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Critical revision of the Myxomycetes collection of Young Naturalists Club of Zoological Museum of Moscow State University

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ABSTRACT

In the present paper, we report the results of a critical revision of the Myxomycetes collection of Young Naturalists Club of Zoological Museum of Moscow State University. The collection consists of 1715 specimens from 142 species in 35 genera, 11 families, and 6 orders. Comprehensive material from Moscow and Moscow Region (1112 specimens), Tver Region (191), and Tyumen Region (112) is presented in the collection. There are also numerous specimens from Irkutsk, Murmansk, Ryazan Regions, and Primorye Territory, and fragmentary collections from Astrakhan, Kaluga, Pskov, Vladimir, Yaroslavl Regions, Altai, Krasnodar, Khabarovsk Territories, Altai and Karelia Republics, as well as Crimean Peninsula and Kingdom of Cambodia (Southeast Asia). During revision we discovered two new species for Russia: *Stemonitis uvifera* T. Macbr. and *Fuligo intermedia* T. Macbr. Descriptions and illustrations of these species are presented.

Keywords: Amoebozoa, biodiversity, slime moulds, herbarium, Russia

РЕЗЮМЕ

Гмошинский В.И., Матвеев А.В., Губанов Е.С., Бортников Ф.М., Дунаев Е.А. Критическая ревизия коллекции миксомицетов Кружка юных натуралистов Зоологического музея МГУ. В работе приведены результаты ревизии коллекции миксомицетов (Amoebozoa, Myxomycota) Кружка юных натуралистов Зоологического музея МГУ. Она включает 1715 образцов спороношений, относящихся к 142 видам миксомицетов из 35 родов, 11 семейств и 6 порядков. В коллекции обширно представлены материалы, собранные на территории Московской (1112 образцов), Тверской (191) и Тюменской (112) областей. Депонировано значительное число образцов из Иркутской, Мурманской, Рязанской областей и Приморского края, присутствуют фрагментарные сборы из Астраханской, Владимирской, Калужской, Псковской и Ярославской областей, Алтайского, Краснодарского и Хабаровского краев, республик Алтай, Карелия и Крым, а также из Королевства Камбоджа (Юго-Восточная Азия). При ревизии коллекции были обнаружены два новых вида для России – *Stemonitis uvifera* T. Macbr. и *Fuligo intermedia* T. Macbr., их иллюстрации и описания особенностей морфологии приведены в статье.

Ключевые слова: Amoebozoa, биоразнообразие, гербарий, Россия, слизевики

The myxomycetes (Amoebozoa, Myxogastrea) are a relatively small group of amoeboid fungus-like protists which are widely spread across all continents (Schnittler et al. 2017). According to the online nomenclatural information system of Eumycetozoa (Lado 2005–2020), this group consists of approximately 1050 morphospecies. Some of them apparently occur more often in certain terrestrial ecoregions (Novozhilov et al. 2009). It is important to note that myxomycetes are a very convenient object for herbarium storage. The specimens of fruit bodies (sporophores) on substrate pieces are relatively small (mostly in the range of 10–100 mm) and take up little space in herbarium. Unlike macromycete fungi, it is not significant on which substrate myxomycete specimens were found. Almost all essential information to identify myxomycete species can be obtained from morphological characters of sporophores.

Despite the research intensification over the last 40 years, the territory of Russia remains extremely unevenly studied. The most well-studied areas are Astrakhan, Volgograd, Leningrad, Moscow, Novosibirsk, Sverdlovsk, and Tver Regions, Altai and Krasnoyarsk Territories, and Republic of Karelia. A total of 454 myxomycete species from 56 genera and 6 orders are found in Russia, which is approximately 42 % of the total number of known species (Matveev et al. 2016–2020). However, studies of species diversity have never been conducted in most areas of Russia. Therefore, critical revisions of the available collections may provide additional information on the distribution of certain species throughout the country.

The Club of Young Naturalists of Zoological Museum of Moscow State University (CYN) was founded by Evgeny A. Dunayev in 1991. Since then, more than 512 students have been trained in this club and many of them have subsequently chosen biology as their main area of professional activity. During the years of the CYN existence, more than 135 field courses have been conducted in Russia and other countries

(Dunayev 2017). The Myxomycetes collection of CYN was created in 1992 by E.A. Dunayev, who is still maintaining it. Specimens collected during field courses represent the basis of the deposited material (Dunayev & Barsukova 2002). In addition, part of the specimens was provided by the staff of the Department of Mycology and Algology (Biological Faculty, Lomonosov Moscow State University).

MATERIAL AND METHODS

Before the revision, all specimens in the collection were kept in matchboxes provided with finishing labels. A catalog containing the following information about the specimens was attached to the collection: taxon name and its authors; location description; date of collection; names of the collector and the person who identified the specimen. Sporophores of the same species collected on the same day and in the same habitat were often consolidated into one herbarium specimen, which was noted in the catalog.

During revision, all specimens were re-identified using widely accepted monographs (Martin & Alexopoulos 1969, Novozhilov 1993, Poulain et al. 2011a). Taxa names and authors correspond to the online nomenclatural information system of Eumycetozoa (Lado 2005–2020). We used the classification of Lado & Eliasson (2017). The level of preservation on a five-point scale was indicated for each specimen (according to dela Cruz et al. 2009, with modifications) (Table 1, see also Fig. 1). During identification, we attached them to the bottom of a U-shaped paper tray (according to Stephenson & Stempen 2000). Labels with specimen unique number, species name, collection location and date, collector's and determination person's names were affixed to box tops.

Based on the analysis of the verbal description of collection sites, we assigned georeferences and location uncertainties in meters to all specimens.

All information about the specimens in the collection was modified according to the Darwin Core standard (Wieczorek et al. 2012) and presented as a dataset on gbif.org (Gmoshinskiy et al. 2018).

List of collection sites

Altai Republic

1. 51.762990°N 85.732476°E (±1 km), 06.08.2007.

Altai Territory

2. 52.569319°N 78.928442°E (±1 km), 05.08.2007.

Astrakhan Region

3. 46.904181°N 47.913736°E (±5 km), **a.** 06.08.1999, **b.** 08.2005.

Crimean Peninsula

4. 44.508184°N 34.236980°E (±10 m), 03.02.1999.
5. 44.508199°N 34.241218°E (±30 m), 30.04.2013.

Table 1. Criteria adopted to establish the level of preservation of Myxomycetes collection of CYN

Level	Description
I	No traces of sporophores
II	Sporophores are heavily damaged. Only stalks and hypothallus of the sporophores are preserved. Precise identification is impossible
III	Sporophores are heavily damaged, but it is possible to identify species by using a set of diagnostic features. There are ≥ 10 complete sporophores in collection
IV	Sporophores in good condition, but many of them are slightly damaged (in particular, broken peridium, whole colonies are pressed as a result of incorrect storage, etc.)
V	Sporophores in excellent condition

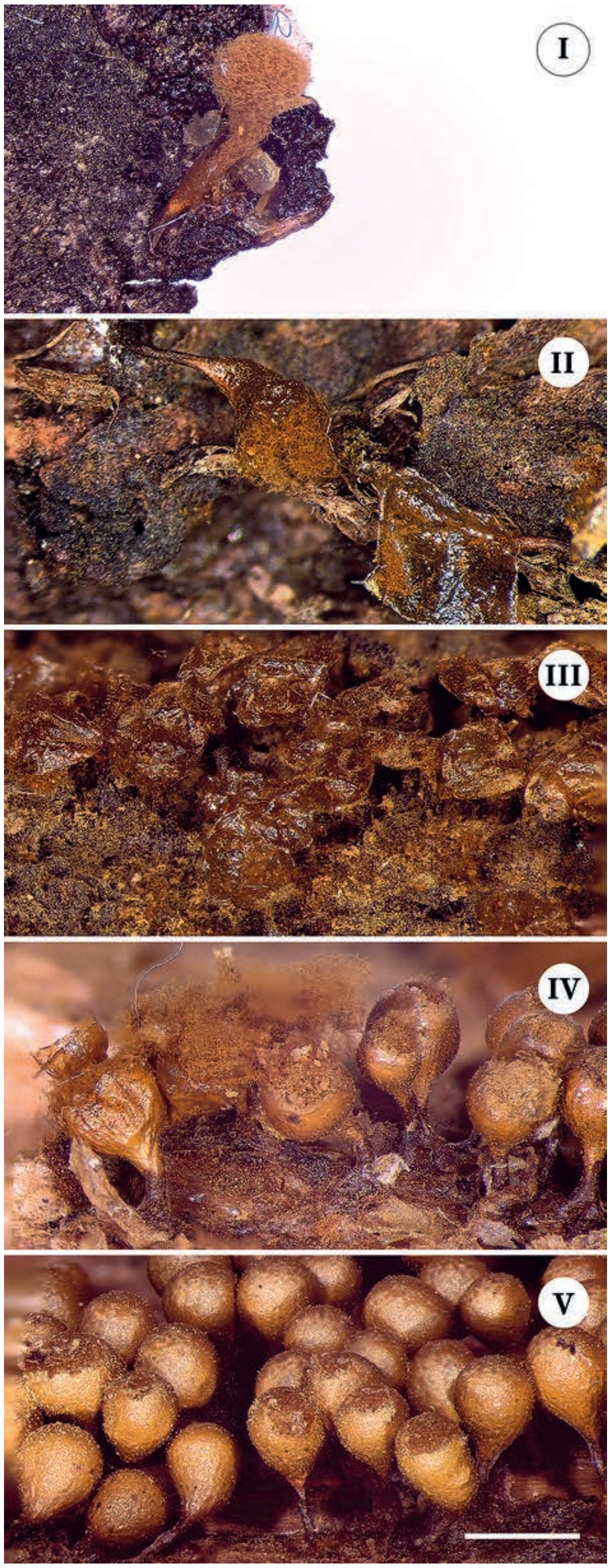

Figure 1 Specimens of *Trichia decipiens* (Pers.) T. Macbr. with levels of preservation from I to V. Scale bar: 1 mm

6. 44.508390°N 34.240043°E (±30 m), collection date is unknown.
7. 44.531043°N 34.255920°E (±50 m), 17.06.1999.
8. 44.561064°N 34.327681°E (±20 m), 03.05.2002.
9. 44.644440°N 34.370180°E (±50 m), 02.04.1997.
10. 44.661576°N 34.346115°E (±20 m), 02.04.1997.
11. 44.666132°N 34.336719°E (±500 m), 04.05.2002.
12. 44.757732°N 34.345456°E (±30 m), 06.05.2002.
13. 44.766951°N 34.392726°E (±70 m), 08.05.2003.
14. Exact collection locality and collection date are unknown.

Irkutsk Region

15. 51.8970987°N 105.0548744°E (±1 km), 02.06.2009.
16. 52.030049°N 104.638495°E (±1 km), **a.** 20.05.2005 – 01.06.2005; **b.** 28.05.2006 – 15.06.2006; **c.** 24.05.2007 – 30.06.2007; **d.** 16.05.2008 – 01.06.2008.
17. Exact collection locality is unknown; 2006.

Kaluga Region

18. 54.553557°N 36.328644°E (±5 km), 10.10.1998.
19. 54.732455°N 35.233281°E (±5 m), 12.09.2011.

Khabarovsk Territory

20. 48.528895°N 135.025458°E (±1 km), 27.09.2005.

Krasnodar Territory

21. 44.700234°N 37.593121°E (±1 km), 12.07.2010.
22. 44.730479°N 37.434199°E (±100 m), 28.03.2003.
23. 44.750953°N 37.411057°E (±100 m), 27.03.2003.
24. 44.771465°N 37.405274°E (±50 m), 25.03.2001.
25. 44.771541°N 37.392413°E (±50 m), 26.03.2003.

Moscow and Moscow Region

26. 54.418306°N 38.516885°E (±5 km), 07.08.1994.
27. 54.473926°N 38.724988°E (±5 km), 07.08.1994.
28. 54.771368°N 37.599469°E (±1 km), 08.06.2002.
29. 54.884892°N 37.617438°E (±5 km), **a.** 03.05.1993; **b.** 17.06.1993 – 12.08.1993; **c.** 06.10.1993; **d.** 27.05.1994; **e.** 08.01.2018; **f.** 1993.
30. 54.984049°N 38.194669°E (±1 km), 03.05.1997.
31. 55.317027°N 37.137380°E (±1 km), 23.10.2003.
32. 55.318798°N 36.913751°E (±5 km), 08.09.1991.
33. 55.414201°N 38.574336°E (±50 m), 22.04.1995.
34. 55.445185°N 35.987815°E (±100 m), 1991.
35. 55.448703°N 36.002789°E (±1 km), **a.** 23.04.1989; **b.** 02.05.1990; **c.** 06.08.1990; **d.** 06.10.1991.
36. 55.453369°N 35.968434°E (±30 m), 11.04.1993.
37. 55.462264°N 40.031258°E (±1 km), 26.07.1994 – 29.07.1994.
38. 55.452248°N 40.030098°E (±1 km), 29.07.1994.
39. 55.471299°N 40.030457°E (±1 km), 29.07.1994.
40. 55.481450°N 40.014083°E (±1 km), 27.07.1994.
41. 55.481607°N 40.030295°E (±1 km), 27.07.1994.
42. 55.483014°N 38.444712°E (±1 km), 31.05.1995.
43. 55.490276°N 38.444283°E (±1 km), 02.08.1994.
44. 55.491720°N 38.466306°E (±1 km), 02.08.1994.
45. 55.492067°N 38.435565°E (±1 km), **a.** 13.09.1990; **b.** 07.01.1991; **c.** 23.08.1992; **d.** 1989; **e.** 1990; **f.** 1991.
46. 55.511765°N 36.221113°E (±1 km), **a.** 16.09.1990; **b.** 05.09.1991.
47. 55.535992°N 36.589461°E (±1 km), 19.04.2014.
48. 55.565815°N 38.856443°E (±50 m), 09.2002.
49. 55.570593°N 38.832239°E (±10 m), 03.10.1999.
50. 55.571482°N 38.823449°E (±20 m), 28.09.2014.
51. 55.572144°N 38.842642°E (±50 m), 22.09.1996.
52. 55.572833°N 37.784500°E (±5 m), 29.05.2010.
53. 55.579058°N 36.587530°E (±1 km), **a.** 24.03.1991; **b.** 22.03.1992 – 26.03.1992.
54. 55.581653°N 38.755459°E (±1 km), 19.06.1993.
55. 55.569260°N 38.836419°E (±20 m), **a.** 11.10.1992; **b.** 25.09.2014.
56. 55.590827°N 38.858224°E (±1 km), 10.10.1993.
57. 55.596667°N 37.751667°E (±5 m), 26.09.2010 – 29.09.2010.
58. 55.599971°N 37.740464°E (±5 m), 14.07.2007.
59. 55.608674°N 37.689313°E (±100 m), 20.12.2009.
60. 55.612851°N 37.684122°E (±500 m), 23.03.1991.
61. 55.601422°N 37.925407°E (±5 km), 14.06.2010.
62. 55.622483°N 37.727228°E (±5 m), 15.10.2011.
63. 55.624000°N 37.727283°E (±5 m), 30.10.2010.
64. 55.617624°N 37.564978°E (±5 km), **a.** 10.09.2000 – 24.09.2000; **b.** 10.09.2001; **c.** 18.10.2001; **d.** 06.04.2010; **e.** 28.06.2010; **f.** 09.06.2014.
65. 55.630133°N 38.195701°E (±10 m), **a.** 23.09.2001; **b.** 2005.
66. 55.631283°N 37.581283°E (±5 m), 09.06.2010.
67. 55.632174°N 38.203141°E (±50 m), **a.** 08.12.1990 – 09.12.1990; **b.** 24.11.1991; **c.** 20.09.1992; **d.** 19.10.2008; **e.** 1990.
68. 55.619200°N 38.612091°E (±30 m), collection date is unknown.
69. 55.646343°N 37.315080°E (±1 km), **a.** 04.04.2004; **b.** 12.07.2010.
70. 55.647200°N 37.679500°E (±5 m), 29.06.2010.
71. 55.658815°N 37.549875°E (±1 km), 24.10.2006.
72. 55.659927°N 37.815521°E (±1 km), 04.06.2010.
73. 55.651460°N 37.542904°E (±5 m), **a.** 10.05.2006; **b.** 05.10.2006.
74. 55.674941°N 37.693630°E (±5 m), 29.06.2010.
75. 55.676526°N 36.925951°E (±1 km), **a.** 03.10.1999; **b.** 24.09.2000.
76. 55.678365°N 36.912055°E (±50 m), 28.09.1997.
77. 55.678744°N 36.964902°E (±100 m), **a.** 23.09.1990 – 25.09.1990; **b.** 03.09.1991; **c.** 07.10.2001; **d.** 09.1991.
78. 55.681233°N 36.727995°E (±5 km), **a.** 19.07.1985; **b.** 02.07.1990 – 07.07.1990; **c.** 12.04.1991; **d.** 12.04.1992; **e.** 02.07.1992; **f.** 18.08.1992 – 10.09.1992; **g.** 02.07.1993 – 29.09.1993; **h.** 01.07.1995 – 01.08.1995; **i.** 17.08.1996 – 06.11.1996; **j.** 06.06.1997 – 26.07.1997; **k.** 28.08.1997 – 13.10.1997; **l.** 20.08.1998 – 24.08.1998; **m.** 25.09.1998 – 27.09.1998; **n.** 20.08.1999 – 22.08.1999; **o.** 01.07.2003 – 24.07.2003; **p.** 11.07.2007; **q.** 21.06.2010 – 25.06.2010; **r.** 01.10.2011; **s.** 1975; **t.** 1982; **u.** 1985; **v.** 09.1992; **w.** 1993; **x.** 08.1993 – 09.1993; **y.** 06.1995.
79. 55.697778°N 38.412778°E (±1 km), 11.12.1995.
80. 55.685148°N 37.070238°E (±1 km), 1993.
81. 55.707283°N 37.527008°E (±1 km), **a.** 25.09.2000 – 05.10.2000; **b.** 20.06.2001.
82. 55.710372°N 37.534850°E (±1 km), 22.09.2008.
83. 55.716992°N 37.587411°E (±1 km), **a.** 30.09.2003 – 12.10.2003; **b.** 22.09.2008.
84. 55.719966°N 38.378226°E (±5 km), 05.01.1996.
85. 55.753240°N 38.120674°E (±1 km), **a.** 15.08.1991 – 25.08.1991; **b.** 13.04.2002; **c.** 14.10.2004; **d.** 15.09.2005; **e.** 28.10.2006 – 10.11.2006; **f.** 27.10.2013; **g.** collection date is unknown.
86. 55.759299°N 37.424102°E (±1 km), 15.09.2001.
87. 55.772867°N 37.677957°E (±20 m), 03.07.2013.
88. 55.776631°N 37.782409°E (±1 km), 10.05.2010 – 10.06.2010.
89. 55.782375°N 38.115931°E (±5 km), **a.** 14.09.1998; **b.** 15.09.2000; **c.** 24.07.2002; **d.** 20.08.2003 – 06.09.2003; **e.** 16.09.2004 – 23.09.2004; **f.** 02.09.2005; **g.** 15.06.2006; **h.** 15.09.2006 – 22.09.2006; **i.** 08.2000; **j.** collection date is unknown.
90. 55.782500°N 37.808250°E (±5 m), 10.05.2010.
91. 55.811654°N 37.989802°E (±1 km), 10.2006.
92. 55.846539°N 37.740247°E (±5 km), 25.08.2003.
93. 55.900875°N 37.742402°E (±1 km), 10.1980.
94. 55.910510°N 37.212507°E (±1 km), **a.** 29.10.1989; **b.** 30.09.1990; **c.** 29.01.1991; **d.** 22.09.1991 – 29.09.1991; **e.** 27.09.1992; **f.** 24.10.1993; **g.** 23.11.1995; **h.** 14.09.1997; **i.** 01.10.2006; **j.** 23.09.2012.
95. 55.921475°N 36.731316°E (±1 km), 16.10.1994.
96. 55.926186°N 36.716532°E (±1 km), **a.** 24.09.1995; **b.** 19.07.1997; **c.** 19.10.1997.
97. 55.917861°N 37.218860°E (±50 m), 08.03.1992.
98. 55.935644°N 37.166286°E (±100 m), 12.1990.

99. 55.956280°N 37.122331°E (±1 km), 07.10.1990.
100. 56.005126°N 36.323589°E (±1 km), **a.** 20.03.1993; **b.** 06.11.1996 – 09.11.1996; **c.** 01.01.1997; **d.** 01.11.1997 – 09.11.1997.
101. 56.005126°N 36.323589°E (±5 km), 07.10.1991.
102. 56.025464°N 38.429571°E (±1 km), 04.11.1991 – 06.11.1991.
103. 56.208728°N 37.006008°E (±5 km), collection date is unknown.
104. 56.043928°N 36.254317°E (±1 km), 28.08.1994.
105. 56.048835°N 37.492784°E (±1 km), **a.** 16.10.1996; **b.** 19.07.1998 – 12.09.1998.
106. 56.512152°N 37.544756°E (±1 km), 13.10.1991.
107. 56.526293°N 37.550477°E (±100 m), **a.** 29.09.1991 – 23.10.1991; **b.** 05.09.1993 – 27.09.1993; **c.** 12.09.1994; **d.** 14.08.1996 – 17.08.1996.
108. 56.677767°N 37.236967°E (±50 m), 19.04.1992.
109. 56.696654°N 37.586167°E (±1 km), 04.08.1996 – 19.08.1996.
110. 56.699621°N 37.196171°E (±2 km), **a.** 31.12.1990 – 10.01.1991; **b.** 07.02.1992; **c.** 07.11.2001; **d.** 25.03.2002; **e.** 02.11.2003 – 07.11.2003; **f.** 02.11.2004 – 07.11.2004; **g.** 29.12.2005 – 05.01.2006; **h.** 05.11.2006 – 10.11.2006; **i.** 27.12.2006 – 31.12.2006; **j.** 15.07.2008; **k.** 24.06.2011 – 30.06.2011; **l.** 27.12.2011 – 05.01.2012; **m.** 10.10.2013; **n.** 29.06.2014; **o.** 27.06.2015; **p.** 29.10.2017; **q.** 10.1999; **r.** 11.2004; **s.** 2005; **t.** collection date is unknown.
111. 56.706602°N 37.152319°E (±50 m), 10.10.2013 – 09.11.2013.
112. 56.701443°N 38.182965°E (±1 km), **a.** 23.05.1994 – 27.05.1994; **b.** 20.07.1994.
113. 56.721446°N 38.082329°E (±1 km), **a.** 03.05.1994; **b.** 23.07.1994 – 23.08.1994.
114. 56.727899°N 37.622286°E (±5 km), 03.08.1996.
115. 56.093617°N 37.298502°E (±50 m), 23.05.1992 – 24.05.1992.
116. 56.094901°N 37.300509°E (±50 m), 19.05.1996.
117. 56.145966°N 36.781394°E (±1 km), 24.06.2011.
118. Exact collection locality and collection date are unknown.

Murmansk Region

119. 66.301711°N 36.409739°E (±1 km), 03.09.2003.
120. 66.523452°N 35.099388°E (±1 km), 31.08.2003.
121. 66.8893302°N 33.0365753°E (±1 km), 17.09.2003.
122. 66.9462324°N 32.9123783°E (±1 km), 01.09.1998.
123. 67.167729°N 31.992337°E (±1 km), 23.07.1996 – 23.08.1996.
124. 67.1854688°N 32.9265404°E (±1 km), 02.07.1994.
125. 67.044026°N 32.581267°E (±1 km), 19.08.1999 – 21.08.1999.
126. 67.086224°N 32.993916°E (±5 km), 14.08.1993.
127. 67.114409°N 31.553058°E (±1 km), 21.07.1996.
128. 67.145636°N 32.517368°E (±1 km), 03.08.1999.
129. 67.154935°N 33.317163°E (±1 km), 17.06.1994.
130. 67.163783°N 32.498657°E (±1 km), 03.07.2000.
131. 67.166312°N 33.201071°E (±1 km), 08.08.1993.
132. 69.205382°N 35.2963257°E (±1 km), 12.08.2003 – 15.08.2003.
133. 69.2204907°N 35.3758049°E (±1 km), 12.08.2003.

Primorye Territory

134. 42.795120°N 131.253779°E (±100 m), 25.08.1996 – 26.08.1996.
135. 42.800404°N 131.244494°E (±50 m), 15.08.1996 – 25.08.1996.
136. 42.806480°N 131.244648°E (±20 m), **a.** 19.08.1996; **b.** 04.09.2000; **c.** 09.2002.
137. 43.168870°N 132.889915°E (±50 m), **a.** 23.08.2000; **b.** 08.2002.
138. 43.213252°N 132.893210°E (±100 m), 30.08.2000.
139. 43.631145°N 132.229432°E (±5 km), 28.09.2005.
140. 43.730934°N 131.698720°E (±2 km), 29.09.2005.

Pskov Region

141. 57.059345°N 28.926145°E (±1 km), 22.08.2014.

Republic of Karelia

142. 66.572989°N 32.836019°E (±50 m), **a.** 01.08.1992 12.08.1992; **b.** 01.08.2003 – 10.08.2003.

Ryazan Region

143. 54.686309°N 40.694984°E (±1 km), 20.07.1997.
144. 54.686343°N 40.681074°E (±1 km), 25.07.1997.
145. 54.687702°N 40.561180°E (±1 km), 25.07.1997.
146. 54.6963567°N 40.8690977°E (±1 km), 01.11.1996.
147. 54.707761°N 40.862092°E (±100 m), 02.12.1986.
148. 54.708883°N 40.854220°E (±1 km), **a.** 22.06.1987; **b.** 24.09.1990; **c.** 10.06.1996.
149. 54.719646°N 40.918454°E (±1 km), 24.07.1997.
150. 54.721094°N 40.926674°E (±1 km), 12.07.1997 – 27.07.1997.
151. 54.721604°N 40.934436°E (±1 km), 12.07.1997 – 27.07.1997.
152. 54.725358°N 40.865028°E (±1 km), 16.07.1997.
153. 54.726700°N 40.857258°E (±1 km), 13.07.1997 – 17.07.1997.
154. 54.726700°N 40.857258°E (±2 km), 17.07.1997.
155. 54.727255°N 40.874405°E (±1 km), 24.07.1997.
156. 54.729691°N 40.925307°E (±1 km), 23.10.1986.
157. 54.732286°N 40.963816°E (±1 km), 29.05.1987.
158. 54.719157°N 40.901206°E (±1 km), 24.07.1997.
159. 54.719214°N 40.885787°E (±1 km), **a.** 19.07.1997 – 27.07.1997; **b.** 19.09.1997.
160. 54.736859°N 40.865661°E (±1 km), 13.07.1997 – 29.07.1997.
161. 54.738747°N 40.916205°E (±1 km), 24.07.1997 – 29.07.1997.
162. 54.741445°N 40.6299734°E (±1 km), 24.06.1987.
163. 54.745987°N 40.848029°E (±1 km), 30.07.1997.
164. 54.792879°N 40.588680°E (±1 km), 22.04.1997.

Siem Reap Province (Kingdom of Cambodia)

165. 13.434917°N 103.887783°E (±1 km), 20.12.2014.

Tver Region

166. 56.304325°N 34.874414°E (±5 km), **a.** 03.05.2015; **b.** 08.2001.
167. 56.456333°N 32.960283°E (±5 m), 26.04.2017.
168. 56.672525°N 36.460565°E (±20 m), **a.** 26.06.1987; **b.** 20.08.1989; **c.** 22.04.1990; **d.** 15.08.1990 – 29.08.1990; **e.** 15.09.1991; **f.** 08.07.1992; **g.** 17.06.1993 – 22.06.1993; **h.** 05.07.1994; **i.** 22.06.1996 – 04.07.1996; **j.** 26.06.1997 – 03.08.1997; **k.** 02.06.1998 – 04.06.1998; **l.** 01.07.2001 – 12.07.2001; **m.** 08.07.2002 – 07.08.2002; **n.** 10.07.2003 – 10.08.2003; **o.** 10.11.2003 – 11.11.2003; **p.** 22.06.2009 – 28.06.2009; **q.** 08.1989; **r.** 08.1990; **s.** 06.1995.
169. 56.681475°N 36.392279°E (±1 km), **a.** 07.07.2004; **b.** 15.07.2006 – 17.07.2006; **c.** 04.07.2007 – 07.07.2007.
170. 56.686144°N 36.568391°E (±1 km), 11.07.2007.
171. 56.701150°N 36.418700°E (±500 m), 10.07.2003 – 11.07.2003.
172. 56.804377°N 37.057179°E (±100 m), 07.01.1993.
173. 57.584893°N 36.215374°E (±500 m), 19.08.1993.

Tyumen Region

174. 56.956338°N 65.763138°E (±5 km), **a.** 05.06.2008 – 08.06.2008; **b.** 2008; **c.** 07.2009.
175. 57.075664°N 65.077175°E (±5 km), **a.** 10.06.2001; **b.** 20.05.2004 – 03.06.2004.
176. 57.106214°N 65.067743°E (±5 km), **a.** 15.05.1996; **b.** 12.05.1997.

Vladimir Region

177. 55.881672°N 39.458536°E (±1 km), 27.08.1992.

Yaroslavl Region

178. 57.032646°N 38.644730°E (±1 km), 25.08.1993.

Unknown area

179. Collection locality and collection date are not specified.

RESULTS

The species list is annotated with boldface numeric codes of collection locations, alphabetic indices of collection dates (see the list of collecting sites) and herbarium numbers in the Myxomycetes collection of CYN in parentheses. Myxomycete nomenclature follows Lado (2005–2020), except for some varieties and subspecies, which are not accepted in this information system, and *Stemonitis lignicola* Nann.-Bremek., which we consider as a separate species.

Amaurochaete atra (Alb. et Schwein.) Rostaf. – **168j** (662).

New for Tver Region.

Arcyodes incarnata (Alb. et Schwein.) O.F. Cook – **20** (1388-1); **94f** (189); **110o** (1479-1).

New for Khabarovsk Territory.

Arcyria affinis Rostaf. – **5** (1571); **7** (491); **23** (762); **27** (355); **29b** (231); **35c** (35); **78b** (330-1); **78g** (282-1); **78i** (417); **78j** (531); **78n** (516); **78o** (715); **78q** (1229); **78t** (28, 255); **83a** (760); **89h** (1263, 1589); **94i** (851); **96a** (450); **105b** (503, 506, 507); **107d** (376); **109** (375, 388, 389); **110e** (1322); **110h** (838-1); **110k** (1430); **110m** (1543); **110o** (1467); **110s** (1114); **121** (819); **132** (804); **135** (421); **136a** (382, 393); **166b** (673); **168i** (442); **174a** (936, 937-1, 983).

New for Tyumen and Murmansk Regions.

Arcyria cinerea (Bull.) Pers. – **16c** (1086, 1092, 1107-1); **43** (364); **69a** (1560); **78g** (314, 327); **78x** (1514-1); **85e** (1356); **88** (1277); **94d** (114); **105b** (504-1); **109** (422); **110e** (1287-2, 1335); **110i** (885); **110k** (1424); **110m** (1544); **110o** (1468, 1478); **117** (1527-1, 1637); **125** (485); **137a** (1034); **137b** (1014); **168m** (774); **169c** (1039); **174a** (938, 984).

New for Irkutsk and Tyumen Regions.

Arcyria denudata (L.) Wettst. – **27** (357); **67c** (148); **69a** (1557); **78g** (286); **88** (1218); **89i** (628); **94d** (108); **110c** (617); **110m** (1545); **137b** (1007); **149** (557); **169c** (1078); **174b** (1046).

New for Tyumen Region.

Arcyria ferruginea Saut. – **40** (342); **45d** (38); **49** (494); **51** (433); **53b** (176); **55a** (138); **57** (1189); **77a** (32); **78g** (306); **78i** (386); **93** (331); **102** (79); **105b** (500); **107a** (87); **110a** (34); **110e** (1137, 1146, 1288, 1289-1, 1311); **110h** (833, 838-2).

Arcyria helvetica (Meyl.) H. Neubert, Nowotny et K. Baumann (Fig. 2A, B) – **4** (489); **110e** (1135).

New for Crimean Peninsula, Moscow and Moscow Region.

Arcyria imperialis (G. Lister) Q. Wang et Yu Li – **16c** (1089-1, 1090); **67a** (40); **67e** (39); **89h** (1274-1); **137b** (1002); **139** (1511).

New for Irkutsk Region, Moscow and Moscow Region.

Arcyria incarnata (Pers. ex J.F. Gmel.) Pers. – **16b** (1396-1); **29b** (217, 218); **45e** (41); **56** (206); **67b** (133); **68** (996); **78g** (282-2); **85a** (121); **89d** (743, 754, 755); **89h** (1258, 1590-1); **94i** (855); **110h** (1402); **110o** (1482); **117** (1519); **132** (816); **143** (563); **159a** (556); **161** (571, 572); **168b** (33); **168m** (624); **174a** (937-2); **174b** (1042).

New for Irkutsk, Tyumen, and Murmansk Regions.

Arcyria obvelata (Oeder) Onsberg – **7** (492); **77a** (36); **78g** (303); **78j** (522, 523, 692); **78o** (716); **78t** (251); **102** (78-1); **107d** (414); **110a** (37); **113a** (360); **117** (1521, 1524); **123** (405); **132** (801); **141** (1437, 1598-1); **142b** (725); **151** (566); **153** (568); **160** (567); **165** (1520); **166b** (674); **168h** (441); **168j** (997); **168k** (533); **168l** (690); **168p** (1445-1); **169b** (1320); **169c** (1085); **171** (794, 797); **174a** (964); **174b** (1044).

Arcyria occidentalis (T. Macbr.) G. Lister, in Lister (Fig. 2C) – **16b** (1384); **20** (1393, 1585-1); **78g** (308); **78x** (289); **110e** (1286, 1328).

New for Khabarovsk Territory and Irkutsk Region.

Arcyria oerstedii Rostaf. – **78b** (330-2); **78j** (515); **78o** (717); **89h** (1271); **110e** (1318); **110j** (1020); **112a** (369); **175b** (892).

New for Tyumen Region.

Arcyria pomiformis (Leers) Rostaf. – **29b** (241); **69a** (1566); **78g** (301); **89d** (751); **89h** (915-1, 922); **105b** (504-2); **110h** (832); **110l** (1415); **168j** (998); **174a** (939, 985); **174b** (1037, 1213).

Arcyria stipata (Schwein.) Lister – **65a** (629); **69a** (1562); **78k** (526); **94d** (109); **109** (378); **110f** (1284).

Badhamia affinis Rostaf. – **16b** (1396-2); **94f** (188); **110f** (1122); **110t** (883).

New for Irkutsk Region.

Badhamia capsulifera (Bull.) Berk. (Fig. 2D) – **54** (243-1); **55a** (139).

Badhamia foliicola Lister – **19** (1226); **53b** (168); **79** (415); **105a** (413); **159a** (573).

New for Kaluga and Ryazan Regions.

Badhamia lilacina (Fr.) Rostaf. – **78g** (267); **78l** (519, 710); **142a** (173, 174).

New for Republic of Karelia.

Badhamia macrocarpa (Ces.) Rostaf. – **29e** (1615); **55b** (1419); **64a** (865, 871); **96c** (582, 583); **97** (83); **110m** (1541, 1547); **110p** (1630); **117** (1522); **168e** (335).

Badhamia utricularis (Bull.) Berk. – **45b** (84); **53b** (167); **77c** (655); **81b** (864); **100b** (1368); **110h** (842); **110i** (884); **110q** (652); **111** (1507).

Ceratiomyxa fruticulosa (O.F. Müll.) T. Macbr. – **69a** (1564); **89h** (915-2); **110o** (1460, 1465, 1487-1); **141** (1598-2); **168p** (1438-1, 1440, 1441, 1445-2); **169a** (1597); **174a** (933); **174b** (1227).

New for Tyumen Region.

Ceratiomyxa fruticulosa* var. *flexuosa (Lister) G. Lister, in Lister – **16c** (1145); **78g** (268); **86** (850-1); **89d** (734); **109** (406); **110k** (1422); **168g** (202); **168j** (469); **168k** (537); **168l** (689); **168m** (631); **168n** (775-1); **169c** (1053).

New for Irkutsk Region.

Ceratiomyxa fruticulosa* var. *porioides (Alb. et Schwein.) G. Lister, in Lister – **29b** (221, 222); **78g** (302); **78q** (1183); **88** (1252).

Clastoderma debaryanum A. Blytt – **20** (1389, 1512); **139** (1600).

Collaria arcyrionema (Rostaf.) Nann.-Bremek. ex Lado – **29b** (220); **40** (340, 343); **44** (366); **78g** (275, 315, 322); **89c** (848); **110e** (1143-1); **113b** (445); **117** (1417); **125** (478); **163** (550); **168i** (444); **168m** (635); **169c** (1066); **174a** (951, 953, 960, 963, 969); **174b** (1041, 1236).

New for Tyumen Region.

Comatricha ellae Härk. – **110o** (1487-2); **132** (807).

Comatricha laxa Rostaf. – **29b** (213, 214).

Comatricha nigra (Pers. ex J.F. Gmel.) J. Schröt., in Cohn – **11** (656); **29a** (224, 225); **29b** (223); **53a** (136); **60** (69); **67a** (63); **78x** (332); **85e** (1029); **94c** (66); **97** (68); **100d** (593); **109** (420, 424); **110a** (64); **110e** (1310-1); **110g** (907); **110h** (1381); **110k** (1427); **110m** (1537-1); **110o** (1457, 1461); **112a** (368); **117** (1418, 1436); **168p** (1450); **170** (1171); **174b** (1248).

Comatricha pulchella (C. Bab.) Rostaf. – **111** (1501-1); **142b** (724); **168j** (663, 664); **174a** (949).

Comatricha* cf. *reticulospora Ing et P.C. Holland – **110-e** (1300); **132** (810).

New for Moscow, Moscow and Murmansk Regions.

Craterium aureum (Schumach.) Rostaf. – **78-g** (296).

Craterium leucocephalum (Pers. ex J.F. Gmel.) Ditmar, in Sturm – **78g** (278); **85a** (112); **89d** (740); **89g** (1243-1, 1246, 1256); **89h** (879, 921, 1264); **132** (805).

New for Murmansk Region.

Craterium minutum (Leers) Fr. – **78g** (266, 316); **110e** (1125, 1350); **174a** (966); **174b** (1235).

New for Tyumen Region.

Craterium obovatum Peck – **16c** (1094, 1108).

New for Irkutsk Region.

Cribraria argillacea (Pers. ex J.F. Gmel.) Pers. – **16c** (1095); **29b** (227); **44** (367); **78g** (290, 304); **78q** (1270); **89d** (737, 738, 739-1); **89h** (1299); **110o** (1454); **152** (560); **162** (599); **174a** (955, 981); **174b** (1045).

New for Irkutsk, Ryazan, and Tyumen Regions.

Cribraria aurantiaca Schrad. – **29b** (226); **78g** (288); **174a** (943-1).

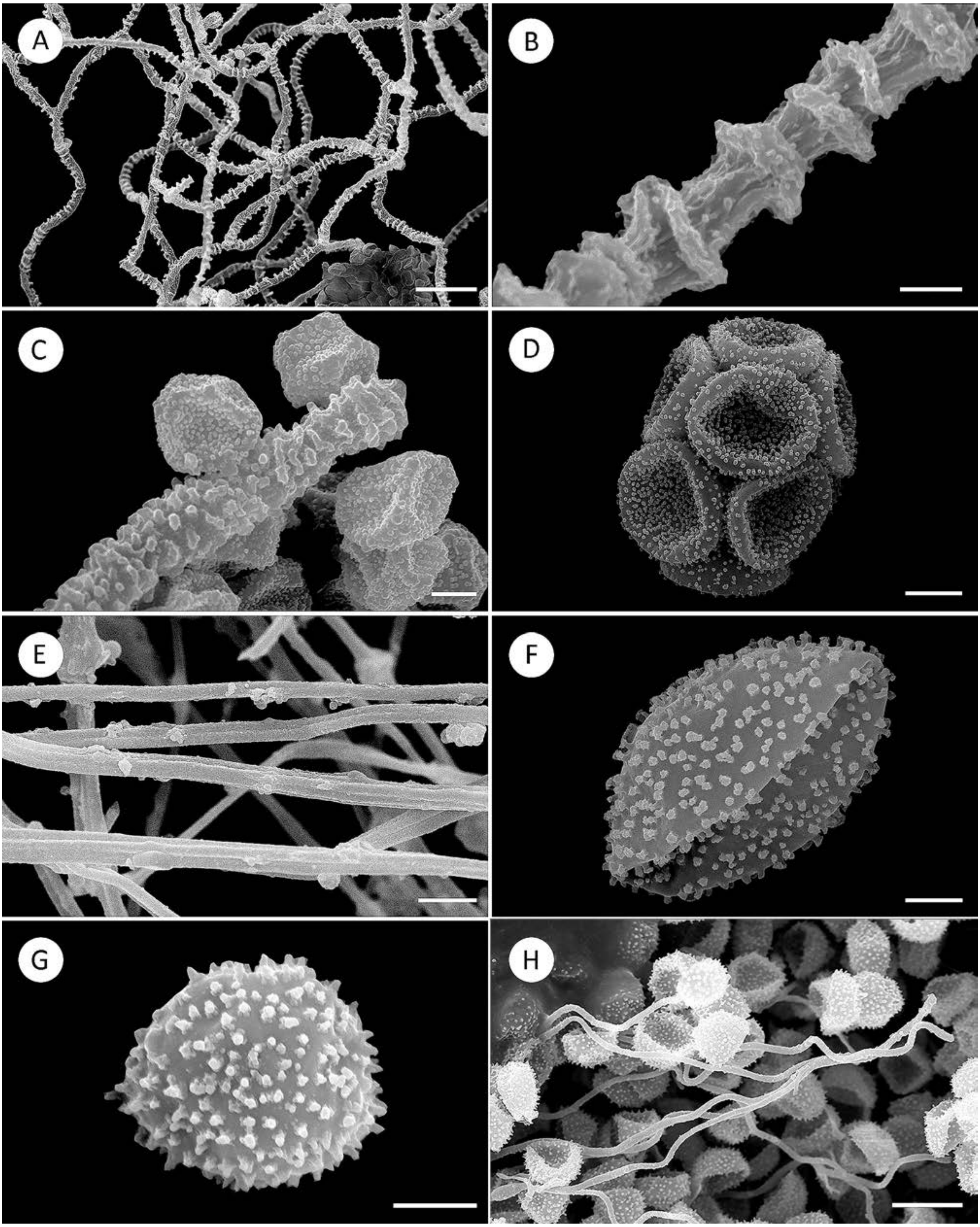

Figure 2 SEM photographs. A–B – *Arcyria helvetica* (Meyl.) H. Neubert, Nowotny et K. Baumann (489): A – capillitium network and fragment of peridium, B – ornamentation of thread of capillitium; C – *Arcyria occidentalis* (T. Macbr.) G. Lister (289), fragment of capillitium and spores; D – *Badhamia capsulifera* (Bull.) Berk. (243), cluster of spores; E–F – *Diderma spumarioides* (Fr. et Palmquist) Fr. (243): E – fragment of capillitium, F – spore; G–H – *Diderma cinereum* Morgan (191): G – spore, H – spores and capillitium. Scale bars: A – 30 μm, B, C, G – 3 μm; D, E – 5 μm; F – 2 μm; H – 10 μm

Cribraria cancellata (Batsch) Nann.-Bremek. – **16c** (1100, 1109); **29b** (190); **39** (348); **78g** (293); **78o** (711); **78q** (1162, 1165); **78t** (254); **78x** (1514-2); **86** (850-2); **89c** (849); **89h** (1267); **110k** (1428); **110o** (1462, 1463, 1475); **136c** (1015); **137b** (1012); **148a** (596); **151** (564, 565); **168a** (660); **168l** (685); **168m** (605); **168n** (787); **174a** (935); **174b** (1047).

New for Irkutsk Region.

Cribraria intricata Schrad. – **174a** (978).

New for Tyumen Region.

Cribraria languescens Rex – **100d** (588).

Cribraria macrocarpa Schrad. – **89d** (739-2); **174a** (958).

New for Tyumen Region.

Cribraria microcarpa (Schrad.) Pers. – **69a** (1554, 1558); **110h** (846); **151** (562); **169c** (1084); **174b** (1160).

New for Ryazan and Tyumen Regions.

Cribraria oregana H.C. Gilbert, in Peck et Gilbert – **78y** (461); **137b** (1009); **174a** (974).

New for Moscow, Moscow and Tyumen Regions.

Cribraria piriformis Schrad. – **78y** (430); **110o** (1471); **168m** (638); **168n** (778).

Cribraria purpurea Schrad. – **35b** (1); **110m** (1552, 1587); **111** (1500).

Cribraria rufa (Roth) Rostaf. – **85a** (118); **89a** (640); **89e** (1233, 1255); **89h** (920); **110h** (837, 1376); **110s** (1115); **111** (1493, 1499-1); **169c** (1063, 1082).

Cribraria tenella Schrad. – **35d** (99); **161** (561).

Cribraria violacea Rex – **69b** (1210).

Cribraria vulgaris Schrad. – **72** (1211); **132** (811); **174a** (943-2).

New for Tyumen Region.

Diachea leucopodia (Bull.) Rostaf. – **78a** (294); **88** (1215).

Dictydiaethalium plumbeum (Schumach.) Rostaf., in Lister – **81a** (867).

Diderma cinereum Morgan (Fig. 2G, H) – **29b** (191).

Diderma effusum (Schwein.) Morgan – **78g** (323); **137b** (989).

Diderma radiatum (L.) Morgan – **16c** (1154); **35d** (94); **67d** (927); **94b** (30); **110c** (644); **110e** (1319); **129** (337); **170** (1173); **174a** (961).

New for Irkutsk Region.

Diderma spumarioides (Fr. et Palmquist) Fr. (Fig. 2E, F) – **54** (243-2); **140** (1398).

Didymium anellus Morgan – **78o** (707, 708).

Didymium clavus (Alb. et Schwein.) Rabenh. – **78g** (283).

Didymium crustaceum Fr. – **78g** (276).

Didymium difforme (Pers.) Gray – **69a** (1556); **82** (1195); **83b** (1197).

Didymium iridis (Ditmar) Fr. – **89g** (1244).

Didymium megalosporum Berk. et M.A. Curtis, in Berkeley (Fig. 3A–C) – **89d** (745-1).

New for Moscow and Moscow Region. *D. megalosporum* is superficially similar to *D. ovoideum*, but has a compact flat columella (Fig. 3A). *D. eximium* Peck. is different due to stellate peridial crystals which are smaller than spores. When it comes to *D. megalosporum*, they are always larger than the spores. In Russia, this species was described only for the Volgograd Region (Zemlianskaia 2003, Novozhilov et al. 2003, Novozhilov 2005).

Didymium melanospermum (Pers.) T. Macbr. – **56** (208); **75b** (667); **78g** (284); **78i** (412, 432); **89d** (744); **89g** (1247); **105b** (501); **106** (76); **107a** (101, 117); **107b** (196); **108** (145); **110e** (1342); **146** (595); **168d** (24); **168o** (1240); **171** (793); **178** (194).

New for Ryazan and Yaroslavl Regions.

Didymium minus (Lister) Morgan – **50** (1518); **66** (1222); **78o** (703, 704, 706); **88** (1217); **89g** (1243-2); **94f** (186); **110e** (1312); **110k** (1421); **117** (1434, 1532); **151** (578).

New for Ryazan Region.

Didymium nigripes (Link) Fr. – **78t** (247); **89i** (641); **137b** (986).

Didymium ovoideum Nann.-Bremek. (Fig. G–I) – **78g** (277).

New for Moscow and Moscow Region. This species is distinguished by an oval shape of sporangia with long, thin, reddish-brown stalk, large clavate columella that reaches the centre of sporangium (Fig. 3G), and evenly warted spores (Fig. 3I). It was previously reported only from Altay Republic (Novozhilov 2005, Novozhilov et al. 2010). Like *D. megalosporum*, *D. ovoideum* is very similar to *D. iridis* (Ditmar) Fr. According to Poulain et al. (2011a): "*D. iridis, which belongs to this group, is a poorly defined species with several interpretations*". Apparently, it is a group of similar morphospecies on long, limeless, semi-translucent stalks.

Didymium squamulosum (Alb. et Schwein.) Fr. et Palmquist – **14** (1602); **46b** (127); **59** (1200); **69a** (1555); **78g** (310); **82** (1194, 1196); **83b** (1198); **88** (1232); **89b** (642); **138** (1032); **174a** (982).

New for Tyumen Region.

Enerthenema papillatum (Pers.) Rostaf. – **29b** (216, 240); **78g** (273); **78s** (253); **107b** (195); **110e** (1310-2); **132** (809); **133** (822); **161** (548); **168j** (661); **168n** (777); **171** (792); **174a** (959, 971); **174b** (1237).

Fuligo cinerea (Schwein.) Morgan – **160** (551).

New for Ryazan Region.

Fuligo intermedia T. Macbr. (Fig. 3D–F) – **3a** (1516).

New for Russia (Astrakhan Region).

Description. Sporophores are aethalia, often forming large groups, pulvinate, 0.5–3 cm in diam., up to 1 cm height, occasionally up to 6 cm or more, covered with crust, spongy, yellowish-grey cortex, which detaches from the spore mass in the form of flaky fragments (Fig. 3F). When cortex breaks up and spores disperse, sporophore turns into a mass of interweaved, small, light-coriaceous films which form an abundant pseudocapillitium. Hypothallus firm and spongy; it remains for a long time after aethalium is broken. Capillitium consists of large angular lime nodes connected by hyaline threads and united into a net with few free ends (Fig. 3E). Occasionally, lime knots gather in the centre and form a loose pseudocolumella. Spores black in mass; light-brown in transmitted light, globose, 10–12 μm in diam., minutely warted (Fig. 3D). Plasmodium white by color (according to Martin & Alexopoulos 1969).

Notes. *Fuligo intermedia* is very similar to *F. septica* var. *candida*, but differs by large spores (10–12 μm vs. 7–9 μm respectively). *F. candida* differs by oval spores, smaller size of sporophore, and a poorly developed hypothallus. In addition, *F. cinerea* has a thin cortex firmly attached to a sporophore that never falls off as white flakes. However, sometimes *F. intermedia* has an underdeveloped cortex (see Poulain et al. 2011b, Fig. 179), but individual sporangia still preserve peridium. In this case, spore diameter and capillitium structure are the only reliable diagnostic features of this species.

Fuligo leviderma H. Neubert, Nowotny et K. Baumann – **16c** (1087); **53b** (166); **67b** (134); **76** (463); **78g** (305); **81a** (858); **85a** (122); **89f** (701); **94b** (6); **94e** (157); **94h** (462); **96a** (449); **100b** (451); **101** (17); **102** (16); **110f** (1638); **110g** (913); **110h** (834); **110m** (1548); **110p** (1626); **168c** (18); **169c** (1062); **170** (1170); **176a** (767).

New for Irkutsk Region.

Fuligo luteonitens L.G. Krieglst. et Nowotny, in Neubert, Nowotny et Baumann – **35d** (93).

New for Moscow and Moscow Region.

Fuligo septica (L.) F.H. Wigg. – **27** (354); **29b** (228); **37** (349-2); **45c** (179); **64b** (870); **78g** (300-2); **78j** (518); **78k** (464); **78q** (1163, 1575); **78s** (252); **87** (1576); **92** (1509); **103** (181); **109** (401, 416); **126** (244); **130** (800); **141** (1435); **142b** (720); **144** (553); **151** (466); **157** (603); **168p** (1438-2); **174a** (1432).

Fuligo septica* var. *candida (Pers.) R.E. Fr. – **37** (349-1); **38** (352); **78g** (274, 300-1); **78j** (528); **85g** (857); **107b** (242); **109** (384); **110n** (1433); **125** (477, 479, 480, 481); **153** (552); **160** (554); **168i** (856); **174b** (1234).

Fuligo septica* var. *rufa (Pers.) Lázaro Ibiza – **153** (555).

Hemitrichia abietina (Wigand) G. Lister, in Lister – **174a** (940).

New for Tyumen Region.

Hemitrichia calyculata (Speg.) M.L. Farr – **64a** (861-1); **71** (877); **78d** (153); **78g** (270, 320, 333); **78i** (455-1); **78m** (512); **78u** (263); **85e** (1026); **94d** (31); **102** (78-2); **110e** (1340); **110g** (910); **110h** (1374); **110m** (1536); **110s** (1111); **111** (1501-2, 1508); **137b** (1008); **147** (600); **176b** (669).

New for Ryazan and Tyumen Regions.

Hemitrichia clavata (Pers.) Rostaf., in Fuckel – **16c** (1091, 1093, 1096, 1097, 1107-2); **20** (1513-1, 1582); **29e** (1603); **47** (1534); **57** (1209); **78d** (150); **78g** (295); **78i** (455-2); **78y** (460); **85e** (1360, 1361, 1379); **85f** (1515); **89h** (1261, 1274-2);

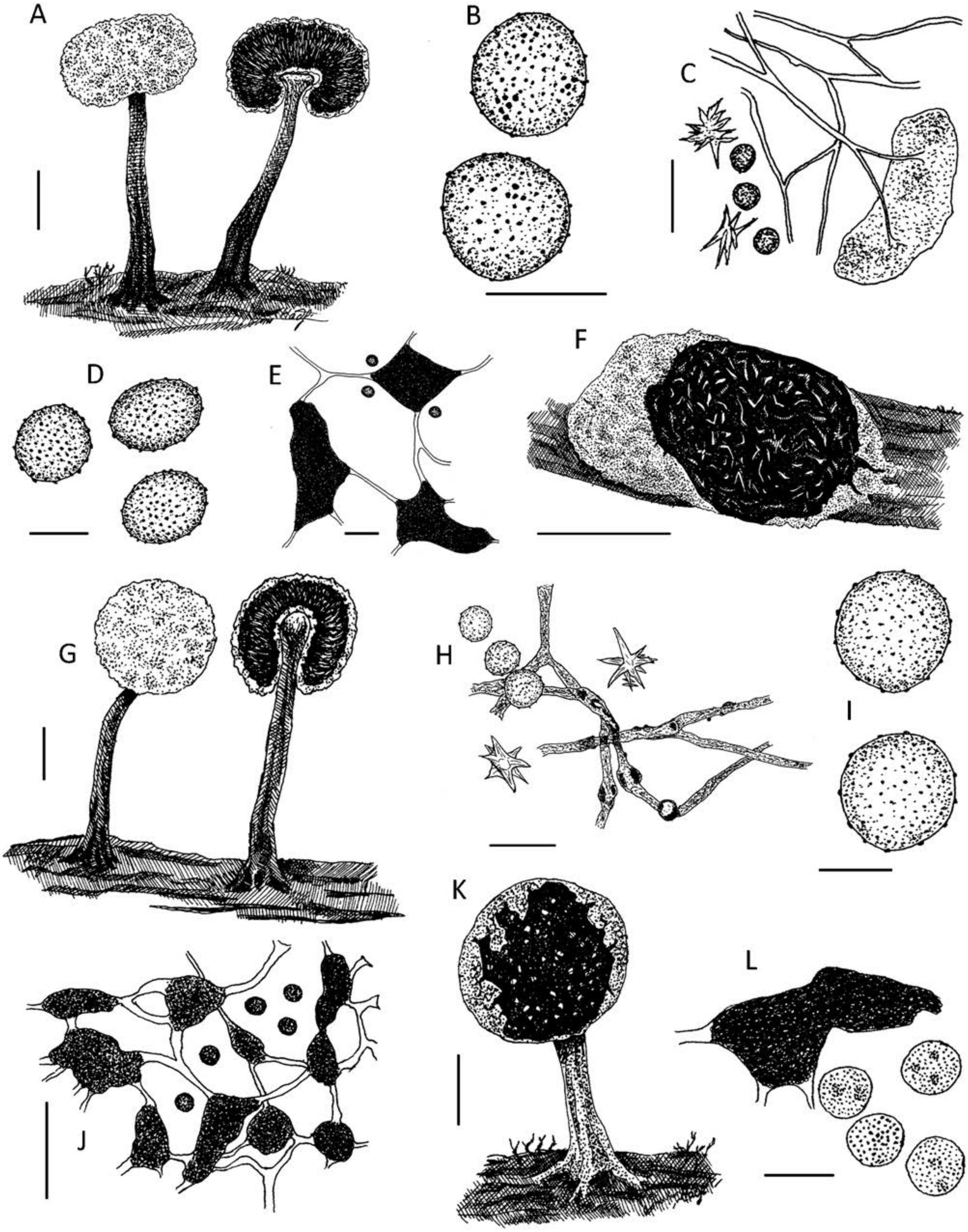

Figure 3 Drawings. A–C – *Didymim megalosporum* Berk. et M.A. Curtis (collection number 745), A – two sporophores with flat columella, B – spores as seen under oil immersion, C – capillitium, spores and stellate lime crystals; D–F – *Fuligo intermedia* T. Macbr. (1516), D – spores, E – capillitium and spores, F – aethalium; G–I – *Didymium ovoideum* Nann.-Bremek. (277), G – two sporophores with clavate columella, H – capillitium, spores and stellate lime crystals, I – spores; J–L – *Physarum murinum* Lister (576), J – capillitium and spores, K – sporophore, L – spores and lime nodule. Scale bars: A – 0.3 mm; B, E – 25 μm; C, D, L – 10 μm; F – 1 mm; G – 0.2 mm; H – 20 μm; I – 5 μm; J – 50 μm; K – 0.2 mm

110c (616, 700); **110e** (1293, 1341-1); **110f** (1130, 1307); **110h** (829, 1369, 1380, 1403-1); **110p** (1616, 1632); **111** (1501-3); **117** (1533); **164** (602); **170** (1175); **174a** (970); **175b** (888-1, 896).

New for Irkutsk Region.

Hemitrichia serpula (Scop.) Rostaf. ex Lister – **16c** (1106); **29e** (1608, 1609); **78h** (456); **85e** (1027); **89d** (753); **110c** (620); **110e** (1324, 1329); **110g** (909); **110h** (840); **110p** (1629); **111** (1506-1, 1593-1); **137b** (1000); **140** (1399); **166a** (1407); **169c** (1069, 1072); **175b** (895).

New for Irkutsk and Tyumen Regions.

Lamproderma arcyrioides (Sommerf.) Rostaf. – **174b** (1253).

New for Tyumen Region.

Lamproderma columbinum (Pers.) Rostaf., in Fuckel – **77d** (131); **85a** (119); **89g** (1245-1); **89h** (1260); **110h** (843); **110m** (1537-2); **111** (1491, 1492, 1494, 1495-1, 1496, 1498-1).

Lamproderma scintillans (Berk. et Broome) Morgan – **61** (1212); **69a** (1561); **110e** (1152).

Leocarpus fragilis (Dicks.) Rostaf. – **6** (1296); **48** (1017); **55a** (140); **56** (207, 209); **78g** (272); **78l** (509); **78o** (709); **78t** (77, 249); **80** (329); **89d** (742); **89h** (924); **107a** (14, 89); **107b** (197); **110e** (1127); **110o** (1486); **146** (468); **168d** (15); **168n** (788); **178** (193).

Lepidoderma tigrinum (Schrad.) Rostaf., in Fuckel – **35d** (100); **94d** (105); **111** (1489, 1498-2, 1501-4).

Licea minima Fr. – **64d** (1230); **78q** (1177, 1179); **174a** (968).

Licea operculata (Wingate) G.W. Martin – **64e** (1205, 1220).

Lindbladia tubulina Fr. – **168p** (1451).

Lycogala epidendrum (L.) Fr. – **9** (584); **12** (606); **13** (773); **16b** (1396-3); **16c** (1110); **16d** (931); **20** (1394); **29b** (187); **32** (67); **45a** (11); **45e** (7, 12-1); **46a** (9); **53b** (70); **55a** (156); **65b** (1035); **76** (988); **77a** (8); **78g** (299); **78j** (525); **78q** (1161); **84** (395); **85c** (882); **85e** (1023, 1359); **88** (1221); **89d** (736); **89f** (702); **89h** (1272); **94a** (10); **94d** (13-1); **105b** (502); **107a** (92); **110c** (614); **110e** (1118); **110f** (1121, 1301); **110g** (911); **110h** (839, 1377); **110k** (1423-1); **110l** (1410); **110m** (1539, 1551); **110o** (1464); **110p** (1634); **110s** (1113); **113b** (362); **121** (817); **125** (475); **127** (409); **132** (813); **133** (823); **136c** (1005); **139** (1601); **142a** (172); **142b** (726); **159a** (580); **166b** (676); **168k** (535); **168l** (686); **168m** (623); **168p** (1446); **169b** (1176); **169c** (1051); **174a** (934, 956, 957); **174c** (1596); **175a** (627); **175b** (898); **177** (142).

Lycogala exiguum Morgan – **78g** (292); **78q** (1164); **89e** (1257); **110k** (1423-2); **110p** (1633); **132** (802); **136a** (403); **169c** (1079); **175b** (893).

New for Murmansk Region.

Macbrideola cornea (G. Lister et Cran) Alexop. – **62** (1298).

Metatrichia floriformis (Schwein.) Nann.-Bremek. – **16c** (1088); **29e** (1611); **77d** (129); **94d** (106, 107); **110e** (1336).

New for Irkutsk Region.

Metatrichia vesparia (Batsch) Nann.-Bremek. ex G.W. Martin et Alexop. – **16b** (1395); **16d** (929); **20** (1513-2); **29e** (1607, 1610); **30** (604, 731); **33** (431); **35a** (44); **35d** (98); **39** (350); **45e** (12-2); **46b** (128); **47** (1535); **64a** (862-1); **69a** (1559); **78d** (159); **78g** (265, 334); **78i** (452); **78j** (517, 530); **78k** (521); **81b** (863); **85a** (120); **85b** (696); **85e** (1352); **89h** (1275); **100a** (185); **104** (373); **108** (144); **110c** (619); **110e** (1308); **110f** (1309, 1351-1); **110g** (903); **110h** (831); **110m** (1542); **110p** (1619, 1622); **110s** (1124); **113b** (359); **115** (158); **137b** (1013); **156** (601); **166b** (675); **168m** (622-1, 639-1); **169c** (1054, 1064); **174a** (941, 961-2); **174b** (1040); **175b** (888-2); **176a** (768); **176b** (671).

New for Irkutsk Region.

Mucilago crustacea F.H. Wigg. – **5** (1567, 1568, 1570, 1572, 1573, 1579); **29b** (229); **56** (205); **78g** (328); **78-t** (260); **122** (486); **137b** (987, 991, 994); **149** (577); **151** (570).

Perichaena chrysosperma (Curr.) Lister – **2** (1282, 1283); **85e** (1028, 1354).

Perichaena corticalis (Batsch) Rostaf. – **22** (765); **25** (766); **37** (346); **58** (1280); **78f** (457); **78g** (311); **85e** (1353); **94i** (853); **110e** (1126, 1302); **110g** (925); **110l** (1406); **168g** (201); **173** (198).

Perichaena corticalis* var. *liceoides (Rostaf.) G. Lister, in Lister – **110b** (182).

Perichaena depressa Lib. – **59** (1199); **70** (1202); **78p** (1186, 1574); **83b** (1204).

Physarum album (Bull.) Chevall. – **20** (1388-2); **29b** (234, 235); **35d** (104); **64a** (859); **69a** (1563); **77a** (20); **78g** (280-1); **78k** (508); **78q** (1166, 1182); **81a** (866); **83a** (758); **85e** (874); **89d** (741, 745-2); **89g** (1245-2); **89h** (916, 1266, 1590-2); **90** (1219); **100d** (589); **105b** (505); **107d** (383); **109** (426); **110c** (647, 648); **110e** (1290, 1291, 1314, 1317, 1344); **110f** (1140); **110h** (828, 844, 1364, 1372, 1401); **110l** (1412); **110m** (1588); **110o** (1456, 1466, 1469); **110p** (1625, 1627); **112b** (370); **114** (385); **120** (798); **136a** (404); **137b** (1004); **160** (579); **168d** (21, 26, 27, 65); **168n** (775-2, 779, 786); **168o** (1239, 1241); **171** (795); **174a** (945-1, 946); **174b** (1038, 1156, 1157, 1158, 1159); **175b** (897).

New for Ryazan Region.

Physarum auriscalpium Cooke (Fig. 4A) – **159b** (574).

New for Ryazan Region.

Physarum bivalve Pers. (Fig. 4B, C) – **75a** (496); **78g** (307); **78o** (698); **89h** (1262).

Physarum cinereum (Batsch) Pers. – **57** (1208); **59** (1201-1); **78d** (151); **78g** (318); **78o** (705); **78q** (1180); **78t** (246); **88** (1279); **100d** (590); **110o** (1484); **168n** (928); **171** (790, 791).

Physarum confertum T. Macbr. – **171** (796).

New for Tver Region.

Physarum contextum (Pers.) Pers. – **110h** (1373).

Physarum diderma Rostaf. – **84** (435); **101** (23).

Physarum didermoides (Pers.) Rostaf. – **81a** (868).

Physarum flavicomum Berk. – **29b** (237, 238).

Physarum globuliferum (Bull.) Pers. – **154** (558); **168n** (785); **174a** (948, 979).

New for Tyumen Region.

Physarum leucophaeum Fr. et Palmquist – **16b** (1382); **20** (1585-2); **45a** (25); **75a** (495); **76** (693, 694); **78v** (427); **85e** (1030, 1031); **89g** (1242); **94d** (110); **94i** (854); **95** (374); **110c** (649); **110e** (1289-2, 1331, 1345); **110f** (1119); **110g** (906); **110o** (1479-2); **110q** (653); **119** (799); **121** (818); **169c** (1056, 1065, 1070, 1081); **175b** (891).

New for Irkutsk and Tyumen Region.

Physarum leucopus Link – **20** (1387); **21** (1193); **29b** (230); **35d** (96); **59** (1201-2); **73a** (875); **85e** (873); **89h** (881); **110c** (646); **110e** (1132); **110h** (1370); **169c** (1061, 1067, 1149); **174a** (961-3).

New for Khabarovsk Territory and Tyumen Region.

Physarum melleum (Berk. et Broome) Massee – **21** (1192).

Physarum murinum Lister (Fig. 3J–L) – **153** (576).

New for Ryazan Region. This species is distinguished by globose sporocarps on long stalks (Fig. 3K), dense capillitium with numerous junctions with small, round, brown nodes connected by thin translucent tubes (Fig. 3J). Capillitium remains in the form of sporangium after spore dispersal. This species is closely related to *Physarum globuliferum*, but differs by pale brown, not white lime nodes. This is the first record of *Physarum murinum* in Russia confirmed by a herbarium specimen. Previously it was described only for Moscow region (Sizova & Titova 1985, Barsukova & Dunaev 1997, Novozhilov 2005), but there were no specimens to confirm identification.

Physarum mutabile (Rostaf.) G. Lister, in Lister – **78g** (324).

Physarum nitens (Lister) Ing (Fig. 5D–F) – **109** (400).

New for Moscow and Moscow Region. This species is distinguished by long plasmodiocarps, slightly curved, with irregular shape, sometimes heaped (Fig. 5D), yellow, with large nodes of capillitium and small light spores (7–9 μm in diam.) uniformly covered with small warts. It was previously described as *P. virescens* var. *nitens* Lister. Typical form of *P. virescens* differs by pseudoaethalia composed of heaped sporangia, which aggregate in a compact structure. *P. luteolum* is distinguished from *P. nitens* by light-yellow lime on top of sporangia and bigger spores (8.5–11 μm). In addition, *P. luteolum* is characterised by clustered but not heaped sporangia. In Russia, it was reported only for Altai by N.N. Lavrov (1929).

Physarum notabile T. Macbr. – **20** (1391); **45e** (19); **53b** (170); **107a** (80); **174a** (973).

New for Khabarovsk Territory and Tyumen Region.

Physarum penetrale Rex (Fig. 5G) – **168d** (22).

This unusual species is characterized by thin, membranous, slightly silvery iridescent peridium, long, thin stalks and long columella that penetrates the whole sporangium (Fig. 5G), solid capillitium network formed by thin hyaline tubes with compact

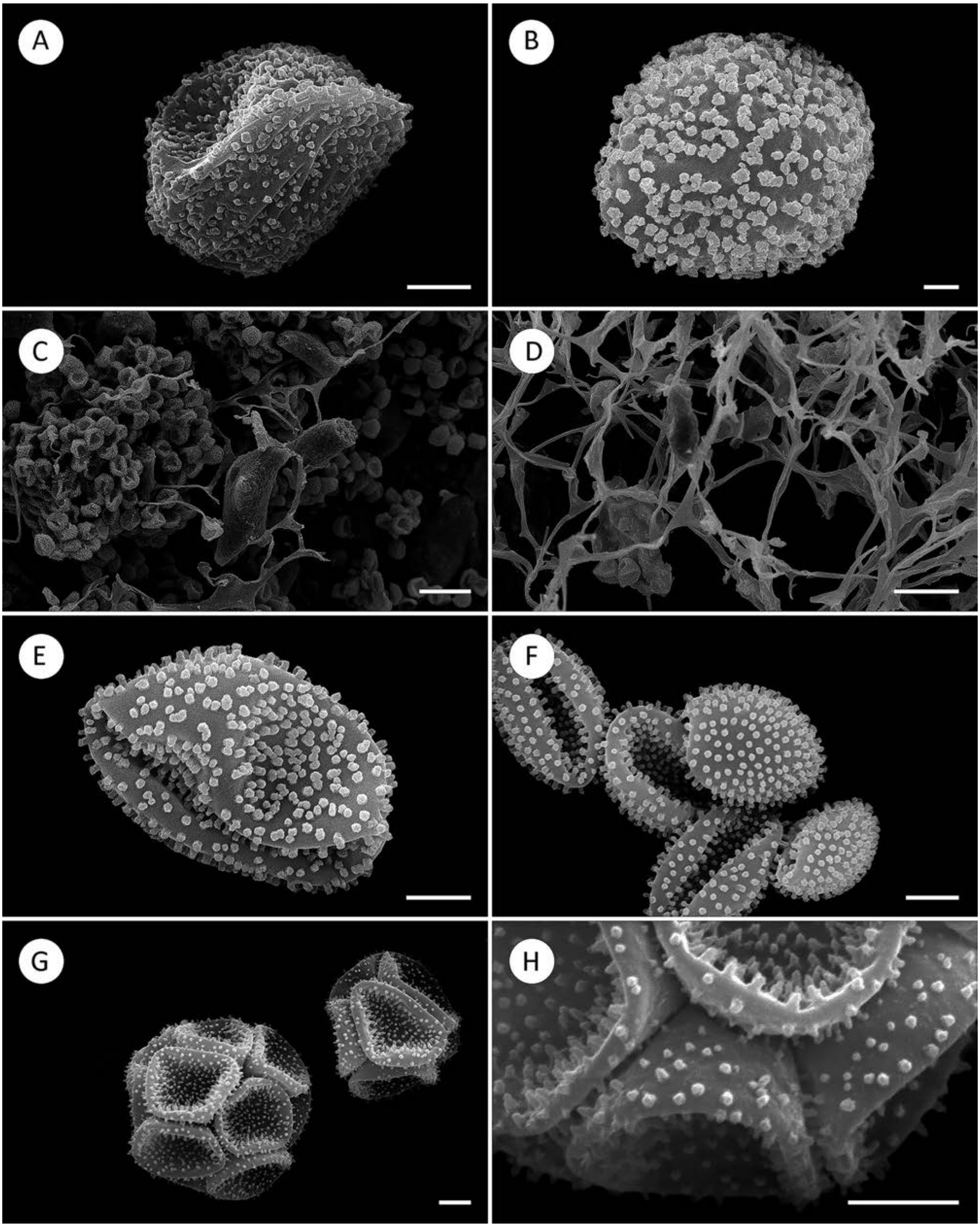

Figure 4 SEM photographs. A – *Physarum auriscalpium* Cooke (574), spore; B–C – *Physarum bivalve* Pers. (37): B – spore, C – fragment of capillitium with large, rounded nodules and spores; D–E – *Physarum flavicomum* Berk. (237): D – fragment of capillitium and spores, E – spores; F – *Stemonaria irregularis* (Rex) Nann.-Bremek., R. Sharma et Y. Yamam. (1612), spores; G–H – *Stemonitis uvifera* T. Macbr. (462): G – two clusters of spores, H – fragment of spore cluster, spores warted on the outer surface, nearly smooth elsewhere. Scale bars: A, E – 2 μm; B – 1 μm; C, D – 20 μm; F–H – 3 μm

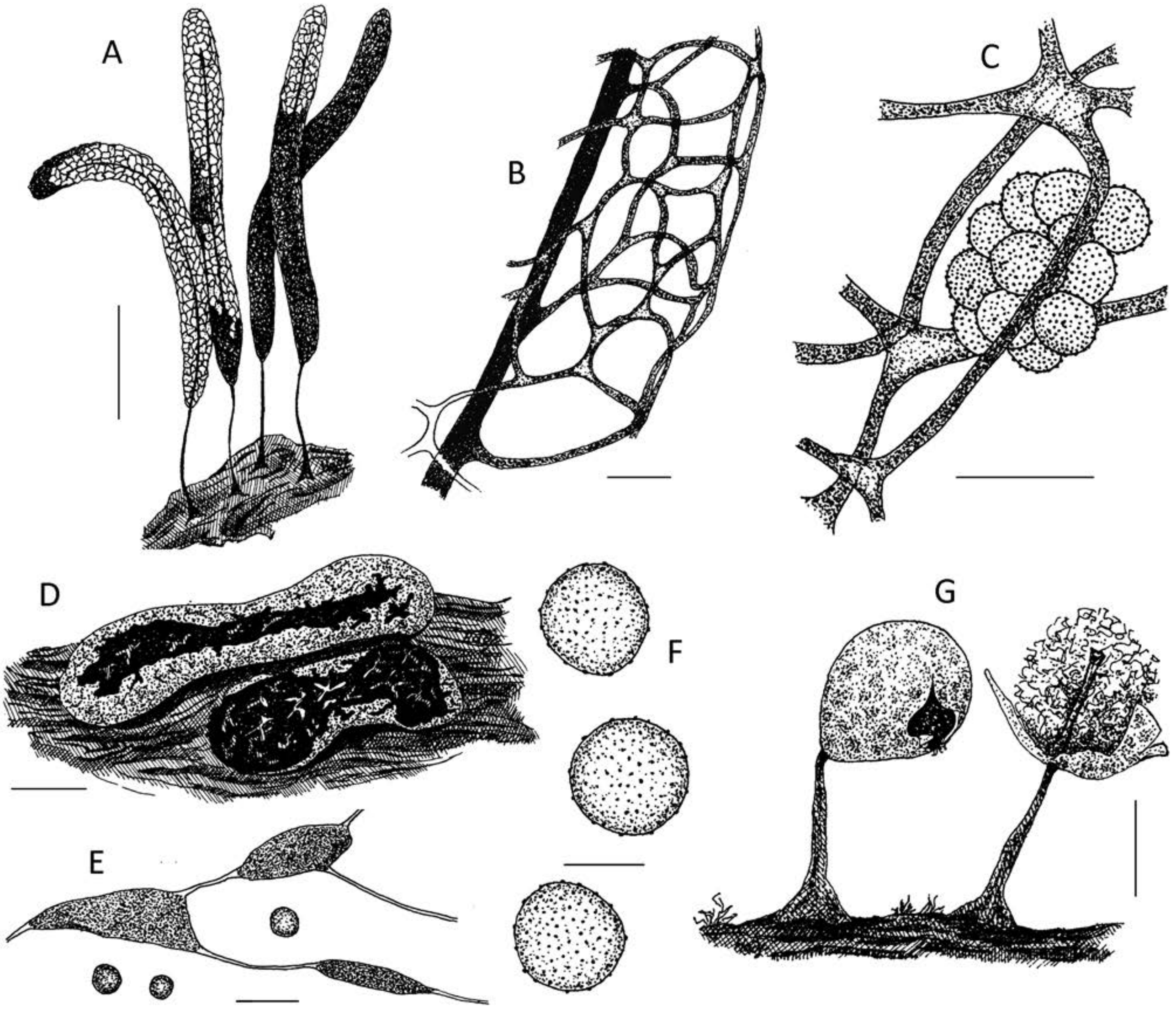

Figure 5 Drawings. A–C – *Stemonitis uvifera* T. Macbr. (462), A – sporophores, B – fragment of columella and capillitium, C – fragment of surface network and clustered spores; D–F – *Physarum nitens* (Lister) Ing (400), D – two plasmodiocarps, E – fragment of capillitium and spores, F – spores; G – *Physarum penetrale* Rex (22), two sporophores. Scale bars: A – 2 mm; B, E – 25 μm; C – 20 μm; D – 0.4 mm; F – 5 μm; G – 0.2 mm

lime nodes, which holds its shape after spore dispersal. In Russia, it was found only in Krasnoyarsk Territory (Kosheleva 2007, Kosheleva et al. 2008), Vladimir Region (Mishulin 2018), and in the Far East (F.M. Bortnikov, Yu.K. Novozhilov, personal data).

Physarum psittacinum Ditmar, in Sturm – **27** (356); **64f** (1297); **78q** (1187); **78r** (1184); **78t** (29); **78y** (459); **110o** (1472); **168d** (81).

Physarum pusillum (Berk. et M.A. Curtis) G. Lister, in Lister – **29b** (232).

Physarum serpula Morgan – **63** (1251); **74** (1203).

Physarum spectabile Nann.-Bremek., Lado et G. Moreno – **35d** (95); **110e** (1330); **110f** (1315); **175b** (894).

New for Moscow, Moscow and Tyumen Regions. This species is very similar to *P. cinereum*, but differs by dark-brown spores with light lines of dehiscence and well-developed warts. For the first time *P. spectabile* was recorded in the Central Forest Natural State Reserve (Nelidovo District, Tver Region) (Gmoshinskiy et al. 2017). This species is probably widely distributed in Russia.

Physarum vernum Sommerf., in Fries – **110e** (1292).

Physarum virescens Ditmar, in Sturm – **78g** (319); **78t** (257); **78y** (458).

Physarum viride (Bull.) Pers. – **29b** (233, 236); **69a** (1565); **78g** (280-2); **89h** (917); **136a** (439); **159a** (559); **160** (575); **166b** (678); **174a** (945-2, 947-2, 980).

Physarum viride* var. *aurantium (Bull.) Lister – **78g** (309); **110k** (1426); **174a** (947-1).

Reticularia intermedia Nann.-Bremek. – **16a** (824); **110g** (912); **110m** (1586-1); **124** (338).

New for Irkutsk and Murmansk Region.

Reticularia lycoperdon Bull. – **8** (610); **11** (608, 613); **15** (1594); **31** (761); **56** (204); **64c** (860); **73b** (876); **78w** (269); **110e** (1150); **110p** (1618); **118** (5); **122** (487); **125** (476); **172** (171).

New for Irkutsk Region.

Reticularia splendens Morgan – **20** (1583); **110f** (1133); **132** (812); **142b** (728).

New for Khabarovsk Territory and Republic of Karelia.

Stemonaria irregularis (Rex) Nann.-Bremek., R. Sharma et Y. Yamam., in Nannenga-Bremekamp, Yamamoto et Sharma (Fig. 4F) – **16b** (1383); **29e** (1612); **94d** (111); **136b** (1033); **168m** (636).

New for Irkutsk and Tver Regions.

Stemonitis axifera (Bull.) T. Macbr. – **7** (490, 493); **16d** (932); **20** (1584); **23** (764); **26** (358); **29b** (215, 219); **53b** (163); **78f** (321); **78g** (313, 317); **78j** (514, 524, 529); **78o** (713); **78t** (248, 259); **79** (423); **85d** (886); **88** (1224, 1250, 1577); **89h** (880, 923, 1276, 1591); **89j** (1254-1); **100a** (184); **100d** (591); **109** (425); **110e** (1334); **110f** (1332); **110g** (904, 908); **110h** (830); **110j** (1018-1); **110k** (1425); **110l** (1414); **110m** (1546); **110o** (1455, 1458, 1473, 1477, 1480); **110p** (1624); **111** (1505-1); **113b** (361); **116** (397); **117** (1416, 1528, 1529); **125** (472, 484); **131** (245); **135** (392); **142a** (178); **142b** (721, 722); **150** (546); **151** (497); **153** (544); **160** (541, 547); **161** (542); **166b** (679); **168i** (399); **168j** (586); **168k** (536); **168l** (684); **168m** (632, 633-1); **168n** (780, 783); **168p** (1439, 1448, 1449); **168q** (61); **168s** (443); **169b** (1355); **169c** (1055, 1059, 1060, 1068, 1074, 1076, 1083); **170** (1172, 1174); **174a** (962, 977); **174b** (1043, 1228, 1249); **175b** (900); **176b** (670); **179** (1285).

New for Khabarovsk Territory and Irkutsk Region.

Stemonitis axifera* var. *smithii (T. Macbr.) Hagelst. – **109** (381); **158** (539); **168m** (637); **169c** (1077, 1148); **174a** (975).

Stemonitis flavogenita E. Jahn – **151** (540, 545); **155** (543); **168k** (471).

New for Ryazan Region.

Stemonitis fusca Roth – **53b** (162); **78g** (279); **78y** (410); **85g** (770); **89j** (1254-2); **94g** (429); **109** (402); **110j** (1018-2); **121** (820); **125** (473); **135** (418); **137b** (1003); **168k** (470); **168m** (633-2); **168p** (1452); **169b** (1338); **170** (1321); **174a** (976).

New for Tyumen Region.

Stemonitis fusca* var. *nigrescens (Rex) Torrend – **88** (1206-1).

Stemonitis lignicola Nann.-Bremek. – **29b** (239); **110e** (1339); **121** (821); **134** (447); **142b** (729); **145** (538); **166b** (682); **168d** (59, 60); **168f** (143); **168r** (58); **168s** (440); **169c** (1073, 1075, 1080).

Stemonitis pallida Wingate, in Macbride – **168n** (781).

Stemonitis splendens Rostaf. – **3b** (1578); **134** (398); **136a** (391, 428); **137b** (1011); **138** (901); **174b** (1214).

New for Tyumen Region.

Stemonitis uvifera T. Macbr. (Fig. 4G–H, 5A–C) – **136c** (1016).

New for Russia (Primorye Territory).

Description. Sporophores stalked sporangia, clustered in large groups, long, cylindrical, erect or slightly dropping (Fig. 5A), rich rusty-brown; become dark-brown or black, semi-transparent after spore dispersal, 7–9 mm high; often join and form a structure resembling a pseudoaethalium. Peridium evanescent. Hypothallus well developed, continuous under a colony, membranous, shining, violet-brown. Stalk black, shining, from 1/4 to 1/2 of the total high, tapering upward, expanded below. Columella black, long, almost reaches the top of sporangium, in upper part curved and gradually transferred into a capillitium network. Capillitium forms a dark-brown to almost black net, with copper reflection. Inner network is very lax, arising from the columella by relatively few branches, often flattened, with membranous expansions in the axils. Surface net large-meshed (the mesh diameter is about 8–10 times the spore diameter), irregular, with many free ends (Fig. 5B–C). Spores dark-brown in mass; smoky-brown in transmitted light; united in clusters of 4–12 or more (Fig. 4G–H, 5C), often angular from pressure, occasionally free and then globose; uniformly warted on external surface of a group and almost smooth inside a cluster (Fig. 4H), 7–8 μm in diam. Plasmodium white before fruiting (Martin & Alexopoulos 1969).

Distribution. This is a very rare species. It is reported from USA, Canada, Germany (GBIF Secretariat 2019), India, Japan, Africa (Poulain et al. 2011a), and Spain (Lado 1994).

Notes. This is the only species from the genus *Stemonitis* with spores adhered in clusters. *S. uvifera* is closely related to species from the genus *Symphytocarpus* because of sporophores adhered in dense groups and spores joined into clusters (*S. fusciformis* Nann.-Bremek. et Härk. and *S. syncarpus* (Yamash.) Y. Yamam). All the latter species, however, differ by more heaped sporophores taking the almost aethaloid form. Moreover, *S. fusciformis* also differs with its black, expanded ends of capillitium, resembling *Paradiacheopsis fimbriata* (G. Lister et Cran) Hertel ex Nann.-Bremek. (Nannenga-Bremekamp & Härkönen 1979). *S. syncarpus* differs by rounded fragments of peridium attached to the ends of capillitium, larger spores (12–13 μm vs. 7–8 μm in *S. uvifera*) and short stipes of sporangium (about 1/8 of the total height) (Poulain et al. 2011a). Another species of Stemonitidales with clustered spores is *Stemonaria rufipes* Nann.-Bremek. et Y. Yamam. (Nannenga-Bremekamp et al. 1984), characterised by short sporophores no more than 2.5 mm high (vs. 7–9 mm in *S. uvifera*) and its oblong-oval shape (Lado et al. 2018).

Stemonitopsis hyperopta (Meyl.) Nann.-Bremek. – **40** (339); **78q** (1181); **88** (1206-2); **110l** (1409); **110o** (1474, 1483); **132** (803); **142b** (730); **160** (549); **168l** (691); **168m** (634); **168n** (782, 784); **168p** (1443, 1444); **171** (789); **174a** (972); **174b** (1036, 1048).

New for Ryazan and Tyumen Regions.

Stemonitopsis reticulata (H.C. Gilbert) Nann.-Bremek. et Y. Yamam., in Yamamoto et Nannenga-Bremekamp – **89d** (746, 749, 750).

Stemonitopsis typhina (F.H. Wigg.) Nann.-Bremek. – **29b** (210); **39** (347); **50** (1517); **52** (1190); **71** (878); **78f** (312); **78g** (285, 326); **78o** (712); **78q** (1185); **78y** (454); **88** (1223); **89d** (748); **107a** (154); **109** (411); **110e** (1349); **110j** (1019); **110o** (1459, 1476, 1481); **110s** (1116); **117** (1527-2, 1530); **125** (483); **136a** (379, 438); **139** (1599); **168l** (688); **169c** (1050, 1151); **174a** (950, 967); **175b** (899).

Stemonitopsis typhina* var. *similis (G. Lister) Nann.-Bremek. et Y. Yamam. – **78e** (298).

Symphytocarpus amaurochaetoides Nann.-Bremek., in Ing et Nannenga-Bremekamp – **78m** (511); **92** (1510).

Symphytocarpus flaccidus (Lister) Ing et Nann.-Bremek. – **132** (808); **142b** (719, 723, 727); **168g** (200); **168j** (587).

New for Murmansk Region.

Symphytocarpus impexus Ing et Nann.-Bremek. – **41** (345); **42** (446); **44** (365); **168l** (687).

New for Moscow and Moscow Region.

Trichia botrytis (J.F. Gmel.) Pers. – **1** (1281); **18** (499); **46-b** (123); **53-b** (161, 165); **89-h** (914, 1259); **99** (54-1); **110-e** (1346); **110-l** (1411); **110-p** (1623); **132** (815).

New for Kaluga Region.

Trichia contorta (Ditmar) Rostaf. – **10** (585); **96b** (581-1); **100d** (594); **110e** (1347); **110l** (1405); **110m** (1549); **110p** (1636).

Trichia decipiens (Pers.) T. Macbr. (Fig. 1) – **16a** (826); **16b** (1385, 1397); **16c** (1105); **17** (1595-1); **29e** (1605); **33** (437); **34** (73-1); **35d** (90, 102); **40** (344); **46b** (125); **53b** (169); **67c** (135); **77a** (51); **78b** (291); **78d** (152); **78e** (297); **78i** (407); **78q** (1168); **85a** (115); **85e** (1025, 1358); **88** (1191); **89d** (756); **89e** (1268, 1278); **89h** (919, 1265, 1273); **91** (1238); **94b** (56); **94d** (50, 53, 113); **98** (55); **99** (54-2); **100c** (654); **100d** (592); **102** (71); **107a** (75, 85, 86); **107c** (372); **110c** (615, 645); **110e** (1120, 1134, 1138, 1141, 1143-2, 1306, 1316); **110f** (1303-1, 1313, 1325); **110h** (835, 1366, 1371, 1400); **110j** (1021, 1022); **110k** (1420); **110l** (1413); **110m** (1550); **110o** (1485); **110p** (1620, 1628); **110r** (1112); **111** (1488, 1504, 1505-2, 1592-1); **117** (1525); **167** (1639); **168e** (52); **168m** (699); **169c** (1057, 1071, 1147); **174a** (944, 965).

New for Irkutsk Region.

Trichia favoginea (Batsch) Pers. – **5** (1569); **28** (626); **29e** (1613, 1614); **34** (73-2); **35b** (47); **78g** (281); **78u** (262); **79** (396); **85e** (1024); **89d** (752-1); **89f** (887); **110a** (43, 49); **110c** (650); **110d** (651); **110e** (1142, 1323); **110g** (905); **110h** (836, 1378); **110k** (1429); **110p** (1631); **110s** (1123); **111** (1490, 1495-2, 1499-2, 1502, 1503); **115** (146, 183); **117** (1526); **161** (569); **166b** (683); **168m** (622-2, 639-2); **168q** (46); **174a** (942); **175b** (890); **176a** (769); **176b** (672).

Trichia lutescens (Lister) Lister – **24** (510); **78k** (995).

New for Krasnodar Territory.

Trichia persimilis P. Karst. – **16b** (1386); **16c** (1089-2, 1099, 1102); **18** (498); **30** (732); **78c** (137); **78d** (147); **78i** (377); **89d** (752-2); **94d** (13-2, 45); **107a** (88); **110a** (42); **110e** (1327); **110f** (1348); **112a** (363); **137b** (1001); **167** (1431); **169c** (1049, 1052).

New for Irkutsk and Kaluga Regions.

Trichia scabra Rostaf. – **12** (607, 612, 665); **13** (772); **16c** (1098, 1103); **16d** (930); **35d** (97); **46b** (124); **52** (1207); **78g** (325); **78j** (532); **78t** (256); **88** (1216); **89h** (1294); **96a** (448); **102** (72); **110e** (1129, 1333); **110m** (1538, 1540, 1586-2); **110p** (1617); **110s** (1153); **111** (1506-2, 1592-2, 1593-2); **117** (1523); **166b** (677); **168p** (1447); **168q** (48).

New for Irkutsk Region.

Trichia varia (Pers. ex J.F. Gmel.) Pers. – **12** (609, 666); **13** (771); **16a** (825); **16c** (1104); **17** (1595-2); **20** (1390, 1392); **22**

(763); **29c** (192); **29d** (371); **29e** (1606); **30** (733); **35d** (103); **36** (199); **39** (351); **46b** (126); **53b** (177); **57** (1188); **64a** (861-2, 862-2); **76** (993); **77d** (130); **78d** (160); **78h** (453); **78i** (387); **78k** (520, 527, 697); **78w** (271); **83a** (759); **85a** (116); **85b** (872); **85e** (1357, 1362); **89d** (752-3, 757); **89h** (1269); **94d** (1580); **94e** (141, 149, 155); **94i** (852); **94j** (1581); **96b** (581-2); **110c** (618); **110e** (1128, 1131, 1136, 1139, 1295, 1305, 1326, 1341-2); **110f** (1303-2, 1304, 1343, 1351-2); **110g** (926); **110h** (1367, 1403-2); **110l** (1408); **110o** (1453); **110p** (1621, 1635); **110s** (1117, 1144); **111** (1497); **125** (482); **169c** (1058); **175b** (889).

New for Irkutsk Region.

Tubifera applanata Leontyev et Fefelov – **29-b** (211); **29-e** (1604); **29-f** (212); **78-g** (287); **89-d** (735); **142-a** (175); **142-b** (718).

New for Moscow, Moscow Region and Republic of Karelia.

Tubifera ferruginosa (Batsch) J.F. Gmel. – **37** (341); **45a** (2); **46b** (336); **65a** (630); **77a** (3); **78l** (513); **78n** (869); **78t** (258); **78y** (434); **89f** (695); **89h** (918); **96a** (436); **107a** (91); **107d** (419); **109** (380, 390); **110c** (621); **110e** (1553); **110h** (841, 1375); **110o** (1470); **117** (1531); **118** (4); **132** (806); **166b** (681); **168g** (203); **168k** (534); **168m** (625); **168n** (776); **168p** (1442).

List of undetermined specimens

To the genus level: ***Arcyria*** sp. – **53b** (164); **110e** (1287-1); **138** (902). ***Diderma*** sp. – **77b** (74); **110c** (643). ***Didymium*** sp. – **88** (1225). ***Licea*** sp. – **110h** (847); **132** (814). ***Reticularia*** sp. – **78k** (465). ***Stemonaria*** sp. – **12** (657, 659); **78u** (264); **176b** (668). ***Stemonitis*** sp. – **16c** (1101); **78t** (250); **78u** (261); **110h** (827).

To the order level: Stemonitidales – 45f (57); **78g** (180); **84** (394); **110h** (1363, 1365). **Physarales – 170** (1169).

Not identified to the order level: 12 (611, 658); **16c** (1155); **64e** (1231); **78o** (714); **78q** (1167, 1178); **85a** (132); **89d** (747); **110e** (1337); **110h** (845, 1404); **123** (408); **125** (474); **128** (488); **136c** (999); **137b** (990, 992, 1006, 1010); **148b** (598); **148c** (597); **153** (467); **166b** (680); **168d** (62); **174a** (952, 954).

Current state of the Myxomycetes collection

The Myxomycetes collection of the CYN includes 1715 specimens of sporophores belonging to 142 species of myxomycetes from 35 genera, 11 families, and 6 orders. Two species, *Stemonitis uvifera* and *Fuligo intermedia*, were recorded for the first time in Russia. The majority of the specimens in collection belongs to the Trichiales (654 specimens / 38.7 % of total), Physarales (431 / 25.5 %), and Stemonitidales (331 / 25.5 %). There are fewer specimens from the Cribrariales (238 / 14.1 %), Ceratiomyxales (31 / 1.8 %), and Echinosteliales (3 specimens / 0.2 %). Moreover, 27 specimens were not identified (see the list of undetermined specimens). Taxonomic structure of the Myxomycetes collection of the CYN is presented in Table 2.

The greatest contribution to the collection establishment was made by O.M. Germant (614 deposited specimens), E.A. Dunayev (267), N.N. Kotelenets (248), T.N. Barsukova (117), V.I. Gmoshinskiy (64), A.N. Bragin (63). During the whole period of the collection existence, only O.M. Germant and E.A. Dunayev were regularly depositing new material into it, while the contribution from other collectors was irregular.

Almost all specimens in the Myxomycetes collection of the CYN were collected in Russia. Many findings presented in the collection are new for the regions (Table 3).

Despite the fact that the specimens in the collection were not fixed on paper tray in matchboxes before the revision and that the age of some of them exceeded 20 years, most of the material (1331 specimens) was kept in satisfactory, good, or excellent condition (levels III to V according to Table 1). Thus, a fact of these species record could be confirmed by morphological features. Only 384 specimens were poorly preserved or were completely without sporophores (levels I and II), which accounted for 22.4 % of the whole collection. It is interesting to note that the level of preservation of the material did not depend on the storage time in the herbarium (Fig. 6). On the contrary, the largest number of specimens in perfect condition were obtained in the early period of collection. Hence, it can be assumed that during storage the

Table 2. Taxonomic structure of Myxomycetes collection of the CYN. Numbers in parentheses show number of species in taxon

Order	**Family**	**Genus**
Ceratiomyxales (1)		
	Ceratiomyxaceae (1)	
		Ceratiomyxa (1)
Echinosteliales (1)		
	Clastodermataceae (1)	
		Clastoderma (1)
Cribrariales (25)		
	Cribrariaceae (15)	
		Cribraria (14)
		Lindbladia (1)
	Dictydiaethaliaceae (1)	
		Dictydiaethalium (1)
	Reticulariaceae (7)	
		Lycogala (2)
		Reticularia (3)
		Tubifera (2)
	Liceaceae (2)	
		Licea (2)
Physarales (59)		
	Physaraceae (41)	
		Badhamia (6)
		Craterium (4)
		Fuligo (5)
		Leocarpus (1)
		Physarum (25)
	Didymiaceae (18)	
		Diachea (1)
		Diderma (4)
		Didymium (11)
		Lepidoderma (1)
		Mucilago (1)
Stemonitidales (26)		
	Stemonitidaceae (26)	
		Amaurochaete (1)
		Collaria (1)
		Comatricha (1)
		Enerthenema (1)
		Lamproderma (3)
		Macbrideola (1)
		Stemonaria (1)
		Stemonitis (7)
		Stemonitopsis (3)
		Symphytocarpus (3)
Trichiales (30)		
	Arcyriaceae (16)	
		Arcyodes (1)
		Arcyria (12)
		Perichaena (3)
	Trichiaceae (14)	
		Hemitrichia (4)
		Metatrichia (2)
		Trichia (8)

morphological features of sporophores were slightly changed, if changed at all. Moreover, we do not have information about the condition in which specimens were initially obtained. A significant part of them was most likely far from being perfectly preserved at the time of gathering in the field. It should be noted that despite the lack of the collection processing by any special chemicals (such as mercuric chloride) or pre-freezing, only a few specimens had traces of insect damage. Representatives of the genera *Badhamia* and *Reticularia* were affected by insects the most.

The specimen preservation in different genera was also similar. The largest proportion of heavily damaged sporophores was related to the Physarales. Representatives of the genera *Badhamia* and *Physarum*, which have relatively small and very fragile sporophores, suffered the most from mechanical damage (Fig. 7). Also the specimens belonging to the genus *Comatricha* were hardly-damaged due to non-fixed storage of such fragile sporophores. Specimens from the genus *Tubifera* were also damaged, including the sporophore tops, which are very important for identification. A slightly smaller part of heavily damaged sporangia was noted in the Cribrariales, Stemonitidales, and Ceratiomyxales. Specimens from the Trichiales (*Trichia*, *Hemitrichia*, *Arcyria*) were preserved the best due to the fact that the majority of their representatives have a sufficiently elastic peridium, which damages less by mechanical impact. Colonies of the genus *Didymium*, as a rule, are light color immediately after maturation because of lime on the sporophore surface, which makes them clearly visible on leaf litter. However, under the influence of precipitation, lime might wash off, so sporangia turn black and almost invisible on the substrate. As a result, they are often skipped during field collection. At the same time, sporophores are initially strong in dry condition and relatively serious impact is required to damage them. Thus, when species of this genus are collected in good condition, they are almost not damaged during storage, and it can explain a high proportion of well preserved specimens of *Didymium* species.

We can conclude that critical revisions of old collections can provide valuable information on the myxomycete distribution.

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Table 3. Distribution of species and specimens by regions in the Myxomycetes collection of CYN

Region	**Number of specimens**	**Number of deposited species**	**Number of new species for the region**
Moscow and Moscow Region	1112	122	11
Tver Region	191	55	3
Tyumen Region	112	49	27
Ryazan Region	56	30	12
Irkutsk Region	50	25	24
Murmansk Region	50	29	7
Primorye Territory	50	27	1
Crimean Peninsula	34	14	1
Republic of Karelia	18	11	3
Khabarovsk Territory	17	13	6
Krasnodar Territory	8	7	1
Pskov Region	4	3	—
Kaluga Region	3	3	3
Altai Territory	2	1	—
Astrakhan Region	2	2	1
Yaroslavl Region	2	2	1
Altai Republic	1	1	—
Vladimir Region	1	1	—
Kingdom of Cambodia	1	1	—
No georeference	1	1	—

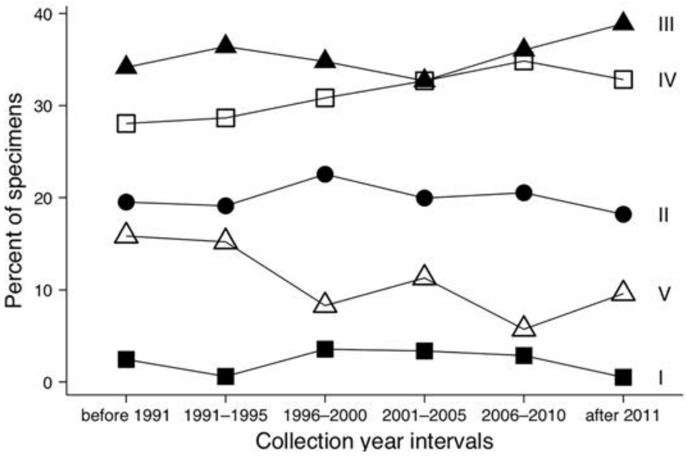

Figure 6 Preservation level of specimens collected in different years and deposited in the CYN collection. Description of preservation levels see in Table 1

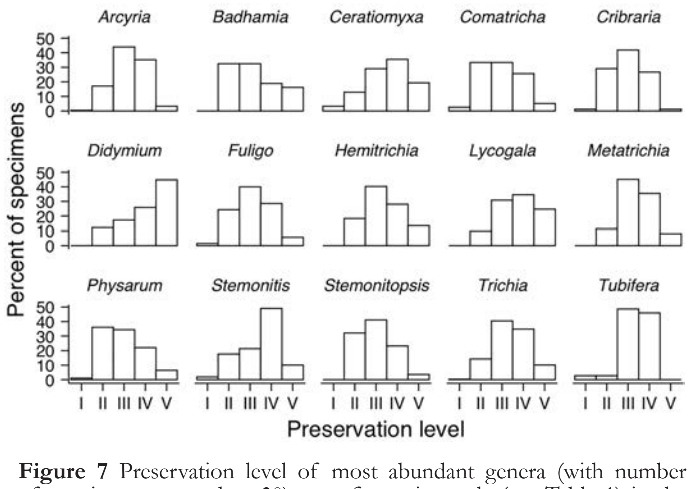

Figure 7 Preservation level of most abundant genera (with number of specimens more than 30) on a five-point scale (see Table 1) in the Myxomycetes collection of CYN

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