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NEW FOR UKRAINE RECORDS OF FUNGI (*ASCOMYCOTA*) FROM THE GORGANY NATURE RESERVE

Key words: Ascomycota, new records, Gorgany Nature Reserve,
Ukraine

The Gorgany Nature Reserve (Nadvirna District, Ivano-Frankivsk Region) is located in the central part of the Ukrainian Carpathian mountains within the range from 700 to 1754 m altitude. It covers several highland vegetation zones: broadleaf forests, mixed and coniferous forests, subalpine woodlands and meadows (Клімук та ін., 2006). Spruce forests (*Picea abies*) comprise about 84 % of the total reserve's area. Other tree stands (*Abies alba*, *Alnus incana*, *Fagus sylvatica*, etc.) have rather restricted distribution. Of particular value are unique postglacial populations of three relict species from the early Holocene, *Pinus cembra* L., *P. mugo* Turra, and *P. sylvestris* L. Another distinctive feature of the reserve is that over 10 % of its area is occupied by rock debris. Large scree patches and extremely steep slopes make an access to some parts of the reserve difficult; however, an advantage of the natural landscape is that significant part of its territory remains almost undisturbed.

The area is mycologically little explored. The first mycological survey in the Gorgany Nature Reserve (Gorgany forestry) took place on August 26 — September 2, 2010. Subsequently, a new record of rust fungi and species diversity of the powdery mildews and rusts were published (Tykhonenko, 2011; Тихоненко, Гелюта, 2011). All of the registered in the reserve *Ascomycota* species, excluding *Erysiphales*, will be published separately (Гайова, in press).

The present paper reports 10 new for Ukraine records of ascomycetes. All specimens were collected by the author during the survey in the Gorgany forestry of the reserve. They are deposited in the Mycological Herbarium of the M.G. Kholodny Institute of Botany (*KW*). The reported fungi belong to three classes: *Dothideomycetes* and *Sordariomycetes* — four and three species respectively, *Leotiomycetes* — one species; other two are currently accepted as *Ascomycota* inc. sedis. Most of the records are lignicolous, or corticolous, fungi developing on twigs or branches of *Alnus incana* (L.) Moench, *Betula pendula* Roth, *Corylus avellana* L., *Fagus sylvatica* L., *Picea abies* (L.) H. Karst., and *Sorbus aucuparia* L., except for *Eupropolella vaccinii*

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(Rehm) Höhn. growing on leaves of *Vaccinium vitis-idaea* L. Some of the listed species are quite common in Europe; however, they are found to be unrecorded in Ukraine; others are presumably rare species, particularly those known from single localities in a few countries.

Brief descriptions of the species, their associated plants, substrata, localities, information on general distribution and original illustrations are provided below. Species of fungi are arranged following Kirk et al. (2008).

ASCOMYCOTA

PEZIZOMYCOTINA

INCERTAE SEDIS

***Actinocladium rhodosporum* Ehrenb.**, Jb. Gewächskde **1**: 52, 1819. Fig. 1, *A*.

Colonies hairy, effused, either forming diffuse dark brown to black spots, or appearing as rather scattered erect conidiophores. Conidiophores brown to blackish, up to 60 μm long and 3–5 μm wide. Conidia septated, branched, usually with 3 or 2 radiating branches, dark grey to olivaceous brown or dark brown, gradually less pigmented to almost subhyaline towards the tips, branches up to 40–75 μm long, 7–10 μm wide at the base, 2.5–4.5 μm wide at the top; young conidia hyaline and unbranched.

Host. On dead barkless twig of *Alnus incana*.

Locality. *Picea abies* forest with *Alnus incana*, *Corylus avellana*, and *Betula pendula*, right bank of the Bystrytsia Nadvirnyanska River, N 48°29', E 24°16', alt. ca. 700 m, 30.08.2010 (KW 38557).

Distribution: Europe (Belarus, Poland, UK, Ukraine), Asia, Africa, Carribean.

Notes. The fungus is quite common in Western Europe on *Betula*, *Corylus*, *Quercus*, *Sorbus*, *Picea*, etc. (Ellis, 1971). More than 10 localities on wood and bark of the fallen twigs and trunks are reported from Belarus (Yurchenko, 2001). In the former Soviet Union it was recorded only in the Far East of Russia (Primorskiy Kray) on *Taxus* (Мельник, 2000).

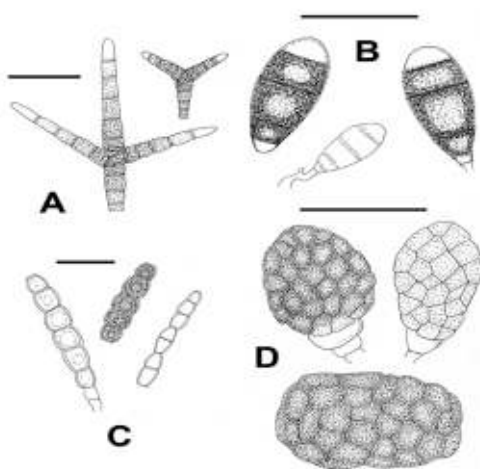


Fig.1. Conidia and conidiogenous cells. *A* — *Actinocladium rhodosporum* Ehrenb., *B* — *Bactrodesmium betulicola* M.B. Ellis., *C* — *Taeniolella alta* (Ehrenb.) S. Hughes., *D* — *Monodictys paradoxa* (Corda) S. Hughes. Scale bars = 20 μm

DOTHIDEOMYCETES

INCERTAE SEDIS

***Bactrodesmium betulicola* M.B. Ellis**, Mycol. Pap. **72**: 13, 1959. Fig. 1, *B*

Conidiomata pulvinate, black, shining, scattered, up to 300 µm wide. Conidiophores 0—2-septate, hyaline or subhyaline, straight or flexuous, up to 40 µm long and usually 2—3 µm wide, sometimes with swollen cells up to 7 µm wide. Conidiogenous cell often geniculate, with refringent scars and denticles. Conidia apical, ellipsoid to obovoid, smooth, 4-septate, 25—33 × 11—14 µm, rounded at the apex, truncate at the flatten base, three central cells brown to dark brown, central conidium cell the longest, upper and basal cells shorter and almost hyaline.

Host. On bark of dead fallen twigs of *Betula pendula*.

Locality. *Picea abies* forest with *Betula pendula*, N 48°29', E 24°17', alt. ca. 1000 m, 26.08.2010 (KW 38558).

Distribution: Europe (Czech Republic, Russia, UK, Ukraine), Asia (Russia), North America (Canada).

Notes. The species originally was known as associated with bark of *Betula*. However, later it was also reported on *Abies*, *Celastrus*, *Cotoneaster*, and *Hippophaë* (Cannon, 2009a).

***Monodictys paradoxa* (Corda) S. Hughes**, Can. J. Bot. **36**: 786, 1958;

Sporidesmium paradoxum Corda, Icon. fung., Prague, **2**: 6, 1838. Fig. 1, *D*

Conidiomata effuse, punctiform, black, usually seen as a small shining clusters of conidia. Conidiophores up to 40 µm long, almost hyaline to pale brown, inflated, more swollen towards the apical cell, up to 15 µm wide. Conidiogenous cell bladder-like, ellipsoid or almost globose, often remaining at separated conidia. Conidia muriform, ellipsoid, pyriform, subglobose to globose, smooth, olivaceous, dark brown to blackish, 20—43 × 16—32 µm, occasionally with one or two lighter or almost hyaline basal cells.

Host. On bark of fallen twigs of *Betula pendula*.

Locality. *Picea abies* forest with *Betula pendula*, N 48°29', E 24°17', alt. ca. 1050 m, 26.08.2010 (KW 38561).

Distribution: Europe (Austria, Belarus, Czech Republic, Georgia, Germany, Hungary, Italy, UK, Ukraine), Asia (Japan, Kazakhstan, Pakistan, Russia, Taiwan), Africa, Carribean, North America (Canada, Mexico).

Notes. The fungus is usually associated with *Betula* bark (Ellis, 1971) but it also occurs on hosts from other genera: *Alnus*, *Nemopanthus*, *Populus*, *Prunus*, *Rhododendron*, *Sorbus*, etc. (Мельник, 2000; Cannon, 2009b; www.cybertruffle.org.uk/).

PLEOSPORALES

INCERTAE SEDIS

***Herpotrichia macrotricha* (Berk. & Broome) Sacc.**, Syll. Fung. **2**: 213, 1883;
Sphaeria macrotricha Berk. & Broome, Ann. Mag. Nat. Hist., Ser. 2, **9**: 319, 1852.
Fig. 2, *A*

Ascomata (pseudothecia) 300—420 μm high, 250—360 wide, black, covered by dark brown septate hyphae, spherical, subglobose or pyriform, superficial, clustered on a dense dark brown subiculum, ostiolate at maturity, apex broadly cap-like, opening in age by a broad pore. Ascomatal wall up to 50 μm wide, composed of brown pseudoparenchymatous cells; in apical part an outer layer brown, inner layer hyaline or light yellow. Pseudoparaphyses numerous, narrowly cellular, hyaline. Asci 8-spored, cylindrical to clavate, short-stalked, 110—140 \times 10—14 μm . Ascospores overlapping biseriata, at first hyaline and 1-septate, becoming brown and 3- to 5-septate, a little constricted at septa, fusoid, straight or slightly curved, 24—45 \times 4—7 μm , surrounded by mucilaginous sheath, often with a colourless appendage at each end.

Host. On wood of decorticated twig of *Corylus avellana*.

Locality. *Picea abies* forest with *Alnus incana* and *Corylus avellana*, right bank of the Bystrytsia Nadvirnyanska River, N 48°29', E 24°16', alt. ca. 700 m, 26.08.2010 (KW 38565).

Distribution: Europe (Finland, France, Germany, Ireland, UK, Ukraine), Asia, Africa, North and South America.

Notes. The species is reported to have a wide distribution in temperate regions (Barr, 1984). Sivanesan (1972) examined several collections from Europe and one from Chile and designated synonymic names. Recent molecular research showed that five specimens of *H. macrotricha* representing collections from Costa Rica, Kenya and Puerto Rico form a strongly supported clade (Magambi, Huhndorf, 2009).

MYTILINIDIACEAE

Taeniolella alta (Ehrenb.) S. Hughes, Can. J. Bot. 36: 817, 1958; *Hormiscium altum* Ehrenb., Sylv. mycol. berol., Berlin: 10, 22, 1817. Fig. 1, C

Colonies small, pulvinate or effuse, blackish brown to black, protruding through the epidermis. Conidiophores develop on hyphae or hyphal nodes immersed in the bark, dark brown, septate. Conidia at first in short chains, later disintegrated, brown, olivaceous brown or dark brown, usually 2—6-septate, 25—55 μm long and 9—12(15) μm wide, rarely up to 100 μm long, each cell often containing either a big guttule or several small ones, apical cell rounded or truncate.

Host. On bark of dead twigs of *Alnus incana*.

Locality. *Picea abies* forest with *Alnus incana* and *Corylus avellana*, right bank of the Bystrytsia Nadvirnyanska River, N 48°29', E 24°16', alt. ca. 700 m, 30.08.2010 (KW 38563).

Distribution: Europe (Belarus, Georgia, UK, Ukraine), Asia (Russia), North America (Canada).

Notes. *T. alta* is specialized to *Alnus* bark (Мельник, Попушой, 1992; Ellis & Ellis, 1997). In Belarus the fungus was reported in association with a basidiomycete, *Hyphoderma setigerum* (Fr.) Donk; the conidiophores penetrated the basidioma tuberculi (Yurchenko, 2001). In our specimen, an accompanying species is *Hypoxylon fuscum* (Pers.) Fr. Colonies of *T. alta* either surround old ascostromata or are scattered on the bark just nearby.

PYRENULALES
MASSARIACEAE

Massaria aucupariae Voglmayr & Jaklitsch, Fungal Diversity 46(1): 145, 2011.

Fig. 2, B

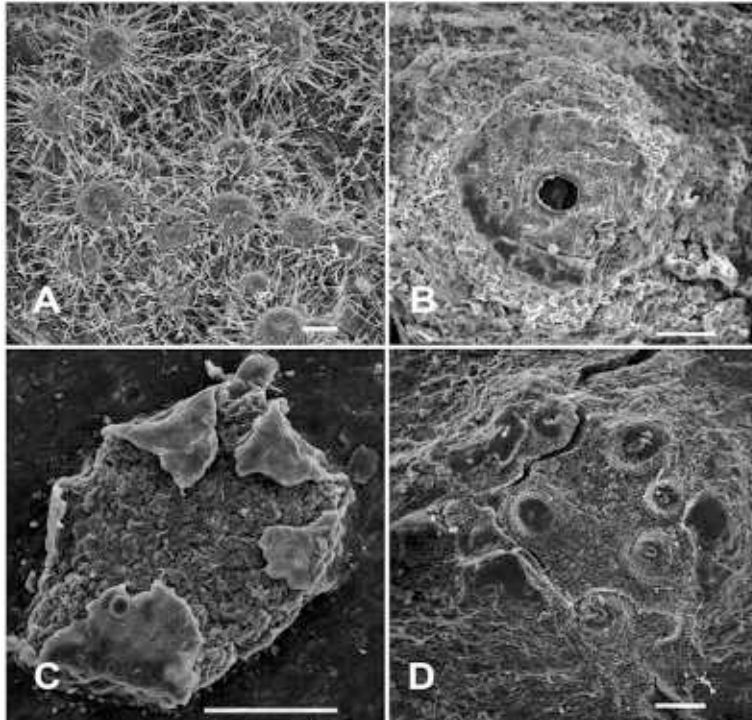


Fig. 2. A — *Herpotrichia macrotricha* (Berk. & Broome) Sacc., pseudothecia, B — *Massaria aucupariae* Voglmayr & Jaklitsch, ostiole of pseudothecium in section, C — *Eupropelella vaccinii* (Rehm) Höhn., apothecium, D — *Anthostoma amoenum* (Nitschke) Sacc., ascostroma. SEM. Scale bars = 100 μ m

Ascomata (pseudothecia) globose or pyriform, up to 1 mm diam., usually solitary, immersed and elevating the bark, not staining the wood yellow, surrounded outside by a distinct dark clypeus around ostiole and inside by black stromatic zone. Ostiole central, in section 150—200 μ m wide. Asci 8-spored, oblong or fusoid, 240—300 \times 33—42 μ m. Ascospores cylindrical or slightly curved, always hyaline in the intact asci, becoming brown only after ejection, 63—80 \times 15—17 μ m, 3-septate, with a mucilaginous sheath.

Host. On dead attached twigs of *Sorbus aucuparia*.

Locality. Left bank of the Bystrytsia Nadvirnyanska River, near the reserve's office, N 48°29', E 24°16', alt. ca. 700 m, 31.08.2010 (KW 38570).

Distribution: Europe (Austria, Czech Republic, Germany, Lithuania, Sweden, Ukraine).

Notes. The fungus was originally identified as *Massaria sorbi* Hazsl. However, recent molecular and morphological studies resulted in description of several new species within the genus *Massaria* De Not. (Voglmayr, Jaklitsch, 2011). Following this

treatment, morphological features of our specimen fit perfectly with the diagnosis of *M. aucupariae*. The species is known to occur much rarer than the host. It was recorded mostly in Northern and Central Europe.

LEOTIOMYCETES

HELOTIALES

INCERTAE SEDIS

Eupropolella vaccinii (Rehm) Höhn., Ann. Mycol. **15**, 5: 311, 1917; *Sphaeropezia vaccinii* Rehm, in Winter, Rabenh. Krypt.-Fl., Edn 2, Leipzig **1**, 3: 74, 1888. Fig. 2, C

Ascomata (apothecia) black, discoid, up to 250 µm diam., irregular, subcultural and erumpent by splitting host tissue to expose hymenium. Paraphyses numerous, slender, slightly enlarged at the tips. Asci 8-spored, clavate, thin-walled, 55—75 × 9—11 µm. Ascospores cylindric, biseriata, at first hyaline and unicellular, becoming brownish and 2—3-septate, 13—18 × 3—5 µm, with minute oil globules.

Host. On the underside of dead leaves of *Vaccinium vitis-idaea*.

Locality. Subalpine shrubs, N 48°28', E 24°18', alt. ca. 1200 m, 27.08.2010 (KW 38572).

Distribution: Europe (Austria, Germany, Norway, Switzerland, UK, Ukraine), Asia (Russia), North America (USA).

SORDARIOMYCETES

DIAPORTHALES

DIAPORTHACEAE

Diaporthe larseniana Munk, Dansk Bot. Ark. **14**, 8: 3, 1952. Fig. 3, A

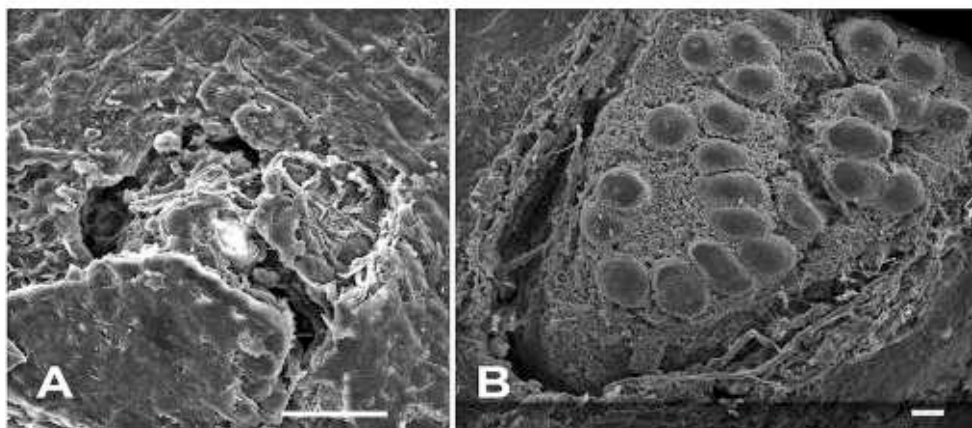


Fig.3. A — *Diaporthe larseniana* Munk, ascostroma. B — *Anisogramma virgultorum* (Fr.) Theiss. & Syd., part of ascostroma. SEM. Scale bars = 100 µm

Stromata pustulate, effuse to isolated, immersed in the bark, causing slight elevations of the epidermis, discoloured in comparison with the surrounding bark tissue, separated by well developed black line. Ascomata (perithecia) 3—12 in each

pustule, circinate, with ostioles in most cases erumpent collectively through a small circular or irregular rupture in the epidermis, top of ostiole slightly projecting. Asci 8-spored, cylindric-clavate, 55—70 × 6—9 μm, with distinct apical structure. Spores rounded-fusiform, almost straight, hyaline, two-celled, slightly constricted at septum, 13—17 × 4—5 μm, with one or few small drops in each cell.

Host. On dead fallen twigs of *Picea abies*.

Locality. *Picea abies* forest, N 48°28', E 24°17', alt. ca. 1000 m, 27.08.2010 (KW 38594).

Distribution: Europe (Denmark, France, Ukraine), Asia (Japan).

Notes. The fungus appears to be rare in Europe. It is apparently known from Denmark, France, and Ukraine as a single record from each country (Munk, 1957; <http://ascofrance.fr/>).

VALSACEAE

Anisogramma virgultorum (Fr.) Theiss. & Syd., Ann. Mycol. **14**, 6: 451, 1917 [1916]; *Sphaeria virgultorum* Fr., in Kunze & Schmidt, Mykologische Hefte, Leipzig **2**: 43, 1823. Fig. 3, B

Stromata large, dark brown to black, usually expanded in length of the shoot, exposed by rupture of the bark, containing numerous ascomata. Ascomata (perithecia) flask-shaped, opening separately as small papillae on the stroma surface. Asci 8-spored, clavate, broadly clavate, thin-walled, 64—75 × 12—15 μm. Ascospores hyaline, ovoid, 9—14 × 6—8 μm, unequally two-celled with a single septum towards the narrower base of the spore, lower cell rounded.

Host. On dying twigs of living tree of *Betula pendula*.

Locality. *Picea abies* forest with occasional *Fagus sylvatica*, *Corylus avellana*, and *Betula pendula*, N 48°29', E 24°17', alt. ca. 900 m, 29.08.2010 (KW 38604).

Distribution: Europe (Denmark, Russia, Sweden, UK, Ukraine), North America.

Notes. Traditionally regarded within *Valsaceae* (<http://www.indexfungorum.org/>), the species is proposed to be placed into *Gnomoniaceae* due to recent molecular data (De Silva et al., 2009). *A. virgultorum* is known as a biotroph causing dieback of young shoots of *Betula pendula* and *B. pubescens*, so called stromatal canker of birch. The species used to be considered as a minor pathogen because of its rare occurrence; however, in recent surveys in the UK it is reported as commonly found and associated with crown dieback of affected trees (De Silva et al., 2008).

XYLARIALES

DIATRYPACEAE

Anthostoma amoenum (Nitschke) Sacc., Syll. Fung. **1**: 307, 1882; *Fuckelia amoena* Nitschke, Jb. Nassau. Ver. Naturk. **23-24**: 224, 1870 [1869-70]; *Lopadostoma amoenum* (Nitschke) Shear, *Mycologia* **30**(5): 593, 1938. Fig. 2, D

Stromata pustulate, submerged in the bark and irregularly erumpent, 2—3 mm diam., white, with white discs showing black coarse ostiolar ascomatal necks. Ascomata (perithecia) black, 550—750 diam., immersed in the stroma in groups of

2—7, ostiole almost not projecting above the stroma surface. Asci 8-spored, cylindrical-clavate, 135—150 × 15—20 μm, thickened at the apex, with discoid apical apparatus, short stipitate. Ascospores brown, ellipsoid-fusiform, 23—32 × 11—14 μm, with a minute germ locus and inconspicuous appendage at each end.

Host. On dead fallen twigs of *Fagus sylvatica*.

Locality. Mixed forest composed of *Picea abies*, *Betula pendula*, and *Fagus sylvatica*, N 48°29', E 24°17', alt. ca. 950 m, 26.08.2010 (KW 38623).

Distribution: Europe (Denmark, France, UK, Ukraine).

Notes. In our specimen, the spores have little primary appendages at both ends and a peculiar poroid germ locus. These spore characters were also reported by Læssøe & Spooner (1994) for *Fuckelia amoena* treated as a synonym of *A. amoenum*. We did not observe spore germ slits «half as long as the spore» as quoted by Munk (1957) in his description of «*Lopadostoma amoenum*».

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НОВІ ДЛЯ УКРАЇНИ ВИДИ ГРИБІВ (*ASCOMYCOTA*) ІЗ ПРИРОДНОГО ЗАПОВІДНИКА "ГОРГАНИ"

У статті наведено 10 нових для України видів аскоміцетів, зібраних у природному заповіднику "Горгани": *Actinocladium rhodosporum*, *Anisogramma virgultorum*, *Anthostoma amoenum*, *Bactrodesmium betulicola*, *Diaporthe larseniana*, *Eupropelella vaccinii*, *Herpotrichia macrotricha*, *Massaria aucupariae*, *Monodictys paradoxa* і *Taeniolella alta*. Подано їх короткі описи, живильні рослини, субстрати, місцезнаходження, дані щодо загального поширення та оригінальні ілюстрації.

Ключові слова: *Ascomycota*, нові знахідки, природний заповідник "Горгани", Україна.

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НОВЫЕ ДЛЯ УКРАИНЫ ВИДЫ ГРИБОВ (*ASCOMYCOTA*) ИЗ ПРИРОДНОГО ЗАПОВЕДНИКА "ГОРГАНЫ"

В статье представлены 10 новых для Украины видов аскомицетов, собранных в природном заповеднике "Горганы": *Actinocladium rhodosporum*, *Anisogramma virgultorum*, *Anthostoma amoenum*, *Bactrodesmium betulicola*, *Diaporthe larseniana*, *Eupropelella vaccinii*, *Herpotrichia macrotricha*, *Massaria aucupariae*, *Monodictys paradoxa* и *Taeniolella alta*. Приведены их краткие описания, питающие растения, субстраты, местонахождения, данные об общем распространении и оригинальные иллюстрации.

Ключевые слова: *Ascomycota*, новые находки, природный заповедник "Горганы", Украина.