

New distribution records of Orthoptera of Greece

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Abstract

New distribution data on Orthoptera of Greece are presented. *Acrometopa servillea* (Brullé, 1832), *Platycleis grisea* (Fabricius, 1781) and *Poecilimon propinquus* Brunner von Wattenwyl, 1878 are reported as new to Mt. Kitheron, the last one also as new to Nomos Biotias. *Anterastes serbicus* Brunner von Wattenwyl, 1882 and *Ephippiger ephippiger ephippiger* (Fiebiger, 1784) are reported as new to Mt. Vrontous. *Platycleis escalerae escalerae* Bolivar, 1899, *Incertana incerta* (Brunner von Wattenwyl, 1882), *Eupholi-doptera kykladica* Heller, Willemse and Willemse, 2009 and *Eumodicogryllus bordigalensis bordigalensis* (Latreille, 1804) are new to Attiki. The last two are also new to Sterea Ellas. *Platycleis affinis affinis* Fieber, 1853, is new to Kiklades. *Gryllus (Gryllus) campestris* Linnaeus, 1758, *Xya variegata* (Latreille, 1809) and *Xya pfaendleri* Harz, 1970 are new records for Nomos Serron. *Trigonidium (Trigonidium) cicindeloides* Rambur, 1838 is reported as new to Macedonia. We confirm the presence of *Mogoplistes brunneus* Serville, 1838 at the Aegean Sea. Lastly, *Paranocarodes chopardi* Pechev, 1965 is reported as new to Macedonia and sound production in that species is discussed for the first time.

Key words

new localities, stridulation, Macedonia, occurrence

Introduction

The southern Balkan peninsula is considered as one of the most important core areas of European endemic Orthoptera. The area served as a refugium during the glacial periods (Kenyeres et al. 2009). The orthopteroid fauna of Greece is considered relatively well studied, especially after the fundamental publications of the Willemse family (1984, 1986, etc.). Even so, since then description of new species and subspecies and new records for the country have considerably inflated the number of taxa known from Greece, which now reach about 395 (Willemse and Willemse 2008). In comparison, the number of Orthoptera species of Bulgaria is 213 (Chobanov 2009) and 175 taxa in FYR Macedonia (Lemonnier-Darcemont et al. 2014). The Orthoptera species richness of Greece is a result of the highly diverse topography, dominated by the Hel-

lenids mountain range (south branch of the Dinarids), the complex palaeogeographic and geological history, the fact that the area served as a refugium during glacial periods and the position of the country between different zoogeographic regions.

Methods

The taxonomic nomenclature follows the Orthoptera Species Files (OSF) (Cigliano et al. 2016).

The material on which this paper is based consists of specimens deposited in the author's collection (cSA). Several specimens will be deposited to the collection of Zoological Museum of University of Athens (ZMUA). The following specimens were transferred to Abant İzzet Baysal Üniversitesi Entomoloji Müzesi, Bolu (AİBÜEM): *Paranocarodes chopardi*, Macedonia, Mt. Vrontous (Lailias), 16 IV 2016, 1 ♂; 19 V 2016, 1 ♀, for confirmation of identification. Specimens of *Poecilimon propinquus*, Sterea Ellas, Biotia (Boeotia), Mt. Kitheron, c.1400m, 20 VI 2015, were transferred to CH (Collectio Klaus-Gerhard Heller, 2 ♂), CL (Collectio Arne W. Lehmann, 2 ♂) and CW (Collectio Willemse, 2 ♂).

The material has been collected in different parts of Greece by the author himself in the years 2012 to 2016, by hand or with a net or by shifting rocks and leaf litter. Specimens were identified using Willemse (1986) and papers published after that.

Results

Tettigonioidea

Tettigoniidae

Acrometopa servillea (Brullé, 1832)

Sterea Ellas: Attiki / Biotia (Boeotia), Mt. Kitheron, 1400m, 20 VI 2015, 2 ♀.

A species common on the eastern half of the Greek mainland (Willemse 1984). New for Mt. Kitheron.

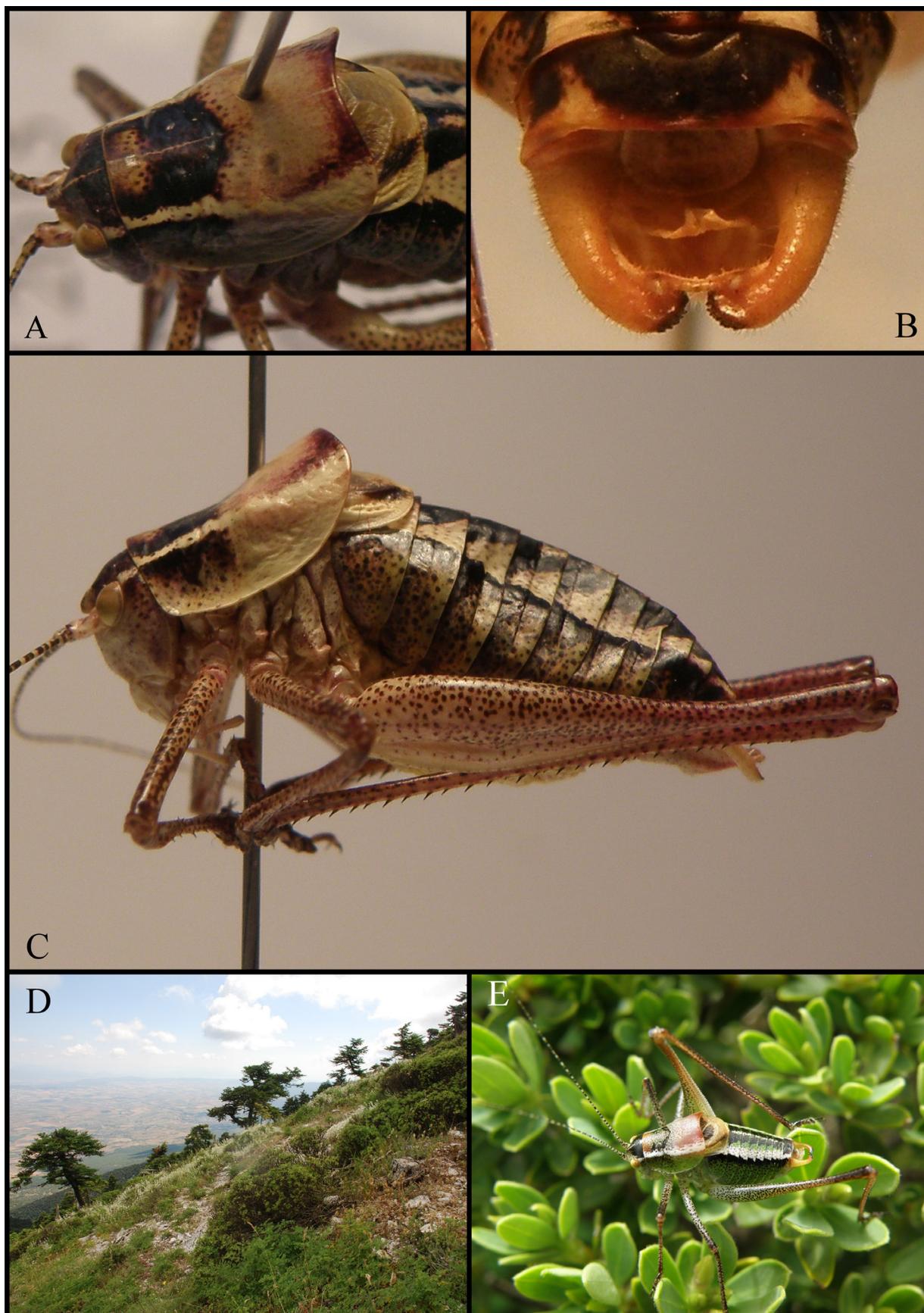


Figure 1. *Poecilimon propinquus*, Sterea Ellas, Mt. Kitheron, 19 V 2013. A. pronotum, B. tip of abdomen, C. habitus, D. collection locality with scattered bushes of *Daphne*, E. habitus.

Poecilimon propinquus Brunner von Wattenwyl, 1878

Stereia Ellas: Biotia (Boeotia), Mt. Kitheron, c.1400m, 19 V 2013, 1♂; 20 VI 2015, 8♂, 1♀. Fig. 1A–E.

New for Biotia and Mt. Kitheron. The male cerci (Fig. 1B) and the female basal fold of our material agrees with the figures published in Willemse (1982, 1986). This is the first member of this genus to be collected from Mt. Kitheron. This mountain ridge forms the borders between Attiki and Biotia. The collection locality is on the northern slope of the mountain summit, which belongs to Biotia (Fig. 1D). *Poecilimon propinquus* is endemic to CE mainland Greece (Attiki and NE Peloponnisos), Evvia and some offshore island (Egina, Spetses, Makronisos) (Fig. 2). The species is known from several localities of Attiki (Parnitha, Imittos, Sounion, Boula), most of them on the north and eastern side (Willemse 1984, 1985). The only, yet unpublished, locality from W Attiki, is at Aigosthena, 5 km east of Porto Germenos, not far from Mt. Kitheron (Lehmann and Lehmann unpubl. 2002, A. Lehmann pers. comm. 2017). This is the fourth member of the genus known so far from Biotia, the other three being *P. gerlindae* Lehmann, Willemse and Heller, 2006, *P. obesus* Brunner von Wattenwyl, 1878 and *P. zimmeri* Ramme, 1933, occurring mostly on the west side of Biotia, Mt. Parnassos.

Poecilimon gerlindae was described from Domokos, Nomos Pthiotidos and it belongs to the *P. propinquus* group. Its southernmost known locality is Aliartos and Ipsilantis at the heart of Biotian valley. Our locality, only a few km to the south, is obviously situated on, or very close to, the borderline of these two closely related species. Although morphologically very similar, *P. propinquus* can easily be separated by the shape of the male cerci and female basal fold (Lehmann et al. 2006).

The population of Mt. Kitheron seems to be localized. This is the situation also on Mt. Imittos, the type locality of the species, where *P. propinquus* is also found in single sites (Lehmann et al. 2014). Several attempts, in several years, by the author to locate more populations were in vain. All the specimens were collected from an area of a few square meters, a rocky slope dominated by

Daphne oleoides shrubs, facing the famous Biotian valley (Fig. 1D). All insects were found on the *Daphne* shrubs, except for a female found moving on the ground.

Anterastes serbicus Brunner von Wattenwyl, 1882

Macedonia: Mt. Vrontous (Lailias): 1500m, 20 VIII 2016, 1♂; 1850m, 20 VIII 2016, 2♂, 1♀. Fig. 3.

Anterastes serbicus is a mountainous species, with isolated, patchy distribution on summits of mountains of Balkan and W. Turkey (Çiplak et al. 2015, Mol et al. 2016). In Greece, it is known from the high elevation of seven mountains, Olimpos, Ossa, Pieria, Bermio, Barnous, Pangeo and Falakro (Willemse 1984) (Fig. 4).

Mt. Vrontous is a well visited mountain mainly because of the road that leads to the ski resort. It is situated just north of the town of Serres. On Mt. Vrontous, *A. serbicus* was collected



Figure 3. *Anterastes serbicus*, lateral view (scale bar: 5)

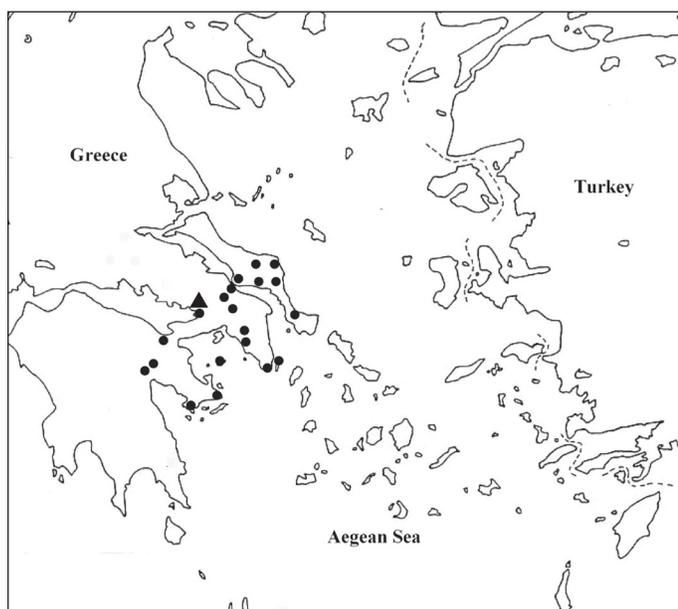


Figure 2. Total known distribution of *Poecilimon propinquus* (• literature localities, ▲ new locality).

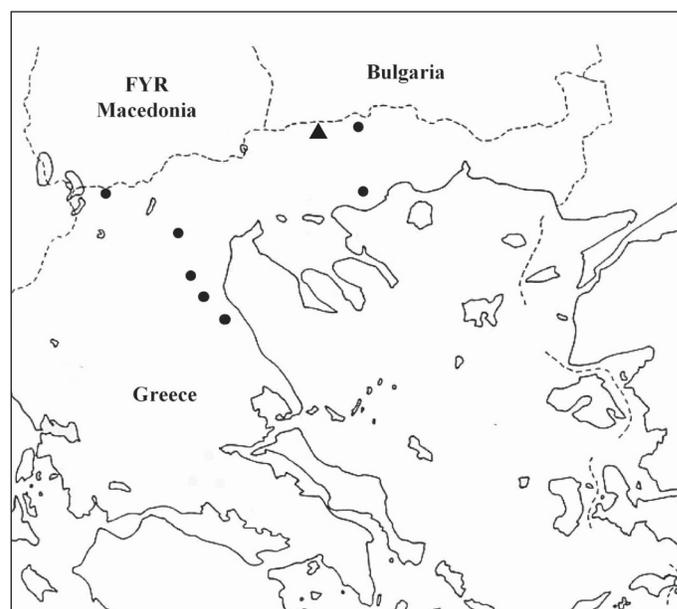


Figure 4. Distribution of *Anterastes serbicus* in Greece (• literature localities, ▲ new locality).



Figure 5. *Eupholidoptera kykladica*, Attiki, Vravra, 11 VI 2013. A. habitus, B. last abdominal segment, dorso-lateral view, C. lateral view (scale bar: 1 cm).

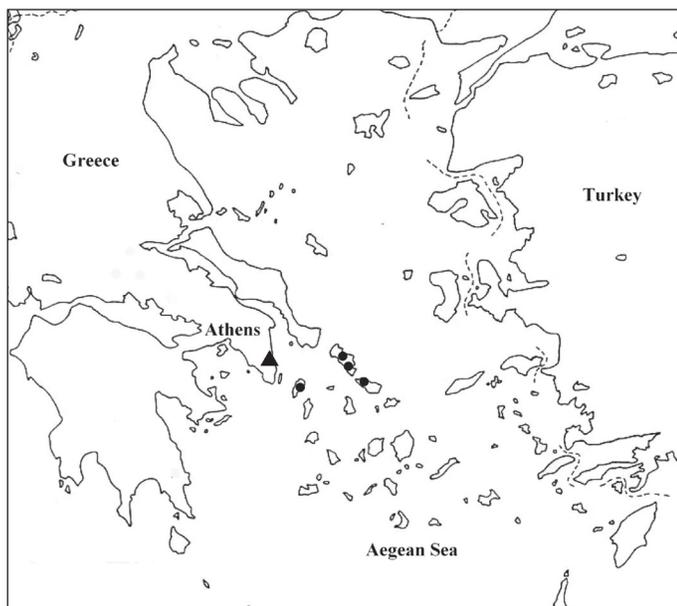


Figure 6. Total known distribution of *Eupholidoptera kykladica* (● literature records, ▲ new record).

from the plateau of the ski center at 1500m, inside dense grass vegetation. The species was most abundant above timberline, at the summit area (1850m), on dry rocky ground with very sparse vegetation. It should be noted that compared to specimens from Mt. Pangeo, those of Mt. Vrondous are 25% smaller, with a body length of 11–13 mm.

Eupholidoptera kykladica Heller, Willemse and Willemse, 2009

Stereia Ellas: Attiki, Vravra, wasteland, 11 VI 2013, 1♂. Fig. 5A–C.

New for Attiki. This is a recently described, small sized *Eupholidoptera*, endemic to the west Kikladic islands of Andros, Tinos and Kea (Tzia) (Çiplak et al. 2009) (Fig. 6). Our location is the first mainland population of this species. The specimen collected

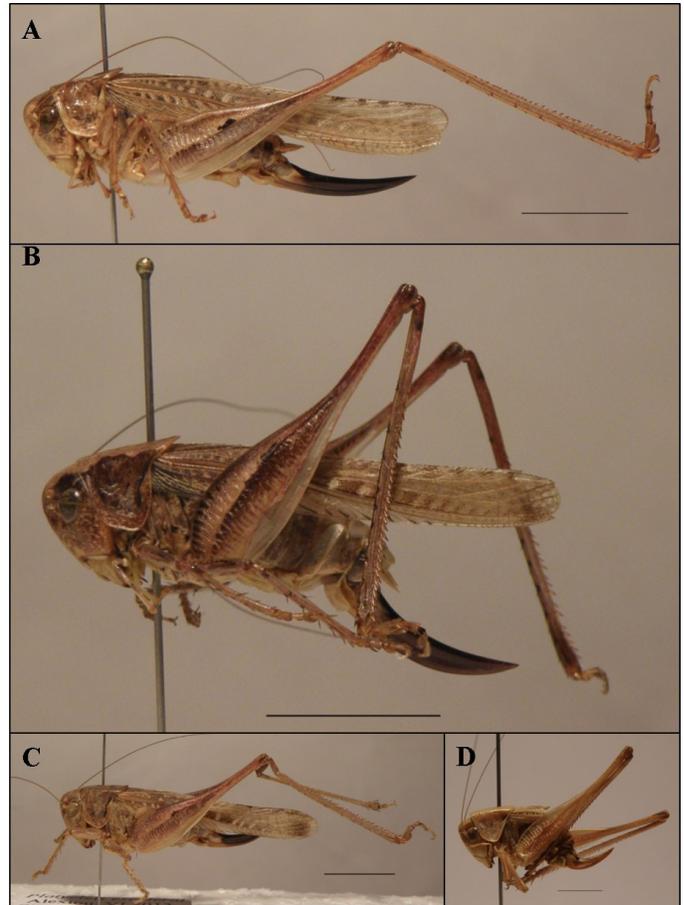


Figure 7. A. *Platycleis affinis affinis*, female, Kiklades, Andros (scale bar: 10 mm), B. *Platycleis grisea*, female, Mt. Kitheron (scale bar: 10 mm), C. *Platycleis escaleraei escaleraei*, female, Attiki, Vravra (scale bar: 10 mm), D. *Incertana incerta*, female, Attiki, Vravra (scale bar: 5 mm).

agrees perfectly with the description regarding small size, coloration (Fig. 5A), cerci (Fig. 5B) and subgenital plate. It was collected from *Sarcopoterium spinosum*, a small, thorny bush, typical of dry coastal habitats of Mediterranean Greece. Measurements (length, in mm): body 18, pronotum 8, hind femur 15.5.

Eupholidoptera kykladica belongs to *E. prasina*-group, a group of Aegean and Anatolian species, mostly with localized distribution. The locality reported here represents the first documented presence of a member of this group on mainland Greece, an area otherwise dominated by members of *E. chabrieri*-group (Çiplak et al. 2009).

The presence of *E. kykladica* on Attiki, or the east mainland in general, is no surprise. The zoogeographical connection of west Kikladic islands with mainland Greece is well documented. Two other orthopteran species that have a similar distribution pattern are *Rhacocleis werneri* F. Willemse, 1982, described from Evvia and since then found on east Attiki and Andros island and *Leptophyes lisae* Heller and Willemse, 1989, occurring at E Peloponnisos and Andros (Willemse and Willemse 2008).

The genus *Eupholidoptera* is rare in the area of Attiki. Antonatos et al. (2014) were the first to report members of the genus from Attiki. In particular, they report *Eupholidoptera* sp.₁ from the area of the Athens International Airport, which is located at the

lowland, near Vravrona, and *Eupholidoptera* sp₂, from Mt. Parnitha. In both locations, *Eupholidoptera* were rare, less than 1% of the sampled specimens. In particular, *Eupholidoptera* sp₁, which could prove to be *E. kykladica*, represented only 0.002% of the collected specimens, over a period of two years, while *Eupholidoptera* sp₂, from the mountain location, represented 0.94%, respectively. On the other hand, Lehmann et al. (2014), in their acoustic monitoring of orthopterans on Mt. Imittos, did not report any *Eupholidoptera* species. We collected members of this genus from Mt. Imittos (VI 2014, 1♀) and Mt. Kitheron (VIII 2014, 1♀; 20 VI 2015, 1♀). All collected specimens are females of small body size (less than 15 mm). Since *Eupholidoptera* species are recognized mainly by male genital morphology, we hesitate to assign them to a particular species until further field research results in collection of male specimens.

Platycleis affinis affinis Fieber, 1853

Kyklades: Andros, 18 VI 2015, 2♀. Figs 7A, 8A.

New for Kyklades. This circum-Mediterranean subspecies is common on mainland Greece. It has also been recorded from Kriti

and few island. On Andros it was found by the road to Chora, on short grass. This is the second member of this genus recorded from Kyklades, after *P. intermedia intermedia* (Serville, 1839), which is common in this area (Willemse 1984).

Platycleis grisea (Fabricius, 1781)

Stereia Ellas: Mt. Kitheron, VIII 2014, 1♀. Figs 7B, 8B.

New for Mt. Kitheron. A mountain taxon, reported from several mountains of mainland.

Platycleis escaleraei escaleraei Bolivar, 1899

Stereia Ellas: Attiki, Vravrona, wasteland. VI 2013, 1♀. Figs 7C, 8C.

New for Attiki. This East Mediterranean subspecies is known from mainland Greece and the islands of Kriti and Rhodos. On Vravrona it was collected from a wasteland, dominated by thorny bushes of *Sarcopoterium* and *Coridothymus*.

Incertana incerta (Brunner von Wattenwyl, 1882)

Stereia Ellas: Attiki, Vravrona, VII 2014, 1♀; Schinias, II 2013, 1♂. Figs 7D, 8D.

New for Attiki. This East Mediterranean species is known from mainland Greece and several Aegean islands.

Ephippiger ephippiger ephippiger (Fiebiger, 1784)

Macedonia: Mt. Pangeo, 2000m, 7 VIII 2016, 1♂, 1♀. Fig. 9.

New for Mt. Pangeo. Known Greek localities for this central- and south-European species are Mt. Falakro, Mt. Vrontous, Mt. Cholomon, Paleokastron Chalkidikis, Mt. Barnous, Veldos, Mt. Olimbos (Willemse 1984) and Mt. Athos (Tilmans et al. 1989).

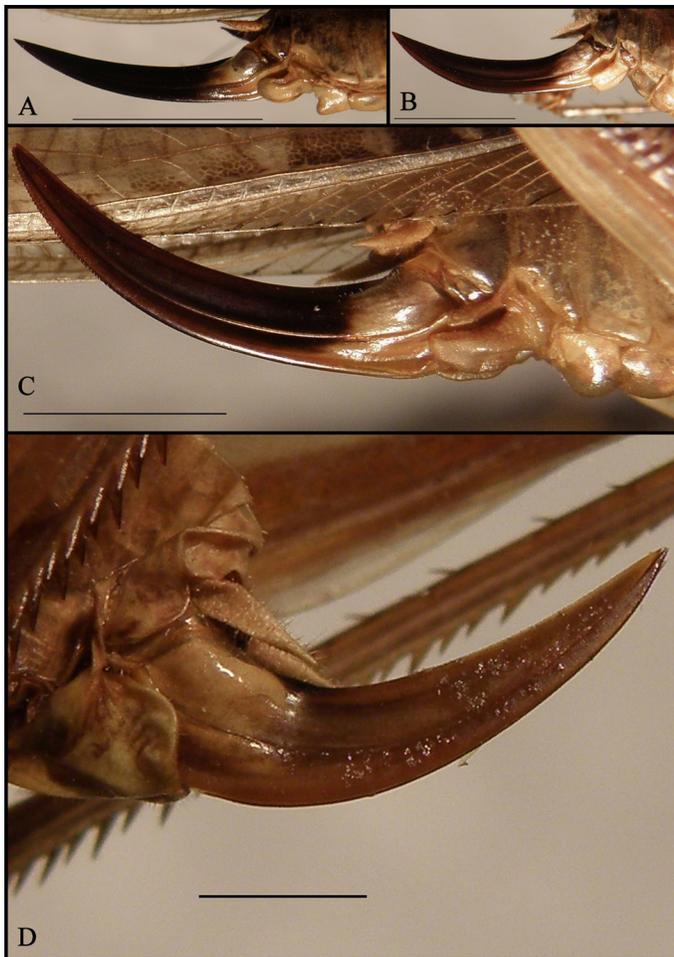


Figure 8. Female, VII and VI sternites, subgenital plate and ovipositor, lateral view A. *Platycleis affinis affinis* (scale bar: 10 mm), B. *Platycleis grisea* (scale bar: 5 mm), C. *Platycleis escaleraei escaleraei* (scale bar: 5 mm), D. *Incertana incerta*, (scale bar: 2 mm).



Figure 9. *Ephippiger ephippiger ephippiger*, male, Macedonia, Mt. Pangeo, 7 VIII 2016.

Grylloidea

Gryllidae

Gryllus (Gryllus) campestris Linnaeus, 1758

Macedonia: Serres, Mt. Vrontous, 600m, IV 2016, 1♀.

New for Nomos Serron. A west Palearctic species, known from mainland Greece and the east Aegean islands of Limnos and Kos. Other Macedonian localities are Mt. Falakro, Pisoderi Florinas, Velvendos Kozanis and Mt. Pieria (Willemse 1984).

Eumodicogryllus bordigalensis bordigalensis (Latreille, 1804)

Stereia Ellas: Attiki, Vravra, Erasinon river, 1 nymph, X 2012; Biotia (Boeotia), entrance of cave Kopaida, XI 2014, 3 nymphs. Fig. 10A, B.

New for Attiki and Stereia Ellas, this widespread Mediterranean species has been recorded from a few localities all over Greece and the islands. Our specimens were collected from under stones, in wet places, close to the margin of cultivations. At the first locality, it was found in syntopy with *Gryllus bimaculatus* De Geer, 1773. Identification of our material was achieved through the details of the head (Fig. 10A) as summarized in Cordero et al. (2007).



Figure 10. *Eumodicogryllus bordigalensis bordigalensis*, Attiki, Vravra, Erasinon river, X 2012. A. frontal view of the head, B. lateral view (scale bar: 5 mm).

Trigonidiidae

Trigonidium (Trigonidium) cicindeloides Rambur, 1838

Macedonia: Chalkidiki, near village Afitos, 40m, 11 VII 2016, 2♀. Fig. 11.

New for Macedonia. This very characteristic orthopteran species is widespread in many parts of the world. In Greece it has been recorded from several localities of southern and central mainland and some islands, as far north as Kerkira island and Magnisia. The specimens were observed and collected during the day time on the wall of a small hotel surrounded by dense pine forest.

Mogoplistidae

Mogoplistes brunneus Serville, 1838

Dodecanisa: Rhodos, 8 X 2016, 2♂, 1♀. Fig. 12.

New for Rhodos and the East Aegean islands. This is a mainly west Mediterranean species. Until now its eastern distribution limits were formed by the islands of Kerkira and Thira (Santorini). According to Willemse (1984), especially Thira record needs confirmation. The specimens collected from Rhodos expand the dis-



Figure 11. *Trigonidium cicindeloides*, female, Macedonia, Chalkidiki, Afitos, 11 VII 2016.



Figure 12. *Mogoplistes brunneus*, Dodecanisa, Rhodos, 'Valley of the Butterflies', 8 X 2016.

tribution of the species considerably to the east. The locality is the well known 'Valley of Butterflies', a rivulet of a few hundred meters length on the west side of the island, named by the locals 'Pelecanos'. The area is visited by millions of tourists every summer in order to admire the huge concentration of the moth *Euplagia quadripunctaria*. It is a humid and shady place dominated by *Platanus orientalis* and *Liquidambar orientalis* trees. *Mogoplistes brunneus* was observed and collected at night from inside the leaf litter, under rocks and on the surface of the rocks that were covered with mosses, where it was common. Syntopic, but less common, we also found *Ovaliptila* sp. nov. (Gorochov and Alexiou, in press.). The related *Pseudomogoplistes squamiger* (Fischer, 1853) was reported from nearby Kos and Tilos islands (Baccetti 1992). Our specimens were identified using Willemse (1986).

Tridactyloidea

Tridactylidae

Xya variegata (Latreille, 1809)

Macedonia: Serres, Strimon river, 25 V 2016, 2 ♂. Fig. 13A.

New for Nomos Serron. Already known from other rivers of Macedonia, like Nestos. Found in syntopy with *X. pfaendleri*.



Figure 13. *Xya* species, Macedonia, Strimon river, 25 V 2016. A. *X. variegata*, B. *X. pfaendleri*.



Figure 14. *Paranocarodes chopardi*, habitus, female, Macedonia, Mt. Vrontous, 19 V 2016.

Xya pfaendleri Harz, 1970

Macedonia: Serres, Strimon river, 25 V 2016, 1 ♀, 1 nymph. Fig. 13B.

New for Nomos Serron. Already known from other rivers of Macedonia, like Axios and Nestos. Found in syntopy with *X. variegata*.

Acridoidea

Pamphagidae

Paranocarodes chopardi Pechev, 1965

Macedonia: Mt. Vrontous (Lailias): 1000m, 16 IV 2016, 2 ♂; 19 V 2016, 1 ♀. Figs 14–15.



Figure 15. *Paranocarodes chopardi*, habitus, male, Macedonia, Mt. Vrontous, 16 IV 2016, lateral view (scale bar, 10 mm).

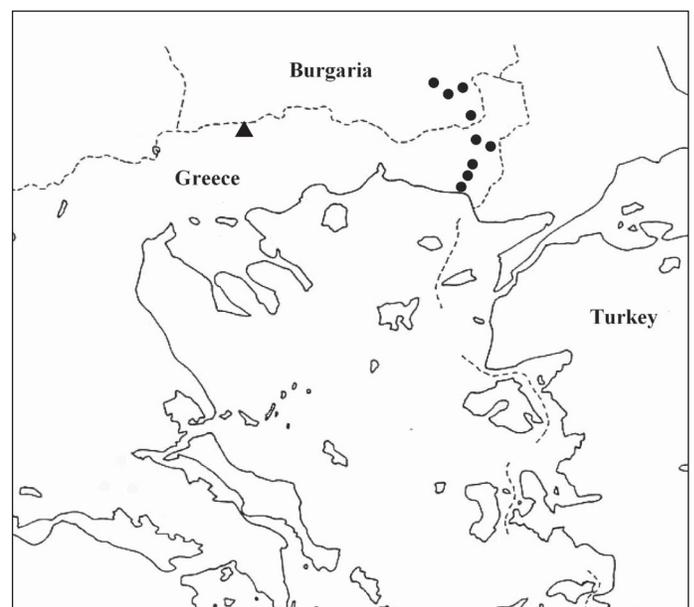


Figure 16. Total known distribution of *Paranocarodes chopardi* (• literature records, ▲ new record).

New to Macedonia. This species was described from the extreme southeast Bulgaria, the eastern foothills of Rhodopi mountain, close to the Greek-Bulgarian borders. In 2001 it was reported as new to the Greek fauna, from several localities of Evros, Thraki (Kati and Willemse 2001) (Fig. 16). Its habitat was described as *Quercus* sp. forest, sometimes mixed with *Pinus brutia* and/or *P. nigra*, commonly with dead leaf litter in which the animal was frequently found, and at an altitude of 200-900m a.s.l.

Pamphagids of the Balkan Peninsula, *Paranocarodes* I. Bolívar, and the related *Nocaracris* Uvarov, 1928 (*Paranocaracris* Mistshenko, 1951 was synonymized with *Nocaracris* by Ünal 2016), are ancient relicts, remnants of a thermophilous Tertiary fauna and have restricted ranges (Popov 2007). The locality of Mt. Vrondous is isolated from the populations in Thraki. Our specimens were collected from a meadow with a few scattered bushes, mainly *Juniperus* sp., bordering dense *Pinus nigra* forest, at an altitude of c. 1000m. The males were found very close to each other and were noticed from a distance by their strong stridulation. The female was noticed crossing the asphalt road from the same meadow towards the forest. No other specimen could be found despite several efforts. Apparently nymphs overwinter and adults appear in early spring, which may explain how such an obvious and impressive insect has gone unnoticed for so long on a well accessible mountain. According to L. Willemse (pers. comm. 2016), nymphs of what could be members of *Paranocarodes* have been observed from a couple of adjacent localities of N. Greece.

The male phallic complex is one of the main diagnostic characters used to distinguish the genera of pamphagids (Ünal 2016). A study that took place at Bolu by Ünal on the phallic complex of specimens sent to him confirmed our identification: this specific characteristic is almost the same as the one of the type specimen, kept provisionally at Bolu. Other morphological characteristics, such as the shape of the pronotum and coloration, are also identical with the type specimen. The tympanum size though of our specimen is much smaller than the typical *P. chopardi*, but a variation of this character has been documented in other pamphagids as well (Ünal pers. comm. 2017).

Notes on stridulation of *Paranocarodes chopardi*

The stridulation (sound production) mechanism within Pamphagidae is very diverse because of the secondary adaptation of some structures for its function (García et al. 2014). Almost all cases of sound production in this family have been documented from females as part of the mating behavior. Sound production in males has very rarely been observed (López et al. 2008). Our observations in the field, a product of good luck, for the first time document that the males of *P. chopardi* stridulate. As far as we know, no other record of stridulation within that particular genus exists.

The purpose of stridulation and the behavior of the males while producing the sounds is intriguing. No female was in sight. The two individuals were very active, moving along parallel paths, within less than a meter away from each other. An unresolved issue is whether the two males were stridulating as part of aggression behavior towards each other, or because of the disturbance caused by our presence, and not as part of an attempt to attract females for mating. Ünal (2007) reached similar results for the pamphagid genus *Glyphotmethis*, documenting that members of this genus produce sounds through Krauss's organ not to attract the different sex but for defense reasons.

The sound produced consisted of 'clicks' easily audible from several meters away. We observed that they used a rubbing method, involving the movement of the hind "feet" (it is uncertain whether tarsi or femora are involved), up and down on the vertical axis. *Paranocarodes* species are extremely squamipterous, with only traces of tegmina found, so the emission of sounds by the males was not achieved by means of rubbing the tegmina against parts of the hind leg, but through a different way, involving most probably parts of the hind legs and the sides of abdomen. Ünal (2007), in his research on *Glyphotmethis*, observed that the sound was produced by rubbing the hind femur on Krauss's organ.

Massa (2012) studied a large number of Pamphagidae genera for their ability to produce sounds. Krauss's organ is a small plate situated on both sides of the second abdominal tergite in most pamphagids, and is supposed to have a stridulatory function by rubbing hind femurs against it. This method of sound production is considered most primitive. The species of genus *Paranocarodes* Bolívar, 1916 have only a just visible Krauss's organ and no specialized hind femur (Massa 2012), thus have probably abandoned this mechanism, and have secondarily adapted a more evolved method of sound production (García et al. 2014). The tympanum, a structure placed also on both sides of the abdominal tergites, although normally used for hearing only, in this case amplifies the emitted sounds. According to Massa (2012), members of *Paranocarodes* have a wide tympanum. *Paranocarodes chopardi* however does not seem to fit that rule as it has a very small tympanum (Ünal pers. comm. 2017).

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