

FAUNA AND BIOECOLOGY OF SNAIL-KILLING FLIES (DIPTERA SCIOMYZIDAE) IN THE CENTRAL BLACK SOIL REGION OF RUSSIA

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Аннотация. В результате изучения фауны сциомизид в Центральном Черноземье выявлено 54 вида из 21 рода. 12 видов указывается впервые для региона. Исследованы некоторые особенности биологии сциомизид региона и новые хозяева (жертвы) из числа моллюсков.

Ключевые слова: сциомизиды, фауны, хозяева, фенология, Центральное Черноземье

Abstract. Fauna of the snail-killing flies in the Central Black Soil Region includes 54 species from 21 genera; 15 species have been found in the region for the first time. Some peculiarities of biology of the Sciomyzidae and their relations with molluscs have been studied

Keywords: snail-killing flies, fauna, phenology, Central Black Soil Region

Family Sciomyzidae (snail-killing flies) contains about 600 species, of which 100-110 can be found in Russia. Currently, the family includes subfamilies Salticellinae and Sciomyzinae (tribae Sciomizini, Tetanocerini) [1]. Larvae of snail-killing flies are predators or parasitoids of molluscs; *Sepe-don knutsoni* and *Sepe-donella nana* use freshwater oligochaetes for their larval development [1]. Species whose larvae attack aquatic molluscs are usually predators feeding on several prey [1, 2, 3]. Species whose larvae are connected with semi-terrestrial or terrestrial snails or slugs are either parasitoids or predators with some features of parasitoids. Based on the degree of environmental connections with water and the hosts (prey), Sciomyzidae can be divided into aquatic, semi-aquatic (semi-terrestrial) and terrestrial ecological groups. Larvae of *Renocera*, some *Ilione* and *Eulimnia* feed on fingernail clams (Heterodonta: Sphaeriidae) under water [4, 5, 6, 7], while larvae of *Hedria* spp. attack aquatic pulmonate snails under water. Many species are connected with marshes, swamplands, logged ponds, shallow rivers

with coastal vegetation, seasonal ponds, puddles, and ditches (*Anticheta*, *Ilione albiseta*, *Renocera*, some *Pherbellia*, *Tetanocera*). Larvae of aquatic species of genera *Sepe-don*, *Hydromya*, *Dictya*, *Dictyodes*, *Ilione*, *Pherbellia*, *Hoplodictya*, *Neolimnia Dichetophora*, *Elgiva*, *Limnia*, *Pherbina*, *Psacadina* and some *Tetanocera* [8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19] are usually predators and attack aquatic nonoperculate pulmonate snails slightly submerged in shallow and slow waters or aquatic vegetation mats. Some species attack aquatic snails who expose their bodies on moist surfaces (Lymnaeidae, Physidae, Planorbidae, Bithyniidae, Bulinidae). The operculum of operculate prosobranch snails usually prevent attacks by snail-killing fly larvae with some exceptions (several species of *Pherbellia*, *Dictya*, *Hoplodictya* and *Neolimnia* feed on the snails of this group).

Aquatic pulmonate snails crept out of water or stranded on shore are used by larvae of *Atrichomelina*, *Colobaea*, some *Pherbellia*, *Pteromicra* and *Tetanocera* for their development. These larvae almost always attack live prey, but continue feeding on decaying organs after they have killed the snail. Larvae of *Atrichomelina* demonstrate saprophagous habits when invading and consuming

dead mollusc bodies. Semi-terrestrial species such as some *Colobaea*, *Pteromicra* and many *Pherbellia* develop in Succineidae snails that live near water and connect with coastal vegetation. Terrestrial species of genera *Coremacera*, *Oidematops*, *Sciomyza*, *Trypetoptera*, *Dichetophora*, *Trypetoptera*, *Tetanura*, some *Pherbellia*, *Pteromicra* and *Euthycera* attack terrestrial pulmonate snail and/or slugs [20, 21, 22]. In particular, larvae of some species of *Tetanocera* and *Euthycera* develop in slugs [25]. Exposed eggs of molluscs are consumed by larvae of *Anticheta* spp. [23, 24].

Partial saprophagy of some snail-killing fly larvae has been discussed [26]. However, there are species whose I-instar larvae start feeding on dead tissue of the victim and then feed on living organs as predators or parasitoids. On the other hand, larvae of some species consume living tissue of their prey until the III-instar, and then finish their development feeding on tissues of already-dead snails. [1].

In general, species of the tribe Sciomyzini are more often parasitoids of terrestrial snails. Puparia of terrestrial and semi-terrestrial Sciomyzini usually stay inside their shells or in shoreline debris, near water or even in water. Aquatic predators prevail in Tetanocerini, but some of them are parasitoids or predators of terrestrial snails or slugs [1].

Fauna, morphology and some elements of ecology of snail-killing flies in Russia's Middle Don Region and Central Black Soil Region have been studied during the last 15 years [27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39]. These results can now be updated with the new data presented here.

MATERIAL AND METHODS

Imago of snail-killing flies have been collected in their typical environment using standard entomological nets. Dry material from collections of several authors was also analyzed, and additional material was bred from the hosts (Tabl.). Numbers representing fly collection sites (Fig) correspond to the following areas and locations: 1. Voronezh Oblast: Voronezh-city (1.1), Novovoronezh (1.2), regions: Anninsky (1.3), Bobrovsky (1.4), Bogucharsky (1.5), Borisoglebsky (1.6), Gribovsky (1.7), Kantemirovsky (1.8), Nizhnedevitsky (1.9), Novousmansky (1.10), Liskinsky (1.11), Novohopersky (1.12), Olhovatsky (1.13), Pavlovsky (1.14), Paninsky (1.15), Podgorensky (1.16), Rossoshansky (1.17), Semiluksky (1.18), Khoholsky (1.19), Ertilsky (1.20); 2. Belgorod Oblast: regions: Alekseevsky (2.1), Belgorodsky (2.2), Valuysky

(2.3), Grayvoronsky (2.4), Krasnogvardeysky (2.5), Novooskolsky (2.6), Prokhorovsky (2.7), Rakityansky (2.8), Rovensky (2.9), Shebekinsky (2.10); 3. Kursk Oblast: regions: Glushkovsky (3.1), Gorshechny (3.2), Kostorinsky (3.3), Kursky (3.4), Sovetsky (3.5), Solntsevsky (3.6), Timsky (3.7), Schigrovsky (3.8); 4. Lipetsk Oblast: regions: Gryazinsky (4.1), Eletsy (4.2), Zadonsky (4.3), Izmalkovskiy (4.4), Krasnovskiy (4.5), Lebedyansky (4.6), Terboonsky (4.7), Khlevensky (4.8), Chapliginsky (4.9); 5. Tambov Oblast: Zherdevsky (5.1), Znamensky (5.2), Kirsanovskiy (5.3), Michurinsky (5.4), Mordovskiy (5.5), Morshansky (5.6), Rasskazovskiy (5.7), Tambovskiy (5.8) (fig. 1).



Fig. 1. Fly collection sites.

RESULTS AND DISCUSSION

In the territory of the Middle Don Region, include the Central Black Soil Region, 39 species of Sciomyzidae have been previously observed. This research identifies 15 new species for the region.

Subfamily Sciomyzinae

Tribe Sciomyzini

Colobaea Ztt., 1837

Colobaea bifasciella (Fallen, 1820)

Univoltine species. Imago occur in June near shallow ponds and temporary water with slow stream. Puparia winter inside the host shell. Larvae are parasitoids of nonoperculate snails near water surface (*Lymnaeidae*: *Lymnaea stagnalis* (L., 1758), *Stagnicola palustris* (Muller, 1774)).

Distribution: 1.1, 1.2, 1.9, 1.10 [27], 1.6, 1.7, 1.9, 1.12; 2.1, 2.3, 2.10; 3.1, 3.4, 3.7; 4.2, 4.3, 4.6, 4.7; 5.1, 5.7. 26 ♀♀, 18 ♂♂.

Colobaea distincta (Meigen, 1830)

Univoltine species. Imago occur in June-July. Puparia overwinter in host shells. Larvae are parasitoids of nonoperculate snails living near water surface (*L. stagnalis*, *Galba truncatula* (Muller, 1774), *Peregrina peregra* (Muller, 1774)).

Distribution: 1.10 [30], 1.7, 1.11, 1.12, 1.14, 1.17, 1.19, 1.20; 2.1, 2.7, 2.8, 2.9; 3.2, 3.4; 3.6, 3.7, 3.8; 4.1, 4.2, 4.3, 4.5; 5.1, 5.2, 5.4, 5.8. 22 ♀♀, 17 ♂♂.

Colobaea pectoralis (Zetterstadt, 1847)

Univoltine species. Imago occur in June-July near shallow and slow ponds, ditches and marshes. Puparia overwinter inside prey shells. Larvae are predators of nonoperculate snails living near water surface or with bodies exposed on moist surfaces. This species is observed for the first time in the Region.

Distribution: 1.20; 2.5, 2.10; 3.2, 3.3; 4.3. 16 ♀♀, 9 ♂♂.

Colobaea punctata (Lundbeck 1923)

Univoltine species. Imago occur in June usually near shore edges of shallow seasonal water, swamplands and lakes with abundant aquatic vegetation. Puparia overwinter inside prey shells. Larvae are predators of nonoperculate snails living near water surface (*G. truncatula*).

Distribution: 1.1, 1.2, 1.9, 1.10, 1.18 [29, 35, 39], 1.8, 1.15, 1.17; 2.2, 2.5, 2.9; 3.4, 3.6; 4.1, 4.2, 4.3, 4.4, 4.9; 5.1, 5.2, 5.4, 5.6, 5.7. 27 ♀♀, 25 ♂♂

Ditaeniella Sack, 1939

Ditaeniella griseocens (Meigen 1830)

Univoltine species. Imago occur in June usually near a shore edges of shallow seasonal waters, swamps and marshes. Puparia overwinter outside prey shells. Larvae are predators of nonoperculate snails living near water surface. This species is observed for the first time in the Region.

Distribution: 1.5, 1.8; 2.1, 2.2, 2.7; 3.1, 3.2; 4.3, 4.8; 5.8. 14 ♀♀, 22 ♂♂.

Pherbellia R.-D., 1830

Pherbellia albocostata (Fall., 1820)

Univoltine species. Imago occur in August usually at river shores. Puparia are in the debris near prey shells. Larvae are predators of Succineidae.

Distribution: 1.9, 1.10, 1.16 [29], 1.19, 1.20; 2.1, 2.3, 2.5, 2.9, 2.10; 3.1, 3.2, 3.6, 3.7; 4.1, 4.2, 4.3, 4.4, 4.7, 4.9; 5.1, 5.3, 5.6. 42 ♀♀, 36 ♂♂.

Pherbellia schoenherri (Fall., 1826)

Multivoltine species. Imago occur in June and August-September. Puparia are overwintering. Larvae are parasitoids of Succineidae. This species is observed for the first time in the Region.

Distribution: 1.6, 1.11; 3.3; 4.3, 4.7; 5.4. 6 ♀♀, 3 ♂♂.

Pherbellia argyra Verbeke 1967

Univoltine species. Imago occur in July usually near shoreline of shallow ponds, such as marshes, ditches, swamps and logged ponds. Puparia are overwintering, often outside of host shells. Larvae are

parasitoids of nonoperculate snails living near water surface (*Planorbis planorbis*).

Distribution: 1.4, 1.10, 1.15, 1.16 [29], 1.5; 2.2, 2.4, 2.9, 2.10; 3.2, 3.3, 3.4, 3.8; 4.1, 4.2, 4.3, 4.5, 4.6, 4.9; 5.1, 5.2, 5.5. 40 ♀♀, 34 ♂♂.

Pherbellia cinerella (Fallen, 1820)

Multivoltine species. Imago occur in June-beginning of July and in August-beginning of September usually at the shoreline of coastal vegetation. Puparia are overwintering; in the Southern parts of Voronezh Oblast, imago are overwintering. Larvae are predators of Succineidae.

Distribution: 1.1, 1.2, 1.4, 1.9, 1.10 [27, 29], 1.8, 1.14, 1.18; 2.1, 2.3, 2.6, 2.9, 2.10; 3.3, 3.4; 4.1, 4.2, 4.3, 4.4, 4.8; 5.3, 5.7. 18 ♀♀, 17 ♂♂.

Pherbellia dorsata (Zetterstadt, 1846)

Univoltine species. Imago occur in August usually near logged water. Puparia overwinter inside prey shells. Larvae are predators of nonoperculate snails living near the water surface (*Planorbis*, *Lymnea*). This species is observed for the first time in the Region.

Distribution: 1.11. 3 ♀♀, 3 ♂♂.

Pherbellia dubia (Fallen, 1820)

Univoltine species. Imago occur in July near shore vegetation. Puparia overwinter inside host shells. Larvae are parasitoids of terrestrial and semi-terrestrial snails (Succineidae, Zonitidae).

Distribution: 1.1., 1.9, 1.10 [27, 29], 1.3, 1.7, 1.11, 1.14, 1.17, 1.19, 1.20; 2.1, 2.2, 2.3, 2.6, 2.7, 2.9; 3.1, 3.2, 3.3, 3.8; 4.1, 4.2, 4.3, 4.4, 4.6, 4.7, 4.8, 4.9; 5.3, 5.4, 5.8. 29 ♀♀, 31 ♂♂.

Pherbellia griseola (Fallen, 1820)

Univoltine species. Imago occur in July near the shoreline. Puparia overwinter inside prey shells. Larvae are predators of the snails at coastal line. This species is observed for the first time in the Region.

Distribution: 1.3, 1.4; 2.2; 3.2, 3.3; 4.3. 5 ♀♀, 7 ♂♂.

Pherbellia nana (Fallen, 1820)

Multivoltine species. Imago occur in June-September near shallow water with dense vegetation, seasonal puddles and ditches. Puparia overwinter inside prey shells. Larvae are predators of nonoperculate snails near water surface. This species is observed for the first time in the Region.

Distribution: 1.11; 5.1, 5.2. 2 ♀♀, 3 ♂♂.

Pherbellia obtusa (Fallen, 1820)

Univoltine species. Imago occur in July. Puparia overwinter inside prey shells. Larvae are parasitoids/predators of nonoperculate snails near water surface.

Distribution: 1.10 [30].

Pherbellia pilosa (Hendel, 1902)

Imago occur in July. Puparia overwinter inside prey shells. Larvae are predators of nonoperculate snails near water surface.

Distribution: 1.10 [30].

Pherbellia scutellaris (Roser, 1846)

Larvae are parasitoids of *Clausilia*. This species is observed for the first time in the Region.

Distribution: 1.6, 1.7, 1.11; 4.2, 4.3; 5.1, 5.5. 11 ♀♀, 14 ♂♂.

Pteromicra Lioy, 1864*Pteromicra glabricula* (Fallen, 1820)

Univoltine species. Imago occur in May-beginning of June near shores of swamps, marshes and small rivers with aquatic vegetation. Larvae are predators of nonoperculate snails.

Distribution: 1.4, 1.5, 1.9, 1.10 [29; 30], 1.3, 1.18; 4.2, 4.3, 4.6; 5.1, 5.2, 5.5. 24 ♀♀, 26 ♂♂.

Pteromicra angustipennis (Staeger, 1845)

Univoltine species. Imago occur in June near logged lakes, ponds and swamps. Puparia are outside of host shells. Larvae are predators of nonoperculate snails.

Distribution: 1.5, 1.10, 1.11, 1.17 [29, 31], 1.3, 1.4; 2.1, 2.3, 2.4, 2.8, 2.9, 3.3, 3.5, 3.7; 4.1, 4.2, 4.3, 4.5, 4.8, 4.9; 5.2, 5.3. 31 ♀♀, 22 ♂♂.

Pteromicra leucopeza (Meigen, 1838)

Univoltine species (?). Imago occur in June-July near logged rivers, lakes and marshes. Larvae are predators of nonoperculate snails.

Distribution: 1.10 [30].

Pteromicra oldenbergi (Hendel, 1902)

Imago occur in July near logged rivers, lakes and marshes. Larvae are predators of nonoperculate snails.

Distribution: 1.10 [30].

Sciomyza Fll., 182021. *Sciomyza simplex* (Fallen, 1820)

Multivoltine species. Imago occur in July-August near logged ponds. Puparia are outside of host shells. Larvae are parasitoids of Succineidae.

Distribution: 1.10 [30], 1.4, 1.12, 1.3, 1.18 [31], 1.8, 1.11, 1.14; 2.1, 2.2, 2.3, 2.5, 2.9, 2.10; 3.1, 3.2, 3.3, 3.4, 3.6; 4.1, 4.2, 4.3, 4.4, 4.9; 5.2, 5.6, 5.7, 5.8. 46 ♀♀, 38 ♂♂.

Sciomyza lucida (Hendel, 1902)

Multivoltine species. Imago occur in June-July near logged water. Puparia are outside of host shells. Larvae are parasitoids of *Stagnicola*.

Distribution: 1.10 [30].

Sciomyza testacea Macquart, 1835

Multivoltine species. Imago occur in June-July

near logged water. Puparia are outside of host shells. Larvae are parasitoids of Succineidae [13].

Distribution: 1.1, 1.2, 1.4, 1.10 [29], 1.3, 1.6, 1.7, 1.11, 1.18; 2.1, 2.3, 2.8, 2.9, 2.10, 3.6, 3.7; 4.2, 4.3, 4.8; 5.1, 5.2, 5.6. 28 ♀♀, 30 ♂♂.

Tetanura Fll., 1820*Tetanura pallidiventris* (Fallen, 1820)

Multivoltine species. Imago occur in June-August in bushy stations and edges of woods. Puparia are outside of host shells. Larvae are parasitoids of terrestrial snails [40].

Distribution: 1.1, 1.2, 1.4, 1.10 [29], 1.3, 1.6, 1.7, 1.9, 1.11, 1.12; 2.6, 2.7, 2.10; 3.3, 3.6; 4.1, 4.3, 4.6, 4.7; 5.7. 24 ♀♀, 28 ♂♂.

Tribe Tetanocerini*Anticheta* Haliday, 1838*Anticheta analis* (Meigen, 1830)

Univoltine species. Imago occur in June-beginning of July near shallow water. Puparia overwinter inside prey shells. Larvae are predators of exposed snail eggs.

Distribution: 1.1, 1.2, 1.4, 1.10, 1.14 [29], 1.16, 1.17, 1.19, 1.20; 2.1, 2.3, 2.8, 2.9, 2.10; 3.2, 3.5, 3.8; 4.1, 4.2, 4.3, 4.8; 5.4, 5.5, 5.8. 42 ♀♀, 38 ♂♂.

Anticheta brevipennis (Zetterstadt, 1846)

Univoltine species. Imago occur in June-July usually in moist areas with grass vegetation not far from water. Puparia are overwintering. Larvae are predators of eggs of Lymnaeidae and Succineidae.

Distribution: 1.4 [29], 1.3; 2.2; 3.4; 5.1. 9 ♀♀, 5 ♂♂.

Anticheta atriseta (Loew 1849)

Univoltine species. Imago occur in June near shallow water. Puparia are overwintering. Larvae are predators of eggs of snails. This species is observed for the first time in the Region.

Distribution: 1.3, 1.4, 1.7, 1.11; 2.1, 2.3, 2.6, 2.7; 3.3; 4.2, 4.3. 22 ♀♀, 22 ♂♂.

Coremacera Rd., 1856*Coremacera marginata* (Fabricius, 1775)

Univoltine species. Imago occur in May-July usually in relatively dry open conditions at the meadows and the edges of woods. Puparia are overwintering. Larvae are predators of terrestrial snails.

Distribution: 1.10 [30], 1.16 [31], 1.5, 1.8, 1.14, 1.17; 2.3, 2.8, 2.9; 3.6; 4.1, 4.2, 4.3, 4.9; 5.2, 5.8. 33 ♀♀, 28 ♂♂.

Coremacera catenata (Loew 1847)

Univoltine species. Imago occur in May-July usually in relatively dry open conditions at the meadows and the edges of woods. Puparia are overwintering. Larvae are predators of terrestrial snails [22].

This species is observed for the first time in the Region.

Distribution: 1.7, 1.11; 2.3; 4.3. 4 ♀♀, 2 ♂♂.

Dichetophora Rd., 1868

Dichetophora finlandica Verbeke, 1964

Univoltine species. Imago occur in June usually in relatively dry open conditions in meadows and the edges of woods. Puparia are overwintering. Larvae are predators/parasitoids of terrestrial snails.

Distribution: 1.10 [30].

Dictya Mg., 1803

Dictya umbratum (Linnaeus, 1758)

Multivoltine species. Imago occur in April-May and August near shorelines of shallow and slow rivers, marshes and swamps. Puparia are overwintering. Larvae are predators of nonoperculate molluscs living near water surface or nonoperculate and operculate submerged snails [41].

Distribution: 1.4, 1.10 [29], 1.9, 1.20; 2.3, 2.9; 3.7; 4.2, 4.3, 4.5, 4.6; 5.1. 17 ♀♀, 16 ♂♂.

Elgiva Mg., 1838

Elgiva cucularia (Linnaeus, 1767)

Multivoltine species. Imago occur in May-June and October at shorelines of logged ponds and marshes. Puparia are overwintering; in the Southern parts of Voronezh Oblast imago are overwintering. Larvae are aquatic predators of nonoperculate snails living near water surface – Limneidae [14].

Distribution: Воронежская обл.: 1.10 [28; 30], 1.3, 1.4, 1.8, 1.16, 1.19; 2.2, 2.3, 2.8, 2.9; 3.8; 4.1, 4.2, 4.3, 4.4, 4.9; 5.2, 5.3. 41 ♀♀, 38 ♂♂.

Elgiva sollicita (Harris, 1780)

Multivoltine species. Imago occur in May-June and August. Puparia are overwintering; in the Southern parts of Voronezh Oblast imago are overwintering. Larvae are aquatic predators of nonoperculate snails living near water surface.

Distribution: 1.4, 1.6, 1.10, 1.11, 1.18 [29], 1.7, 1.8, 1.17, 1.20; 2.1, 2.2, 2.10; 3.5, 3.6, 3.7; 4.2, 4.3, 4.9. 36 ♀♀, 47 ♂♂.

Elgiva divisa Loew, 1845

Multivoltine species. Imago occur in May-June and July-August at shorelines of logged ponds and marshes. Puparia are overwintering; in the Southern parts of Voronezh Oblast imago are overwintering. Larvae are aquatic predators of nonoperculate snails living near water surface.

Distribution: 1.6 [31], 1.12, 1.19; 2.9, 3.1; 4.3, 4.4; 5.8. 11 ♀♀, 12 ♂♂.

Euthycera Latr., 1829

Euthycera chaerophylli (Fabricius, 1798)

Univoltine species. Imago occur in June-July usually at the meadows, wet woods. Puparia are overwintering. Larvae are endoparasitoids of slugs.

Distribution: 1.10 [30].

Euthycera stictica (Fabricius, 1805)

Univoltine species. Imago occur in June-July usually at the meadows, wet woods. Puparia are overwintering. Larvae are probably parasitoids of slugs. This species is observed for the first time in the Region.

Distribution: 1.5, 1.8. ♂♂.

Hydromya R.-D., 1830

Hydromya dorsalis (Fabricius, 1775)

Multivoltine species. Imago occur in May and August-September. III-instar larvae are overwintering. Larvae are predators of nonoperculate snails living close to water surface. This species is observed for the first time in the Region.

Distribution: 1.7, 1.12; 2.2; 4.3. 7 ♀♀, 5 ♂♂.

Ilione Haliday et Curtis, 1837

Ilione lineata (Fallen, 1820)

Univoltine species. Imago occur in July-August near the shoreline. I-instar larvae are overwintering. Larvae are aquatic predators/parasitoids of fingernail clams (Sphaeriidae) [1].

Distribution: 1.10 [30].

Ilione albiseta (Scopoli, 1763)

Univoltine species. Imago occur in July near shorelines of shallow water, including seasonal ditches and ponds. III-instar larvae are overwintering. Aquatic predators of nonoperculate snails living near water surface [42].

Distribution: 1.10 [30].

Ilione rossica (Mayer 1953)

Univoltine species. Imago occur in July-August near shorelines of shallow water, including seasonal ditches and ponds. I-instar larvae are overwintering. Aquatic predators of nonoperculate snails living near water surface.

Distribution: 1.4, 1.5, 1.10, 1.18 [29], 1.3, 1.15, 1.16, 1.19; 2.1, 2.3, 2.4, 2.7, 2.9; 3.8; 4.1, 4.2, 4.3, 4.6, 4.8; 5.2, 5.4. 24 ♀♀, 19 ♂♂.

Limnia R.-D., 1830

Limnia paludicola Elberg 1965

Univoltine species. Imago occur in July-August in wet meadows. Larvae are predators of Succineidae and slugs. This species is observed for the first time in the Region.

Distribution: 1.12. 2 ♂♂.

Limnia unguicornis (Scopoli, 1763)

Univoltine species. Imago occur in July-August at river coasts with well-developed vegetation,

sometimes near swamps. Larvae are predators/parasitoids of Succineidae and slugs [43].

Distribution: 1.1, 1.4, 1.6, [29, 31], 1.10 [30], 1.12, 1.15, 1.16, 1.19, 1.20; 2.1, 2.2, 2.3, 2.4, 2.7, 2.8, 2.9, 2.10; 3.1, 3.2, 3.3, 3.7; 4.1, 4.2, 4.3, 4.6, 4.8; 5.2, 5.3, 5.7, 5.8. 46 ♀♀, 43 ♂♂.

Pherbina R.-D., 1830

Pherbina coryleti (Scopoli, 1763)

Univoltine species. Imago occur in May-June near shallow water. III-instar larvae are overwintering. Larvae are aquatic predators of nonoperculate snails near water surface.

Distribution: 1,9,1.10 [29, 30], 1.16, 1.17, 1.19, 1.20; 2.2, 2.6, 2.7, 2.8; 3.2, 3.4, 3.8; 4.1, 4.2, 4.3, 4.9; 5.6, 5.7. 21 ♀♀, 18 ♂♂.

Pherbina intermedia Verbeke, 1848

Univoltine species. Imago occur in July near shallow water. III-instar larvae are overwintering. Larvae are aquatic predators of nonoperculate snails near water surface.

Distribution: 1.10 [30].

Psacadina Enderlein, 1939

Psacadina vittigera (Schiner, 1864)

Univoltine species. Imago occur in June-September near shallow water. III-instar larvae are overwintering. Larvae are aquatic and semi-terrestrial predators of nonoperculate snails near water surface. This species is observed for the first time in the Region.

Distribution: 1.12. 1 ♂.

Psacadina verbekei Rozkosny 1975

Univoltine species. Imago occur in April-August near shallow water. III-instar larvae are overwintering. Larvae are aquatic and semi-terrestrial predators of nonoperculate snails near water surface. This species is observed for the first time in the Region.

Distribution: 1.7. 2 ♂♂.

Psacadina zernyi (Mayer, 1953)

Univoltine species. Imago occur in May-September near shallow water. Larvae are aquatic and semi-terrestrial predators of nonoperculate snails near water surface. This species is observed for the first time in the Region.

Distribution: 1.6, 1.6, 1.12. ♂♂.

Renocera Hendel, 1900

Renocera pallida (Fallen, 1820)

Univoltine species. Imago occur in June-August near the shoreline. Puparia are overwintering. Larvae are aquatic predators/parasitoids of fingernail clams (Sphaeriidae) [5, 6, 7].

Distribution: 1.10 [30].

Sepedon Latr., 1804

Sepedon spinipes (Scopoli, 1763)

Multivoltine species. Imago occur in May-September near shallow water. Puparia are overwintering; in the Southern parts of Voronezh Oblast imago are overwintering. Larvae are aquatic predators of nonoperculate snails and semi-terrestrial Succineidae.

Distribution: 1.10 [30]

Sepedon spegea (Fabricius, 1775)

Multivoltine species. Imago occur in May-September near shallow water. Puparia are overwintering; in the Southern parts of Voronezh Oblast imago are overwintering. Larvae are aquatic predators of nonoperculate snails near water surface and semi-terrestrial Succineidae.

Distribution: 1.1, 1.2, 1.4 [27, 29], 1.10 [29, 30], 1.12, 1.16, 1.19, 1.20; 2.1, 2.2, 2.3, 2.7, 2.8, 2.9, 2.10; 3.1, 3.2, 2.5, 3.8; 4.1, 4.2, 4.3, 4.6, 4.8; 5.1, 5.4, 5.5. 32 ♀♀, 27 ♂♂.

Tetanocera Dumeril, 1800

Tetanocera elata (Fabricius, 1781)

Multivoltine species. Imago occur in June-August usually at the edges of woods or wet meadows. Puparia are overwintering. Obligatory predators of slugs with some features of parasitoids.

Distribution: 1.1, 1.2, 1.4, 1.12, 1.18 [27, 29], 2.1, 2.2, 2.3, 2.4, 2.7; 3.3, 3.8; 4.2, 4.3, 4.6, 4.8; 5.1, 5.5, 5.7, 5.8. 34 ♀♀, 29 ♂♂.

Tetanocera ferruginea Fallen, 1820

Multivoltine species. Imago occur in May-July and September-October usually at the edges of woods or wet meadows. Puparia are overwintering. Larvae are aquatic predators of nonoperculate snails whose bodies are exposed on wet surfaces.

Distribution: 1.2, 1.4, 1.8 [31], 1.6, 1.7, 1.11; 2.2, 2.5; 3.3, 3.4; 4.1, 4.3, 4.6; 5.8. 22 ♀♀, 26 ♂♂.

Tetanocera robusta Loew, 1847

Multivoltine species. Imago occur in May-September usually at woods edges or wet meadows. Puparia are overwintering. Larvae are predators of slugs and snails *Zonitoides*, *Succinea*.

Distribution: 1.1, 1.2, 1.4, 1.6, 1.16 [27, 29], 1.12, 1.14, 1.17, 1.19, 1.20; 2.2, 2.3, 2.6, 2.7, 2.9; 3.1, 3.2, 3.6, 3.7; 4.1, 4.2, 4.3, 4.8; 5.3, 5.5, 5.7. 40 ♀♀, 35 ♂♂.

Trypoptera Hendel, 1900

Trypoptera punctulata Scopoli

Univoltine species. Imago occur in May-August usually in bushy stations or at the edges of woods. Puparia overwinter outside prey shells. Larvae are predators of terrestrial viviparous snails *Lauria cylindracea* [44] and sometimes aquatic and semi-aquatic predators of *Lymnea*, *Vertigo*, *Zonitoides*.

List of Sciomyzidae breeding

	Sciomyzid species	Host/prey species
1	<i>Colobaea bifasciella</i>	Lymnaeidae: <i>Lymnaea stagnalis</i> (L., 1758), <i>Stagnicola palustris</i> (Muller, 1774)
2	<i>Colobaea distincta</i>	Lymnaeidae: <i>L. stagnalis</i> , <i>Galba truncatula</i> (Muller, 1774), <i>Peregriana peregra</i> (Muller, 1774)
3	<i>Colobaea punctata</i>	Planorbidae: <i>Planorbis planorbis</i> [29], Limnaeidae: <i>G. truncatula</i>
4	<i>Pherbellia argyra</i>	Planorbidae: <i>Planorbis planorbis</i> (L., 1758); <i>Anisus septemgyratus</i> (Rossmassler, 1858); <i>Planorbis carinatus</i> (Muller, 1774)
5	<i>Pherbellia cinerella</i>	Succineidae: <i>Succinea oblonga</i> Drap., <i>Succinea putris</i> L.
6	<i>Pteromicra angustipennis</i>	Lymnaeidae: <i>Galba truncatula</i> ; Physidae: <i>Physa fontinalis</i> (L., 1758)
7	<i>Sciomyza testacea</i>	Succineidae: <i>Succinea putris</i>
8	<i>Tetanura pallidiventris</i>	Pupillidae: <i>Vertigo antivertigo</i> ; Zonitidae: <i>Zonitoides nitidus</i> Muller
9	<i>Coremacera marginata</i>	Zonitidae: <i>Zonitoides nitidus</i>
10	<i>Elgiva divisa</i>	Limnaeidae: <i>Limnaea stagnalis</i> [29, 35, 39]
11	<i>Euthycera chaerophylli</i>	Limacidae: <i>Agriolimax agrestis</i>
12	<i>Ilione albiseta</i>	Physidae: <i>Physa fontinalis</i>
13	<i>Limnia unguicornis</i>	Succineidae: <i>Succinea putris</i>
14	<i>Sepedon sphegea</i>	Lymnaeidae: <i>Peregriana peregra</i> ; <i>Stagnicola palustris</i>
15	<i>Tetanocera ferruginea</i>	Lymnaeidae: <i>Lymnaea stagnalis</i> ; <i>Galba truncatula</i>
16	<i>Tetanocera elata</i>	Limacidae: <i>Agriolimax agrestis</i> (L.); <i>A. reticulatus</i> (Muller)
17	<i>Tetanocera robusta</i>	Limacidae: <i>Limax</i> sp. [29, 35, 39]
18	<i>Trypetoptera punctulata</i>	Pupillidae: <i>Vertigo antivertigo</i> Drap.; Zonitidae: <i>Zonitoides nitidus</i>

Distribution: 1.1, 1.4, 1.6, 1.7, 1.10 [27, 29]; 1.10 [30], 1.5, 1.18, 1.19; 2.1, 2.2, 2.4, 2.5, 2.9; 3.1, 3.2, 3.6, 3.7; 4.3, 4.8, 4.9; 5.2, 5.3, 5.7. 38 ♀♀, 28 ♂♂.

CONCLUSION

Current fauna of snail-killing flies in the Central Black Soil Region of Russia comprise 54 species from 21 genera. Of these, 15 species were identified for the first time by this study.

Breeding data representing 14 Sciomyzidae host/prey species are reported for the first time. In total, 18 Sciomyzidae host/prey species are known for the Region.

The majority of species of Sciomyzidae in the region are predators at larval stage (42 species); some of them have features of parasitoids. 12 species are parasitoids at their larval stage. Some occurrences of saprophagy on dead molluscs were observed for larvae of *Ph. cinerella*, *C. pectoralis*, *C. punctata*, *D. grisescens*, *Pteromicra* spp., *S. simplex*, *Ph. cor-*

yleti, *L. paludicola*, some *Tetanocera*. Consumption of dead host/prey tissues is usually in addition to the main feeding on living mollusc organs.

The typical aquatic species in the region are *Ilione albiseta*, *Renocera pallida*, *Sepedon spinipes*, *S. sphegea* and *Tetanocera ferruginea*. Several species are semi-terrestrial, including *Pherbellia schoehnerri*, *Sciomyza testacea* and *Trypetoptera punctulata*. Terrestrial larvae are characteristic of *Euthycera chaerophylli*, *Coremacera marginata*, *Dichetophora*, *Tetanura pallidiventris*, *Trypetoptera punctulata*, *Pherbellia cinerella*, *Limnaea unguicornis* and *Tetanocera elata*.

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