

THE FUNGUS GNATS (DIPTERA, MYCETOPHILIDAE)
OF MOSCOW PROVINCE

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In terms of abundance and wealth of species gnats of the family Mycetophilidae are one of the leading groups of the Diptera inhabiting damp deciduous, mixed and coniferous woodlands, where they occur from early spring to late autumn and even in winter during thaws.

Mycetophagy, which is the main means of larval feeding in most species of this family, is particularly prevalent in the subfamily Mycetophilinae, the species of which develop mainly in live tissues of Basidiomycetes. Saprophyagy and even phytophagy is noted in the subfamily Sciophilinae, in addition to feeding on mycelium and on mold.

The abundance of members of this family under natural conditions and the diversity of their modes of larval feeding (imagines are aphagous or feed on flower nectar) are indications that fungus gnats undoubtedly play a large role in the cycle of matter in forest biogeocoenoses. Despite this, the family has remained inadequately investigated in many respects; there is a particular lack of information on the biology of the preimaginal phases: for example, the larvae of only 4% of the 2000 species of the Mycetophilidae in the world fauna have been described (Plassmann, 1972).

Only the West European and North American faunas have been most fully examined in the faunistic studies of the family begun in the past century (Edwards, 1924; Landrock, 1927; Johannsen, 1909).

Only the fauna of the northern and northwestern European regions has been better investigated in the Soviet Union, and there is very little information on the fungus gnats of the Crimea and W. Siberia; Fedchenko (1968) gives a list of 48 species of the family Mycetophilidae for Moscow Province.

The present article results from a study of the fauna, biology and some behavioral characteristics of fungus gnats collected in a number of districts of Moscow Province in the years 1972-1974, a total of some 8000 specimens. In order to establish the food substrates and certain biological characteristics we made wide use of rearing flies from fungi damaged by larvae, employing the following procedure: "wormy" fungi were placed in jars on moistened sawdust or peat, which excellently imitate the forest litter in which most species of the Mycetophilidae pupate; the necks of the jars were covered with close fitting gauze. We employed about 1000 samples.

Species recorded for the first time for the USSR are indicated by an asterisk.

Subfam. SCIOPHILINAE

1. *Mycomyia bicolor* Dzied., 1885. Material: Z. *, June 1973, ♂♂, rare; F. **, Aug.-Sept. 1973, ♂♂, ♀♀, not common. Reared from Polyporaceae from birch stumps. Development from the last instar larva to the imago took 18-20 days. Pupa exarate, brown, with dense integument; attached to the substrate by a few threads of sticky gossamer.
2. *M. brunnea* Dzied., 1885. Material: W., June 1973, ♂♂, rare; F., Oct. 1973, ♂♂, rare.
3. *M. cinerascens* Ztt., 1826. Material: W., June-July 1973, ♂♂, ♀♀, not common; F., Sept.-Oct. 1973, ♂♂, ♀♀, fairly common.
4. *M. exigua* Winn., 1863. Material: W., June-Aug. 1972, 1973, ♂♂, ♀♀, relatively common.
5. *M. fulva* Dzied., 1885*. Material: W., June-July 1973, ♂♂, rare; F., Oct. 1973, ♂♂, rare.
6. *M. incisurata* Ztt., 1838. Material: W., June, Aug. 1973, ♂♂, ♀♀, relatively common.
7. *M. livida* Dzied., 1885*. Material: W., July 1973, ♂♂, rare.
8. *M. maculata* Mg., 1804. Material: F., 12 Oct. 1973, 2 ♂♂.
9. *M. marginata* Mg., 1818. Material: F., p. MGU***, Sept.-Oct. 1973, ♂♂, ♀♀, not common.
10. *M. maura* Walker, 1856. Material: F., Oct. 1973, ♂♂, rare.
11. *M. occultans* Winn., 1863. Material: W., 17 July 1973, 1 ♂.
12. *M. ornata* Mg., 1818. Material: W., June-July, 1972, 73, ♂♂, ♀♀, common.
13. *M. pseudoapicalis* Landr., 1925. Material: W., June 1973, ♂♂, rare.
14. *M. ruficollis* Ztt. 1852. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, common.
15. *M. trilineata* Ztt., 1865. Material: Zag. ****, Aug. 1973; ♂♂, ♀♀, common.

*Zvenigorod, Moscow Province.
**Fryazino, Moscow Province.
***Moscow University grounds, Lenin Hills, Moscow.
****Zagorsk, Moscow Province.

16. *M. winnertzi* Dzied., 1885*. Material: W., 17 July 1973, 2 ♂♂; F., Sept.-Oct. 1973, ♂♂, rare.
 17. *Neompheria pictipennis* Haliday, 1833. Material: W., June-July 1973, ♂♂, ♀♀, not common; F., Sept.-Oct. 1973, ♂♂, rare.
 18. *N. winnertzi* Edw., 1913. Material: W., 19 June 1973, 1 ♂.
 19. *Leptomorphus forcipatus* Landr., 1927. Material: W., 11 June 1973, 1 ♂.
 20. *Allococeera pulchella* Curtis, 1837. Material: W., June-July 1973, ♂♂, ♀♀, relatively common.
 21. *Polylepta borealis* Lundst., 1912. Material: W., June 1973, ♂♂, ♀♀, rare.
 22. *P. guttiventris* Ztt., 1852. Material: W., June-July 1973, ♂♂, ♀♀, very rare.
 23. *Neurotella minor* Lundst., 1912. Material: W., 22 June 1973, 1 ♂.
 24. *N. nemoralis* Mg., 1818. Material: W., June-July 1973, ♂♂, ♀♀, common.
 25. *Syntenna nitidula* Edw., 1924. Material: W., June 1973, ♂♂, ♀♀, rare; Zag., 4 Aug. 1973, 1 ♂.
 26. *Sciophila cliftoni* Edw., 1924. Material: W., June-July 1973, ♂♂, ♀♀, not common.
 27. *S. fenestella* Curtis, 1837. Material: W., June-July, 1973, ♂♂, ♀♀, not common.
 28. *S. hirta* Mg., 1818. Material: W., 22 June, 17 July 1973, 2 ♂♂.
 29. *S. limbatella* Ztt., 1852. Material: W., 6 June 1973, 1 ♂.
 30. *S. lutea* Macq., 1826. Material: W., June-July 1973, ♂♂, not common.
- Sciophila* sp. (♀♀) develops in the caps of the fungus *Paxillus*. Species of the family Bolitophilidae, which are closely related to the fungus gnats, were usually reared in large numbers from these fungi.
31. *Megalopelma nigroclavatum* Strobl., 1909. Material: F., 30 Sept. 1973, 1 ♂.
 32. *Monocloa rufilatera* Walk., 1837. Material: W., June 1973, ♂♂, ♀♀, rare.
 33. *Acnemia nitidicollis* Mg., 1818. Material: W., June-July 1973, ♂♂, ♀♀; Zag., 12 Aug. 1973, 1 ♂.
 34. *Coelophthiria thoracica* Winn., 1863. Material: W., 9 July 1973, 1 ♂, 1 ♀; F., 2 Oct. 1973, 2 ♂♂.
 35. *Coelosia tenella* Ztt., 1852. Material: W., 19 June 1972, 1 ♂; Zag., 2 Aug. 1973, 1 ♂; F., 30 Oct. 1973, 1 ♀.
 36. *Gnoriste bilineata* Ztt., 1852. Material: W., June-July 1973, ♂♂, ♀♀, rare.

37. *Palaeodocosa alpicola* Strobl., 1895. Material: W., Aug. 1972, ♂♂, ♀♀, rare.
38. *P. janickii* Dzied., 1885. Material: W., 19 June 1972, 2 ♂♂.
39. *Apolophthisa subincana* Curtis, 1837. Material: W., Aug. 1972, ♂♂, ♀♀, rare; Ch. *, 30 July 1973, 1 ♂.
40. *Boletina basalis* Mg., 1818. Material: W., June 1972, 1973, ♂♂, common; F., 30 Oct. 1973, 5 ♂♂.
41. *B. borealis* Ztt., 1852. Material: F., 7 Oct. 1973, 3 ♂♂.
42. *B. brevicornis* Ztt., 1852. Material: F., Oct. 1973, ♂♂, ♀♀, not common.
43. *B. cincticornis* Walk., 1848. Material: W., June 1973, ♂♂, rare.
44. *B. digitata* Lundst., 1914. Material: W., June 1973, ♂♂, rare.
45. *B. dispecta* Dzied., 1885. Material: W., June-July 1973, ♂♂, ♀♀, not common.
46. *B. gripha* Dzied., 1885. Material: W., June-July 1973, ♂♂, ♀♀, relatively common; F., Sept.-Oct. 1973, ♂♂, ♀♀, common.
47. *B. griphoides* Edw., 1924*. Material: F., Oct. 1973, ♂♂, ♀♀, common; Ch., 30 July 1973, 2 ♂♂.
48. *B. nigricans* Dzied., 1885. Material: W., 14 June 1973, 1 ♂; F., 30 Oct. 1973, 1 ♂.
49. *B. nigrofusa* Dzied., 1885. Material: W., 14 June 1973, ♂♂, rare.
50. *B. nitida* Grzeg., 1885. Material: W., 29 June 1973, 1 ♂.
51. *B. plana* Walk., 1856. Material: W., 13 June 1973, 1 ♂.
52. *B. sciarina* Staeg., 1840. Material: W., June 1973, ♂♂, rare.
53. *Lela bimaculata* Mg., 1804. Material: W., 27 June 1972, 1 ♂, 30 June 1973, 1 ♂.
54. *L. cylindrica* Winn., 1863. Material: W., 22 June, 4 July 1973, 2 ♂♂.
55. *L. picta* Mg., 1830. Material: W., 29 June, 30 June 1973, 2 ♂♂.
56. *L. subfasciata* Mg., 1818. Material: W., 18 June 1973, 1 ♂.
57. *L. winthemi* Lohm., 1822. Material: W., June-July 1973, ♂♂, ♀♀, not common.
58. *Rondaniella dimidiata* Mg., 1804. Material: W., 3 July 1973, 1 ♂, rare.

*Chashnikovo, Moscow Province.

59. *Tetragoneura sylvatica* Winn., 1863. Material: W., June 1973, ♂♂, ♀♀, rare.

60. *Tetragoneura sylvatica* Curtis, 1837. Material: W., 24 June 1972, 2 ♂♂.

61. *Docosia gilvipes* Hall., 1856. Material: W., 6 June 1973, 1 ♂; F., Sept.-Oct. 1973, ♂♂, ♀♀, rare. Larvae of this species develop in *Stropharia Tricholoma*, *Lepista* species and some *Russula* species (e.g., in *R. foetens*). Reared from fungi in October and November. The females place their eggs between the gills in the cap of the fungus.

On hatching the larvae initially feed on the tissues of the cap, but they subsequently feed on the whole fungus. Development from egg to imago took 20-22 days. The cocoons of *D. gilvipes*, which are of sticky gossamer, are slender and semitransparent. Females emerge from the cocoons with the abdomen distended with eggs, and mate soon after emerging. Imagines overwinter.

Subfam. MYCETOPHILINAE

62. *Anatella ciliata* Winn., 1863. Material: W., June 1973, ♂♂, very rare.

63. *A. incisurata* Edw., 1924. Material: W., 18 June 1973, 1 ♂; F., 6 May 1974, 1 ♂. Imagines overwinter beneath exposed roots of tree stumps and trees.

64. *A. unguigera* Edw., 1924. Material: W., 23 June 1973, 1 ♂.

65. *A. schmitzi* Landr., 1925*. Material: W., 4 Aug. 1973, 1 ♂.

66. *Exechia bicincta* Staeg., 1840. Material: F., p. MGU, Sept.-Oct. 1973; ♂♂, relatively common. Imagines also overwinter in hollows in trees.

67. *E. confinis* Winn., 1863. Material: F., p. MGU, Sept.-Oct. 1973, ♂♂, ♀♀, abundant. Imagines overwinter underneath bark, in stumps, underneath exposed roots and in plant debris, where they frequently form clusters of 10-20 gnats. During the mass flight period the gnats swarm around fungi, mating takes place on the underside of the fungus cap, where the females also lay their eggs. Development takes place in various *Russula* species. Development from the last instar larva to the imago takes 7-10 days. *E. confinis* has slender, semitransparent cocoons of light gossamer, like other species of the genus.

68. *E. contaminata* Winn., 1863. Material: W., June, Aug. 1973, ♂♂, ♀♀, not common; F., p. MGU: Sept.-Oct. 1973, ♂♂, ♀♀, relatively common. Imagines overwinter in stumps.

69. *E. crucigera* Lundstr., 1909. Material: W., Aug. 1972, ♂♂, ♀♀, not common; F., Sept.-Oct. 1973, ♂♂, rare.

70. *E. dizona* Edw., 1924. Material: F., p. MGU, Sept.-Oct. 1973, ♂♂, not common. Imagines overwinter underneath exposed roots of stumps and trees.

71. *E. dorsalis* Staeg., 1840. Material: W., Aug. 1972, ♂♂, ♀♀, not common; F., p. MGU, Oct.

1973, ♂♂, ♀♀, not common; F., p. MGU, Oct. 1973, ♂♂, ♀♀, not common. Imagines overwinter beneath exposed roots, and various *Russula* species.

72. *E. exigua* Lundst., 1909. Material: W., Aug. 1972, ♂♂, not common; rare; F., Sept.-Oct. 1973, ♂♂, not common. Imagines overwinter beneath exposed roots.

73. *E. frigida* Holm., 1865. Material: F., p. MGU, Oct. 1973, ♂♂, rare.

74. *E. hammi* Edw., 1924. Material: F., 6 May 1974, 5 ♂♂.

75. *E. lucidula* Ztt., 1838. Material: F., Sept.-Oct. 1973, ♂♂, not common. Imagines overwinter in stumps.

76. *E. lundstroemi* Landr., 1923. Material: F., p. MGU, Oct. 1973, ♂♂, ♀♀, not common. Imagines overwinter in hollows in trees. Reared from Agaricaceae (which we were unable to identify) along with *Mycetophila lineola*.

77. *E. nana* Staeg., 1840. Material: W., 10 July 1973, 1 ♂; F., Oct. 1973, ♂♂, rare.

78. *E. nigroscutellata* Landr., 1912. Material: W., June-Aug. 1972, ♂♂, ♀♀, relatively common; F., p. MGU, Sept.-Oct. 1973, ♂♂, ♀♀, common. Imagines overwinter in stumps, and beneath exposed roots in plant debris.

79. *E. pallida* Stann., 1931. Material: Zag., Aug. 1973, ♂♂, ♀♀, common; F., p. MGU, Aug.-Oct. 1973, ♂♂, ♀♀, common. Imagines overwinter in stumps and beneath the bark of felled trees. Larvae of this species develop in various *Russula* species and *Lactarius vellereus*. Development from the last instar larva to the imago takes 9-13 days. The pupa is most often exarate, sometimes slightly entangled in gossamer. In repose gnats of this and many other species of the genus raise the middle legs.

80. *E. parva* Lundst., 1909. Material: F., p. MGU, Oct. 1973, ♂♂, rare.

81. *E. pseudocincta* Strobl., 1909. Material: F., p. MGU, Sept.-Oct. 1973, ♂♂, not common; Oz., 1 Oct. 1974, 2 ♂♂. Reared from *Lactarius deliciosus*.

82. *E. pulchella* Winn., 1863. Material: F., p. MGU, Oct. 1973, ♂♂, rare.

83. *E. repanda* Joh., 1912. Material: F., p. MGU, Oct. 1973, ♂♂, rare. Imagines overwinter beneath exposed roots and in plant remains. Reared from *Laccaria* sp.

84. *E. separata* Lundst., 1912. Material: F., Sept. 1973, ♂♂, ♀♀, not common. Reared from *Boletus* species, less frequently from various *Russula* species between the end of July and the end of September. Development from the last instar larva to the imago takes 7-9 days. The cocoons of gnats of this species are small, oval and semitransparent and consist of light gossamer.

85. *E. spinigera* Winn., 1863. Material: F., p. MGU, Aug.-Oct. 1973, ♂♂, ♀♀, abundant. Imagines

tips and in plant debris. They swarm around fungi. The gnats mate and the females lay their eggs on the underside of the fungus cap. Development takes place in various *Russula* species. Development from the last instar larva to the imago requires 7-10 days. The cocoons of these gnats are light, thin and semitransparent.

86. *E. subulata* Winn., 1863. Material: F., Sept.-Oct. 1973, ♂♂, rare.

87. *E. tristriata* Stackelberg, 1940. Material: F., Oct. 1973, ♂♂, rare.

88. *E. trivittata* Staeg., 1840. Material: F., p. MGU, Oct. 1973, ♂♂, rare.

89. *E. unimaculata* Ztt., 1860. Material: F., Oct. 1973, ♂♂, ♀♀, not common; Zag., Aug. 1973, ♂♂, ♀♀, rare.

90. *Rhymosia cristata* Staeg., 1840. Material: W., June-July 1972, 1973, ♂♂, ♀♀, abundant.

91. *Rh. domestica* Mg., 1830. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, relatively common; F., Sept.-Oct. 1973, ♂♂, ♀♀, not common. Reared from *Lepista* sp., *Collybia* sp. and *Cystoderma amianthinum*. Pupation takes place in large oval cocoons of fine light gossamer. Ichneumonid parasites of the genus *Plectiscidea* Viereck have been found in gnats of this species.

92. *Rh. fasciata* Mg., 1804. Material: F., p. MGU, Oct. 1973, ♂♂, ♀♀, rare.

93. *Rh. fovea* Dzied., 1909*. Material: W., June 1973, ♂♂, rare.

94. *Rh. maculosa* Mg., 1818*. Material: W., June-Aug. 1973, ♂♂, not common; p. MGU, 11 Oct. 1973, 2 ♂♂.

95. *Rh. tarnanii* Dzied., 1909. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, not common; F., 6 May 1974, 2 ♂♂. Imagines overwinter beneath exposed roots of stumps and in plant debris.

96. *Rh. truncata* Winn., 1863. Material: W., 3 July, 18 Aug. 1973, 2 ♂♂, F., p. MGU, Oct. 1973, ♂♂, rare.

97. *Brachypeza bisignata* Winn., 1863. Material: W., June-July 1973, ♂♂, ♀♀, rare.

98. *B. radiata* Jen., 1908. Material: W., June-July 1973, ♂♂, ♀♀, rare.

99. *B. striata* Bukowski, 1934. Material: F., Sept. 1974, ♂♂, ♀♀, rare. Reared from *Pleurotus* sp. Cocoons of gnats of this species are large, oval and fairly dense although fine.

100. *Allodia alternans* Ztt., 1838. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, not common.

101. *A. anglofennica* Edw., 1921. Material: W., June-July 1973, ♂♂, ♀♀, common; F., Oct. 1973, ♂♂, ♀♀, relatively common.

102. *A. fuscipennis* Staeg., 1840. Material: W., June-July 1973, ♂♂, rare.

July 1973, ♂♂, ♀♀, rare.

104. *A. lugens* Wied., 1817. Material: W., Aug. 1972, ♂♂, ♀♀, rare; W., June-July 1973, ♂♂, ♀♀, common; F., Sept.-Oct. 1973, ♂♂, ♀♀, common. Imagines overwinter beneath exposed roots, in plant debris.

105. *A. ornaticollis* Mg., 1818. Material: W., June-July 1973, ♂♂, ♀♀, not common; F., p. MGU, Oct. 1973, ♂♂, ♀♀, common. Imagines overwinter beneath exposed roots. Reared from *Clitocybe* sp., *Amanita* sp., *Cortinarius* sp. (with *Mycetophila fungorum*), various species of *Russula* and *Polyporaceae* that are difficult to identify, along with *Bolitophila nigrolineata* (*Bolitophilidae*). Parasites of the genus *Plectiscidea* Viereck (Ichneumonidae, Microleptinae) were found when the species was reared from fungi.

106. *A. pistillata* Lundst., 1911*. Material: W., 18 July 1973, 1 ♂.

107. *A. proxima* Staeg., 1840. Material: W., June-July 1973, ♂♂, rare.

108. *A. silvatica* Landr., 1912*. Material: W., June-July 1973, ♂♂, rare; F., 1 Aug. 1973, 1 ♂.

109. *A. truncata* Edw., 1921. Material: W., 6 June 1973, 2 ♂♂.

110. *Cordyla brevicornis* Staeg., 1840. Material: F., Oct. 1973, Aug. 1974, ♂♂, ♀♀. The species was not found in the wild, but was reared only from fungi, from various *Russula* species and from *Boletus edulis*.

111. *C. crassicornis* Mg., 1818. Material: p. MGU, 11 Oct. 1973, 1 ♂, 1 ♀.

112. *C. fusca* Mg. 1804. Material: W., F., Aug.-Nov. 1973, ♂♂, ♀♀. Not found under natural conditions, reared only from fungi - various *Russula* species and *Boletus* species, fairly often along with *Mycetophila fungorum*. Development from the last instar larva to the imago takes 9-12 days in the summer; the development period is extended in the autumn. The cocoons of gnats of this species are woven from white, sticky gossamer, and are thinner and looser at the anterior end to facilitate emergence of the imago. Females emerge from the cocoon with the abdomen distended by eggs. When *C. fusca* was reared from fungi we found that they were parasitized by hymenopterans - *Cryptoserphus aculeator* Hal. (Proctotrupidae), [previously known as a parasite of *Mycetophila ruficollis* (= *M. lineola*) and of *Exechia contaminata*, but these data were inaccurate] and *Plectiscidea* Viereck (Ichneumonidae, Microleptinae).

113. *C. fasciata* Mg., 1830. Material: F., W., July-Oct. 1973, ♂♂, ♀♀. Not found under natural conditions, reared only from fungi - *Russula adusta*, *R. foetens* and *Boletus edulis*.

114. *C. murina* Winn., 1863. Material: W., June 1973, ♂♂, very rare; F., 30 Oct. 1973, 1 ♂.

115. *C. nitidula* Edw., 1924. Material: F., July 1973, Aug.-Sept. 1974, ♂♂, ♀♀, relatively common. Reared from fungi - *Russula adusta*, other *Russula* species and *Boletus luridus*.

*Lakes of Moscow Province.

116. *C. parvipalpis* Edw., 1924. Material: F., Sept. 1973, Aug. 1974, ♂♂, ♀♀. Not found under natural conditions, reared only from fungi - various *Russula* species. It is possible that species of this genus live concealed in forest litter and fly little, since they are very rarely found under natural conditions, although it is not usually difficult to rear them from fungi.

117. *C. semiflava* Staeg., 1840. Material: W., June 1973, 2 ♂♂.

118. *Trichonta aberrans* Lundst., 1911. Material: W., June-July 1973, ♂♂, relatively common.

119. *T. atricauda* Ztt., 1852. Material: W., June-July, 1973, ♂♂, ♀♀, common; F., Oct., 1973, ♂♂, ♀♀, rare.

120. *T. bifida* Lundst., 1909. Material: W., June-July 1973, ♂♂, ♀♀, rare.

121. *T. brevicauda* Lundst., 1907. Material: W., June-Aug. 1973, ♂♂, rare.

122. *T. clavigera* Lundst., 1913. Material: W., June 1973, ♂♂, rare.

123. *T. conjungens* Lundst., 1909. Material: W., June 1973, ♂♂, rare.

124. *T. hainata* Mik., 1880. Material: W., June 1973, ♂♂, rare.

125. *T. melanura* Staeg., 1840. Material: F., 6 May 1974, 2 ♂♂.

126. *T. subfusca* Lundst., 1909. Material: W., June-July 1973, ♂♂, ♀♀, common.

127. *T. venosa* Staeg., 1840. Material: W., June 1973, ♂♂, rare.

128. *T. vitta* Mg., 1830. Material: W., June-July 1973, ♂♂, ♀♀, common; F., Sept.-Oct. 1973, ♂♂, ♀♀, relatively common.

129. *Phronia bicolor* Dzied., 1889. Material: W., June 1973, ♂♂, rare.

130. *Ph. conformis* Walk., 1856. Material: W., June-July 1973, ♂♂, ♀♀, not common.

131. *Ph. dubia* Dzied., 1889. Material: W., June-July 1973, ♂♂, ♀♀, common.

132. *Ph. forcipata* Winn., 1863. Material: W., 17 July 1973, 1 ♂.

133. *Ph. praecox* Winn., 1924. Material: W., June-July 1973, ♂♂, ♀♀, abundant; F., Sept.-Oct. 1973, ♂♂, ♀♀, common.

134. *Ph. signata* Winn., 1863. Material: W., June-July 1973, ♂♂, rare.

135. *Ph. strenua* Winn., 1863*. Material: W., June-July 1973, ♂♂, rare.

136. *Ph. vulcani* Dzied., 1889. Material: W., June-July 1973, ♂♂, rare.

137. *Dynatosoma chochleare* Strobl., 1895. Material: W., Aug. 1972, June 1973, ♂♂, rare.

138. *D. fuscicornis* Mg., 1830. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, common.

139. *D. nigromaculatum* Lundst., 1913. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, not common.

140. *D. reciprocum* Walk., 1848. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, not common.

141. *D. thoracicum* Ztt., 1838. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, not common.

142. *Mycetophila abbreviata* Landr., 1914. Material: W., June 1973, ♂♂, rare.

143. *M. adumbrata* Mik., 1884*. Material: W., June-Aug., 1973, ♂♂, relatively common.

144. *M. bimaculata* Fabr., 1805. Material: F., 2 Oct. 1973, 1 ♂.

145. *M. blanda* Winn., 1863. Material: W., 19 June 1973, 3 ♂♂.

146. *M. caudata* Staeg., 1840. Material: W., F., Aug.-Oct., 1973, ♂♂, rare.

147. *M. fasciata* Plotnikova, 1962. Material: W., F., July-Oct. 1972, 1973, ♂♂, ♀♀, common. Develops in fungi - *Russula adusta*, other *Russula* species and *Armillaria mellea*. Before pupation the larvae weave dense light cocoons with a thin lid on top to facilitate emergence of the imago.

148. *M. flava* Winn., 1863. Material: W., 10 July 1973, 2 ♂♂.

149. *M. forcipata* Lundst., 1913. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, common.

150. *M. formosa* Lundst., 1911. Material: W., June 1973, ♂♂, ♀♀, not common.

151. *M. fraterna* Winn., 1863. Material: W., Aug., 1972, ♂♂, rare.

152. *M. fungorum* Deg., 1776. Material: W., Aug., 1972, ♂♂, ♀♀, rare; F., Aug.-Oct. 1973, 1974, ♂♂, ♀♀, common. Imagines overwinter in the soil, in plant litter, beneath exposed roots. The species is the most polyphagous of all those investigated. Almost all the fungi to be found in the second half of the summer and in the autumn are infested by its larvae. The same fungus is quite often damaged by larvae of different fungus gnat species: for example, *M. fungorum* was reared along with *Cordyla fusca*, *M. fasciata* and *Exechia* species.

Development from the last instar larva to emergence of the imago usually takes 7-9 days. *M. fungorum* has light, oval cocoons of semitransparent sticky gossamer.

153. *M. gibbula* Edw., 1924. Material: W., Aug. 1972, June 1973, ♂♂, not common.

154. *M. hetschkoi* Landr., 1918. Material: W., 21 Aug. 1973, 2 ♂♂.

155. *M. lineola* Mg., 1818. Material: W., Aug. 1972, ♂♂, ♀♀, not common; Ch., 30 July 1973, 1 ♂; F., Sept.-Oct. 1973, ♂♂, ♀♀, relatively common; F., Aug.-Sept. 1974, ♂♂, ♀♀, relatively common.

Imagines overwinter in plant remains and beneath exposed roots. Reared from *Naematoloma* sp., various *Russula* species, *Cortinarius* sp., *Mycena* sp., *Clitocybe* sp., *Lactarius* sp. and *Armillaria mellea*, often with *M. fungorum*.

156. *M. obscura* Dzied., 1884. Material: W., June 1973, ♂♂, rare. Species reared from *Clitocybe* sp.

157. *M. pumilla* Winn., 1863. Material: W., June, Aug., 1972, ♂♂, rare.

158. *M. schnabli* Dzied., 1884. Material: W., Aug. 1972, June-July 1973, ♂♂, ♀♀, common.

159. *M. sigillata* Dzied., 1884. Material: W., June 1973, ♂♂, rare.

160. *M. sigmatoides* Dzied., 1884. Material: W., F., July-Oct., 1972, 1973, ♂♂, ♀♀, common. Imagines overwinter in stumps. Reared from various *Russula* species and from *Lactarius vellereus*. If the fungus had not rotted, but had withered, pupation of the larvae took place within the fungus. Before spinning the cocoon the larvae come to the surface of the fungus and gnaw through its outer skin a hole the size of the lid of the future cocoon, which facilitates emergence of the imago. The cocoons of these gnats are oval, light and very compact.

161. *M. sordida* v. d. Wulp., 1887. Material: W., June-July 1973, ♂♂, not common.

162. *M. stylata* Dzied., 1884. Material: W., Aug., 1972, ♂♂, rare; F., Oct., 1973, ♂♂, rare.

163. *M. zetterstedti* Lundst., 1907. Material: W., June 1973, ♂♂, rare.

164. *M. vittipes* Ztt., 1852. Material: F., Oct. 1973, ♂♂, rare.

165. *Zygomyia humeralis* Wied., 1817. Material: W., June-July 1973, ♂♂, ♀♀, not common.

166. *Z. notata* Stann., 1931. Material: W., 23 June 1973, 1 ♂.

167. *Z. pictipennis* Staeg., 1840. Material: W., 17 July 1973, 1 ♂, 1 ♀.

168. *Z. valida* Winn., 1863. Material: W., June 1973, ♂♂, ♀♀, rare; F., p. MGU, Sept.-Oct., 1973, ♂♂, ♀♀, rare.

169. *Z. vara* Staeg., 1840. Material: F., W., Zag., Aug.-Oct., 1973, ♂♂, ♀♀, not common.

170. *Sceptonia concolor* Winn., 1863. Material: W., 6 June 1973, 1 ♂; F., 7 Oct. 1973, 1 ♂.

171. *S. nigra* Mg., 1804. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, rare.

172. *Epicypta punctum* Stann., 1831. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, not common.

173. *E. testata* Edw., 1924. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, common; F., Sept. 1973, ♂♂, ♀♀, rare.

174. *Delopsis aterrima* Ztt., 1852. Material: W., Aug. 1972, June 1973, ♂♂, ♀♀, not common.

175. *D. scatorpha* Perris, 1849. Material: W., Aug., 1972, ♂♂, ♀♀, rare.

Consequently, 175 species of the Mycetophilidae belonging to 36 genera of 2 subfamilies, Sciophilinae and Mycetophilinae, have been found in Moscow Province (61 species of 22 genera in the subfamily Sciophilinae and 114 species of 14 genera in the Mycetophilinae); 11 species have been recorded for the first time in the USSR.

Although the subfamily Sciophilinae contains more genera, many of them are monotypic (*Allocotocera*, *Coclophthia*, *Megalopelma*) or small in the number of species that they include (*Gnoriste*, *Acnemia*, *Palaeodocosis*). There are only two genera rich in species in the whole subfamily, *Boletina* and *Mycomyia*, both of which are well represented in the fauna of Moscow Province. Species of this family are, as a rule, not very plentiful and even rare, with the exception of *Boletina basalis*, *B. griffa*, *Mycomyia ornata* and a few others. Most species of the Sciophilinae fly in the first half of the summer, when they are numerically predominant over species of the subfamily Mycetophilinae, which are most active in the second half of the summer and the autumn, especially the autumn. At that time the gnats form small swarms above moss-covered stumps and hummocks, around tree-trunks, crawl through the moss and underneath leaf litter, and are attracted in large numbers by fungi. They are sometimes to be found on the underside of the cap (*Mycetophila fungorum*, *Exechia confinis*), between the gills of the cap or beneath the films found in *Amanita*, *Boletus* and some other fungi. Mating occurs and the females lay their eggs on fungi.

Although the number of genera of the subfamily Mycetophilinae is little more than half that of Sciophilinae, most of the genera of the Mycetophilinae are large, and their species are abundant. The genera *Exechia*, *Mycetophila*, *Phronia*, *Allodia* and *Trichonta* are richest in species, the commonest of which are *Exechia dorsalis*, *E. confinis*, *E. spinigera*, *E. nigroscutellata*, *Mycetophila fungorum*, *M. fasciata*, *M. sigmatoides*, *Trichonta vitta*, *Phronia praecox*, *Ph. dubia*, *Allodia lugens*, *A. ornaticollis*, *A. anglofennica* and many other species. The only truly rare species in the subfamily are members of the genus *Anatella*, which are found singly.

Excluding isolated finds, all the investigated species of the Mycetophilidae may be divided into three unequal groups in relation to the flight period. The first and largest consists of species with two flight peaks, spring and autumn. The species concerned from among the Sciophilinae are *Mycomyia winnertzi*, *M. cinerascens*, *M. ruficollis*, *Neompheria pictipennis*, *Coclophthia thoracica*, *C. tenella*, *Boletina griffa*, *B. sciarina*, *B. nigricans*, *B. basalis* and *D. gilvipes*; among the Mycetophilinae such species constitute the majority. The second small group consists of species that have one flight peak and that are found for a brief period, 7-10 days, under natural conditions. The species concerned include *Allocotocera pulchella*, *Gnoriste bilineata*, etc. The flight of these species is usually in June and July. Finally, many species have a protracted flight period, for example *Mycetophila sigmatoides*, *M. fasciata*, *Phronia praecox*, *Trichonta brevicauda*, *Rhynchosia cristata*, some *Exechia* species, etc. We may also include under this heading species reared from fungi throughout the time for which the fungi are to be found under natural conditions, namely *Cordyla fusca*, *C. fasciata*, *Exechia pallida* and *E. separata*.

Study of the biology of members of the family has enabled us to clarify the food relations of 24 species, mainly of the subfamily Mycetophilinae (21 species). In Moscow Province they feed on almost all species of Agaricaceae and Polyporaceae. Various Russula species, which occur widely in our forests, appear earlier than other fungi and are found in abundance until the autumn frosts, are the most attractive for most of the gnats investigated. Fifteen species of the Mycetophilidae are associated with them. For the remainder of the fungi (the overwhelming majority) the range of consumers is limited; thus, only members of the genus Mycetophila (M. fungorum, M. lineola and M. obscura) develop in Armillaria mellea and Clitocybe sp.

M. fungorum, which was reared from more than 14 species of fungi, was found to be the most polyphagous of the species investigated. During the mass flight period almost all the fungi growing at the time are damaged by larvae of this species. Other species of the genus Mycetophila are also fairly undemanding in the choice of food. On the other hand, there are species that tend to select certain fungi. Thus, members of the genus Cordyla have been reared mainly from Russula species and Boletus edulis; Rhymosia domestica prefers Lepista species, although it may also develop in other fungi; members of the genus Exechia mainly utilize various Russula species.

When rearing fungus gnats from fungi it was noted that the sexual products of the imagines matured before emergence of the flies from the cocoons on the basis of the nutrients derived by the larvae.

When establishing the food relations of the Mycetophilidae we succeeded incidentally in finding a number of their hymenopterous parasites. Thus, Cordyla fusca is parasitized by Cryptoserphus aculeator (Proctotrupidae). Species of the genus Plectiscidea (Ichneumonidae, Microleptinae) were reared from Alodia ornaticollis, Cordyla fusca and Rhymosia domestica. The range of hosts of the Plectiscinae may possibly be far wider. It is the first time that Cryptoserphus aculeator and Plectiscidea have been recorded as parasites of the fungus gnat species enumerated, at least in the Soviet Union.

In addition to members of the order Hymenoptera, the predatory mite Parasitus (Colcogamazus) americanus (Parasitidae), which occurs in abundance on fungi in litter, where most fungus gnat species pupate, is a parasite of the larvae and pupae of the Mycetophilidae.

The imagines of most of the species of Mycetophilidae investigated overwinter. With the onset of autumn they become increasingly rare under natural conditions; Exechia and Mycetophila species conceal themselves in stumps and underneath bark; Boletina and Exechia species burrow into the forest litter; Exechia bicincta, E. lundstroemi and certain others overwinter in hollows in trees; Exechia exigua, E. dorsalis, E. contaminata, Rhymosia tarnanii and Dynatosoma reciprocum overwinter beneath the exposed roots of stumps and trees. Some members of the genera Mycetophila and Exechia frequently form groups of 10-15 on stumps where they overwinter, but they are also found singly. When the cold weather arrives many of them take refuge in houses and buildings if these exist near their habitats. We have been able to note that certain species of the Mycetophilidae developing in Russula adusta, R. foetens and Lactarius vellereus, which are fungi that

rarely rot, also pupate in the fungi. The adult gnats remain in the pupal cocoons throughout the winter. In most of the species that develop in rapidly rotting fungi pupation occurs in the soil; nevertheless a proportion of the gnats remain to overwinter in the cocoons, not emerging in the autumn.

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LITERATURE CITED

- BUKOWSKI, W. 1934. Neue und abweichende Formen von Pilzmücken (Diptera, Mycetophilidae) aus der Krim. *Konowia*, 13 (3): 183-192.
- EDWARDS, F. W. 1924. British fungus-gnats (Diptera, Mycetophilidae). *Trans. Ent. Soc. London*, 5: 505-670.
- FEDCHENKO, A. L. 1868. A list of Diptera. *Tr. obshch. lyubit. yestestv.*, 6 (1): 35-38.
- JOHANSEN, O. A. 1909. *Genera Insectorum*. Mycetophilidae. Fasc. 93: 1-14. Bruxelles.
- LACKSCHEWITZ, P. 1937. Die Fungivoriden des Ostbaltischen Gebietes. *Riga*: 44.
- LANDROCK, K. 1927. Fungivoridae. In Lindner: Die Fliegen der palaearktischen Region, 2 (8): 97-196.
- LUNDSTROEM, C. 1913. Beitrag zur Kenntnis der Dipterenfauna des Nordl. Europäischen Russland. *Soc. Fauna et Flora Fennica*, 37 (10): 3-20.
- OSTROVERKHOVA, G. P. * 1962. New fungus gnats (Diptera, Fungivoridae S. L.) from West Siberia. *Entom. obozr.*, 41 (4): 890-897.
- OSTROVERKHOVA, G. P. 1970. New data on Siberian fungus gnats (Diptera, Mycetophilidae). *Entom. obozr.* 49(2): 452-458.
- OSTROVERKHOVA, G. P. and A. A. SHTAKEL'BERG. 1969. Identification key to the insects of the European regions of the USSR, 5. Diptera, Aphaniptera, 1. Leningrad, Nauka Press: 1-807.
- PLASSMANN, E. 1927. Morphological-taxonomische Untersuchungen an Fungivoridenlarven (Diptera). *Deutsch. ent. Zeitschr.*, 19(1-3): 73-99.

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PLASSMANN, E. 1973. Die Pilzmücken Gattung Leia (Diptera Mycetophilidae). *Senckenberg. Biol.*, 54(1-3): 131-140.

PŘÍHODA, A. 1972. Houbařuv rok. Státní zemědělské nakladatelství, Prague.

Paleontological Institute, USSR Academy of Sciences, Moscow

WINNERTZ, J. 1863. Beitrag zu einer Monographie der Pilzmücken, Vienna, *Verh. zool. bot. Ges.*, 13: 637-964.