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## RED LIST OF ORTHOPTERA OF THE REPUBLIC OF MACEDONIA

Michèle LEMONNIER-DARCEMONT<sup>1</sup>, Dragan CHOBANOV<sup>2</sup> & Vladimir T. KRPAČ<sup>3</sup>

RÉSUMÉ. — *Liste rouge des Orthoptères de la République de Macédoine*. — Cet article a pour but de définir une Liste Rouge des Orthoptères de la République de Macédoine, adaptée au contexte du pays. La sélection s'effectue par l'application des critères UICN à l'échelle du pays, principalement axée sur la mesure ou l'estimation de l'état des populations et leur évolution, mais aussi sur des considérations de populations particulièrement restreintes. Les directives UICN pour l'établissement des listes régionales et nationales ont été suivies pour définir le statut de chaque espèce au niveau du pays. Il en résulte une Liste Rouge composée de 17 taxa (soit 10 % environ de la faune du pays), dont un en danger critique d'extinction (*Bradyporus macrogaster macrogaster* (Lefebvre 1831)) et quatre en danger (*Saga pedo* (Pallas 1771), *Bradyporus oniscus* (Burmeister 1838), *Paracinema tricolor* (Thunberg 1815) et *Stethophyma grossum* (Linnaeus 1758)).

SUMMARY. — This paper is aimed to draw up a Red List of Orthoptera of the Republic of Macedonia, adapted to the context of the country. The selection is based on IUCN criteria applied for the country, mainly focused on the observation or estimation of population status and trends, and also population in very restricted area of occupancy. The IUCN Regional Guidelines to the regional population have been applied to determine the final classification of each species within the country. The resulting Red List is composed of 17 taxa (roughly 10 % of the fauna of the country), including one Critically Endangered (*Bradyporus macrogaster macrogaster* (Lefebvre 1831)) and four Endangered (*Saga pedo* (Pallas 1771), *Bradyporus oniscus* (Burmeister 1838), *Paracinema tricolor* (Thunberg 1815) and *Stethophyma grossum* (Linnaeus 1758)).

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The Republic of Macedonia belongs to several biogeographic regions and despite its relatively small territory (25 713 km<sup>2</sup>), includes an extremely rich and diverse orthopteran fauna (175 taxa).

With Mediterranean, Alpine, Continental, or steppe affinities, this fauna contains many rare and relict elements, potentially threatened by human activity. Thus, it is appropriate to develop an initial Red List, even though for some species groups, the state of knowledge is still quite low. Indeed, this region of the Balkans remains poorly surveyed by entomologists, especially concerning Orthoptera.

The present Red List has been established in accordance with the recommendations of the IUCN Version 3.1. (2001), and the guidelines for application of IUCN Red List criteria at regional and national levels Version 4.0.

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## MATERIAL AND METHODS

In a first step we have compiled a list of all species confirmed in the Republic of Macedonia (175 species) and traced the outline of their distribution across the country. Three main sources were used: The collections of the Natural History Museum of Skopje, thoroughly revised by one of us (Chobanov & Mihajlova, 2010); Literature (see bibliography in Appendix) and the personal data of the authors of this Red List and of some observers or private collections (L. Courquin, Th. Stalling, L. Stefanov).

For each taxon, we have set a status according to the IUCN criteria, based on its geographical distribution, the state of biotopes of its localities and taking into account their potential change in the short and medium term, particularly in relation to anthropogenic factors. The non-selected species have been classified in LC (Least Concern) or DD (Data Deficient). The selected species have been subject to a focused field research in 2011-2012, in order to update and refine their areas of occupancy (AOO) and extend of occurrence (EOO). Then, the IUCN Regional Guidelines to the regional population have been applied to determine the final estimate extinction risk within the country.

The taxonomic nomenclature used follows the Orthoptera Species File (OSF) (Eades *et al.* 2013). The terms and categories used for the red list assessments are detailed below.

AOO: Area of occupancy is the area around the recorded localities probably occupied by the taxon. Instead of using grid or circle, we have preferred to outline same biotope characteristics, with no discontinuity around each record. Area of occupancy is defined as the area within its 'extent of occurrence' (see hereafter).

EOO: Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon, excluding cases of vagrancy.

The concerned species are divided into four categories: CR: Critically Endangered; EN: Endangered; VU: Vulnerable; NT: Almost threatened species that could become threatened in short term, if no specific conservation measures are taken.

Applicable Criteria are as follows: A: Reduction in population size; B: Geographic range; C: Small and declining population; D: Very small or restricted population.

Among all of these criteria, the subset used for this list is:

A2c: Reduction in population size based on a observed, estimated, inferred or suspected population size reduction of  $\geq 30\%$  (VU) or  $50\%$  (EN) or  $80\%$  (CR) over the last 10 years, where the reduction or its causes may not have ceased or may not be understood or may not be reversible, based on a decline in area of occupancy, extent of occurrence and/or quality of habitat.

A3c: Reduction in population size based on a population size reduction of  $\geq 30\%$  (VU) or  $50\%$  (EN) or  $80\%$  (CR), projected or suspected to be met within the next 10 years, based on a decline in area of occupancy, extent of occurrence and/or quality of habitat.

B2ab(ii): Area of occupancy estimated to be less than  $2,000\text{ km}^2$  (VU) or  $500\text{ km}^2$  (EN) or  $10\text{ km}^2$  (CR), and estimates indicating severely fragmented or known to exist at no more than 10 (VU) or 5 (EN) or 1 (CR) location(s) and continuing decline, observed, inferred or projected, in area of occupancy.

B2ab(iii): Area of occupancy estimated to be less than  $2,000\text{ km}^2$  (VU) or  $500\text{ km}^2$  (EN) or  $10\text{ km}^2$  (CR), and estimates indicating severely fragmented or known to exist at no more than 10 (VU) or 5 (EN) or 1 (CR) location(s) and continuing decline, observed, inferred or projected, in area, extent and/or quality of habitat.

D2: (VU) Population with a very restricted area of occupancy (typically less than  $20\text{ km}^2$ ) or number of locations (typically five or fewer) such that it is prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and is thus capable of becoming Critically Endangered or even Extinct in a very short time period.

## RESULT OF ASSESSMENTS

Among the 175 taxa occurring in the Republic of Macedonia: 17 are selected for the Red List (Tab. I); 10 are classified Data Deficient (Tab. II) and 148 are classified Least Concern (Tab. III).

### COMMENTS ON THE SELECTED SPECIES

*Poecilimon ebneri* Ramme 1933. — According to the OSF taxonomy (Eades *et al.*, 2013) used in this paper, this species is in synonymy with *Poecilimon klisuriensis* Willemse 1983. The taxa are currently considered Near Threatened (NT) due to the stable population size, observed over few years. Yet, we believe their range represents remains of a formerly wider area of occurrence. This in combination with their occurrence in areas neighbouring to anthropogenized territories may easily lead to reduction of their AOO, EOO or habitat quality.

TABLE I  
Red List of Orthoptera of the Republic of Macedonia

Species	Global Red List	Result of assessment for Republic of Macedonia			
		Red List for Republic of Macedonia	Number of localities	Total AOO (sq. km)	
<i>Poecilimon ebneri</i> Ramme, 1933		NT A3c	6	15,4	
<i>Poecilimon pechevi</i> Andreeva, 1978	VU	VU D2	1	0,6	
<i>Poecilimon jablanicensis</i> Chobanov & Heller, 2010		NT A3c	4	4,8	
<i>Pholidoptera ebneri</i> Ramme, 1931 / <i>Pholidoptera stankoi</i> M Karaman, 1960		NT A3c	3	3,6	
<i>Saga pedo</i> (Pallas, 1771)	VU	EN A2c; B2ab(iii)	3	39,3	
<i>Saga campbelli campbelli</i> Uvarov, 1921		VU A2c; D2	3	0,4	
<i>Saga hellenica</i> Kaltenbach, 1967		VU A2c; D2	4	1,4	
<i>Saga rammei</i> Kaltenbach, 1965		NT A3c	11	3,9	
<i>Bradyporus macrogaster macrogaster</i> (Lefebvre, 1831)		CR A2c; B2ab(ii)	5	5,4	
<i>Bradyporus oniscus</i> (Burmeister, 1838)		EN A2c; B2ab(ii)	6	6,1	
<i>Troglophilus lazarepolensis</i> Karaman, 1958		VU A3c	16		
<i>Troglophilus zorae</i> Karaman & Pavićević, 2011		VU A3c	15		
<i>Melanoplus frigidus</i> (Boheman, 1846)		VU A3c; D2	3	0,9	
<i>Odontopodisma albanica</i> Ramme, 1951		VU A3c	4	2,2	
<i>Paracinema tricolor</i> (Thunberg, 1815)		EN A2c; B2ab(iii)	3	2,0	
<i>Stethophyma grossum</i> (Linnaeus, 1758)		EN A2c; B2ab(iii)	7	6,2	
<i>Stenobothrus eurasius macedonicus</i> Willemse, 1974	VU	VU D2	2	3,6	

TABLE II  
Species classified Data Deficient

Species classified DD
<i>Isophya brevicauda</i> Ramme, 1931
<i>Broughtonia arnoldi</i> (Ramme, 1933)
<i>Ovaliptila newmanae</i> (Harz, 1969)
<i>Calliptamus tenuicercis</i> Tarbinskii, 1930
<i>Sphingonotus coerulipes</i> Uvarov, 1922
<i>Arcyptera labiata</i> (Brulle, 1832)
<i>Poecilimon vodnensis</i> Karaman, 1958
<i>Stenobothrus graecus</i> Ramme, 1926
<i>Mecostethus parapleurus</i> (Hagenbach, 1822)
genus <i>Myrmecophilus</i> Berthold, 1827

TABLE III  
Species classified Least Concern

<i>Phaneroptera nana</i> Fieber, 1853	<i>Troglophilus neglectus</i> Krauss, 1879
<i>Phaneroptera falcata</i> (Poda, 1761)	<i>Troglophilus cavicola</i> (Kollar, 1833)
<i>Tylopsis lilifolia</i> (Fabricius, 1793)	<i>Dolichopoda remyi</i> Chopard, 1934
<i>Acrometopa servillea servillea</i> (Brullé, 1832)	<i>Gryllotalpa stepposa</i> (Zhantiev, 1991)
<i>Leptophyes punctatissima</i> (Bosc, 1792)	<i>Gryllotalpa gryllotalpa</i> (Linnaeus, 1758)
<i>Leptophyes albobittata</i> (Kollar, 1833)	<i>Xya variegata</i> Latreille, 1809
<i>Andreiniimon nuptialis</i> (Karny, 1918)	<i>Xya pfaendleri</i> (Harz, 1970)
<i>Isophya tosevski</i> Pavićević	<i>Paratettix meridionalis</i> (Rambur, 1838)
<i>Isophya modestior</i> Brunner von Wattenwyl, 1882	<i>Tetrix subulata</i> (Linnaeus, 1758)

- Isophya speciosa* (Frivaldszky, 1867)  
*Barbitistes ocskayi* (Charpentier, 1850)  
*Ancistura nigrovittata* (Brunner von Wattenwyl, 1878)  
*Metaplastes ornatus* (Ramme, 1931)  
*Poecilimon affinis affinis* (Frivaldszky, 1867)  
*Poecilimon hoelzeli* Harz, 1966  
*Poecilimon ornatus* (Schmidt, 1849)  
*Poecilimon gracilis* (Fieber, 1853)  
*Poecilimon schmidtii* (Fieber, 1853)  
*Poecilimon thoracicus* (Fieber, 1853)  
*Poecilimon jonicus jonicus* (Fieber, 1853)  
*Poecilimon brunneri* (Frivaldszky, 1867)  
  
*Poecilimon macedonicus* Ramme, 1926  
*Poecilimon chopardi* Ramme, 1933  
*Polysarcus denticauda* (Charpentier, 1825)  
*Meconema thalassinum* (De Geer, 1773)  
*Conocephalus fuscus* (Fabricius, 1793)  
*Ruspolia nitidula* (Scopoli, 1786)  
*Decticus albifrons* (Fabricius, 1775)  
*Decticus verrucivorus verrucivorus* (Linnaeus, 1758)  
*Platyleis affinis affinis* Fieber, 1853  
*Platyleis escalerae escalerae* I. Bolivar, 1899  
*Platyleis intermedia intermedia* (Serville, 1839)  
*Platyleis albopunctata* (Goeze, 1778)  
*Modestana ebneri* (Ramme, 1926)  
*Montana macedonica* (Berland & Chopard, 1922)  
*Tessellana nigrosignata* (Costa, 1863)  
*Tessellana orina* (Burr, 1899)  
*Decorana incerta* Brunner von Wattenwyl, 1882  
*Vichetia oblongicollis* Brunner von Wattenwyl, 1882  
*Metrioptera tsirojjanni* Harz & Pfau, 1983  
*Roeseliana roeselii* (Hagenbach, 1822)  
*Pholidoptera frivaldskyi* (Hermann, 1871)  
*Pholidoptera macedonica macedonica* Ramme, 1928  
  
*Pholidoptera aptera karnyi* (Ebner, 1910)  
*Pholidoptera aptera gjorgjevici* M. Karaman, 1960  
*Pholidoptera stankoi* M. Karaman, 1960  
*Pholidoptera fallax* (Fischer, 1853)  
*Pholidoptera griseoaptera* (De Geer, 1773)  
*Pholidoptera femorata* (Fieber, 1853) (\*)  
  
*Sepiana sepium* (Yersin, 1854) (\*)  
*Eupholidoptera smyrnensis* (Brunner von Wattenwyl, 1882)  
*Eupholidoptera chabrieri* (Charpentier, 1825)  
*Bucephaloptera bucephala* (Brunner von Wattenwyl, 1882)  
*Psorodonotus fieberi macedonicus* (Ramme, 1931)  
*Pachytrachis gracilis* (Brunner von Wattenwyl, 1861)  
*Anterastes serbicus* Brunner von Wattenwyl, 1882  
  
*Rhacocleis germanica* (Herrich-Schäffer, 1840)  
  
*Tetrix bolivari* Sauley, 1901  
*Tetrix ceperoi* (Bolivar, 1887)  
*Tetrix tuerki tuerki* (Krauss, 1876)  
*Tetrix bipunctata* (Linnaeus, 1758)  
*Tetrix tenuicornis* Sahlberg, 1893  
*Depressotetrix depressa* (Brisout de Barneville 1849)  
*Asiotmethis limbatus* (Charpentier, 1845)  
*Glyphotmethis heldreichi* Brunner von Wattenwyl, 1882  
*Anacridium aegyptium* (Linnaeus, 1764)  
*Calliptamus italicus italicus* (Linnaeus, 1758)  
*Calliptamus barbarus barbarus* (Costa, 1836)  
*Paracaloptenus caloptenoides caloptenoides* (Brunner von Wattenwyl, 1861)  
*Podisma pedestris pedestris* (Linnaeus, 1758)  
*Oropodisma macedonica* Ramme, 1951  
*Odontopodisma decipiens decipiens* Ramme, 1951  
*Pezotettix giornae* (Rossi, 1794)  
*Acrida ungarica ungarica* (Herbst, 1786)  
*Locusta migratoria cinerascens* (Fabricius, 1781)  
*Oedaleus decorus* (Germar, 1826)  
*Psophus stridulus* (Linnaeus, 1758)  
*Celes variabilis variabilis* (Pallas, 1771)  
*Oedipoda caerulescens caerulescens* (Linnaeus, 1758)  
*Oedipoda miniata miniata* (Pallas, 1771)  
*Oedipoda germanica germanica* (Latreille, 1804)  
*Sphingonotus caeruleus caeruleus* (Linnaeus, 1767)  
*Acrotylus insubricus insubricus* (Scopoli, 1786)  
*Acrotylus patruelis* (Herrich-Schäffer, 1838)  
*Acrotylus longipes longipes* (Charpentier, 1845)  
*Aiolopus thalassinus thalassinus* (Fabricius, 1781)  
*Aiolopus strepens strepens* (Latreille, 1804)  
*Mecosthetus parapleurus parapleurus* (Hagenbach, 1822)  
*Euthystira brachyptera brachyptera* (Ocskay, 1826)  
*Arcyptera fusca* (Pallas, 1773)  
*Arcyptera microptera microptera* (Fischer von Waldheim, 1833)  
*Chrysochraon dispar dispar* (Germar, 1834)  
*Ramburiella turcomana* (Fischer von Waldheim 1846)  
*Doclostaurus maroccanus* (Thunberg, 1815)  
*Doclostaurus brevicollis* (Eversmann, 1848)  
*Notostaurus anatolicus* (Krauss, 1896)  
*Omocestus haemorrhoidalis haemorrhoidalis* (Charpentier, 1825)  
*Omocestus petraeus* (Brisout de Barneville, 1856)  
*Omocestus minutus* (Brullé, 1832)  
*Omocestus rufipes* (Zetterstedt, 1821)  
*Omocestus viridulus viridulus* (Linnaeus, 1758)  
*Stenobothrus lineatus lineatus* (Panzer, 1796)  
*Stenobothrus fischeri fischeri* (Eversmann, 1848)  
*Stenobothrus nigromaculatus nigromaculatus* (Herrich-Schäffer, 1840)  
*Stenobothrus stigmaticus stigmaticus* (Rambur, 1838)

<i>Gampsocleis abbreviata abbreviata</i> Hermann, 1874	<i>Stenobothrus rubicundulus</i> Kruseman & Jeekel, 1967
<i>Tettigonia viridissima</i> (Linnaeus, 1758)	<i>Gomphocerus sibiricus sibiricus</i> (Linnaeus, 1767)
<i>Tettigonia cantans</i> (Fuessly, 1775)	<i>Gomphocerippus rufus</i> (Linnaeus, 1758)
<i>Tettigonia caudata caudata</i> (Charpentier, 1845)	<i>Myrmeotettix maculatus maculatus</i> (Thunberg, 1815)
<i>Saga natoliae</i> Serville, 1839	<i>Stauroderus scalaris scalaris</i> (Fischer de Waldheim, 1846)
<i>Bradyporus dasypus</i> (Illiger, 1800)	<i>Chorthippus apricarius apricarius</i> (Linnaeus, 1758)
<i>Ephippiger ephippiger ephippiger</i> (Fiebig, 1784)	<i>Chorthippus vagans dissimilis</i> Willemse, Helversen & Ode 2009
<i>Gryllus bimaculatus</i> De Geer, 1773	<i>Chorthippus mollis mollis</i> (Charpentier, 1825)
<i>Gryllus campestris</i> Linnaeus, 1758	<i>Chorthippus bornhalmi</i> Harz, 1971
<i>Acheta domesticus</i> (Linnaeus, 1758)	<i>Chorthippus biguttulus euhedicekei</i> von Helversen, 1989
<i>Melanogryllus desertus</i> (Pallas, 1771)	<i>Chorthippus loratus</i> (Fischer de Waldheim, 1846)
<i>Tartarogryllus tartarus</i> (Saussure, 1878)	<i>Chorthippus oschei oschei</i> Helversen, 1986
<i>Modicogryllus bordigalensis bordigalensis</i> (Latreille, 1804)	<i>Chorthippus dorsatus dorsatus</i> (Zetterstedt, 1821)
<i>Modicogryllus truncatus</i> (Tarbinsky, 1940)	<i>Pseudochorthippus parallelus parallelus</i> (Zetterstedt, 1821)
<i>Gryllomorpha dalmatina dalmatina</i> (Ocskay, 1832)	<i>Euchorthippus pulvinatus</i> (Fischer de Waldheim, 1846)
<i>Pteronemobius heydenii heydenii</i> (Fischer, 1853)	<i>Euchorthippus declivus</i> (Brisout de Barneville, 1848)
<i>Oecanthus pellucens pellucens</i> (Scopoli, 1763)	
<i>Arachnocephalus vestitus</i> Costa, 1855	(*) : unpublished data Lemonnier-Darcemont

*Poecilimon pechevi* Andreeva 1978. — A very locally distributed species discovered in Bulgaria close to the Macedonian border. This species has been assessed worldwide already as Vulnerable (IUCN, 2012). On the Macedonian side, we found it in 2012 on predominant Fabaceae (Lemonnier-Darcemont, unpublished data) from a single locality with AOO/EOO of less than 10 sq. km. According to Andreeva (1978), the species would be linked to herbaceous groups composed of *Trifolium* spp., *Urtica* spp., *Rubus idaeus*. On this locality, the main potential threats could be the ovine and bovine (combined) overgrazing and also a risk of extension of the mining, just downslope of the present habitat.

*Poecilimon jablanicensis* Chobanov & Heller 2010. — Though widely distributed in the treeless zone of Jablanica Mt., the small territory of its endemic range and the sensitivity of its habitat to human impact may easily lead to significant threat.

*Pholidoptera ebneri* Ramme 1931 / *Pholidoptera stankoi* M Karaman 1960. — We have grouped these two taxa together because their synonymy is assumed by some taxonomists. Known from very isolated localities in Western Macedonia this species seems to have a restricted area of occupancy which could be, in the future, threatened by modification of biotopes linked to anthropic activities.

*Saga pedo* (Pallas 1771). — Although the species does not yet seem threatened in mountains of the southwestern part of the country, the situation is far more different in the north of Macedonia. At lower altitude (< 500 m), it occurs at least on one locality (Lemonnier-Darcemont, 2011), in a fallow land in border to cultivated lands. Up to now, the agricultural practices seem traditional with a limited use of chemical products, however, given that these practices are changing in the country, we fear a negative trend in the coming years. Moreover there is a risk of anthropogenic impact on its biotope (road expansion, buildings, etc.). Even if some additional studies are required before clarifying the exact status of *Saga pedo* in lowlands of the country, we anticipate a pessimistic future for this species here.

*Saga campbelli campbelli* Uvarov 1921. — In addition to its limited AOO, this species is potentially threatened by anthropic modification of habitats such as overgrazing in some places, or, in the opposite, undergrowth expansion and densification of the vegetation in other places.

*Saga hellenica* Kaltenbach 1967. — The threat is the same as for *Saga pedo* in lowlands.

*Saga rammei* Kaltenbach 1965. — The threat is the same as for *Saga hellenica* and *Saga pedo* in lowlands.



*Bradyporus macrogaster macrogaster* (Lefebvre 1831). — Earlier data for Southern Macedonia (e.g. Ramme 1951) are highly doubtful. There is possibility the species has never existed there. The species was observed in the 60s-70s by Karaman (1961, 1975) in the Skopje kettle but presently we could not find it there. This might be due to significant changes of the habitat which occurred since the 70s and until then up to present times. Thus, the species is highly threatened with extinction if not already extinct.

*Bradyporus oniscus* (Burmeister 1838). — Except one recent record in 2003 (Stojkoska, det. Lemonnier-Darcemont), all records of this species are old (Berland & Chopard, 1922; Karaman, 1961; Us & Matvejev, 1967). In 2012, most of the old localities have been visited by one of us (Lemonnier-Darcemont), without success. Some of them are too much damaged and are no longer suitable. The species is very sensitive to any disruption of its habitat due to its weak colonization capabilities and is also sensitive to pollution of its food by pesticides.

*Troglophilus lazarepolensis* Karaman 1958. — This sub-endemic species (Greece, Macedonia, Albania) inhabits mainly caves. These habitats are especially sensitive to changes linked to human activities.

*Troglophilus zorae* Karaman & Pavicevic 2011. — This sub-endemic species (Greece, Macedonia, Albania) inhabits mainly caves. These habitats are especially sensitive to changes linked to human activities.

*Melanoplus frigidus* (Boheman 1846). — The species is a glacial relict in the country, distributed in a single range – the mountain plateau of Jakupica Mts. Being restricted to isolated stony carstic ridges it is exhibited to a potential threat of even weak human impact, like e.g. keeping livestock (overgrazing risk) or buildings for military use, both present in the Jakupica's ridge. Moreover, we suspect future impact from development of tourism infrastructure. Thus, the species has been subjected to recent range contraction and is threatened with a plausible future unfavourable anthropogenic impact. Furthermore, the species could decrease due to global climate change.

*Odontopodisma albanica* Ramme 1951. — This micropterous species has a limited expansion capability and seems quite restricted by its biotope, in particular with the structure of the vegetation. It could rapidly become endangered in the localities directly linked to human activities which could lead to modification of habitats.

*Paracinema tricolor* (Thunberg 1815). — In Europe, this thermo-hygrophilous species is distributed mainly in the south. After the vast destruction of the wetlands in the Republic of Macedonia, this species suffers continuing habitat destruction by ground material abstraction, cultivation, cattle grazing and other activities in the river valleys, and also water pollution linked to industrial activities, open dump and treated crops. And though it may be found in considerably threatened habitats its rarity makes it facing risk of extinction at present in the Republic of Macedonia. Only old records from literature are existing (Karaman, 1975). During summer 2012, an unsuccessful focused research has been performed by one of us (Lemonnier-Darcemont).

*Stethophyma grossum* (Linnaeus 1758). — This Eurosiberian species is threatened in most of its global distribution, for the same reasons as the above species. Similarly to *Paracinema tricolor*, this hygrophilous species inhabits wetlands but instead prefers cooler climate of montane valleys, marshes and swamps. We know only old data from Museum collections and from literature from lowlands (Karaman, 1975; Chobanov & Mihajlova, 2010) and a single more recent locality in the mountains (Chobanov & Mihajlova, 2010). Concerning lowland distribution, the species has not been found during the research in 2012. The high human pressure in such habitats (by e.g. developing touristic infrastructure) is reflected in the categorization Endangered.

*Stenobothrus eurasius macedonicus* Willemse 1974. — This subspecies is presently known from two highly isolated ranges in Greece and Macedonia (Willemse, 1974; Ingrisic & Pavicevic, 1985; Kati & Willemse, 2001; Willemse & Willemse, 2008). It has been found again in 2012 (Lemonnier-Darcemont, unpublished data) in the same locality where it has been found in 1974 (Willemse, 1974).

#### COMMENTS ON POTENTIALLY ELIGIBLE (ASSESSED AND NOT YET SELECTED) SPECIES

*Isophya brevicauda* Ramme 1931. — At this stage, this species is classified as DD (Data Deficient). It is known in Republic of Macedonia only by two female specimens. Moreover, recent studies (Chobanov *et al.*, in press) argue for its closer relationships with *I. camptoxypha*.

*Broughtonia arnoldi* (Ramme 1933). — The classification of the genus group *Metrioptera* is herewith given in accordance with the OSF but the authors still prefer to follow the systematics by Heller *et al.* (1998) for the genus *Metrioptera*. This species was recorded for the first time for Macedonia by Ramme (1951). Our field studies on its first record location proved only the occurrence of *M. tsirojanni*, species with a very similar habitus, which is known to occur all over the Macedonia. Yet, a population of *M. arnoldi* was discovered to inhabit the mountain belt of Ossogovo Mts over 1500 m (Chobanov, unpublished data). At this stage, we classify this species as DD (Data Deficient).

*Ovaliptila newmanae* (Harz 1969). — The species is known from a single locality in Macedonia (Chobanov & Mihajlova, 2010). It has a hidden lifestyle inhabiting soil crevices, caves and leaf litter being active mostly at night. Thus it is possible that it has not been observed due to a low search effort (as it was the case for *O. buresi* Mařan in Bulgaria). Therefore we classify this species as DD (Data Deficient) at this stage.

*Calliptamus tenuicercis* Tarbinskii 1930. — Only a single record from the region of Barovo in the period 1964-1965 is known (F. Willemse in Matvejev, 1976). The species has not been found since this record and seems absent from neighbouring regions.

*Sphingonotus coerulipes* Uvarov 1922. — The species is known from a single record in 1959 (Matvejev, 1976). No record exists since this date, neither within Macedonia nor within the neighbouring countries.

*Arcyptera labiata* (Brulle 1832). — The species is known from a single record (1958) from the area of Gevgelija (Matvejev, 1976). No records are available in the country since that date. Moreover, the occurrence of this species in the neighbouring territories is considered doubtful.

*Poecilimon vodnensis* Karaman 1958. — Despite several field studies in its potential biotopes performed by us in the last years, this taxon, described from the Vodno Mountain, could not be found again.

*Stenobothrus graecus* Ramme 1926. — Willemse (1974) recorded the species twice (1965, 1972) in the region of Vranitca, north of Tetovo. The species has not been found since this period and seems absent from the neighbouring regions.

*Mecostethus parapleurus* (Hagenbach 1822). — No accurate data are available in the country. Therefore we classify this species as DD (Data Deficient) at this stage.

Genus *Myrmecophilus* Berthold 1827. — A revision of the genus is currently performed by Thomas Stalling. The final assessment has to be done after the finalization of his work.

#### CONCLUSION

The present work is a first red-list assessment of the Orthoptera of Macedonia based on existing data. It is a starting point for more elaborate research on this topic. Additional surveys with a particular focus on the most endangered species and those depending on urgent measures of environmental management are necessary. These concern in particular taxa with old fragmented locations, as *Bradyporus oniscus*, and those which habitats have been deeply altered due to the human activity, like *Stethophyma grossum* and *Paracinema tricolor*. The case seems even more critical for *Bradyporus macrogaster macrogaster*, which, if it is still present in the Republic of Macedonia, remains likely through relict populations.

Moreover, new taxonomic studies are essential to clarify the status of several species of the genus *Myrmecophilus*, as well as of *Poecilimon klisuriensis* Willemse 1983 and *Pholidoptera stankoi* M Karaman 1960, where some doubts remain about their synonymy, respectively with *Poecilimon ebneri* Ramme 1933, and *Pholidoptera ebneri* Ramme 1931.



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