A REVIEW OF THE DISTRIBUTION OF THE *MYCOMICROTHELIA* KEISSL. 1936 GENUS IN ROMANIA

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Abstract. Recent data on the *Mycomicrothelia* genus chorology have not been reported for Romania. The information found in literature revealed a low distribution of the *Mycomicrothelia* genus on Romanian territory. Atmospheric pollution could be a cause of the lack of species belonging to the *Mycomicrothelia* genus within forests from Romania. In this paper, the worldwide and national chorological data, substrate, taxonomy and cenotaxonomy of *Mycomicrothelia* genus are presented. As the main conclusion, the *Mycomicrothelia* genus has not been identified on an extended area from Romania.

Keywords: *Mycomicrothelia* genus, chorology, Romania.

Rezumat. O recenzie a distribuției genului *Mycomicrothelia* 1936 în România. Date recente asupra corologiei genului *Mycomicrothelia* nu au fost semnalate în România. Informațiile găsite în literatura de specialitate au evidențiat o distribuție redusă a genului *Mycomicrothelia* pe teritoriul României. Poluarea atmosferică ar constitui o cauză a absenței speciilor din genul *Mycomicrothelia* în pădurile din România. În acest articol sunt prezentate date corologice la nivel național și internațional, tipul de substrat, cenotaxonomia și taxonomia genului *Mycomicrothelia*. În concluzie, genul *Mycomicrothelia* nu a fost identificat pe o arie cât mai extinsă a teritoriului României.

Cuvinte cheie: genul *Mycomicrothelia*, corologie, România.

INTRODUCTION

The species from *Mycomicrothelia* Keissl. 1936 genus are widely distributed at the worldwide level (APTROOT et al., 2007; APTROOT, 2009; LÜCKING et al., 2011; CÁCERES et al., 2014; XAVIER-LEITE et al., 2015; BUNGARTZ et al., 2012; KINALIOĞLU, 2009).

Ancient forests represent refugia for epiphytic lichen species (MALÍČEK & PALICE, 2013). Nowadays, worldwide, native forests are threatened by changing their structure (PALTTO et al., 2011; BRUNIALTI et al., 2012).

The oldest information about the distribution of the *Mycomicrothelia* genus in Romania dates back to 1884 (HASZLINSZKY 1884 cited by MORUZI et al., 1967). The lichen species from *Mycomicrothelia* genus were identified in mountainous and hilly areas. The habitats where the lichen species from the *Mycomicrothelia* genus were found are the forests (BURLACU et al. 1969; CIURCHEA, 2004) and the arboretum (CIURCHEA & SZABÓ, 1966; CIURCHEA, 1972; CIURCHEA, 2004).

In addition are known other species widespread on the European (GIORDANI & INCERTI, 2008), American (CÁCERES et al., 2014; XAVIER-LEITE et al., 2015), Asia (URBANAVICHUS & ISMAILOV, 2013) and Australian (APTROOT, 2009) continents. Also, worldwide data about *Mycomicrothelia* genus are reported as follow: *Mycomicrothelia atlantica* D. Hawksw. & Coppins: Azorean Archipelago (BERGER & PRIEMETZHOFER, 2008); Republic of Dagestan (URBANAVICHUS & ISMAILOV, 2013); *Mycomicrothelia confluens* (Müll. Arg.) D. Hawksw.: Island of Reunion in the Indian Ocean (van den BOOM et al., 2011); *Mycomicrothelia confusa* D. Hawksw.: Boulogne District, Northern France (SÉRUSIAUX et al., 2003); Liguria, Italy (GIORDANI & INCERTI, 2008); *Mycomicrothelia conothele* (Nyl.) Hawksw.: West Midnapore District, West Bengal, India (SEN, 2014); *Mycomicrothelia conothelena* (Nyl.) D. Hawksw.: Sri Lanka (WEERAKOON & APTROOT, 2014); Similipal, Mayurbhanj, Odisha, India (Nayak et al., 2016); *Mycomicrothelia exigua* (Müll. Arg.) D. Hawksw.: North Western Ghats, India (PANDIT, 2015); *Mycomicrothelia fumosula* (Zahlbr.) D. Hawksw.: Uthai Thani, Khao Nang Rum, Thailand (APTROOT et al., 2007); *Mycomicrothelia hemisphaerica* (Müll. Arg.) D. Hawksw.: Uthai Thani, Khao Nang Rum, Thailand (APTROOT et al., 2007); Osa Peninsula, Costa Rica (BREUSS, 2008); North Western Ghats, India (PANDIT, 2015); *Mycomicrothelia lateralis* Sipman: Paluma Village, Queensland, Australia (APTROOT, 2009); *Mycomicrothelia megaspora* Aptroot & M. Cáceres: Brasil (CÁCERES et al., 2014; XAVIER-LEITE et al., 2015); *Mycomicrothelia miculiformis* (Nyl. ex Müll. Arg.) D. Hawksw.: Petchabhun, Nam Nao N.P., Thailand (APTROOT et al., 2007); Berry Springs Nature Park, Australia (APTROOT, 2009); *Mycomicrothelia minutissima* (C. Knight) D. Hawksw.: New Zealand (de LANGE et al., 2018); *Mycomicrothelia minutula* (Zahlbr.) D. Hawksw.: Cascades, South Hobart, Tasmania (APTROOT, 2009); *Mycomicrothelia modesta* (Müll. Arg.) D. Hawksw.: Fakahatchee Strand Preserve State Park, Florida (LÜCKING et al., 2011); *Mycomicrothelia obovata* (Müll. Arg.) D. Hawksw.: North Western Ghats, India (PANDIT, 2015); *Mycomicrothelia oleosa* Aptroot: Bosque Esquinas and La Gamba, Costa Rica (BREUSS, 2008); Brasil (CÁCERES et al., 2014; XAVIER-LEITE et al., 2015); *Mycomicrothelia queenslandica* (Müll. Arg.) Sipman: Balt's Spur, Tasman Peninsula (APTROOT, 2009); *Mycomicrothelia pachnea* (Körb.) D. Hawksw.: virgin forest reserve Rajhenavski Rog, Slovenia (BILOVITZ et al., 2011); *Mycomicrothelia subfallens* (Müll. Arg.) D. Hawksw.: Chiang Mai, Doi Inthanon N.P., Mae Cham road (APTROOT et al., 2007); Black Jungle (Northern Territory), Garners Beach (Queensland), Lankelly Ck, Australia (APTROOT, 2009); Fakahatchee Strand

Preserve State Park, Florida (LÜCKING et al., 2011); Brasil (CÁCERES et al., 2014; XAVIER-LEITE et al., 2015); Floreana and Santiago, Galapagos (BUNGARTZ et al., 2012); *Mycomicrothelia thelena* (Ach.) D. Hawksw.: Floreana and San Cristóbal, Galapagos (BUNGARTZ et al., 2012); Bío-Bío Region, Chile (PEREIRA et al. 2016); *Mycomicrothelia wallrothii* (Hepp.) D. Hawksw.: central, eastern, and southern forest districts, Estonia (LÕHMUS et al., 2006). *Mycomicrothelia willeyana* (Müll. Arg.) D. Hawksw.: Fakahatchee Strand Preserve State Park, Florida (LÜCKING et al., 2011); Čepkeliai state nature reserve, southern Lithuania (MOTIEJŪNAITĖ, 2015).

Most of the mentioned lichen species were found in protected areas *i.e. M. oleosa* (CÁCERES et al., 2014), *M. walrothii* (MOTIEJŪNAITĖ, 2015), Amazonian remnant forests *i.e. M. megaspora* and *M. subfallens* (XAVIER-LEITE et al., 2015) and within sites with socio-cultural importance, for instance *M. conothele* (SEN, 2014). *Mycomicrothelia melanospora* unlike *M. wallrothii* has not been identified in the reviewed papers therefore it seems to have a restricted distribution (CIURCHEA, 2004). A few lichen species from *Mycomicrothelia* genus are somehow widely distributed such as: *M. hemisphaerica* (APTROOT et al., 2007; BREUSS, 2008; PANDIT, 2015), *M. subfallens* (APTROOT et al., 2007; APTROOT, 2009; LÜCKING et al., 2011; BUNGARTZ et al., 2012; CÁCERES et al., 2014; XAVIER-LEITE et al., 2015; PEREIRA et al. 2016).

The aim of this study consists in the mapping of the *Mycomicrothelia* genus in Romania. The objective of the study is based on the characterization of the *Mycomicrothelia* genus with its substrata, habitat type, cenotaxonomy, taxonomy and worldwide distribution point of view.

MATERIALS AND METHODS

Information about chorology of the *Mycomicrothelia* genus in Romania were obtained from literature (CIURCHEA, 2004). The nomenclature of lichen species, taxonomy and cenotaxonomy is according to CIURCHEA, 2004. Specimens from the Collection of the Babeș-Bolyai University Herbarium (Cluj-Napoca, Cluj County) are abbreviated as H.U.C. Also, collections of the Mycological Herbarium from Bucharest (BUCM) were consulted to find out the studied specimens.

RESULTS AND DISCUSSIONS

In Romania, the *Mycomicrothelia* genus is represented by two species, as follows: *Mycomicrothelia melanospora* (Hepp.) D. Hawksw. and *Mycomicrothelia walrothii* (Hepp.) D. Hawksw. (CIURCHEA, 2004). In literature, the chorology of the *Mycomicrothelia* genus in Romania is less known (CIURCHEA, 2004).

1) ***Mycomicrothelia melanospora*** (Hepp.) D. Hawksw. (Fig. 1)

Bistrița-Năsăud County: Arcalia Scientific Center Park (CIURCHEA & SZABÓ, 1966; CIURCHEA, 1972; CIURCHEA, 2004; H.U.C. nr. 550693); Botoșani County: Moldavian Plateau, at Gorovei (CIURCHEA, 2004); Caraș-Severin County: Banat Mountains, Danube Defile at Cozla and Coronini (BURLACU et al. 1969; CIURCHEA, 2004).

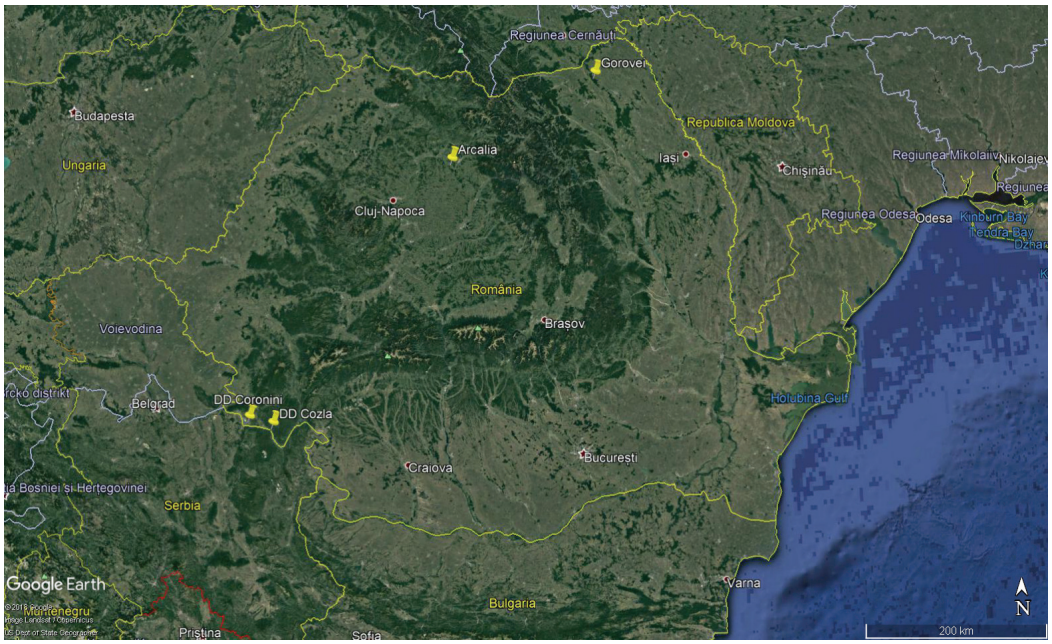

Figure 1. The spatial distribution of *Mycomicrothelia melanospora* in Romania (Source: Google Earth Pro V 7.3.2.5776. (December 14, 2015). Romania. 45° 52' 22.05"N, 26° 08' 58.69"E, Eye alt 1141.41 km. SIO, NOAA, U.S. Navy, NGA, GEBCO. US Dept of State Geographer. Landsat/Copernicus 2018. http://www.earth.google.com [February 11, 2019].

2) ***Mycomicrothelia walrothii*** (Hepp.) D. Hawksw. (Fig. 2)
Hunedoara County: Retezat Mountains (CRETZOIU, 1941; MORUZI et al., 1967; CIURCHEA, 2004).

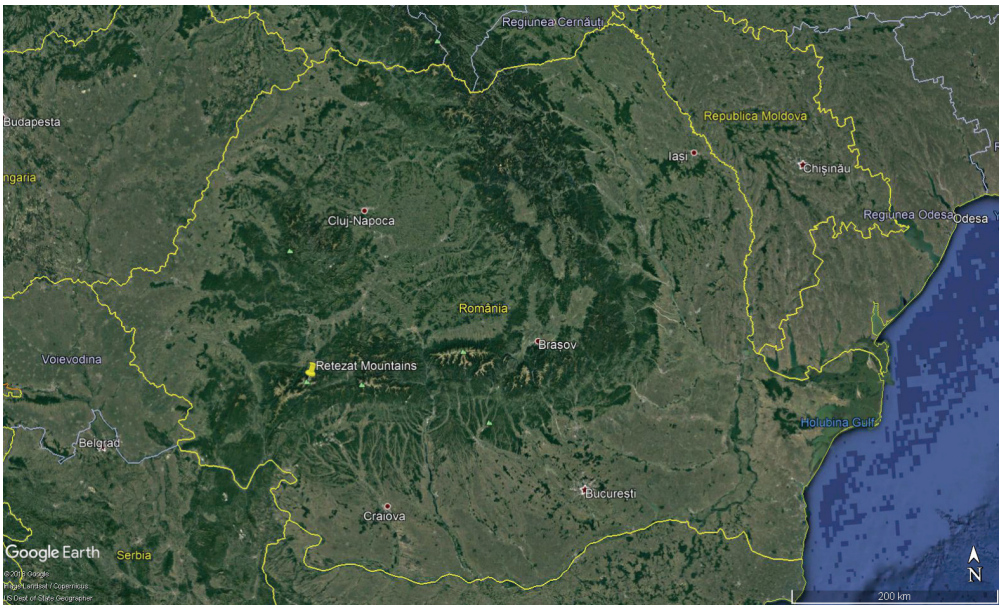

Figure 2. The spatial distribution of *Mycomicrothelia walrothii* in Romania (Source: Google Earth Pro V 7.3.2.5776. (December 14, 2015). Romania. 45° 52' 22.05"N, 26° 08' 58.69"E, Eye alt 1141.41 km. SIO, NOAA, U.S. Navy, NGA, GEBCO. US Dept of State Geographer. Landsat/Copernicus 2018. http://www.earth.google.com [February 11, 2019].

The Romanian Red List does not present any data regarding the conservation status of the species belonging to the *Mycomicrothelia* genus (SÂRBU et al., 2007; ARDELEAN et al., 2013). The low distribution of *Mycomicrothelia* in Romania could be attributed to atmospheric pollution, destruction and fragmentation of natural habitats. The studied species grew up on corticolous substrata, especially on conifers, the smooth bark of *Betula* (birch) and other deciduous trees (Table 1). The two lichen species of the *Mycomicrothelia* genus belong to the *Xanthorion* and *Graphidion* communities. Thus, these lichen species prefer both nitrophilous and acidophilous bark (CIURCHEA, 2004).

Table 1. The substrata colonized by species of the *Mycomicrothelia* genus (CIURCHEA, 2004).

Species	Substrata
Mycomicrothelia melanospora	Smooth bark of deciduous arbuscles *Picea abies* (L.) H. Karst. Coniferous trees *Acer negundo* L. *Acer campestre* L. *Fraxinus ornus* L.
Mycomicrothelia walrothii	On birch trunks

The sociology of the studied genus is represented by the following cenotaxons: *Arthonio-Lecidelletea elaeochromae* Drehwald 1993 including *Graphidetalia scriptae* Hadač 1944, *Graphidion scriptae* Ochsner 1928, and *Pyrenuletum nitidae* Hil 1925 on the one hand and *Physcietea* Tomaselli et De Micheli 1957 that include *Physcietalia adscendentis* Hadač 1944 em Barkm. 1958, *Xanthorion parietinae* Ochsner 1928 and *Physcietum adscendentis* Frey et Ochsner 1926 (Table 2). The taxonomy of the *Mycomicrothelia* genus is presented in Table 3.

Table 2. The cenotaxonomy of the studied lichen species (CIURCHEA, 2004).

Species	Class	Order	Alliance	Association
Mycomicrothelia melanospora	*Physcietea* Tomaselli et De Micheli 1957	*Physcietalia adscendentis* Hadač 1944 em Barkm. 1958	*Xanthorion parietinae* Ochsner 1928	*Physcietum adscendentis* Frey et Ochsner 1926
	Arthonio-Lecidelletea elaeochromae Drehwald 1993	*Graphidetalia scriptae* Hadač 1944	*Graphidion scriptae* Ochsner 1928	*Pyrenuletum nitidae* Hil 1925
Mycomicrothelia walrothii	N/A	N/A	N/A	N/A

Legend: N/A data are not available

Table 3. The taxonomy of studied lichen species (www.speciesfungorum.org).

Species	Kingdom	Division	Class	Order	Family
Mycomicrothelia melanospora ***Mycomicrothelia walrothii***	Fungi R. T. Moore 1980	Ascomycota Caval. Sm. 1998	Dothideomycetes O. E. Erikss. et Winka 1997	Pleosporales Luttr. ex M.E. Barr (1987)	Arthopyreniaceae Walt. Watson (1929)

CONCLUSIONS

In Romania, the *Mycomicrothelia* genus is rather poorly represented; therefore, further field studies are needed to reveal new localities where these lichen species could be distributed.

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