

SIX ORTHOPTERA SPECIES NEW TO THE FAUNA OF PORTUGAL (ORTHOPTERA: TETTIGONIIDAE, GRYLLIDAE, TETRIGIDAE, ACRIDIDAE)

Paulo Lemos¹, Koen Lock², Baudewijn Odé³ & Roy Kleukers⁴

¹ Rua Prof. António Maria Rodrigues, nº7: 2500 884 Caldas da Rainha, Portugal — paulolemos@live.com.pt

² Koen Lock, Merelstraat 27, B-9000 Gent, Belgium — Koen_Lock@hotmail.com

³ Baudewijn Odé, P.C. Hooftstraat 149, 1071 BT, Amsterdam, The Netherlands — baudewijnode@gmail.com

⁴ Roy Kleukers, EIS Kenniscentrum Insecten / Naturalis, Postbus 9517, 2300 RA Leiden, The Netherlands — roy.kleukers@naturalis.nl.

Abstract: Six species of Orthoptera are reported as new to the Portuguese fauna: *Cyrtaspis tuberculata* Barranco, 2005, *Natula averni* (Costa, 1855), *Oecanthus dulcisonans* Gorochoy, 1993, *Pteronemobius heydenii* (Fischer, 1853), *Tetrix bipunctata kraussi* Saulcy, 1888 and *Stenobothrus grammicus* Cazorro, 1888. The first documented records of *Stenobothrus bolivarii* (Brunner von Wattenwyl, 1876) and *Omocestus viridulus kaestneri* Harz, 1972 are presented, along with new records of some rare species: *Leptophyes punctatissima* (Bosc, 1792), *Conocephalus conocephalus* (Linnaeus, 1767), *Metrioptera ambigua* Pfau, 1986 and *Sphingonotus nodulosus* Lluçà-Pomares, 2013.

Key words: Orthoptera, Tettigoniidae, Gryllidae, Tetrigidae, Acrididae, *Tetrix bipunctata kraussi*, new records, bioacoustics, chorology, Portugal.

Seis especies de Orthoptera nuevas para la fauna de Portugal (Orthoptera: Tettigoniidae, Gryllidae, Tetrigidae, Acrididae)

Resumen: Se registran seis especies de ortópteros nuevas para la fauna portuguesa: *Cyrtaspis tuberculata*, *Natula averni*, *Oecanthus dulcisonans*, *Pteronemobius heydenii*, *Tetrix bipunctata kraussi* y *Stenobothrus grammicus*. Asimismo, se incluyen los primeros datos verificados de *Stenobothrus bolivarii* y *Omocestus viridulus kaestneri* y nuevos registros de algunas especies raras: *Leptophyes punctatissima*, *Conocephalus conocephalus*, *Metrioptera ambigua* y *Sphingonotus nodulosus*.

Palabras clave: Orthoptera, Tettigoniidae, Gryllidae, Tetrigidae, Acrididae, *Tetrix bipunctata kraussi*, nuevas citas, bioacústica, corología, Portugal.

Introduction

Until recently the Portuguese Orthoptera fauna was relatively poorly studied. In recent years more and more data are being published, e.g. Lock (1999), Miranda-Arabolaza & Barranco (2005), Ferreira *et al.* (2006, 2007, 2008, 2009), Ferreira (2007, 2009), Ferreira & Grosso-Silva (2008a, b, c) and Schmidt *et al.* (2009).

In recent years, field trips focussing on Orthoptera were undertaken by the authors. Paulo Lemos has been active especially in the central part of the country. Koen Lock investigated several areas in October 2011. Baudewijn Odé, Luc Willemsse and Roy Kleukers studied parts of Serra da Estrela and NP Alvao in July 2015.

This has yielded several interesting records. In this paper we present six species new to Portugal: *Cyrtaspis tuberculata* Barranco, 2005, *Natula averni* (Costa, 1855), *Oecanthus dulcisonans* Gorochoy, 1993, *Pteronemobius heydenii* (Fischer, 1853), *Tetrix bipunctata kraussi* Saulcy, 1888 and *Stenobothrus grammicus* Cazorro, 1888. Furthermore we present the first documented records of *Stenobothrus bolivarii* (Brunner von Wattenwyl, 1876) and *Omocestus viridulus kaestneri* Harz, 1972 and new records of some rare species: *Leptophyes punctatissima* (Bosc, 1792), *Conocephalus conocephalus* (Linnaeus, 1767), *Metrioptera ambigua* Pfau, 1986 and *Sphingonotus nodulosus* Lluçà-Pomares, 2013.

Material and Methods

The field work has been carried out using several techniques, especially walking slowly through the field with a sweep net, looking for jumping or sitting grasshoppers and listening to the songs. For this cause also bat detectors (Magenta Bat4)

were used. Additionally moist areas were inspected for groundhoppers and for tree- and bush dwelling species branches were beaten with a stick, collecting the specimens with an entomological umbrella. The research was performed during the day as well as during the night, when some species of cricket and bush-cricket were active.

Sound recordings have been made with an Olympus LS-100 and Tascam HD-P2 solid state recorder with a Sennheiser microphone (K6-module with ME67 or ME62 condenser microphone) at 96kHz/24bits PCM quality, both in the field and in studio conditions. Analysis of the sound recordings has been performed with Bias Peak software. Oscillograms have been prepared with Praat software.

The collected specimens are stored in the collections of the authors and Naturalis Biodiversity Center in Leiden (the Netherlands). For some specimens DNA samples have been taken (see the RMNH numbers in the locality lists) and these will be processed in the coming years and published via www.boldsystems.org.

Results

Family Tettigoniidae

• *Leptophyes punctatissima* (Bosc, 1792)

NEW RECORDS. 1 female nymph, 8-VII-2015, Serra da Estrela, surr. of Famalicao (district Guarda), N40.449286, W07.365879; alt. 850 m, R. Kleukers, B. Odé, & L. Willemsse *leg.*, col. Naturalis Leiden (RMNH5014955) (fig. 1).

This cryptic species was mentioned by Miranda-Arabolaza & Barranco (2005) from Serra da Nogueira and

Ferreira *et al.* (2007) from Peneda-Gerês National Park. In 2015, a female nymph was caught in a road side verge in a mixed forest in Serra da Estrela (fig. 2). The nymph was raised to adult (fig. 1). It is quite probable that *L. punctatissima* is much wider distributed in northern Portugal, as the insects have a cryptic lifestyle and the male makes a sound which cannot be heard by the human ear. A batdetector is very useful to detect the species.

• ***Cyrtaspis tuberculata* Barranco, 2005**

New to Portugal

NEW RECORDS. Many males and females, 2013-2015, between S. Antonio and Sagres (district Faro), N37.0423, W08.9559, alt. 50 m, P. Lemos *leg.* (photo, 4 males and 2 females in collection Lemos) (fig. 3, 4).

This species was recently described on the basis of a single female (Barranco 2005), from Doñana National Park in Andalucía (Spain). The male was described from a population found in the province of Málaga (Llucià-Pomares & Quiñones-Alarcón, 2013). In the past years, it has been found in large numbers in a forest area near Santo Antonio, in the extreme southwest of Portugal (fig. 5). These are the first records from this country. The adult individuals were found from May to November, mostly on *Quercus coccifera*.

• ***Conocephalus conocephalus* (Linnaeus, 1767)**

NEW RECORDS. 20-X-2011, Povoia do Conde (district Beja), N39.300030, W8.800572, P. Lemos (photo) (fig. 6); 28-X-2012, Évora (district Évora), N38.564772, W7.935537, P. Lemos (photo) (fig. 7).

Schmidt *et al.* (2009) provided the first record of *C. conocephalus* for Portugal: one male was found at Grândola/Ribeiro Abaixo in 1998. The species was found on two more localities (fig. 8), near Évora there are records since 2003. The habitat of this species is moist, dense vegetations of especially *Cynodon dactylon*.

• ***Metrioptera ambigua* Pfau, 1986**

NEW RECORDS. Many individuals, 29-IX-2012, Castro Laboreiro (district Viana do Castelo), N42.039645, W8.156537, P. Lemos (photos) (fig. 9).

Metrioptera ambigua was first recorded in Portugal at the eastern edge of Peneda-Gerês National Park (Ferreira *et al.*, 2007). It was recently found at Castro Laboreiro, in the northwestern part of the same park (fig. 10). Here, many adults and nymphs were found in low dense vegetations in moist areas, such as margins of brooks. It is a very rare species, which is, outside the two Portuguese localities, known from the type locality: Lugo (Galicia, Spain) (Pfau 1986) and a few records in Cantabria (Herrera Mesa & Larumbe, 1992). According to Ferreira *et al.* (2007), the identity of the populations in Cantabria is in need of confirmation. Maybe it concerns *Metrioptera maritima* Olmo-Vidal, 1992, which was described later.

Family Gryllidae

• ***Natula averni* (Costa, 1855)**

New to Portugal

NEW RECORDS (*first recording dates are given*). V-2004- 2-XII-2013, Rua do Negrelho (district Leiria), N39.405478, W9.163254 (sound recording, photo, fig. 11); 4-XI-2011, Praia D'El Rei (district Leiria), N39.398541, W9.275659, P. Lemos (observation song); 20-V-2012, Praia do Salgado, Nazaré (district Leiria), N39.570676, W9.083918, N39.570

676, W9.083918, P. Lemos (observation song); 28-VII-2012, Casais da Fonte (district Leiria), N39.423217, W9.185419, P. Lemos (observation song); 4-VIII-2012, Aljezur, along Ribiera de Aljezur, next to village of Aljezur (district Faro), N37.317, W8.803, B. Odé (sound recording); 5-VIII-2012, Aljezur, along Ribiera de Aljezur (district Faro), in rushes and reeds, N37.328, W8.824, B. Odé (sound recording); 6-VIII-2012, Aljezur (district Faro), along road in salt marsh, in rushes, N37.331, W8.826, B. Odé (sound recording); 5-X-2013, Budens/Boca do Rio (district Faro), N37.074081, W8.804747, P. Lemos (observation song); 6-X-2013, Gafanha da Boa Hora (district Aveiro), N40.522382, W8.774444, P. Lemos *leg.* (col. Lemos); 1-XI-2013, Poça do Vau (district Leiria), N39.383689, W9.210885, P. Lemos (photo); 12-XI-2013, Lagoa dos Salgados (district Faro), N37.091990, W8.330299, P. Lemos *leg.* (col. Lemos, photo/video); 21-XI-2013, Braço da Barrosa (Lagoa de Óbidos) (district Leiria), N39.403113, W9.178727, P. Lemos *leg.* (col. Lemos, photo, fig. 12); 2-XII-2013; 24-II-2014, Paul de Tornada (district Leiria), N39.448417, W9.134184, P. Lemos (photo); 29-III-2014, Bom Sucesso/Vau (district Leiria), N39.380228, W9.228446, P. Lemos (observation song); 15-IV-2014, São Martinho do Porto (district Leiria), N39.498674, W9.141728, P. Lemos (observation song); 15-IV-2014, Salir do Porto (district Leiria), N39.473712, W9.143125, P. Lemos (observation song); 3-X-2014, Trabalhã-Alvominha (district Leiria), N39.390217, W9.076637, P. Lemos (observation song); 13-VII-2015, Rio Lis (district Leiria), N39.883559, W8.934026, P. Lemos (observation song).

Until recently, *N. averni* was only known from the type specimen, which was found around 1850 near Naples (Italy). Since the loud song has become known, *N. averni* was discovered in many delta areas in southern Europe in the past 10 years (Odé *et al.*, 2011). The species is mentioned here for the first time for Portugal. *Natula averni* seems to be widespread in the coastal area of Portugal, at least in the southern and central part (fig. 13). The northern limit needs to be established.

Natula averni lives in swampy, mostly brackish habitats. The crickets are hidden in dense, shady vegetation of e.g. *Phragmites*, *Juncus*, *Spartina*, *Typha*, *Sparganium*, *Iris pseudacorus* and *Cyperaceae*. Adults have been found throughout the year. The crickets jump very quickly and purposeful in the dense vegetation, especially the males. They overwinter in mats of plant material, probably preferring the vicinity of

► **Fig. 1.** *Leptophyes punctatissima*, female from Famalicoa (Serra da Estrela), July 8, 2015. Photo Roy Kleukers. **Fig. 2.** Records of *Leptophyes punctatissima* in Portugal. Star: new record. **Fig. 3.** *Cyrtaspis tuberculata*, male from Santo Antonio, May 19, 2014. Photo Paulo Lemos. **Fig. 4.** *Cyrtaspis tuberculata*, ovipositing female from Santo Antonio, September 11, 2014. Photo Paulo Lemos. **Fig. 5.** Records of *Cyrtaspis tuberculata* in Iberian Peninsula. These are the only known records worldwide. Star: new record. **Fig. 6.** *Conocephalus conocephalus*, male from Abitureiras, October 20, 2011. Photo Paulo Lemos. **Fig. 7.** *Conocephalus conocephalus*, female from Évora, October 18, 2012. Photo Paulo Lemos. **Fig. 8.** Records of *Conocephalus conocephalus* in Portugal. Star: new records. **Fig. 9.** *Metrioptera ambigua*, female from Castro Laboreiro, September 29, 2012. Photo Paulo Lemos. **Fig. 10.** Records of *Metrioptera ambigua* in Portugal. Star: new record. **Fig. 11.** *Natula averni*, longwinged male from Rua do Negrelho, September 28, 2015. Photo Paulo Lemos. **Fig. 12.** *Natula averni*, female from Barrosa, November 21, 2013. Photo Paulo Lemos.



rotten vegetation, where the temperature is higher. At Poça do Vau males were singing in this kind of vegetation, when the outside temperature was about 9 °C in November. Near Caldas da Rainha longwinged specimens were observed flying very slowly and smoothly, at dusk.

As Odé *et al.* (2011) point out, the taxonomical status of this taxon has to be investigated further. It is possible that *N. averni* is conspecific with the widespread *N. longipennis* (Serville, 1838) or that it comprises of a group of closely related species.

• *Oecanthus dulcisonans* Gorochov, 1993

New to Portugal

NEW RECORDS. 1 male, 4-X-2011, Gambelas (district Faro), N37.050, W7.984, K. Lock *leg.* (col. Lock); 12-X-2011, Castro Marim (district Faro), N37.184, W7.465, K. Lock *leg.* (col. Lock); 13-X-2011, Faro (district Faro), N37.051, W7.961, K. Lock *leg.* (col. Lock); 2 males, 1-VIII-2012, Faro, Quinta do Lago (district Faro), N37.034880 W8.032466, B. Odé *leg.*, col. Naturalis Leiden (RMNHINS550951, RMNHINS550952), 2-VIII-2012, Faro, Praia do Trafal (district Faro), N37.057, W8.077 (sound recording); 11-IX-2014, Ecovia do Litoral (Boca do Rio) (district Faro), N37.074220, W8.799644, P. Lemos (observation song); 11-IX-2014, Pêra (district Faro), N37.095526, W8.335869, P. Lemos (photo, observation song); 11-IX-2014, Sagres (district Faro), N37.053364 W8.958303, P. Lemos (photo, observation song); 11-IX-2014, Lagos (district Faro), N37.111016, W8.689912, P. Lemos (observation song).

Oecanthus dulcisonans was described recently by Gorochov (1993). The song is similar to that of *Oecanthus pellucens* (Scopoli, 1763), but continuous and not with pauses as in *O. pellucens* (Cordero *et al.*, 2009) (fig. 14). Cordero *et al.* (2009) list a number of locations for *O. dulcisonans* in Spain. We present the first records for Portugal (fig. 15). The species seems to be quite common in the south of the country.

• *Pteronemobius heydenii* (Fischer, 1853)

New to Portugal

NEW RECORDS. 9-V-2012, Nadadouro (Casais da Fonte) (district Leiria), N39.423315, W9.184749, P. Lemos (photo, fig. 17); 1 male, 1 female, 3-VII-2015, same locality, P. Lemos *leg.*, col. Naturalis Leiden (RMNHINS5009643) (fig. 16); 21-XI-2013, Montante do Braço da Barrosa (Lagoa de Óbidos) (district Leiria), N39.398023, W9.17862, P. Lemos (photo); 16-IX-2015, Poça do Vau (district Leiria), N39.386211, W9.210051, P. Lemos (photo).

These are the first records of *P. heydenii* for Portugal (fig. 20). The species can be easily distinguished from *Pteronemobius lineolatus* (Brullé, 1835) by its genitalia (fig. 18) and song (fig. 19). It is very probable that *P. heydenii* can be found in other localities in Portugal.

Family Tetrigidae

• *Tetrix bipunctata kraussi* Saulcy, 1888

New to Portugal

NEW RECORDS. 1 female, 9-VII-2015, NP Alvao, 5 km SE of Ermelo (district Vila Real), N41.335756, W7.863342; alt.: 725 m, R. Kleukers, B. Odé, & L. Willemse, *leg.* col. Naturalis Leiden (RMNH5015019) (fig. 21, 22).

Tetrix bipunctata (Linnaeus, 1758) has been reported many times for Portugal, but in the course of history there has

been much confusion about this taxon. All old records of *T. bipunctata* are considered to refer to *T. undulata* (Llorente & Presa, 1981; Ferreira *et al.*, 2006).

The specimen at NP Alvao (fig. 21, 22) was found at the foot of a rocky hillside, in a muddy area along a stream. The identification is confirmed by Hendrik Devriese. It is the first confirmed record for Portugal (Ferreira *et al.*, 2006) and only the second confirmed record for the Iberian Peninsula (Devriese, 1996, pers. comm. H. Devriese) (fig. 23). *Tetrix bipunctata kraussi* is also known from Sierra Nevada (Andalucía, Spain) (Pascual, 1978; Devriese, 1996). Devriese (1996) studied one specimen of Sierra Nevada and concluded that it differed from specimens of the forma *kraussi* from other parts of Europe and the status should be studied further. The Portuguese specimen has short hind wings (about 2x the length of the fore wings) and therefore belongs to the forma *kraussi*. This forma is considered as a subspecies or even a species by some authors. The current view, based on morphological, ecological and DNA studies, is that these taxa are conspecific and that *kraussi* should be considered a form of *T. bipunctata* (pers. comm. Hendrik Devriese).

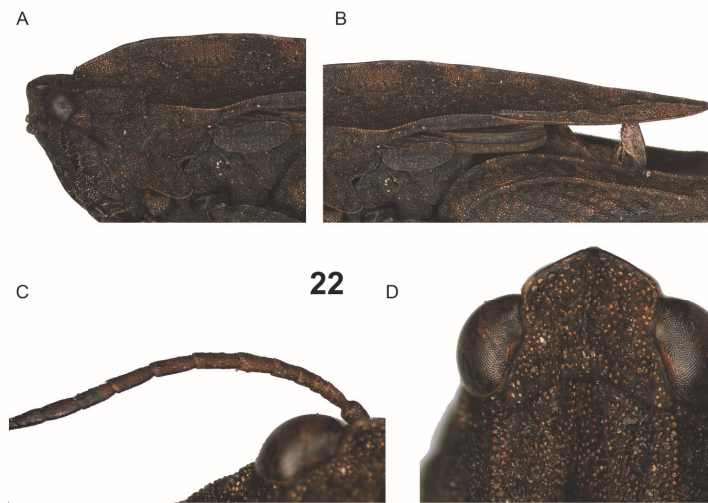
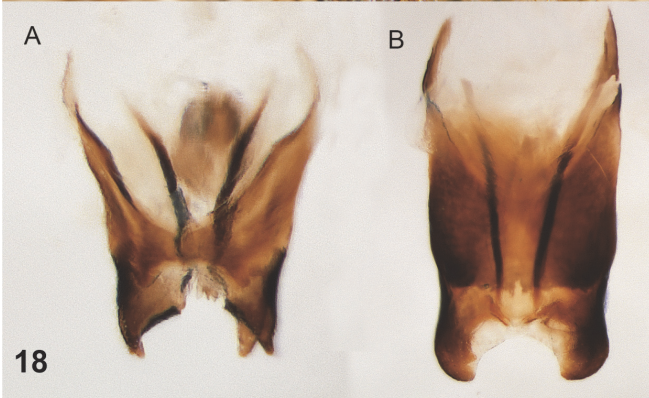
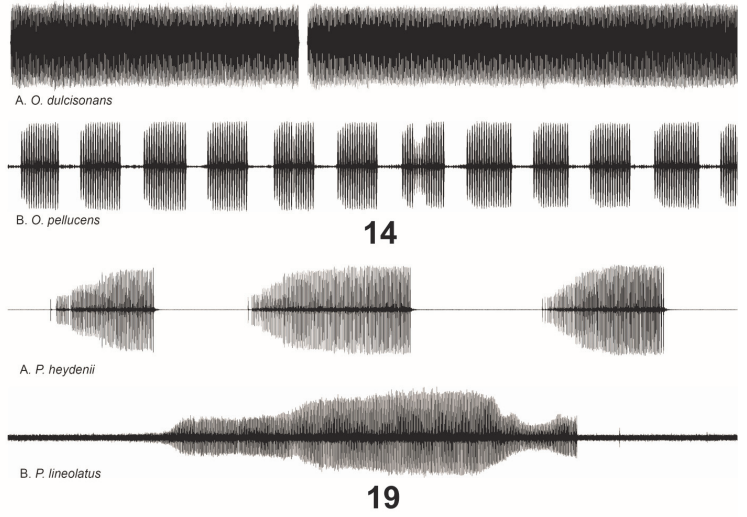
Family Acrididae

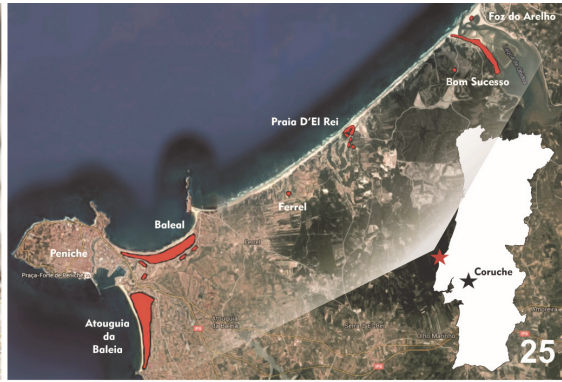
• *Sphingonotus nodulosus* Llucià-Pomares, 2013

ALL RECORDS (*first recording dates are given*). 9-IX-2013, Atouguia da Baleia, Peniche (district Leiria), N39.349334, W9.360274, P. Lemos (photo); 4-XI-2011, Vale de Janelas (district Leiria), N39.396625, W9.277364, P. Lemos (photo); 15-IX-2013, Ferrel (district Leiria), N39.358098, W9.354807, P. Lemos (photo); 29-VIII-2014, Coruche (district Santarém), N38.987325, W8.547738, P. Lemos (photo, fig. 24); 29-XI-2015, Óbidos (Bom Sucesso) (type locality) (district Leiria), N39.415145, W9.237038, P. Lemos; 29-XI-2015, Ferrel (farm lands) (district Leiria), N39.378062, W9.301942, P. Lemos.

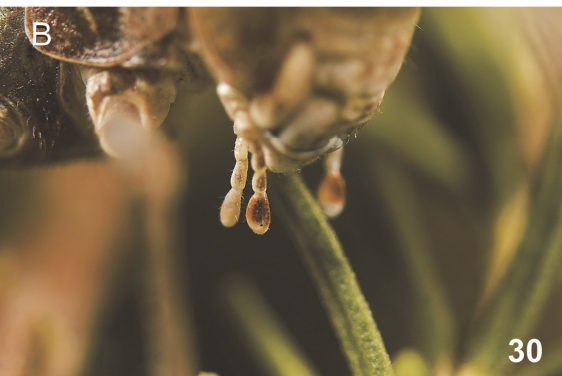
Sphingonotus nodulosus was described in 2013, from Lagoa de Óbidos on the centralwestern coast of Portugal and is known from several other localities on the Iberian Peninsula (Husemann *et al.*, 2013). We present here an overview of all known Portuguese locations (fig. 25). The species mostly inhabits the dune area in southwestern and centralwestern part

► **Fig. 13.** Records of *Natula averni* in Portugal. **Fig. 14.** Oscillogram (10 s) of *A. Oecanthus dulcisonans*, Portugal, Faro, Quinta do Lago, August 1, 2012, 25 °C, B. *O. pellucens*, Italy, Sardinia, Lago Alto di Flumendosa, August 12, 1999, 25 °C. Recordings and diagrams Baudewijn Odé. **Fig. 15.** Records of *Oecanthus dulcisonans* in Portugal. **Fig. 16.** *Pteronemobius heydenii*, male from Casais da Fonte, July 3, 2015. Photo Roy Kleukers. **Fig. 17.** *Pteronemobius heydenii*, female from Casais da Fonte, May 9, 2012. Photo Paulo Lemos. **Fig. 18.** Male genitalia (dorsal view), *A. Pteronemobius heydenii*, Casais da Fonte, July 3, 2015, B. *Pteronemobius lineolatus*, Abreiro, July 11, 2015. Photos Roy Kleukers. **Fig. 19.** Oscillogram (10 s) of *A. Pteronemobius heydenii*, Portugal, Estremadura, Casais da Fonte, July 3, 2015, 25 °C, B. *P. lineolatus*, France, Drome, stony riverbed between Pont-de-Barret and Manas, August 24, 2010, 30 °C. Recordings and diagrams Baudewijn Odé. **Fig. 20.** Records of *Pteronemobius heydenii* in Portugal. **Fig. 21.** *Tetrix bipunctata kraussi*, female from NP Alvao, 5 km SE of Ermelo, July 9, 2015. Photo Roy Kleukers. **Fig. 22.** *Tetrix bipunctata kraussi*, characters. A. Pronotum high, B. Hindwing short, C. Antenna short, D. Front edge of pronotum and head pointed. Female from NP Alvao, 5 km SE of Ermelo, July 9, 2015. Photo Roy Kleukers. **Fig. 23.** Records of *Tetrix bipunctata kraussi* in the Iberian Peninsula.





29



◀ **Fig. 24.** *Sphingonotus nodulosus*, female and male from Coruche, September 1, 2013. Photo Paulo Lemos. **Fig. 25.** Distribution of *Sphingonotus nodulosus* in Portugal. **Fig. 26.** *Stenobothrus grammicus*, male from Penhas da Saúde, July 7, 2015. Photo Roy Kleukers. **Fig. 27.** *Stenobothrus grammicus*, female from Cortes do Meio, August 10, 2015. Photo Paulo Lemos. **Fig. 28.** Records of *Stenobothrus grammicus* in Portugal. **Fig. 29.** Oscillogram (10 s) of calling song of *Stenobothrus grammicus*, Serra da Estrela, W of Penhas da Saúde, July 7, 2015, 35°C. Diagram Baudewijn Odé. **Fig. 30.** *Stenobothrus bolivarii*, male from Penhas Dourades, July 8, 2015. Photo Roy Kleukers. **Fig. 31.** Records of *Stenobothrus bolivarii* in Portugal.



▲ **Fig. 32.** Records of *Omocestus viridulus kaestneri* in Portugal. Star: new record. **Fig. 33.** *Omocestus viridulus kaestneri*, female from Castro Laboreiro, September 30, 2012. Photo Paulo Lemos.

of Portugal, which is under threat, especially by building projects. For example the population in Vale de Janelas is threatened by a new touristic resort. It will be very important to protect this very rare grasshopper. The species has been recently assessed for the IUCN red list as Endangered (pers. comm. Axel Hochkirch). When potential harmful activities are planned in the areas where *S. nodulosus* occurs, local government should take the effect on the populations into account. See Lemos (in press) for more information on the local threats of this Iberian endemic.

● *Stenobothrus grammicus*

New to Portugal

NEW RECORDS. 6 males and 2 females, 7-VII-2015, Serra da Estrela, W of Penhas da Saúde (district Castelo Branco), N40.30544, W07.56759; alt. 1570 m, R. Kleukers, B. Odé, & L. Willemse *leg.*, col. Naturalis Leiden (RMNH5009713, 5009716, 5015036 (sound recording, fig. 29), 5009708); 9-IX-2014, Cortes do Meio (district Castelo Branco), N40.294928, W7.579424, P. Lemos (photo); 10-VIII-2015, Cortes do Meio (district Castelo Branco), N40.308301, W7.576713, P. Lemos (photo, fig. 27).

We present here the first records of *S. grammicus* for Portugal (fig. 28). The males can be recognised in the field by the rather incurved pronotal keels and clubshaped tips of the antennae (fig. 26). The tip of the palps are black in both sexes (fig. 26, 27). The specimens at Serra da Estrela were found at a rocky mountain side, at high altitude.

● *Stenobothrus bolivarii*

NEW RECORDS. 1 male, 5-VII-2015, Prados (district Guarda), N40.549525, W7.365510, R. Kleukers, B. Odé, & L. Willemse *leg.*, col. Naturalis Leiden (foto) (RMNH5015037); 2 males, 6-VII-2015, Nave de Santo Antonio (district Guarda), N40.312642, W7.580583, R. Kleukers, B. Odé, & L. Willem-

se *leg.*, Naturalis Leiden (RMNH50009698); 3 males, 8-VII-2015, Penhas Dourades (district Guarda), N40.412508, W7.568135, 1400 m, R. Kleukers, B. Odé, & L. Willemse *leg.*, col. Naturalis Leiden (video) (RMNH5015029, 5015031, 5015032).

The dot on the distribution map in the surroundings of Serra da Estrela (Clemente *et al.*, 1989) is the only published record we found for this species in Portugal. However, no details on this record are given and the species is not indicated specifically for Portugal. We present here the first documented records of *S. bolivarii* for Portugal (fig. 31). We made a short video of a singing male (www.youtube.com/watch?v=aB_Y2M4JuLw). The recording of the song is not clear enough to be analysed in depth, but the song clearly places the male in the group of *S. grammicus*, which comprises only *S. grammicus* and *S. bolivarii* (Berger, 2008). *Stenobothrus grammicus* can be recognised by the widened, blacktipped palps and the widened tips of the antennae. The last segment of the palps of the studied males are widened, but with an orange colour (fig. 30) and the tips of the antennae are not widened.

● *Omocestus viridulus kaestneri*

NEW RECORDS. 29-IX-2012, Castro Laboreiro (district Viana do Castelo), N42.039216, W8.155912, P. Lemos (photo, fig. 32).

In the distribution map of *Omocestus viridulus* in Clemente *et al.* (1990), a dot is indicated in the northernmost district Viana do Castelo (although in the text only Spanish localities are mentioned). This dot is the only reference to the presence of *Omocestus viridulus* in Portugal, without any further details on the locality. We present here a recent locality for *O. viridulus* (Iberian subspecies *kaestneri*), confirming that the taxon is present in Portugal (fig. 33).

Discussion

In this paper several interesting new records for the Portuguese Orthoptera fauna are summarised. It is quite remarkable that six new species could be found. This is an indication that much remains to be discovered in Portugal. We expect that especially in the Ephemeroptera and Grylloidea several new species to the fauna and even to science can be found in Portugal.

Acknowledgements

We thank Luc Willemsse for his help with this paper. Hendrik Devriese provided information on *Tetrix bipunctata* in the Iberian Peninsula and confirmed the identification. Sonia Ferreira was very helpful in the organisation of the field trip of Baudewijn Odé, Luc Willemsse and Roy Kleukers in 2015. Dirk Berger helped with the identification of *Stenobothrus bolivarii*. We thank Marina Sequeira (Instituto da Conservação da Natureza e das Florestas) for the permission to collect voucher specimens for our research.

Bibliography

- BARRANCO, P. 2005. Description of *Cyrtaspis tuberculata* sp. nov. (Orthoptera, Tettigoniidae, Meconematidae) from Spain. *Boletín de la Asociación Española de Entomología*, **29**(3-4): 35-40.
- BERGER, D. 2008. *The evolution of complex courtship songs in the genus Stenobothrus Fischer, 1853 (Orthoptera, Caelifera, Gomphocerinae)*. Thesis, Friedrich-Alexander-Universität, Erlangen-Nürnberg.
- CLEMENTE, M.E., M.D. GARCÍA & J.J. PRESA 1989. Los Gomphocerinae de la península Ibérica: I. *Stenobothrus* Fischer, 1853 y *Myrmeleotettix* Bolívar, 1914. *Graellsia*, **45**: 35-74.
- CLEMENTE, M.E., M.D. GARCÍA & J.J. PRESA 1990. Los Gomphocerinae de la península Ibérica: II. *Omocestus* Bolívar, 1878. (Insecta, Orthoptera, Caelifera). *Graellsia*, **46**: 191-246.
- CORDERO, P.J., V. LLORENTE, P. CORDERO & J. ORTEGO 2009. Recognizing taxonomic units in the field - The case of the crickets *Oecanthus dulcisonans* Gorochoff 1993, and *O. pellucens* (Scopoli, 1763) (Orthoptera: Gryllidae): implications for their distribution and conservation in southern Europe. *Zootaxa*, **2284**: 63-68.
- DEVRIESE, H. 1996. Bijdrage tot de systematiek, morfologie en biologie van de West-Palearktische Tettigoniidae. *Nieuwsbrief Saltabel*, **15**: 1-38.
- FERREIRA, S.A.F. 2007. On the grasshoppers and crickets of Douro Internacional Park, Portugal (Orthoptera). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **40**: 441-444 (*).
- FERREIRA, S.A.F. 2009. Revisão da fauna da Superfamília Grylloidea (Insecta, Orthoptera, Ensifera) de Portugal continental. Dissertation Faculdade de Ciências da Universidade do Porto.
- FERREIRA, S.A.F. & J.M. GROSSO-SILVA 2008a. *Petaloptila (Petaloptila) fermini* Gorochoff & Llorente, 2001, new species to Portugal (Orthoptera, Gryllidae). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **43**: 389-390 (*).
- FERREIRA, S.A.F. & J.M. GROSSO-SILVA 2008b. Confirmation of the occurrence of *Gryllomorpha uclensis* Pantel, 1890 in Portugal (Orthoptera, Gryllidae). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **42**: 384 (*).
- FERREIRA, S.A.F. & J.M. GROSSO-SILVA 2008c. On the true identity of the Portuguese specimens of *Mogoplistes brunneus* Serville, 1839 (Orthoptera, Mogoplistidae). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **43**: 325-326 (*).
- FERREIRA, S., J.M. GROSSO-SILVA, P. SOUSA & P. SOARES-VIEIRA 2006. Contribution to the knowledge of the Tettigoniidae (Orthoptera) in continental Portugal. *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **38**: 141-144 (*).
- FERREIRA, S.A.F., J.M. GROSSO-SILVA & P. SOARES-VIEIRA 2007. New and interesting grasshopper and cricket (Orthoptera) records from the fauna of Peneda-Gerês National Park (north-western Portugal). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **40**: 309-312 (*).
- FERREIRA, S.A.F., J.M. GROSSO-SILVA, A. ESPIRIDIANO DE OLIVEIRA & M.O. MIRALTO 2008. *Gryllotalpa africana* Palisot de Beauvois, 1805, new species for Portugal (Orthoptera, Gryllotalpidae). *Boletín de la Asociación Española de Entomología*, **32** (1-2): 179-181.
- FERREIRA, S., A. ESPIRIDIANO DE OLIVEIRA & M.O. MIRALTO 2009. On the family Meconematidae in continental Portugal (Orthoptera). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **44**: 477-479 (*).
- GOROCHOV, A.V. 1993. Grylloidea (Orthoptera) of Saudi Arabia and adjacent countries. *Fauna of Saudi Arabia*, **13**: 79-97.
- HERRERA MESA, L. & J.A. LARUMBE 1992. Distribución de los tettigónidos en Cantabria (España) (Orthoptera: Tettigoniidae). *Boletín de la Real Sociedad Española de Historia Natural Sección Biológica*, **88**: 39-48.
- HUSEMANN M., D. LLUCIA-POMARES & A. HOCHKIRCH. 2013. A review of the Iberian Spingonotini with description of two novel species (Orthoptera: Acrididae: Oedipodinae). *Zoological Journal of the Linnean Society*, **168**(1): 29-60.
- LEMONS, P. (in press). The nodulose sand grasshopper (*Spingonotus nodulosus*) under threat. *Newshopper*.
- LLORENTE, V. & J.J. PRESA 1981. Los Tettigoniidae de la Península Ibérica. *Eos*, **57**: 127-152.
- LLUCIA-POMARES, D. & J. QUINONES-ALARCÓN 2013. Nueva aportación al conocimiento de los Meconematinae Burmeister, 1838 (Orthoptera: Tettigoniidae) de la península Ibérica. *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **53**: 7-30 (*).
- LOCK, K. 1999. Contribution to the knowledge of the Portuguese grasshoppers. *Boletín de la Asociación Española de Entomología*, **23**(1-2): 315-324.
- MIRANDA-ARABOLAZA, M. J. & P. BARRANCO 2005. Os Orthopteros da Bacia do Rio Sabor (Tras-os-Montes e Alto Douro, Portugal) (Insecta, Orthoptera). *Boletín de la Sociedad Entomológica Aragonesa (S.E.A.)*, **37**: 173-200 (*).
- ODÉ, B., R. KLEUKERS, L. FORBICINI, B. MASSA, C. ROESTI, E. BOITIER & Y. BRAUD 2011. In search of the most mysterious orthopteran of Europe: the reed cricket *Natula averni* (Orthoptera: Gryllidae). *Articulata*, **26**(1): 51-65.
- PASCUAL, F. 1978. Estudio preliminar de los Orthopteros de Sierra Nevada, I: Introducción general e inventario de especies. *Boletín de la Asociación Española de Entomología*, **1**: 163-175.
- PFAU, H.K. 1986. Morphologie und Stridulation von Metrioptera ambigua nov. spec. aus Nordwestspanien, im Vergleich zu nahestehenden Arten (Insecta: Ensifera). *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)* **389**: 1-10.
- SCHMIDT, G.H., A.P. MARTINHO & M.R. PAIVA 2009. The saltoppteran fauna of Portugal: new records and biogeographical aspects (Orthopteroidea). *Fragmenta Entomologica*, **41**(1): 15-67.

(* Available www.sea-entomologia.org)