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On expansion of the distribution range of some scoliid wasps (Scoliidae, Hymenoptera, Insecta) in the Middle Volga region.

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ABSTRACT

Five species of the family Scoliidae are currently observed in the Middle Volga region: *Colpa quinquecincta* (Fabricius, 1793), *Scolia hirta* (Schrank, 1781), *S. galbula* (Pallas, 1771), *S. sexmaculata* (O.F. Muller, 1766), and *Megascolia maculata* (Drury, 1773). The largest number of findings has been made since the 2000s, suggesting that the scoliid wasps recently appeared in the examined region. Many species form stable but still low-sized populations. The northern distribution boundaries within the Middle Volga region are determined for all species. Only one scoliid species, *S. hirta*, rather abundant in this region, is present in most diverse biotopes, including anthropogenically changed landscapes. Recently, scoliid wasps actively settle in anthropogenic landscapes, becoming ever more frequent near human habitation. The total abundance of the scoliid wasps in the Middle Volga region is rather low but displays the trend of an increase in some habitats.

Keywords: Scoliidae, distribution, fauna, Middle Volga region

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INTRODUCTION

During the last two decades, we notice ever increasing number of insect species that spread in all directions and expand their distribution ranges. For example, many hymenopterans in 2000–2010 stably appear and reproduce at a considerable distance from their main distribution ranges (Gusenleitner et al. 2007, Shcherbakov 2008, Mokrousov 2011, Mokrousov et al. 2013); moreover, some transit ways in spreading of flying insect groups have been detected (Tshernyshev 2010). The family Scoliidae belongs to the group of stinging hymenopterans. Its representatives are most diverse in the regions with warm and mostly arid climate, that is, mainly in the tropical and subtropical zones. Approximately 560 species and 220 subspecies of this family are found worldwide (Osten 2005). A specific feature of this hymenopteran group is a sophisticated instinct of parental care, which is implemented when female scoliids attack scarab beetle larvae in soil and deposit eggs there. Thus, these wasps are involved in the control of various scarab pests (Ganeshan 2001).

MATERIAL AND METHODS

During the last decade, we conduct entomological observations in the Middle Volga region. This is a rather vast area on the Volga Upland, comprising several administrative regions of Russia (Chuvash Republic, Mordovia, Tatarstan, as well as Nizhny Novgorod, Samara, Ulyanovsk, and Penza oblasts). The published sources for other regions were also used to obtain objective information about the species distributions. The Middle Volga region contains rather diverse geographical zones, from steppe to boreal zones. Many localities “wedge into” other zones, thereby contributing to high diversity of biotopes and, as a consequence, considerable biological diversity.

RESULTS

Colpa (Heterelis) quinquecincta (Fabricius, 1793)

This species was for the first time collected in 2008–2009 in the Penza oblast (Serdobsk, Kondol', and Kuznetsk raions). These are the northernmost findings for this species: the northern point of its distribution range is 53°7.10' N, 46°35.07' E (Shibaev 2010). Before these observations, the species was recorded in the north direction only to the Lower Volga region (Mil'ko & Kazenas 2005) and once in the Belgorod oblast (Prisnyi et al. 2013).

Scolia (Discolia) hirta (Schrank, 1781)

In the Samara oblast, this species has been recorded in the Zhiguli Mountains, Togliatti and its neighborhood, as well as Stavropol'skii, Bor, Volzhskii, and Syzran' raions (The Red List of the Samara oblast 2009). This species is rather abundant in many southern raions of the Ulyanovsk oblast versus its northern part, where only solitary findings have been recorded (Kharisov 2000, The Red List of the Ulyanovsk oblast 2008). In the Penza oblast, this species has been mainly observed in the southeastern part with solitary cases in the west of the area (Polumordvinov 2004, The Red List of the Penza oblast 2005). Solitary findings of this species in 2008–2009 have been reported for the southern part of the Republic of Mordovia (Mordovian Nature Reserve) (Ruchin et al., 2009; Ruchin, Kurmaeva, 2010). Several findings are known for the Nizhny Novgorod oblast; so far, the northernmost point is in the settlement of Rustai, Bor raion (56°30.10' N, 44°48.88' E); this species was also observed in the Tatarstan (Mokrousov & Zryanin 2010).

In the Ryazan oblast, this species is present in individual localities and has been recorded in the Spas-Klepiki, Kasimov, Rybnoe, and Ryazan raions. The main findings were recorded in 2000–2010 (Anan'eva & Kochetkov 2002, The Red List of the Ryazan oblast 2011). As for the more southern regions, for example, Saratov oblast, this species is recorded in the Saratov raion (neighborhood of the city of Saratov), Khvalynsk, Krasnopartizanskii, Balakovo, Dukhovnitskoe, and Rovnoe raions (The Red List of the Saratov oblast 2006). This species is observed in dry steppe valleys, stepped sites, at the forest margins and openings, ravine slopes exposed to south, and roadsides. Adult scoliids are typical anthophiles feeding on pollen and nectar of composites, umbellate, etc. Thus, this species appeared in the Middle Volga region rather long ago, in the 1980s (Polumordvinov 2004). However, the findings 30 years ago were solitary and could suggest accidental visits of adult individuals, while the number of recorded cases in the 2000s considerably increased. The

abundance of this species at the sites of findings also considerably elevated. Tens of individuals of this species are observable according to the data from the Samara oblast (Kuzovenko et al. 2015).

***Scolia (Scolia) galbula* (Pallas, 1771) (=dejeani Vander Linden, 1829)**

As was earlier believed, this species did not spread to the north of the Voronezh oblast (Mil'ko & Kazenas 2005). However, other data demonstrate that it is present in the Volga region. In particular, this species was once recorded in the Penza oblast (Nicol'sk raion) in 1976 (Polumordvinov 2004). Thus, it is rather rarely met in the Middle Volga region and more frequently occurs in more southern regions (Volgograd, Belgorod, Astrakhan, and Rostov oblasts). For example, this species has been observed in the Voronezh oblast in the Kantemirovka raion and neighborhood of the city (The Red List of the Voronezh oblast 2011). This is prevalently a steppe species, spread from the Balkan Peninsula in the west to Altai in the east as well as extends to the forest–steppe and Transcaucasia. In the south of its distribution range, it penetrates into the arid regions of Western Kazakhstan (Mil'ko & Kazenas 2005). This species is low abundant over the entire distribution range and is observed on the flowers of various plants (globe thistle, thyme, veronica, etc.).

***Scolia (Scolia) sexmaculata* (O.F. Muller, 1766) (=quadripunctata Fabricius, 1775)**

According to Osten (2005), this is rather widespread scoliid species, observable in the steppe and forest–steppe zones from Portugal in the west to Khakassia in the east and from Poland and Tomsk in the north to Transcaucasia, Iran, and Egypt. In the Middle Volga region, this species is known to expand northward to 56°6.34' N (Vetchak village, Kstovo raion, Nizhny Novgorod oblast, 2007; Mokrousov 2007) and has been also observed in this region in more southern localities. In the Samara oblast, this species has been recorded in the Zhiguli Mountains (Stavropol'skii raion) as well as the Volzhskii and Sergievsk raions (The Red List of the Samara oblast 2009). One individual of this species was found in 1998 in the Ulyanovsk oblast (Nikolaevka raion) in a sandy steppe area (Kharisov 2000). Solitary individuals of this species were recorded in the mid-1990s in the south and southeast of Tatarstan (Nurlat, Cheremshan, and Bavly raions). This is the northern boundary of the distribution range for this species; no new cases have been reported since that time (The Red List of the Republic of Tatarstan 2006). In the Voronezh oblast, we found one individual in 2012 on a roadside in the Novokhopersk raion (Khooper Nature Reserve). The abundance of this species in all examined localities in the listed regions is rather low. Its habitats are located in well warmed south-exposed steppefied or steppe areas.

***Megascolia (Regiscolia) maculata* (Drury, 1773)**

This species is very rarely met in the Samara oblast; it has been recorded in the Samarskaya Luka national park as well as in the Stavropol'skii, Bol'shaya Chernigovka, and Khvorostyanka raions (The Red List of the Samara oblast 2009, Kuzovenko et al. 2015). In the Ulyanovsk oblast, it has been recorded in the Radishchevo raion; the first findings date back to the late 1990s; later this species has been regularly observed near the village of Vyazovka (Kharisov 2001). The findings of this species in the Penza oblast are also very rare; only four localities have been recorded in its southern part, namely, in the Kamenka, Gorodishche, Tamala, and Serdobsk raions (The Red List of the Penza oblast 2005). In the Saratov oblast, this species has been recorded in the Lysye Gory, Krasnoarmeisk, Saratov, Krasnopartizanskii, Rovnoe, and Krasnyi Kut raions (The Red List of the Saratov oblast 2006). Two cases have been recorded in the Nizhny Novgorod oblast in 2005 and 2010 in its southern part, the Arzamas raion (Mokrousov 2008, Shustov 2010). Currently, this is likely to be the northernmost site of this species (55°40.60' N, 43°34.31' E). One habitat has been found in the Vladimir oblast (Mukhanov 2005).

According to the descriptions of the findings (The Red List of the Saratov oblast 2006, Prisnyi & Snegin 2008, Shustov 2010, Tsurikov 2013, The Red List of the Rostov oblast 2014), this species prefer the habitats in the vicinity of animal breeding plants, farms, wood processing facilities (saw mills), compost and manure piles, sawmill, and wood refuse, being the habitats and reproduction sites for the host of scoliid larvae, the rhinoceros beetle *Oryctes nasicornis* (Linnaeus, 1758) Thus, *M. maculata* becomes ever more abundant near human habitations, where the living conditions for the rhinoceros beetle are favorable (Dechambre & Lachaume 2001). As for the natural habitats, this species prefer thin forest–steppe and steppe biotopes with shrubs and forbs, ravines, dry valleys, steppefied sites, and pine stand edges.

CONCLUSIONS

Thus, five species of the family Scoliidae are currently observed in the Middle Volga region. Most cases have been recorded since the 2000s, suggesting that the scoliid wasps are newcomers to the examined region. Note that several species are observed in the same habitats and form stable populations still small in their size. The northern distribution boundaries within the Middle Volga region have been determined for all species.

A large part of the scoliid wasps “advance” from their main distribution range to the north and northeast. Presumably, the described species advance in the northern direction via steppefied areas, present in many regions. In this process, the sand deposits along river banks, certain anthropogenically transformed landscapes, fallow lands, ravines, and south-exposed slopes can serve as the transit routes, representing continuum of similar landscapes spanning different geographical regions and enhancing formation of similar ecological niches. In particular, the scarab beetles (genera *Melolontha*, *Polyphylla*, *Protaetia*, *Cetonia*, *Oryctes*, *Epicometis*, *Anisoplia*, *Anomala*, etc.), the larvae of which is utilized by scoliids, inhabit such landscapes, and wasps can easily find them. This fits well the general distribution scheme for southern species (Tshernyshev 2010), which move from deserts to arid steppes and further to the forest–steppe zone in stably hot and dry years to occupy there the biotopes of arid type. The fact that the following Scoliidae species have been found in the middle part of the Russian Plain confirms the continuum of the above listed similar landscapes, namely,

- sand deposits; *S. sexmaculata* and *S. hirta* (Prisnyi & Snegin 2008);
- anthropogenically transformed landscapes, including city parks, public gardens, summer cottage plots, and farms; *S. hirta*, *S. sexmaculata*, and *M. maculata* (Polumordvinov 2004, Prisnyi & Snegin 2008, The Red List of the Voronezh oblast 2011, Tsurikov 2013, The Red List of the Rostov oblast 2014, Kuzovenko et al. 2015, Trushev & Volodchenko 2015);
- fallow lands and dry meadows; *S. hirta* (Anan’eva & Kochetkov 2002, The Red List of the Rostov oblast 2014);
- ravines and dry valleys; *C. quinquecincta*, *S. hirta*, *S. galbula*, and *M. maculata* (Shibaev 2010, The Red List of the Voronezh oblast 2011, The Red List of the Rostov oblast 2014);
- south-exposed slopes *C. quinquecincta*, *S. hirta*, and *S. galbula* (Shibaev 2010, The Red List of the Rostov oblast 2014);
- steppefied areas; *S. hirta*, *S. sexmaculata*, and *M. maculata* (Kharisov 2000, 2001, Prisnyi & Snegin 2008, Ruchin et al. 2009, Tsurikov 2013, The Red List of the Rostov oblast 2014); and
- margins of dry pine stands and mixed forests, openings, cuttings, and forest roads; *S. hirta*, *S. sexmaculata*, and *M. maculata* (Kharisov 2000, Polumordvinov 2004, Ruchin et al. 2009, Artem’eva et al. 2010, The Red List of the Rostov oblast 2014, Kuzovenko et al. 2015, Trushev & Volodchenko 2015).

As is evident from the description, only one species, *S. hirta*, rather widespread in the Middle Volga region, is present in all listed biotopes. It is likely that this species can parasitize more host beetle species inhabiting most diverse sites. Scoliid wasps start to actively utilize anthropogenic landscapes; the number of records in the vicinity of human settlements for this family increases every year. In general, the abundance of these five scoliid species in the Middle Volga region cannot be regarded as high. It is still at a low level but in some cases display the trend of an increase.

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