

RARE SPECIES OF ORTHOPTERA (INSECTA) FROM THE REPUBLIC OF MOLDOVA

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Abstract. In the article it is discussed the Orthoptera conservation in the Republic of Moldova, especially those from subfamily Saginae – *Saga pedo* (PALLAS, 1771) and Tettigoniinae – *Gampsocleis glabra* (HERBST, 1786) and *Onconotus servillei* (FISCHER VON WALDHEIM, 1846). The *Saga pedo* is considered one of the largest insect of Europe. Its exclusive carnivorous diet and parthenogenetic reproduction makes it an exceptional orthopteran. In 2005-2010, the authors found *Saga pedo*, *Gampsocleis glabra* and *Onconotus servillei* only in two localities: village Slobozia-Dushca and “Bugeac” Natural Reserve. These species are vulnerable not just for the Republic of Moldova but for Europe too (all are included in different Red Lists as an endangered or critically endangered species). Also, there are data concerning habitat choice, accompanying species, abundance and phenology of these grasshoppers.

Keywords: Republic of Moldavia, Saginae, Tettigoniinae, Red List, endangered.

Rezumat. Specii rare de ortoptere (Insecta) din Republica Moldova. În lucrare este discutată conservarea ortopterelor (Orthoptera) în Republica Moldova, în special a celor din subfamiliile Saginae – *Saga pedo* (PALLAS, 1771) și Tettigoniinae – *Gampsocleis glabra* (HERBST, 1786) și *Onconotus servillei* (FISCHER VON WALDHEIM, 1846). Specia *Saga pedo* este considerată una dintre cele mai mari insecte din Europa. Specie exclusiv carnivoră și cu reproducere partenogenetică, face ca acest orthopteran să fie excepțional. Pe parcursul anilor 2005-2010 speciile au fost semnalate doar în două localități: comuna Slobozia-Dușca și Rezervația Naturală „Bugeac”. Speciile citate sunt rare nu numai în Republica Moldova, ci și în Europa (toate fiind incluse în diferite Liste Roșii, având statut pe cale de dispariție sau critic periclitată). De asemenea, lucrarea include date privind particularitățile bio-ecologice ale speciilor.

Cuvinte cheie: Republica Moldova, Saginae, Tettigoniinae, Listă Roșie, dispariție.

INTRODUCTION

All species and the communities that they compose are increasingly threatened by human disturbance, habitat loss and extirpation. Orthoptera are no exception. Around the world, at least four orthopteran species have already been lost (HOEKSTRA, 1998). The 1996 Red List of Threatened Animals (IUCN, 1996) includes 66 orthopteran species classified as critically endangered, endangered or vulnerable, while three more are considered to be conservation dependent. Species on this list are found in over 25 countries across Europe, Asia, Australia and North America. Additional species may be threatened in Africa and South America but we lack documentation of their status. Preservation of these and other Orthoptera will require effective conservation (HOEKSTRA, 1998).

MATERIAL AND METHODS

The investigations were done in different sectors of the Republic of Moldova, especially steppe sectors, from 2004 till 2008. Investigations were mainly made in summer months – June-August in the “Bugeac” Natural Reserve, which is a botanical reserve, situated in the south-east of our Republic between Bugeac and Cicur-Mingir villages, Cimishlia district. The species of Orthoptera order were not collected; they were investigated in the field only; we have also taken photos of this species. The identification of the species was made according to: KNECHTEL & POPOVICI-BÎZNOSEANU (1959), IORGU & IORGU (2008).

RESULTS AND DISCUSSIONS

Until now, in the Republic of Moldova, there was only one bush cricket, *Saga pedo*, included in the Red Book (2002). In the last several years, we discovered two new rare species, which are included in the European national Red List as an endangered or critically endangered species (ANDREEV et al., 2007; STAHI, 2008).

As a result of the investigations we have established that on the territory of the Republic of Moldova three species, which belong to Orthoptera order (Insecta), have statutes as an endangered or critically endangered species. Those species are from the subfamilies Saginae – *Saga pedo* (PALLAS, 1771), Tettigoniinae – *Gampsocleis glabra* (HERBST, 1786) and *Onconotus servillei* (FISCHER VON WALDHEIM, 1846).

Saga pedo is included in the Red Book of the Republic of Moldova; *Gampsocleis glabra* is a new species for the fauna of the republic; furthermore, in Europe, all the three species have the status of very rare and protected species by European laws (IUCN, 1996, 2006).

Onconotus servillei and *Gampsocleis glabra* were observed in the “Bugeac” Nature Reserve, but the specimens of this species were not collected. The authors had to collect the species *Saga pedo* and *Onconotus servillei* from the “Bugeac” Nature Reserve (ANDREEV et al., 2007; STAHI, 2009), but during the four years of our researches, only in the summer of 2008 we observed one of these two species – *Onconotus servillei*.

All three are xerophilous and praticolous species that prefer steppe vegetations, where the height of the herbal layer is higher than 30 cm and even more. In these biotopes, steppe vegetations prevail such as: *Poa angustifolia*, *Bromopsis inermis*, *Elytrigia repens*, *Eremopyrum triticeum*, *Festuca valesiaca*, *Stipa capillata*, *Taraxacum officinale*, and others; and shrubs *Thymus marschallianus*, *Crataegus curvisepala*, *Rosa spinosissima* and *Rosa pratensis*, etc. (POSTOLACHE, 1995).

The *Saga pedo* (Fig. 1), *Onconotus servillei* (Fig. 2), and *Gampsocleis glabra* (Fig. 3), can be met along with other typical grasshoppers for the steppe vegetation: *Phaneroptera falcata*, *Tettigonia viridissima*, *Platycleis vittata*, *P. tessellata*, *P. intremedia*, *Gryllus campestris*, *Melanogryllus desertus*, *Oecanthus pellucens*, *Calliptamus italicus*, *Oedaleus decorus*, *Oedipoda caerulea*, *Dociostaurus brevicollis*, *Stenobothrus lineatus*, *Omocestus viridulus*, *O. rufipes*, *O. haemorrhoidalis*, *O. minutus*, *Myrmeleotettix maculatus*, *Chorthippus brunneus*, *Ch. biguttulus*, *Ch. mollis*, *Ch. albomarginatus*, *Ch. loratus*, *Euchorthippus pulvinatus*, *E. declivius* and others.

Description, distribution, phenology, habitat and the way of life of the three species will be given below.

***Saga pedo* (PALLAS, 1771)**

Nomenclature: family Tettigoniidae KRAUSS, 1902; subfamily Saginae BRUNNER VON WATTENWYL, 1878 genus *Saga* CHARPENTIER, 1825.

Scientific synonyms: *Gryllus giganteus* VILLERS, 1789; *Gryllus pedo* PALLAS, 1771; *Locusta serrata* FABRICIUS, 1793; *Saga italica* COSTA, O.G. & A. COSTA, 1871; *Saga nudipes* FISCHER VON WALDHEIM, 1830; *Saga serrata* (FABRICIUS, 1793); *Saga vittata* FISCHER VON WALDHEIM, 1830.

Description: The body has a cylindrical form and is very long: it ranges between 50 and 70 mm and the ovipositor's length is about 35-40 mm. The adult female has an obtuse head and the antennae are threadlike and longer than the body. The body may be of green or brown with yellow lines situated on the lateral parts of the body that starts from the lateral borders of the pronotum and continues on the abdomen. The tibiae of the first and second pair of legs have two rows of 10-11 thorns for each row on the lower parts; these thorns are adapted for catching insects which they devour. The insect has the tympanum located on the fore tibia. The hind legs are not adapted for jumping and are endowed with two spurs on the inferior parts of tibiae. The previous and hind wings are much reduced, sometimes they are absent. Subgenital plate of the female is triangular with a small incision in the apex. The ovipositor is very long, straight and denticulate in the apical region.

In her work, OLMO-VIDAL (2007) described the male of *Saga pedo* that has a very short tegmen reduced to the stridulatory organs; in contrast, the females do not have tegmen.

Habitat: The steppe biotopes are specific for *Saga pedo*.

Life history, food and feeding: *Saga pedo* is an obligatory parthenogenetic species of Orthoptera and is therefore able to produce off spring without any fecundation. This is a tetraploid species and has 68 chromosomes. The females begin to lay eggs about 3-4 weeks after moulting of imagos, in late summer, especially in day-time. Eggs are planted deep in the soil by means of long sabre-like ovipositor. The females lay 7-8 eggs only. The larvae appear in spring and they have 8 stadia. Adults appear in July and can be observed till September.

Saga pedo is an obligatory parthenogenetic xerothermophilous and praticolous insect. This is a nocturne, predatory insect, which with its thorns of fore and middle pairs of legs catches and devours different insects of smaller size- Bush-crickets, grasshoppers, Mantids and others.

Distribution: this is a Central Asian – South-European species distributed from Portugal in the west, to Western Siberia in the east and Sicily in the south – its northern boundary runs across the Czech Republic and Slovakia (HELLER, 2004). So, it is present in more than 20 countries from Europe and Asia, such as: Armenia, Austria, Azerbaijan, Bulgaria, China, the Czech Republic, France, Georgia, Germany, Hungary, Italy, Kazakhstan, Kyrgyzstan, Romania, Russia, Serbia and Montenegro, Slovakia, Spain, Switzerland, Tajikistan, Turkmenistan, Ukraine and Uzbekistan (HELLER, 2004).

Range: in the Republic of Moldova *Saga pedo* was registered in the 20th century only. The first data on this species in our republic were published by MALICHENKOVA (1983), later, NECULISEANU et al. (1992) and since 1992, this species is included in the List of rare and endangered species of insects from the Republic of Moldova.

For a long period of time (fifteen years) this species was not found on the territory of the republic. In the summer of 2007 five females were found in the village Slobozia-Dushca, Criuleni district, from the central part of the republic. The females were observed on the terrain with steppe vegetation with more than 3 hectares (STAHl, 2008).

Status: the bush-cricket – *Saga pedo* is a very rare and vulnerable species which is included in Red Books of diverse countries and in 2006 IUCN Red List of Threatened Species (IUCN, 2006).

Key sites: *Saga pedo* was observed in village Slobozia-Dushca, Criuleni district.

***Onconotus servillei* (FISHER VON WALDHEIM, 1846)**

Nomenclature: family Tettigoniidae KRAUSS, 1902, subfamily Tettigoniinae KRAUSS, 1902.

Scientific synonyms: *Onconotus crassicaudus* IVANOV, 1888.

Life history/food and feeding: this is a phytophagous, geophilous and praticolous species;

Distribution: *Onconotus servillei* is a Central Asian-Pontic species present in Bulgaria, Hungary, Romania, Central Russia, East and South Russia, Ukraine, Yugoslavia inclusive Serbia, Kosovo, Vojvodina, Montenegro, Asiatic Turkey, Caucasian Russian Republics, Georgia, Armenia, Azerbaijan, Lebanon, Syria, Israel, Jordan, Sinai Peninsula (Egypt), Arabian Peninsula, Iran, Iraq (HELLER, 2004).

Status: In Romania it is a very rare species and is protected (IORGU & IORGU, 2008). Furthermore, this species is included in IUCN Red List of Threatened Animals (IUCN, 1996, 2006).

Conservation: the *Onconotus servillei* is proposed to be included in the Red Book of the Republic Moldova.

Key sites: the *Onconotus servillei* was collected just in “Bugeac” Natural Reserve.

Conservation of *Saga pedo*, *Gampsocleis glabra* and *Onconotus servillei* requires the following needs:

- protection and the preservation of specific habitat of the species-steppe surfaces;
- reducing the treatments with chemical substances in steppe areas;
- prohibition of the collection made by the collectors;
- ban on grazing of sheep, goats and cows in the habitat of these species;
- research of distribution, biology and ecology of the species.



Figure 1. *Saga pedo* L. (♀) (original).



Figure 2. *Onconotus servillei* FICH. (♂) (original).



Figure 3. *Gampsocleis glabra* HERB. (♀) (original).

Gampsocleis glabra (HERBST, 1786)

Nomenclature: family Tettigoniidae KRAUSS, 1902, subfamily Tettigoniinae KRAUSS, 1902.

Scientific synonyms: *Decticus alberti* SEIDL, 1937, *Gampsocleis annae* SHUGUROV, 1908, *Gampsocleis podolica* SHUGUROV, 1908, *Locusta glabra* HERBST, 1786, *Locusta prima* SCHAFF, 1776.

Biology: adults can be seen from June till August.

Habitat: this species lives hidden in bushes and in grassland where the height of grasses reaches about 40-60 cm.

Description: The body length of *Gampsocleis glabra* is about 20-26 mm and the ovipositor of the female is 15-22 mm, and it is notched at the apex. The body of the specimens belonging to this species is green or brown-yellow; moreover, on its body there can very well be seen a lot of dark or brown spots. The pronotum of the insect has two stripes, white and black. The femurs of posterior legs have two longitudinal stripes. The fore wings are green and the hind ones are transparent. The dorsal part of the abdomen is green or yellow, and the abdominal sites with dark stripes ventral yellow.

Distribution: Bush cricket *Gampsocleis glabra* is a Central Asian – South European species. This species is included in the European national Red Lists as an endangered or critically endangered species in Austria (BERG & ZUNA-

KRATKY, 1997), Germany (MAAS et al., 2002), Poland (LIANA, 2007), Slovakia (KRIŠTÍN, 2007). Also, this species is rare in Romania and very rare in Moldavia (Romania) and is spread especially between the Siret and the Prut rivers (IORGU, 2008).

A brilliant work on the distribution and ecology of *Gampsocleis glabra* has been written by A. KRISTIN et al. (2007). In this paper, they have shown that *Gampsocleis glabra* in Central Europe reaches actually the northern edge of its range in Poland and it is extinct in the Czech Republic (BAZYLUK & LIANA, 2000). The distribution of this species in the northern area was analysed by several authors in the last decade (BAZYLUK & LIANA, 2000; KRIŠTÍN & ZACH 1997; KRIŠTÍN et al., 2004; MAAS et al., 2002).

Habitat: for this reason, we can consider it as a thermophilous species, with affinity to xeric vegetation (STAHİ, 2009). Considering the height of the herbal layer, the species prefers grassy stands taller than 50 cm (Fig. 3).

Life history/food and feeding: *Gampsocleis glabra* is an insectivorous, praticalous, xerophilous, thermophilous and stenotopic species.

Status: the *Gampsocleis glabra* is proposed to be included in the Red Book of the Republic Moldova.

Key sites: the *Gampsocleis glabra* was collected just in “Bugeac” Natural Reserve.

CONCLUSIONS

Saga pedo, *Onconotus servillei* *Gampsocleis glabra* species are proposed to be included the third edition of the Red Book of the Republic Moldova. The *Gampsocleis glabra* is a new species for the fauna of the Republic of Moldova.

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