Contribution to the clavarioid fungi of Lithuania

Article · January 2009

CITATIONS
3

READS
83

2 authors:

Anton Shiryaev
Russian Academy of Sciences
90 PUBLICATIONS **434** CITATIONS
SEE PROFILE

Reda Iršėnaitė
Institute of Botany
31 PUBLICATIONS **252** CITATIONS
SEE PROFILE

BOTANICA LITHUANICA 2009, **15(2)**: 117–127

CONTRIBUTION TO THE CLAVARIOID FUNGI OF LITHUANIA

Anton Shiryaev[1], **Reda Iršėnaitė**[2]

[1] Institute of Plant and Animal Ecology, Russian Academy of Science, Ural Division, 8 March Str. 202, RUS-620144 Ekaterinburg, Russia; e-mail anton.g.shiryaev@gmail.com
[2] Institute of Botany, Laboratory of Mycology, Žaliųjų Ežerų Str. 49, LT-08406 Vilnius, Lithuania; e-mail reda.irsenaite@botanika.lt

Abstract

Shiryaev A., Iršėnaitė R., 2009: Contribution to the clavarioid fungi of Lithuania [Nauji duomenys apie žagarūninius grybus Lietuvoje]. – Botanica Lithuanica, **15(2)**: 117–127.

Eighty seven species of clavarioid fungi are reported from Lithuania, including 50 species new for the country. The most frequently recorded species are *Typhula erythropus*, *Clavulina cinerea*, *Clavulina coralloides*, *Macrotyphula juncea*, *Lentaria byssiseda*, *Typhula setipes*, and *Ramaria stricta*. They account for around 40 % of all observations, though comprise only 12 % of all the species. 36 % of species were found less than four times (only 9 % of specimens), and altogether these rare species make up three quarters of the total species richness. For some species Lithuania is apparently the southern limit of their lowland distribution in the Northern Hemisphere (*Clavaria argillacea* var. *sphagnicola*, *Clavariadelphus sachalinensis*, *Multiclavula vernalis*, *Typhula lutescens*). At present, the Eastern Baltic hemiboreal complex of the clavarioid fungi includes 118 species, whilst 106 are known from the temperate zone.

Keywords: *Basidiomycota*, distribution, ecology, Eastern Baltic, Eurasia, hemiboreal zone, temperate zone.

INTRODUCTION

The clavarioid fungi (*Basidiomycota*) are a widely distributed group in the boreal zone of Eurasia with high diversity of species (Hansen & Knudsen, 1997; Shiryaev, 2004, 2006; Kotiranta et al., 2009) and play an important role in ecosystem functioning (Corner, 1950; Berthier, 1976; Shiryaev, 2009 a). In this artificial (life form) fungal group united only by morphological characters (Pine et al., 1999; Dentinger & McLaughlin, 2006), three ecological groups are traditionally distinguished: saprotrophs, parasites and mycorrhizal species. This makes clavarioid fungi a good subject for all kinds of ecological studies.

Clavarioid fungi make up 14–18 % of aphyllophoroid fungi in the Eurasian boreal forests (Kotiranta et al., 2009; Shiryaev, 2009 a; Shiryaev et al., 2009), with some genera especially rich in species (*Typhula* and *Ramaria*). These fungi are less common in temperate ecosystems where corticioid and poroid fungi prevail (Jülich, 1984; Vesterholt et al., 2003; Wojewoda, 2003). Such a shift of diversity in taxonomic groups is among the oldest (Hawkins, 2001) and most prevalent patterns in biogeography. However, alterations in zonal shifts remain largely unexplored and in the face of changing ecological conditions, including global change (Shiryaev, 2008), modification of latitudinal diversity gradient and their respective ecosystems is imminent.

Lithuania is crossed by the border of the boreal and temperate climatic zones (Ahti et al., 1968; Kavaliauskas, 1999). Studies in borderline regions are

important for understanding of spatial and temporal variation within the clavarioid fungi complex of Western Eurasia. Moreover, a long-term investigation of the Lithuanian mycota gives a good chance for more exact estimation of species richness and the understanding of possible reasons for changes.

Present-day knowledge of the diversity of Lithuanian clavarioid fungi is based on 220 years of investigations. The first records from Lithuania were the species *Clavaria coralloides* and *C. pistillaris* reported by Gilibert (1781) who gave information on some fungi from the environs of Vilnius and Grodno without indicating exact localities. B. S. Jundziłł (1811) added *Clavaria muscoides*, describing the substrate of the species but not the exact locality. J. Jundziłł (1830) collected fungi in Lithuania, Poland and Belarus and among 81 fungi species mentioned eleven clavarioid species. There is no clear evidence which of these fungi were found in present-day Lithuania. At the beginning of the 20th century K. Proszyński collected fungi in the environs of Trakai and mentioned 9 species of clavarioid fungi all under the genus name *Clavaria* (Proszyński, 1931). The environs of Vilnius were investigated by J. Trzebiński and J. Mowszowicz (Trzebiński, 1934; Mowszowicz, 1937). The latter author summarized information about fungi found around Vilnius and among 549 species mentioned fifteen clavarioid fungi, mainly *Ramaria*, *Clavaria* and *Clavulina* species (Mowszowicz, 1957). Additional records of clavarioid species were published by A. Minkevičius, J. Mazelaitis, A. Gricius, V. Urbonas (Mazelaitis, 1958, 1960, 1962; Mazelaitis et al., 1963; Minkevičius, 1939, 1944). Eight species were mentioned by E. Parmasto in his monograph "Key to the *Clavariaceae* of USSR" (Parmasto, 1965). For Lithuania as a whole, the majority of records of clavarioid fungi were published by J. Mazelaitis who recorded 29 species (Mazelaitis, 1976). Recently, clavarioid fungi have been studied as threatened fungi sensitive to habitat destruction and changes and as indicators of vulnerable and biologically rich habitats (Urbonas et al., 1990; Iršėnaitė, 2004).

The present study is an attempt to summarize knowledge on the diversity of clavarioid fungi in Lithuania – herbarium, field diary and literature data. However, material is so far insufficient for making reliable conclusions about the distribution, host preferences and position of the Lithuanian clavarioid fungi complex in the total list of Eastern Baltic hemiboreal and temperate zones. The data presented here contribute to the general knowledge of the Lithuanian mycota and Red Data Book species and may be helpful for future studies on fungal diversity and conservation.

MATERIAL AND METHODS

The climate of Lithuania is transitional between maritime and continental (Drobnys, 1981). The mean annual temperature is +6 °C degrees. In January the range of temperature is from –3 °C at the sea coast to –6 °C eastward, with the July variation +16 ° to +18 °C. Western and south-western winds prevail. According to the mean annual precipitation and humidity evaporation, Lithuania lies in the surplus humidity subzone.

Field work was conducted by the authors over a five year period (2004–2008) in both the boreal and temperate nature zones of Lithuania. As far as possible identical numbers of potential types of substrata (habitats) for each complex of the nature zone were examined during similar periods of time. To estimate the abundance of a particular species, the number of samples (recording units) of the species was compared with the total number of samples of all investigated species (Novozhilov, 2005). Fruit bodies detected in a group, irrespective of their quantity and size, are considered as one recording unit. Groups of fruitbodies (spaced not less than 15 m from other similar group, for soil- and litter-inhabiting as well as for mycorrhizal fungi) also count as a single recording unit. For wood-inhabiting fungi a specimen found on one substrate (stump, trunk) was considered as one recording unit, regardless of the quantity and size of observed fruit bodies (Mukhin, 1993). Also, a record of a species in the literature with sufficiently precise location data (area or vicinities of settlement, a substratum) is accepted as one recording unit.

The collected material is deposited in the herbaria of the Institute of Botany, Vilnius, Lithuania (BILAS), the Institute of Plant and Animal Ecology of the Russian Academy of Science (SVER), and in Vilnius University, Lithuania (WI). For species identification the following sources were used: Corner (1950, 1970), Petersen (1975, 1981), Berthier (1976), Jülich (1984), Hansen & Knudsen (1997) and Franchi & Marchetti (2001). The corticioid genera *Ramaricium*, *Kavinia*, *Clavulicium*, and the cantharelloid *Gomphus*, as well as the heterobasidioid *Tremellodendropsis* (*Aphelaria*), *Calocera* and *Eocronartium* were excluded from consideration.

The taxa of clavarioid fungi are listed in a checklist. Genera in families are arranged alphabetically, with species alphabetically listed within each genus. The names of the authors of species follow the *Index Fungorum* (http://www.indexfungorum.org), which is consistent with "Dictionary of the Fungi", 10th edition (Kirk et al., 2008). The most common synonyms are

listed. Species marked with an asterisk are new to Lithuania.

An estimate of abundance in the species list is given according to Stephenson et al. (1993) (the proportion of a species in relation to the total number of records (981): **R** – rare (<0.5 % of all records), **O** – occasional (0.5–1.5 % of all records), **C** – common (1.5–3 % of all records), **A** – abundant (>3 % of all records). After that, a natural zone (HB – hemiboreal zone; T – temperate zone) where the species was found is listed, number of specimens (recording units) in each zone is indicated and the main substratum and habitat are described. Localities and collection dates of specimens deposited in herbaria are indicated. Names of the collectors are abbreviated as follows: AG – A. Gricius, AM – A. Minkevičius, AS – A. Shiryaev, EK – E. Kutorga, JM – J. Mazelaitis, ML – M. Lapelė, RA – R. Almanaitė, RI – R. Iršėnaitė, SO – S. Obelevičius, VU – V. Urbonas. Tree species are named as follows: "spruce" and "*Picea*" refer to *Picea abies*, "pine" and "*Pinus*" to *Pinus sylvestris*, "birch" to *Betula pendula* or *B. pubescens*, "aspen" or "*Populus*" to *Populus tremula*, "lime" or "*Tilia*" to *Tilia cordata*, "oak" or "*Quercus*" to *Quercus robur*, "hazel" or "*Corylus*" to *Corylus avellana* and "elm" or "*Ulmus*" to *Ulmus laevis* and *U. scabrum*, respectively.

RESULTS

Material used in the work consisted of 981 samples of clavarioid fungi: 482 are field collections, 434 – records in a field diary and 65 – literature records. In general, for the hemiboreal zone 536 recording units were obtained, for the temperate zone – 445 (Table 1).

Some specimens belonging to the genera *Clavaria*, *Pterula*, *Ramaria* and *Typhula* remain unidentified. Most probably, they represent still unknown taxa and will be described and published later. Based on the above-mentioned three sets of specimens and observations, 87 species (belonging to 15 genera and 9 families) were determined in Lithuania, including 50 species new for the country. 36 % of species are rare, being represented by only 9 % of specimens (recording units), which together with occasional species makes a group of "rare fungi" (1–13 records). This group comprises three-quarters of the total checklist, but only about one third of specimens. Five species were found only once and five species were recorded more than 40 times. Abundant species made up 12 % of the total with 40 % of specimens, and together with the common species group made in total 24 % of species and 66 % of recording units (15–51 records).

AGARICALES

Clavariaceae

Clavaria argillacea Pers. – **O**; HB 6, T 4: on soil and litter in various forest types and meadows. – Vilnius, Paneriai, August 20,1952, JM (BILAS 34932); Varėna distr., Pirčiupiai, September 29, 1962, JM (BILAS 5218); Šalčininkai distr., Tetėnai, October 3, 1962, VU (BILAS 5025); Varėna distr., Pirčiupiai, September 25, 1969, JM (BILAS 13221), October 6, 1972, JM (BILAS 12540), October 9, 1972, JM (BILAS 12742); Šalčininkai distr., Rūdnikai forest, October 28, 1974, JM (BILAS 1296); Tauragė distr., Mažonai, June 10, 2007, AS (SVER(F) 67463).

Clavaria argillacea var. ***sphagnicola*** Corner – **R**; HB 1: amongst mosses in bog. – Utena distr., Štadviliai, Zarasas Lake surrounds, October 30, 2006, AS (SVER(F) 67484).

****Clavaria falcata*** Pers.: Fr. – **O**; HB 3, T 3: on soil in mixed forests and meadows. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67477); Curonian Spit, Pervalka, June 13, 2007, AS and RA (SVER(F) 67505).

Table 1.

Species richness of the zonal clavarioid fungi complexes of Lithuania

Criteria	Hemiboreal	Temperate	Total
Number of specimens	536	445	981
Number of species	84	78	87
Number of genera	15	15	15
Number of families	9	9	9
[a]S/G	5.6	5.2	5.8
[b]S/F	9.3	8.7	9.7

[a]S/G – species/genus ratio; [b]S/F – species/family ratio

Clavaria fragilis Holmsk. (syn. *C. vermicularis* Scop.) – **O**; HB 3, T 2: on sandy, rich and calcareous soils in mixed forests and meadows. – Biržai distr., Latveliai, September 13, 2005, coll. RA, det. AS (SVER(F) 67493); Curonian Spit, Neringa, June 12, 2007, AS and RA (SVER(F) 67530).

Clavaria fumosa Pers. – **O**; HB 4, T 3: on soil in mixed forests and meadows. – Vilnius, Verkiai, Žalieji Ežerai area, August 9, 1950, JM (BILAS 34930); Utena distr., Zarasai, Degučiai, October 3, 2005, coll. RA, det. AS (SVER(F) 67518).

****Clavaria pullei*** Donk – **R**; HB 2, T 1: on soil in mixed forests. – Alytus distr., Druskininkai, Grūtas Park, October 25, 2006, AS and RA (SVER(F) 67560).

****Clavaria purpurea*** O. F. Müll.: Fr. – **R**; HB 2, T 2: on soil in forests and meadows. – Biržai distr., Latveliai, September 13, 2005, coll. RA, det. AS (SVER(F) 67471); Kaunas distr, Kačerginė, September 26, 2005, coll. RA, det. AS (SVER(F) 67552).

****Clavaria rosea*** Dalman: Fr. – **R**; HB 1, T 1: on soil in mixed forest and meadows. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67546).

****Clavaria zollingeri*** Lev. – **R**; HB 1, T 2: on soil in forests and meadows. – Utena distr., Aukštaitija National Park, September 9, 2005, coll. RA, det. AS (SVER(F) 67524); Šiauliai distr., Žerkščiai, Ventos Regional Park, October 2, 2008, AS and RA (SVER(F) 67497).

Clavulinopsis corniculata (Schaeff.) Corner – **O**; HB 3, T 5: on soil in forests and meadows. – Klaipėda distr., Kretinga, September 16, 1960, JM (BILAS 2536); Curonian Spit, Neringa, June 12, 2007, AS and RA (SVER(F) 67536).

****Clavulinopsis fusiformis*** (Sowerby) Corner – **O**; HB 4, T 5: on soil in forests and meadows. – Tauragė distr., Pagramantis, September 25, 2005, coll. RA, det. AS (SVER(F) 67499).

Clavulinopsis helvola (Pers.) Corner – **O**; HB 5, T 3: on litter and mosses in forests and meadows. – Marijampolė distr., Šunskai forest, August 27, 1962, coll. VU, det. JM (BILAS 6108); Kėdainiai distr., Lančiūnava forest, August 21, 1998, VU (BILAS 19240); Kėdainiai distr., Stebuliai forest, August 21, 1998, VU (BILAS 19206); Marijampolė distr., Igliauka environs, August 24, 1962, VU (BILAS 6113); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67515).

****Clavulinopsis laeticolor*** (Berk. et M. A. Curtis) R. H. Petersen – **O**; HB 3, T 4: on soil in forests and meadows. – Curonian Spit, Juodkrantė, September 10, 2005, coll. RA, det. AS (SVER(F) 67505); Alytus distr., Druskininkai, Grūtas Park, October 25, 2006, AS (SVER(F) 67489).

Clavulinopsis luteoalba (Rea) Corner – **O**; HB 4, T 2: on litter and twigs of coniferous and deciduous trees. – Plungė distr., Salantai Regional Park, September 28, 2001, RI (BILAS 21420); Utena distr., Zarasai, Štadviliai, October 30, 2006, AS (SVER(F) 67469).

****Clavulinopsis rufipes*** (G.F. Atk.) Corner (syn. *C. microspora* (Josserand) Corner) – **R**; HB 1, T 1: on coniferous litter with *Pteridium aquilinum*. – Tauragė distr., Mažonai, June 10, 2007, AS (SVER(F) 67503).

****Clavulinopsis umbrinella*** (Sacc.) Corner (syn. *C. cinereoides* (G. F. Atk.) Corner) – **R**; HB 3: on soil in forests and meadows. – Biržai distr., Latveliai, September 13, 2005, coll. RA, det. AS (SVER(F) 67472); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67520).

****Mucronella bresadolae*** (Quél.) Corner **– R**; HB 2: on dead coniferous trunks covered with mosses and on dead polypore fruit bodies. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67556).

Mucronella calva (Alb. et Schwein.) Fr. – **O**; HB 7, T 4: on stumps and branches of coniferous and deciduous trees. – Jonava distr., Pageležiai forest, October 5, 2004, RI (BILAS 27678); Ukmergė distr., Glitiškiai forest, May 27, 2005, RI (BILAS 34189); Jurbarkas distr., Viešvilė Strict Nature Reserve, September 16, 2005, RI (BILAS 33952); Jonava distr., Pageležiai forest, October 5, 2005, RI (BILAS 27811); Tauragė distr., Pagramantis, June 10, 2007, AS (SVER(F) 67521).

Mucronella flava Corner – **O**; HB 4, T 4: on trunks and stumps of coniferous trees. – Vilnius distr., Elektrėnai, Jagelonys forest, October 7, 2003, RI (BILAS 45751); Jonava distr., Pageležiai forest, October 5, 2004, RI (BILAS 27677), September 8, 2005, RI (BILAS 34504); Klaipėda distr., Salantai, Salantai Regional Park, September 10, 2005, coll. RA, det. AS (SVER(F) 67529).

****Ramariopsis asperulispora*** (G. F. Atk.) R. H. Petersen – **R**; HB 2, T 2: on soil in deciduous forests and meadows. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67535); Tauragė distr., Mažonai, June 10, 2007, AS (SVER(F) 67569).

****Ramariopsis biformis*** (G. F. Atk.) R. H. Petersen – **R**; HB 1, T 3: on soil and mixed litter. – Alytus distr., Merkinė, Dzūkija National Park, October 24, 2006, AS (SVER(F) 67557).

****Ramariopsis crocea*** (Pers.) Corner – **R**; HB 2, T 1: on sandy and rich soil in forests and meadows. – Curonian Spit, Pervalka, October 19, 2005, coll. RA,

det. AS (SVER(F) 67566); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67534).

Ramariopsis kunzei (Fr.) Corner – **O**; HB 2, T 3: on soil and litter in deciduous and mixed forests, as well as in meadows. – Elektrėnai distr., Jagelonys forest, September 28, 2004, RI (BILAS 27394); Tauragė distr., Mažonai, June 10, 2007, AS (SVER(F) 67464).

****Ramariopsis pulchella*** (Boud.) Corner – **R**; HB 1, T 1: on soil. – Biržai distr., Latveliai, September 13, 2005, coll. RA, det. AS (SVER(F) 67541); Klaipėda distr., Kretinga, September 16, 2005, coll. RA, det. AS (SVER(F) 67531).

****Ramariopsis subtilis*** (Pers.) R. H. Petersen (syn. *Clavulinopsis subtilis* (Pers.) Corner) – **O**; HB 4, T 1: on soil and litter in broadleaved and mixed forest, as well as in meadows. – Utena distr., Zarasai, Degučiai, October 3, 2005, coll. RA, det. AS (SVER(F) 67466); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67523).

Pterulaceae

****Pterula gracilis*** (Desm. et Berk.) Corner – **O**; HB 3, T 3: on rotting herbs, grasses and leaves. – Utena distr., Sheimatis, Aukštaitija National Park, October 28, 2006, AS (SVER(F) 67485); Vilnius, Lazdynai, Sudervė brook environs, September 30, 2006, coll. RA, det. AS (SVER(F) 67512); Curonian Spit, Neringa, October 20, 2006, AS (SVER(F) 67522).

Pterula subulata Fr. (syn. *P. multifida* Chevall.) – **O**; HB 5, T 3: on soil, mixed litter and amongst grasses. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67548).

Typhulaceae

Macrotyphula fistulosa (Holmsk.) R. H. Petersen – **A**; HB 18, T 13: on fallen branches and twigs of *Acer*, *Betula*, *Corylus*.

Macrotyphula fistulosa var. ***contorta*** (Holmsk.) Nannf. et L. Holm – **O**; HB 4, T 2: on fallen branches of *Sorbus* and *Ulmus*.

Macrotyphula juncea (Alb. et Schwein.) Berthier – **A**; HB 23, T 19: on dead leaves.

****Typhula abietina*** (Fuckel) Corner – **R**; HB 1, T 3: on dead pine needles on sandy soil in pine dominated forests. – Curonian Spit, Pervalka, October 3, 2007, AS (SVER(F) 67559).

****Typhula capitata*** (Pat.) Berthier – **R**; HB 2, T 2: on rotting grasses (*Gramineae*) and herbs. – Klaipėda distr., Palanga, Paliepgiriai, June 13, 2007, AS (SVER(F) 67482); Utena distr., Zarasai, Štadviliai, Zarasas Lake environs, October 30, 2006, AS (SVER(F) 67567).

****Typhula crassipes*** Fuckel. – **O**; HB 4, T 4: on dead herbs and leaves. – Klaipėda distr., Palanga, Paliepgiriai, June 13, 2007, AS (SVER(F) 67502); Vilnius, Lazdynai, November 1, 2007, AS (SVER(F) 67543); Utena, Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67478).

****Typhula culmigena*** (Mont. et Fr.) J. Schröt. – **O**; HB 4, T 2: on rotting stems of herbs. – Tauragė distr., Mažonai, June 10, 2007, AS (SVER(F) 67476).

Typhula erythropus (Pers.) Fr. – **A**; HB 27, T 24: on dead leaves of all trees.

****Typhula graminum*** P. Karst. – **O**; HB 4, T 1: on dead grasses (*Gramineae*). – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67568); Utena distr., Zarasai, Štadviliai, Zarasas Lake environs, October 30, 2006, AS (SVER(F) 67539).

****Typhula hyalina*** (Quél.) Berthier – **O**; HB 3, T 3: on dead grasses and leaves. – Curonian Spit, Pervalka, June 13, 2007, AS and RA (SVER(F) 67506); Utena, Zarasai, Štadviliai, Zarasas Lake environs, October 30, 2006, AS (SVER(F) 67485).

****Typhula incarnata*** Lasch – **R**; HB 2: facultative parasite on grasses. – Alytus distr., Druskininkai, Latežeris, October 25, 2006, AS and RA (SVER(F) 67513).

****Typhula lutescens*** Boud. – **R**; HB 3: on dead grasses, herbs and leaves. – Utena distr., Zarasai, Štadviliai, Zarasas Lake environs, October 30, 2006, AS (SVER(F) 67501).

****Typhula micans*** (Pers.: Fr.) Berthier (syn. *T. anceps* P. Karst.) – **C**; HB 12, T 15: on dead herbs, grasses and leaves.

****Typhula olivascens*** Berthier – **O**; HB 4, T 2: on dead petioles of *Dryopteris*. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67590); Utena distr., Zarasai, Štadviliai, Zarasas Lake environs, October 30, 2006, AS (SVER(F) 67576).

****Typhula phacorrhiza*** (Reichard: Fr.) Fr. – **A**; HB 21, T 15: on fallen leaves and grasses.

****Typhula quisquiliaris*** (Fr.: Fr.) Henn. – **O**; HB 4, T 3: on rotted petioles of *Pteridium aquilinum*. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67574); Alytus distr., Druskininkai, Grūtas, October 1, 2007, AS (SVER(F) 67582).

****Typhula sclerotioides*** (Pers.) Fr. – **C**; HB 15, T 10: on dead stems of herbs in different habitats. – Alytus distr., Druskininkai, Gailiūnai, October 25, 2006, AS and RA (SVER(F) 67496); Klaipėda distr., Palanga, Kveciai, October 10, 2005, coll. RA, det. AS (SVER(F) 67551); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67525).

Typhula setipes (Grev.) Berthier (syn. *Clavaria gyrans* Batsch, *C. diaphana* Schumach.) – **A**; HB 19, T 13: on dead leaves (mostly *Acer*, *Alnus*, *Betula*, *Populus*).

Typhula spathulata (Peck) Berthier – **O**; HB 4, T 5: on fallen twigs of broadleaved trees (*Fraxinus*, *Salix*, *Quercus*). – Biržai distr., Biržai forest, October 5, 2005, RI (BILAS 34221); Biržai distr., Latveliai, September 13, 2005, coll. RA, det. AS (SVER(F) 67589).

****Typhula todei*** Fr. (syn.: *T. athyrii* Remsberg) – **O**; HB 3, T 2: on rotted petioles of *Athyrium* sp. in mixed forests. – Utena distr., Zarasai, Štadviliai, October 30, 2006, AS (SVER(F) 67584).

Typhula uncialis (Grev.) Berthier – **O**; HB 6, T 2: mostly on rotted stems of *Chamaenerion*. – Alytus distr., Druskininkai, Grūtas Park, October 25, 2006, AS and RA (SVER(F) 67533).

****Typhula variabilis*** Riess – **C**; HB 14, T 11: mostly on rotted stems of herbs. – Utena distr., Zarasai, Štadviliai, Zarasai Lake environs, October 30, 2006, AS (SVER(F) 67576); Klaipėda distr., Kretinga, Kurmaičiai, June 15, 2007, AS and RA (SVER(F) 67588).

POLYPORALES

Sparassidaceae

Sparassis crispa (Wulfen) Fr. – **O**; HB 22, T 17: as a parasite on coniferous roots. – October 5, 1977, JM (BILAS 13937); August 31, 1993, VU (BILAS 17342); September 13, 1994, SO (BILAS 34297); September 24, 1994, VU (BILAS 34296); August 20, 1997, ML (BILAS 18348); September 29, 1997, VU (BILAS 37072); September 13, 2001, VU (BILAS 21104); VU (BILAS 21189); September 9, 2000, VU (BILAS 20516); Utena distr., Zarasai, Štadviliai, October 30, 2006, AS (SVER(F) 67537).

GOMPHALES

Gomphaceae

****Ceratellopsis sagittiformis*** (Pat.) Corner – **R**; HB 1, T 3: on rotted stems and leaves of *Inula*, *Lychnis* and *Corylus*. – Klaipėda distr., Palanga, Paliepgiriai, June 13, 2007, AS (SVER(F) 67502).

Ramaria abietina (Pers.) Quél. (syn. *Clavaria ochraceo-virens* Jungh.) – **C**; HB 12, T 10: mostly on coniferous litter, rarely on soil. – Varėna distr., Maceliai, October 22, 1965, JM (BILAS 8796); Kretinga distr., Darbėnai, September 17, 1970, JM (BILAS 11886); Vilnius, Verkiai, August 21, 1974, JM (BILAS 13017); ibid, RI (BILAS 25015); Akmenė distr., Kamanai Strict Nature Reserve, September 5, 2003, VU (BILAS 24106); Varėna distr., Dzūkija National Park, Skroblus Strict Nature Reserve, October 11, 2003, RI (BILAS 25630); Kaunas distr., Dubrava forest, August 30, 2004, VU (BILAS 26861); Plungė distr., Žemaitija National Park, September 21, 2004, coll. RA, det. AS (SVER(F) 67473).

Ramaria apiculata (Fr.) Donk – **O**; HB 3, T 2: on fallen coniferous trunks. – Ukmergė distr., Seveikiai forest, August 15, 1961, JM (BILAS 4581); Vilnius, Verkiai, October 18, 1974, JM (BILAS 13035); Vilnius, Verkiai, August 24, 1978, JM (BILAS 14140); Utena distr., Šeimatis, Aukštaitija National Park, September 10, 2005, coll. RA, det. AS (SVER(F) 67481).

Ramaria aurea (Schaeff.) Quél. – **R**; T 2: on soil in old growth broadleaved forests. – Alytus distr, Druskininkai, Grūtas, October 1, 2007, AS and RA (SVER(F) 67498); Tauragė distr., Rambynas Regional Park, Pempynė, October 2, 2008, AS and RA (SVER(F) 67516). **Note**: Old specimens deposited in BILAS with unclear anatomical structures were excluded from analyses: Vilnius, Verkiai environs, August 23, 1968, JM (BILAS 10217); Vilnius, environs of Žalieji Ežerai, August 19, 1970, JM (BILAS 11861).

Ramaria botrytis (Pers.) Ricken – **O**; HB 3, T 4: on soil in mixed old growth forests. – Vilnius, environs of Žalieji Ežerai, September 9, 1960, JM (BILAS 46849); Šalčininkai distr., Jašiūnai environs, September 18, 1969, JM (BILAS 10848); Vilnius, environs of Žalieji Ežerai, September 1, 1972, VU (BILAS 12495); Utena distr., Ąžuolija forest, August 21, 2001, RI (BILAS 21356); Tauragė distr., Pagramantis, September 24, 2005, coll. RA, det. AS (SVER(F) 67488); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67587).

****Ramaria corrugata*** (P. Karst.) Schild – **R**; HB 2, T 2: on coniferous litter and soil in mixed forests. – Utena distr., Zarasai, Degučiai, October 4, 2005, coll. RA, det. AS (SVER(F) 67487); Alytus distr., Druskininkai, Grūtas Park, October 25, 2006, AS and RA (SVER(F) 67542).

****Ramaria curta*** (Fr.) Schild – **R**; HB 3, T 1: on soil in coniferous and broadleaved forests. – Šiauliai, Žerkščiai, Ventos Regional Park, October 2, 2008, AS and RA (SVER(F) 67504); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67487).

Ramaria eumorpha (P. Karst.) Corner (syn. *Clavaria invalii* Cotton et Wakef.) – **C**; HB 13, T 10: on coniferous litter.

****Ramaria fennica*** (P. Karst.) Ricken – **O**; HB 2, T 3: on rich soil in mixed old growth forests. – Klaipėda distr., Salantai Regional Park, September 10, 2005, coll. RA, det. AS (SVER(F) 67545).

Ramaria flaccida (Fr.) Bourdot – **C**; HB 9, T 8: on soil, litter, branches and fallen trunks of coniferous and deciduous trees. – Vilnius, Verkiai environs, October 1, 1972, JM (BILAS 12496); ibid., August 20, 1974, JM (BILAS 12994); ibid., September 20, 1978, JM (BILAS 14195); Trakai distr., Užtrakė park, October 9, 1978, JM (BILAS 14790); Varėna distr., Dzūkija National Park, near Ūla river, October 13, 2003, RI (BILAS 24797); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67504); Curonian Spit, Neringa, June 12, 2007, AS and RA (SVER(F) 67561).

Ramaria flava (Schaeff.) Quél. – **O**; HB 3, T 3: on soil in coniferous and broadleaved forests. – Kaišiadorys distr., Parancius forest, August 16, 1965, JM (BILAS 8278); Vilnius, Verkiai Park, September 9, 1965, coll. JM, det. AS (BILAS 8346); ibid., August 21, 1974, JM (BILAS 12997); Utena distr., Zarasai, Degučiai, October 3, 2005, coll. RA, det. AS (SVER(F) 67562).

****Ramaria flavescens*** (Schaeff.) R. H. Petersen – **O**; HB 5, T 7: on soil in mixed forests. – Vilnius, Verkiai environs, August 7, 1960, JM (BILAS 3016).

****Ramaria flavicingula*** R. H. Petersen – **R**; T 1: on soil in oak forest of *Vaccinium myrtillus* type. – Vilnius, Verkiai environs, October 5, 1972, coll. JM, det. AS (BILAS 12492).

****Ramaria flavobrunnescens*** (G. F. Atk.) Corner – **O**; HB 3, T 5: on soil in mixed forests. – Kaunas distr., Kačerginė forest, September 24, 2005, coll. RA, det. AS (SVER(F) 67495); Alytus distr., Druskininkai, Grūtas, October 1, 2007, AS (SVER(F) 67527).

****Ramaria formosa*** (Pers.) Quél. – **R**; HB 2, T 1: on humus and calcareous soil in forests. – Biržai distr., Latveliai, September 13, 2005, coll. RA, det. AS (SVER(F) 67516); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67564).

Ramaria gracilis (Pers.) Quél. – **C**; HB 14, T 11: on coniferous litter (mostly pine) and amongst mosses, rarely on soil. – Kaunas distr., Kačerginė, August 22, 1940, AM (WI 282); Panevėžys distr., Berčiūnai environs, August 23, 1960, coll. JM, det. AS (BILAS 14791); Vilnius, Verkiai environs, August 21, 1978, coll. JM, det. AS (BILAS 14 120); Varėna distr., Dzūkija National Park, near river Ūla, October 13, 2003, RI (BILAS 24796); ibid, August 23, 1960, JM (BILAS 14791); Curonian Spit, Neringa, October 12, 2005, coll. RA, det. AS (SVER(F) 67536); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67509).

****Ramaria lutea*** (Vittad.) Schild – **R**; HB 1, T 2: on soil in mixed forests. – Alytus distr., Dzūkija National Park, September 12, 2005, coll. RA, det. AS (SVER(F) 67519); Klaipėda distr., Palanga, Karklė, June 14, 2007, AS (SVER(F) 67470).

****Ramaria obtusissima*** (Peck) Corner – **R**; HB 2: on soil in herb-rich mixed old-growth forests. – Utena distr., Aukštaitija National Park, September 9, 2005, coll. RA, det. AS (SVER(F) 67563); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67496).

Ramaria pallida (Schaeff.) Ricken – **R**; HB 1, T 1: on soil in pine and spruce dominated forests. – Vilnius, environs of Žalieji Ežerai, August 11, 1960, JM (BILAS 3045); Alytus distr., Vidzgiris forest, October 10, 1962, VU (BILAS 5026).

****Ramaria paludosa*** (Lundell) Schild – **R**; HB 1: on soil in mixed forest. – Šiauliai, Žerkščiai, Ventos Regional Park, October 2, 2008, AS and RA (SVER(F) 67542).

****Ramaria rubella*** (Schaeff.) R. H. Petersen – **R**; HB 1, T 1: on dead trunks of spruce in forests. – Marijampolė distr., Višakio Rūda environs, October 10, 2005, coll. RA, det. AS (SVER(F) 67494).

****Ramaria sanguinea*** (Pers.) Quél. – **R**; T 2: on soil in broadleaved forests. – Vilnius, environs of Žalieji Ežerai, September 7, 1947, coll. AM, det. AS (WI 3375); Tauragė distr., Gaurė forest, September 10, 2007, AS and RA (SVER(F) 67514).

Ramaria stricta (Pers.) Quél. – **A**; HB 17, T 18: on fallen branch, trunks and litter of coniferous and deciduous trees.

Ramaria suecica (Fr.) Donk – **C**; HB 11, T 7: on coniferous litter in forests.

Clavariadelphaceae

Clavariadelphus ligula (Schaeff.) Donk – **A**; HB 20, T 16: on coniferous litter in forests.

Clavariadelphus pistillaris (L.) Donk – **C**; HB 13, T 11: on soil in forests. – Plungė distr., Žemaitija National Park, Didvyčiai forest, September 4, 2003, MJ (BILAS 24600); Marijampolė distr., Bukta forest, August 29, 1962, JM (BILAS 6139); Utena distr., August 25, 1999, RI (BILAS 20684); Rokiškis, Rageliai environs, August 7, 1977, JM (BILAS 13948); Alytus distr., Vidzgiris forest, August 20, 1962, VU (BILAS 6093); Marijampolė distr., Bukta forest, September 1, 1062, JM (BILAS 6252); Vilnius, Žalieji Ežerai forest, August 22, 1974, JM (BILAS 12998); Kėdainiai distr., Lančiūnava forest, September 3, 2001, EK (BILAS 20919); Alytus distr., Punia forest, August 21, 1962, AG (BILAS 5380); Rokiškis distr., Rageliai environs, August 9, 1979, JM (BILAS 14412); Anykščiai distr., Troškūnai forest, September 20, 1960, coll. AG, det. JM (BILAS 3000); Anykščiai distr., Žvirblūnai forest, September 22, 1960, RI (BILAS 2990); Utena distr., August 24,

2000, RI (BILAS 20679); Marijampolė distr., Bukta forest, August 31, 1962, VU (BILAS 6392); Kaunas distr., Kačerginė forest, August 27, 1940, AM (WI 281); Tauragė distr., Pagramantis, September 24, 2005, coll. RA, det. AS (SVER(F) 67507).

***Clavariadelphus sachalinensis** (S. Imai) Corner – **R**; HB 1: on dead needle litter of spruce. – Švenčionys distr., Labanoras Regional Park, Girutiškis Nature Reserve, October 8, 2003, RI (BILAS 24693).

Clavariadelphus truncatus (Quél.) Donk – **O**; HB 2, T 4: on soil in forests. – Tauragė distr., Pagramantis, September 24, 2005, coll. RA, det. AS (SVER(F) 67508); Alytus distr., Druskininkai, Grūtas, October 1, 2007, AS (SVER(F) 67555).

Lentariaceae

Lentaria afflata (Lagger) Corner – **O**; HB 4, T 3: on fallen rotten trunks of aspen. – Utena distr., October 7, 1996, AG (BILAS 20799); Trakai distr., Varnikai forest, October 20, 2002, RI (BILAS 23484); Tauragė distr., Pagramantis, September 24, 2005, coll. RA, det. AS (SVER(F) 67549).

Lentaria byssiseda Corner – **A**; HB 22, T 18: on branches, trunks and bark of oaks, but also on other coniferous and deciduous trees.

***Lentaria dendroidea** (Fr.) J. H. Petersen – **R**; HB 2, T 2: on sandy soil with mosses in planted pine forest, and on conifer litter. – Curonian Spit, Juodkrantė, September 10, 2005, coll. RA, det. AS (SVER(F) 67528).

***Lentaria subcaulescens** (Rebent.) Rauschert – **R**; HB 1: on rotted trunk of spruce in mixed forest. – Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67554).

CANTHARELLALES

Clavulinaceae

***Clavulina amethystina** (Bull.: Fr.) Donk – **R**; HB 1, T 2: on soil in forests and meadows. – Alytus distr., Merkinė, Dzūkija National Park, October 24, 2006, AS (SVER(F) 67540).

Clavulina cinerea (Bull.) J. Schröt. – **A**; HB 25, T 23: on soil, litter, rotted trunks in forests, meadows and sandy dunes.

Clavulina coralloides (L.) J. Schröt. (syn. *C. cristata* (Fr.) J. Schröt.) – **A**; HB 21, T 24: on soil in forests, meadows and sandy dunes.

Clavulina rugosa (Bull.) J. Schröt. – **C**; HB 9, T 6: on soil in forests, meadows and sandy dunes.

***Multiclavula mucida** (Pers.) Corner – **O**; HB 3, T 2: on dead fallen trunks of *Populus* and *Picea* covered with algae in moist forests. – Tauragė distr., Mažonai, June 10, 2007, AS (SVER(F) 67532); Utena distr., Tauragnas, Aukštaitija National Park, October 29, 2006, AS (SVER(F) 67550).

***Multiclavula vernalis** (Schwein.) Corner – **R**; HB 2: on soil covered with algae and mosses. – Utena distr., Zarasai, Degučiai, October 30, 2006, AS and RA (SVER(F) 67490).

RUSSULALES

Amylostereaceae

Artomyces pyxidatus (Pers.) Jülich (syn. *Clavicorona pyxidata* (Fr.) Doty) – **C**; HB 18, T 10: wide spread species on *Populus* and also on other deciduous trees (*Alnus*, *Betula*, *Fraxinus*, *Salix*, *Quercus*, *Ulmus*), but only two specimens are known from *Pinus* (Tauragė distr., Viešvilė Strict Nature Reserve, September 15, 2005, RI (BILAS 33931); Marijampolė distr., Bukta forest, September 4, 1962, JM (BILAS 9206)) and one from *Picea* (Kaunas distr., Kačerginė forest, August 9, 1946, AM (WI 284)).

The richest families are *Clavariaceae* (24 species), *Gomphaceae* (24), and *Typhulaceae* (21), comprising 79 % of all species. Other families contain six or less species: *Clavulinaceae* (6), *Clavariadelphaceae* (4), *Lentariaceae* (4), *Pterulaceae* (2), and two families – *Amylostereaceae* and *Sparassidaceae* – only contain one. The average species/family ratio is 9.7, which is quite similar with European richness of the hemiboreal clavarioid fungal complex (vary 9.0–10.9) (Shiryaev, 2006, 2007). Of 16 genera, the largest are *Ramaria* (23 species) and *Typhula* (19 species), the others including eight or less species: *Clavaria* (8), *Clavulinopsis* (7), *Ramariopsis* (6), *Clavariadelphus* (4), *Clavulina* (4), *Lentaria* (4), *Mucronella* (3), *Macrotyphula* (2), *Multiclavula* (2), and *Pterula* (2). Three genera contain one species: *Artomyces*, *Ceratellopsis* and *Sparassis*. Species/genus ratio in Lithuania is 5.8 (Table 1), which is less if compared with Estonia (6.8), but correlates with other hemiboreal clavarioid fungi complexes (vary 5.3–7.5).

DISCUSSION

87 species of clavarioid fungi (15 genera, 9 families) were identified in Lithuania. A similar number was recorded in Belarus (91 species, Shiryaev unpubl.). The history of clavarioid fungi investigations in Lithuania and Belarus is alike, but the area covering similar spectrum of habitats and biogeographical zones is three times smaller in Lithuania. On the other hand, the

number of species found in the Kaliningrad region of Russia (73 species, Shiryaev, unpubl.) is smaller, but the size of the territory (15000 km^2) is four times smaller than Lithuania. Estonia is the most completely studied country in the East Baltic region with 102 clavarioid species (Shiryaev, 2009 b) and its area is similar (45227 km^2) to that of Lithuania. In contrast, only 65 species are reported for Poland, the biggest country in the region (Wojewoda, 2003).

The development of the Lithuanian landscape was defined by glaciation, which formed a relatively flat relief (Kavaliauskas, 1999). There are no sharp distinctions and borders between natural zones, as in mountain areas. Therefore, distinctions between the hemiboreal and temperate zones are poorly expressed, which is also reflected in the mycobiota. Practically all clavarioid species found in Lithuania are also distributed both northwards and southwards outside the country, and probably only for four taxa (*Clavaria argillacea* var. *sphagnicola*, *Clavariadelphus sachalinensis*, *Multiclavula vernalis*, *Typhula lutescens*) is this the southernmost border of lowland distribution in the Northern Hemisphere. No species with their northernmost border of distribution in Lithuania have been found.

The hemiboreal clavarioid fungi complex of the Eastern Baltic area, which forms part of a latitudinal transect from the arctic tundra of Svalbard, through Finland, Eastern Baltic, to the steppes of Hungary and mountain forests of Bulgarian Balkans, is better studied than the temperate one. A combined list of hemiboreal zone (south-western Finland, Estonia, Latvia and northern Lithuania) gives a total of 118 species, though about 200 specimens remain unidentified. Based on this, we can predict that the Eastern Baltic hemiboreal zone harbours about 130 species. The clavarioid fungi checklist of the temperate zone of the above-mentioned transect (southern Lithuania, Kaliningrad region of Russia, eastern Poland and Slovakia, western Belarus and westernmost Ukraine) comprises 106 species (Shiryaev, unpubl.), which is close to the total richness (115 species) in the whole of temperate Europe (according to a map by Natura, 2000) based on the lists published in France (Courtecuisse & Duhem, 1994), Denmark (Vesterholt et al., 2003), Poland (Wojewoda, 2003), Ukraine (Shiryaev, unpubl.), and Russia, the Urals (Shiryaev, 2006, 2007) and on other papers which include brief information on clavarioid fungi distribution.

Obviously, the revealed species richness of Lithuanian clavarioid fungi biota will expand in the future, as demonstrated by the results of research in adjacent countries. For example, *Ceratellopsis aculeata* (Pat.) Corner is widely distributed on dead leaves of *Cladium mariscus* (L.) Pohl north- and southwestwards from Lithuania – in the Kaliningrad region and Latvia. *Typhula subvariabilis* Berthier may also occur in Lithuania, as it is common on rotten leaves of *Corylus*, *Carpinus*, *Sorbus* in Poland, the Kaliningrad region, Belarus and Estonia. Moreover, large fruit bodies of *Ramaria magnipes* Marr et Stuntz were found during the June field trips in mixed forests of *Pinus*, *Picea*, *Corylus*, *Quercus* and *Carpinus* in Latvia and the Kaliningrad region, as well as in Finland. According to Petersen & Scates (1988) this species, also named as 'vernal Ramaria', produces fruit bodies at or beneath the humus layer in conifer-dominated forests.

ACKNOWLEDGEMENTS

We thank the curators of the herbaria of BILAS, SVER and WI for the loan of specimens. We are very grateful to Jurga Motiejūnaitė and two anonymous reviewers for critical review of the manuscript. Work was supported by a cooperative project between the Lithuanian and Russian Academy of Sciences.

REFERENCES

Ahti T., Hämet-Ahti L., Jalas J., 1968: Vegetation zones and their sections in northwestern Europe. – Ann. Bot. Fennici, **5**(**3**): 169–211.

Berthier J., 1976: Monographie des *Typhula* Fr., *Pistillaria* Fr. et genes voisins. – Bull. Mens. Soc. Linn. (Lyon), **45**: 1–233.

Corner E. J. H., 1950: A monograph of *Clavaria* and allied genera. – Ann. Bot. Mem., **1**: 1–740.

Corner E. J. H., 1970: Supplement to "A monograph of *Clavaria* and allied genera". – Nova Hedwigia, **33**: 1–299.

Courtecuisse R., Duhem D., 1994: Guide des champignons de France et d'Europe. – Lausanne.

Dentinger B., McLaughlin D., 2006: Reconstructing the *Clavariaceae* using nuclear large subunits rDNA sequences and a new genus segregated from *Clavaria*. – Mycologia, **98**(**5**): 746–762.

Drobnys A. (ed.), 1981: Lietuvos TSR atlasas. – Maskva.

Franchi P., Marchetti M., 2001: Fungi non delineati. Introduzione allo studio genere *Ramaria* in Europa, pars XVI. – Alassio.

Gilibert J., 1781: Flora Litvanica inchoata seu enumeratio plantarum quas circa Grodnam collegit et determinavit Joannes Emmanuel Gilibert. – Grodno.

Hansen L., Knudsen H. (eds.), 1997: Nordic Macromycetes. Heterobasidioid, Aphyllophoroid and Gasteromycetoid Basidiomycetes, **3**. – Copenhagen.

Hawkins B. A., 2001: Ecology's oldest patterns? – Trends Ecol. Evol., **16**: 470.

Iršėnaitė R., 2004: Diversity and conservation of macromycetes in Dusetos Forest, Sartai Regional Park. – Botanica Lithuanica, **10**(**3**): 177–194.

Jundziłł B. S., 1811: Opisanie roślin litewskich według układu Linneusza. – Wilno.

Jundziłł J., 1830: Opisanie roślin w Litwie, na Wolyniu, Podolu i Ukraine, dziko rosnących jako i oswojonych. – Wilno.

Jülich W., 1984: Die Nichtblätterpilze, Gallertpilze und Bauchpilze. – Jena.

Kavaliauskas P., 1999: Biogeografijos raidos Lietuvoje problemos. – Geografijos metraštis, **32**: 350–364.

Kirk P. M., Cannon P. F., Minter D. W., Stalpers J. A., 2008: Ainsworth & Brisby's Dictionary of the Fungi. 10th edition. – UK.

Kotiranta H., Saarenoksa R., Kytövuori I., 2009: Aphyllophoroid fungi of Finland. A check-list with ecology, distribution and threat categories. – Norrlinia, **19**: 1–233.

Mazelaitis J., 1958: Medžiaga Lietuvos TSR himenomicetų florai. – Lietuvos TSR MA Biologijos instituto darbai, **3**: 13–54.

Mazelaitis J., 1960: Medžiaga himenomicetų florai. – Lietuvos TSR MA darbai. C ser., **1**(**21**): 29–42.

Mazelaitis J., 1962: Medžiaga Lietuvos TSR basidiomicetų florai. – Lietuvos TSR MA darbai. C ser., **3**(**29**): 23–42.

Mazelaitis J., 1976: Lietuvos TSR Afiloforiečių eilės grybai. – Vilnius.

Mazelaitis J., Gricius A., Urbonas V., 1963: Naujos Lietuvos TSR florai buožiagrybių (*Basidiomycetes*) rūšys. – Lietuvos TSR MA darbai. C ser., **3**(**32**): 89–101.

Minkevičius A., 1939: Valgomieji ir nuodingieji grybai Kauno apylinkėse ir Kazlų-Rūdoje 1938 m. – Kosmos, **20**: 71–80.

Minkevičius A., 1944: Grybai Kačerginės miške 1940 metais. – Mūsų girios, **1**–**2**: 51–60.

Mowszowicz J., 1937: Flora i zespoły roślinne "Gor Ponarskych" i ich najbliższych okolic. – Prace Tow. Przyj. Nauk w Wilnie, **11**: 5–8.

Mowszowicz J., 1957: Conspectus florae Vilnensis. – Łódź.

Mukhin V., 1993: Wood-inhabiting *Basidiomyces* biota of the West Siberian plain. – Ekaterinburg.

Novozhilov J. K., 2005: Miksomicety (*Myxomycetes*) Rossii: taksonomija, ekologija i geografija. Avtoreferat disertacii doktora biologičeskikh nauk. – Sankt-Peterburg.

Parmasto E. H., 1965: Opredelitel' rogatikovych gribov SSSR. – Moskva–Leningrad.

Petersen R. H., 1972: Notes on clavarioid fungi. XII. Miscellaneous notes on *Clavariadelphus*, and a new segregate genus. – Mycologia, **64**(**1**): 137–152.

Petersen R. H., 1975: *Ramaria* subgenus *Lentoramaria* with emphasis on the North America taxa. – Biblioth. Mycol., **43**: 1–161.

Petersen R. H., 1981: *Ramaria* subgenus *Echinoramaria*. – Biblioth. Mycol., **79**: 1–261.

Petersen R. H., Scates C., 1988: Vernally fruiting taxa of *Ramaria* from the Pacific Northwest. – Mycotaxon, **33**: 101–144.

Pine E. M., Hibbert D. S., Donoghue M. J., 1999: Phylogenetic relationships of cantharelloid and clavarioid *Homobasidiomycetes* based on mitochondrial and nuclear rDNA sequence. – Mycologia, **91**(**6**): 944–963.

Proszyński K., 1931: Spis wyzszych grzybów z rzędu oblocznіaków (*Hymenomycetes*) zebranych w okolicy m. Trok i w lasach przyleglych w latach 1926–1929. – Prace Tow. Przyj. Nauk w Wilnie, **6**: 1–15.

Shiryaev A., 2004: Clavarioid fungi of the Urals. I. Boreal-forest zone. – Mikologija i Fitopatologija, **38**(**4**): 59–72.

Shiryaev A. G., 2006: Klavarioidnye griby Urala. Avtoreferat disertacyi kandidata doktora biologičeskikh nauk. – Sankt-Peterburg.

Shiryaev A., 2007: Clavarioid fungi of Urals. II. The nemoral zone. – Karstenia, **47**(**1**): 5–16.

Shiryaev A., 2008: The Ural-Siberian mycobiota changing under the global warming and human interference. – Bull. Ecol. Forest. Land., **9**: 67–83.

Shiryaev A., 2009 a: Clavarioid fungi of the boreal ecosystems of the Ural-Siberian region: diversity, distribution, ecological functions. – Macromycetes of the boreal zone. Materials of conference: Krasnoyarsk, Russia: 45–50. – Krasnoyarsk.

Shiryaev A., 2009 b: Diversity and distribution of clavarioid fungi in Estonia. – Folia Cryptogamica Estonica (in press).

Shiryaev A. G., Kotiranta H., Mukhin V. A., Stavishenko I. V., Ushakova N. V., 2009: Aphyllophoroid fungi of the Sverdlovsk region, Russia: biodiversity, distribution and ecology. – Ekaterinburg (in press).

Stephenson S. L., Kalyanasundaram I., Lakhanpal T. N., 1993: A comparative biogeographical study of myxomycetes in the mid-Appalachians of eastern North America and two regions of India. – J. Biogeog, **20**: 645–657.

Trzebiński J., 1934: Spis wyższych grzybów podstawczaków i workowców, zabranych w Wilnie i okolicach w latach 1924-32. – Prace Tow. Przyj. Nauk w Wilnie, **8**(**4**): 7–11.

Urbonas V. A., Matelis A. A., Gricius A. I., 1990: Trends of variability of macromycetes, extinguishing and principles of their protection in Lithuania. – Mikologija i Fitopatologija, **24**(**5**): 385–388.

Vesterholt J., Koch J., Eilenberg J., Sochting U., Rosendahl S., 2003: The List of Danish Fungi: preliminary. – DanBIF Mycology Group (http://www.danbif.dk/Svampe.htm).

Wojewoda W., 2003: Checklist of Polish larger *Basidiomycetes*. – Biodiversity of Poland, **7**: 1–812.

NAUJI DUOMENYS APIE ŽAGARŪNINIUS GRYBUS LIETUVOJE

Anton Shiryaev, Reda Iršėnaitė

Santrauka

Lietuvoje nustatytos 87 žagarūninių grybų rūšys, iš kurių 50 šalyje anksčiau nebuvo konstatuotos. Dažniausios rūšys yra *Typhula erythropus*, *Clavulina cinerea*, *Clavulina coralloides*, *Macrotyphula juncea*, *Lentaria byssiseda*, *Typhula setipes* ir *Ramaria stricta*. Nors jos sudaro tik 12 % visų žagarūninių grybų rūšių, jų dažnumas yra 40 %. Net 36 % visų rūšių buvo aptiktos mažiau kaip keturis kartus (sudaro 9 % visų radimo atvejų), o 3/4 visų rūšių radimo atvejų sudaro retos rūšys. Galima teigti, kad kai kurios rūšys (*Clavaria argillacea* var. *sphagnicola*, *Clavariadelphus sachalinensis*, *Multiclavula vernalis*, *Typhula lutescens*) Lietuvoje yra ties pietinio paplitimo riba. Dabar Europos hemiborealiniam žagarūninių grybų kompleksui priskiriama 118 rūšių, o iš temperatinių zonų žinomos 106 rūšys.