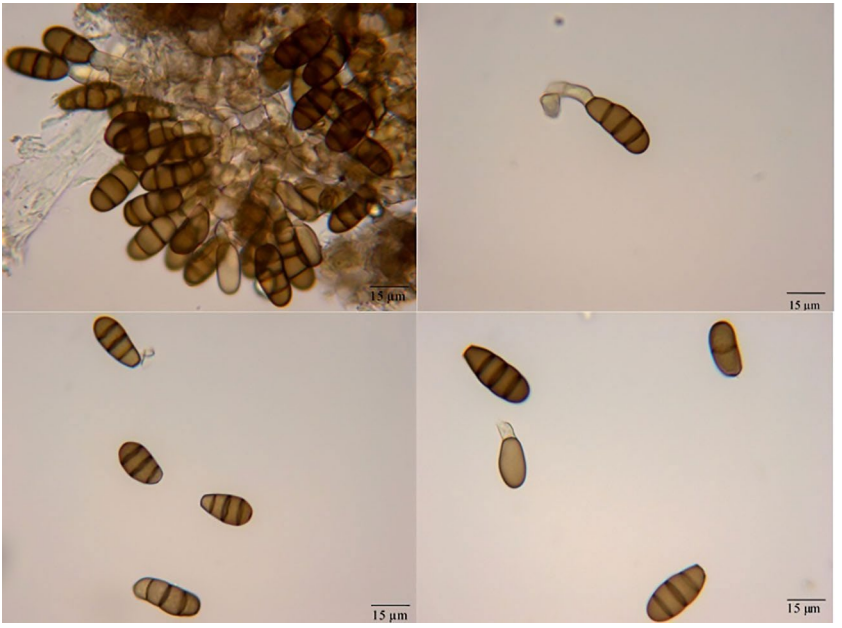


Plate 3. *Stigmina dothideoides* (AEUT MU1087). Top left. conidia and conidiophores; Top right. conidium and conidiophore; Bottom. conidia.

been recorded on *Gaillardia aristata* further north in Alberta, Canada (Shoemaker & Egger 1982). *Stigmina dothideoides* on branches of *Artemisia* sp. is reported as new to the mycobiota of Turkey.

Although our Turkish specimen of *Stigmina dothideoides* is morphologically similar to specimens described in the literature, it differs slightly in having shorter and narrower 3-septate conidia, compared with 25–46 × 13–19 µm 3-septate conidia in Ellis (1959) and 30–38(–42) × (12.3–)14–16.8 µm 3(–4)-septate conidia in Shoemaker & Egger (1982).

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