

Systematic status and distribution of *Eupholidoptera* (Orthoptera: Tettigoniidae) in the Balkans (north of Central Greece)

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Abstract

The genus *Eupholidoptera* occurs with about 50 species in the central and eastern Mediterranean area. In the southeastern part of its range most species can be easily separated morphologically. This is, however, not the case in the north-western part. In the Balkan Peninsula north of 39 degree of latitude nine forms have been described or recorded, some of which with unclear status. By comparing a large material (including some holotypes) from several museums and collections it became evident that in this area only three species occur, *E. smyrnensis*, *E. megastyla* and *E. chabrieri*. Within the last species a high morphological variability can be observed. The clear differences between local forms cannot be used to define separate species because they are connected by intermediate forms. In addition, a map of all known localities of this genus in the study area is presented.

Zusammenfassung

Die Gattung *Eupholidoptera* ist mit etwa 50 Arten in mittleren und östlichen Mittelmeerraum verbreitet. Während die meisten Arten im Osten, dem Verbreitungsschwerpunkt der Gattung, morphologisch gut unterscheidbar sind, gilt dies nicht für den Westen des Verbreitungsgebiets. So wurden allein von der Balkanhalbinsel nördlich des 39. Breitengrades neun Formen beschrieben bzw. nachgewiesen, deren Status jedoch z.T. unklar ist. Im Vergleich eines großen Materials (einschließlich mehrerer Holotypen) aus mehreren Museen und Sammlungen zeigt sich, dass im Gebiet nur drei Arten vorkommen, *E. smyrnensis*, *E. megastyla* und *E. chabrieri*. Die letztgenannte Art weist eine große morphologische Variabilität auf, die sich aber aufgrund des häufigen Auftretens intermediärer Formen nicht zur Abgrenzung distinkter Formen eignet. Zusätzlich geben wir eine Übersicht aller bisher bekannten Fundpunkte der Gattung in diesem Gebiet.

Introduction

The genus *Eupholidoptera* Maran, 1953 is distributed in the northern part of the mediterranean area excluding Iberia and south-western France. Most of the species are endemic to Greece and Turkey (HARZ 1969, SALMAN 1983, WILLEMSE 1980, 1984, 1985, CIPLAK et al. 1999, HELLER et al. 1998) and are morphologically well defined. However, in parts of the European mainland (Italy, Balkan) the situation is much less clear. In France, at the western edge of the distribution of the genus, only *E. chabrieri* occurs, the type species of the genus. In Italy, the situation is more complex. LA GRECA (1959) subdivided the Italian *Eupholidop-*

tera in 3 species (*E. garganica* La Greca, *E. hesperica* La Greca, *E. danconai* La Greca) and 4 subspecies (*E. chabrieri chabrieri*, *E. chabrieri schmidti*, *E. chabrieri bimucronata* and *E. chabrieri magnifica*). WILLEMSE (1980) synonymised *E. danconai* with *E. megastyla* (at the east side of the Adriatic and Ionian sea) and all others (except *E. hesperica*) with *E. chabrieri*. Later, MASSA (1999) and RUFFO & STOCH (2005) suggested all these forms to be distinct species. However, many of them are in any case very closely related to *E. chabrieri*. *E. hesperica* and *E. danconai* obviously both have their closest relatives in Greece (CIPLAK et al. in prep.).

In the Balkans north of Greece the case is even more difficult. ADAMOVIC (1972) described three subspecies of *E. chabrieri* from former Yugoslavia (*E. chabrieri usi* - N Adriatic Islands; *E. chabrieri galvagnii* - Hercegovina and Montenegro; *E. chabrieri kaltenbachi* - Serbia and N. Macedonia). Furthermore PESHEV (1960, 1962) added two species, *E. beybienkoi* and *E. marani*, from Bulgaria. All forms of Adamovic were synonymized with *E. chabrieri* by WILLEMSE (1980). He demonstrated that the diagnostic characters of these forms are highly variable with clinal transitions. However, the status of the Bulgarian species is unsolved.

To establish an exact list of the Balkan species and their distribution, we examined the type specimens of these Bulgarian taxa and tried to find all data on the distribution of the species occurring in this region. All of these forms were described according to the morphology. Although the songs of these forms are known, a character source widely used for species distinction in Orthoptera, they are not useful in identification of this *Eupholidoptera* species/subspecies group (CIPLAK et al. in prep.). Thus, it is necessary to state some assumptions to be used in the taxonomical decisions of the Balkan *Eupholidoptera*. Since songs are not helpful there should be at least a unique and invariable morphological autapomorphy that defines a species/subspecies or indicates independent inbreeding units. If not or if there are populations that show intermediate character states (or if there is a clinal tendency) then such forms should be considered as geographical races only.

Methods

We studied and compared the material available in NHM: The Natural History Museum, London, UK; ZMB: Zoologisches Museum der Humboldt University in Berlin, Germany; NMW: Naturhistorisches Museum in Wien, Austria; Hungarian Natural History Museum, Budapest, Hungaria; National Museum of Natural History, Sofia, Bulgaria; MMNH: Macedonian Museum of Natural History, Skopje, Macedonia; CC: Collectio Chobanov; CH: Collectio Heller and CW: Collectio Willemse. Most records from these museums and collections have been already published, many of them even several times (see References). In the appendix we give information on the unpublished records only.

The area we were interested in covers all Balkan countries (including the European part of Turkey) up to Croatia and Slovenia in the north. In the south we excluded the parts of Greece situated south of the Amvrahikos Gulf (= 39 degrees northern latitude). South of this latitude *E. chabrieri* has not been found.

To produce distribution maps we additionally checked all available papers from the area, which are dealing with Orthoptera. Those references containing information on *Eupholidoptera* are listed in the references. The geographic coordinates from the respective localities with *Eupholidoptera* records were determined. Only the data from RUFFO & STOCH (2005) were transferred directly from the map presented there.

Results and Discussion

From the area we studied the following forms have been known or have been reported:

Eupholidoptera chabrieri (Charpentier, 1825)

E. chabrieri schmidtii (Fieber, 1861)

E. chabrieri galvagnii Adamovic, 1972

E. chabrieri kaltenbachii Adamovic, 1972

E. chabrieri usi Adamovic, 1972

E. garganica La Greca, 1959

E. marani Peshev, 1960 (original spelling *mařani*; corrected according to ICZN Art. 32.5.2.3)

E. beybienkoi Peshev, 1962 (original spelling *bey-bienkoi*; corrected according to ICZN Art. 32.5.2.3)

E. megastyla (Ramme, 1939)

E. smyrnensis (Brunner von Wattenwyl, 1882)

Details about the synonymy of the species can be found in WILLEMSE (1980) and OSF (2007; *E. marani* mis-spelled as *E. makani*).

The species *E. epirotica* (Ramme, 1927) was mentioned from Korfu and northern Epirus, but these records are considered as doubtful (WILLEMSE & WILLEMSE 2004).

The distribution of *E. smyrnensis* (known also from Aegean part of Anatolia and some Greek islands) and *E. megastyla* (known mainly from Greek mainland) outside the region is not covered. However, we present all known distribution data of the form *garganica* in Italy. Some specimens from Croatia and Albania in NHM are labelled as *Eupholidoptera chabrieri bimucronata*. Since these specimens show characteristics of the endemic Sicilian population (or subspecies), probably there has been a confusion of the labels.

Comparing these species, *Eupholidoptera smyrnensis* differs distinctly from all others. It can be easily distinguished by the long spine-like and laterally located processes of the male anal tergum (see WILLEMSE 1985). It occurs in the south-eastern Balkans (Fig. 1). One record of an unidentified *Eupholidoptera* species by PESHEV (1974) near to the border between Bulgaria and Turkey is omitted. We (D.C.) have not found any specimens of the genus *Eupholidoptera* from this region in the collection of NMNH, but there are 2 male and 1 female nymphs of *Parapholidoptera castaneoviridis* (Brunner von Wattenwyl, 1882) from same locality and date (16.06.1963, Peshev leg.) as in the paper (see PESHEV & DJINGOVA 1974), while the latter species is not mentioned (misidentification?).

E. smyrnensis is morphologically quite constant over its whole range from Europe (including some Aegean islands) to Anatolia and its presence in Europe is suggested to be a result of a recent postglacial expansion from Anatolia (CIPLAK et al. in prep.).

From the other Balkan forms *E. megastyla* is clearly separated by its titillators, which show narrow and long apical parts, the tips parallel and close together (see WILLEMSE 1985). It occurs also in the southern parts of the Greek mainland (see WILLEMSE 1984). All other Balkan forms show characteristics of *E. chabrieri* and are closely related.

The characters used to distinguish the members in the *E. chabrieri* complex are the length, the curvature and the divergence of the apical arms of the titillator, length of the lateral expansions of the titillator and the number and length of spines of the male subgenital plate. However, some of these characters are quite variable, even among specimens from the same locality. Thus, they are not valid to diagnose the species. The curved unfused parts of the arms of titillators are typical for two populations, one in Gargano peninsula in Italy and the other at the opposite side of the Adriatic Sea (north-western Balkan coasts and island of Kerkira (Greece)). Obviously these two populations are quite similar in this character. Additionally, the titillators are quite large in these two populations. Thus, this may be a characteristic of the ancestor of these populations before their separation. The non-curved or almost straight unfused parts of apical arms is typical for the other forms of the *E. chabrieri* complex, especially the populations in the north-west part of its range (typical *E. chabrieri*) while that in the north-east part is weakly curved (typical *E. schmidtii*). However, *E. chabrieri usi*, *E. chabrieri galvagnii* and *E. chabrieri kaltenbachi* show intermediate characteristics of large titillators (between *garganica* and *schmidtii*) and more or less curved unfused part of apical arms. Since these intermediate forms are present in many places of the Balkans, the occurrence of a very broad hybrid zone between the two most divergent populations needs to be tested. Inferring from these data we conclude that the curvature of the apical arms of the titillators does not sufficiently diagnose these forms. Another character state used in previous studies to diagnose species/subspecies, though it is not unique, is the parallel unfused part of the apical arms, assumed to define *E. chabrieri chabrieri* while it diverges in *E. chabrieri schmidtii*. However, it seems that there is a clinal tendency in respect to this character, the divergent type being common (not unique) in the east and the parallel/convergent type being common in the west of the range of *E. chabrieri*. Since there is no clear gap between the two states we suggest it to be intra-specific variation and not to be used in defining species. Other characters used in the previous studies such as width of lateral expansions of the apical arms and the number of spines on the caudal margin of male subgenital plate are also variable. Especially the second is not only variable between populations but also from the right lobe to the left lobe within one individual. Thus, from this perspective all remaining forms together can at present be best considered to be a single variable species, *E. chabrieri*. Further, both Bulgarian forms, *E. marani* and *E. beybienkoi*, were diagnosed according to the above mentioned characters and

cannot be distinguished from *E. chabrieri*. Compared to previously described forms, they are quite similar to *E. chabrieri schmidtii* (terra typica Istra, Croatia).

Thus, in agreement with WILLEMSE (1980) all Balkan forms of the *E. chabrieri* complex are considered to be a single species (Fig. 1). From this conclusion the following species are listed for the Balkans (north of Central Greece).

- 1) *Eupholidoptera chabrieri* (Charpentier, 1825)
Eupholidoptera beybienkoi Peshev, 1962 **syn. n.**
Eupholidoptera marani Peshev, 1960 **syn. n.**
- 2) *Eupholidoptera megastyla* (Ramme, 1939)
- 3) *Eupholidoptera smyrnensis* (Brunner von Wattenwyl, 1882)

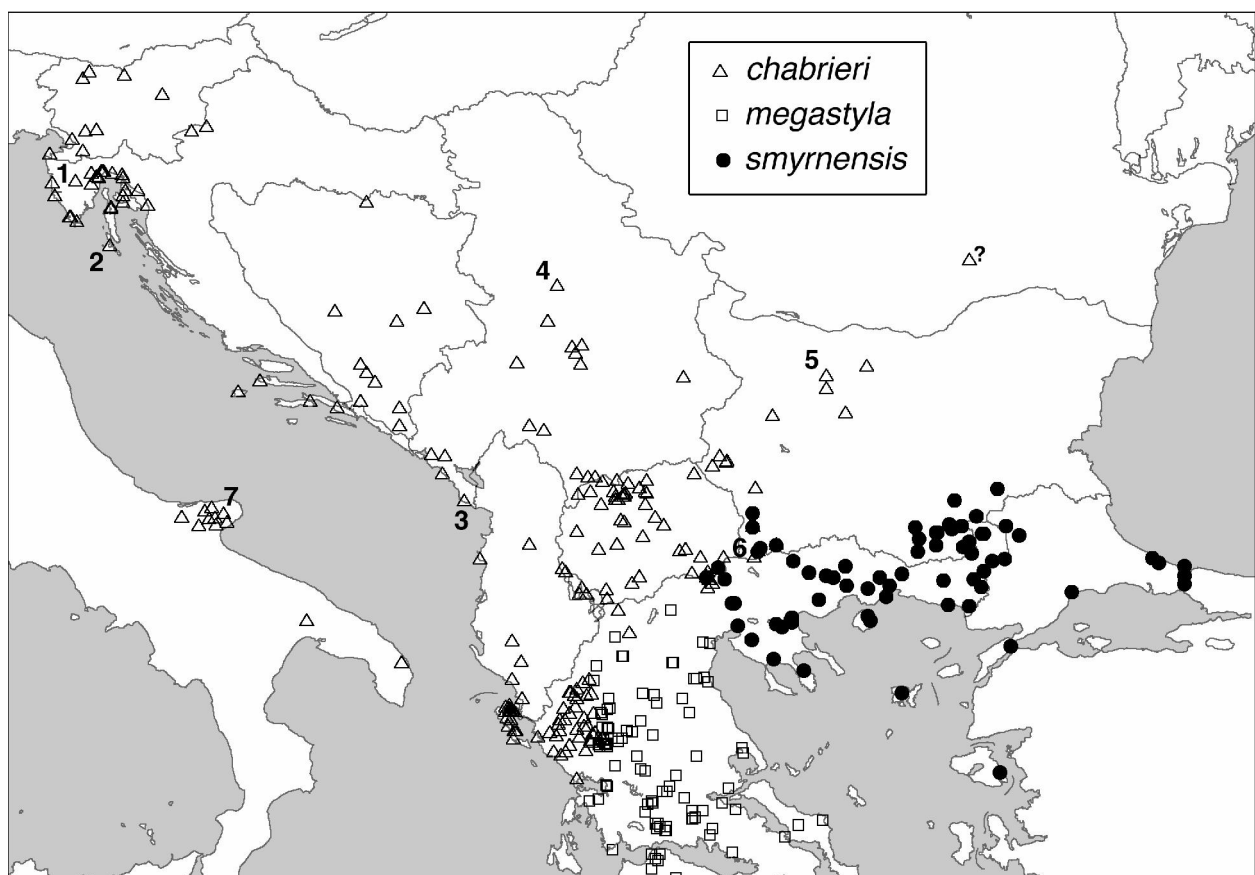


Fig. 1: Distribution of *Eupholidoptera chabrieri*, *E. smyrnensis* and *E. megastyla* in the Balkans (including "garganica" in Italy). The type localities of the different *chabrieri* forms are marked by numbers: 1 *schmidtii*, 2 *usi*, 3 *galvagnii*, 4 *kaltenbachii*, 5 *beybienkoi*, 6 *marani*, 7 *garganica*.

At present, we do not recognize any subspecies. Subspecies definitions may be possible, but will require closer examination of these populations using genetic or more inclusive morphological (e.g. morphometry) data. The different described forms can mostly be recognised in toptotypical specimens, but are commonly connected by clinal variation (NADIG 1985; CIPLAK et al. in prep.).

E. chabrieri is the most widespread species of the genus and its range covers the central part of southern Europe including some western Mediterranean islands. Though it has a large range and some geographical races have been described, there are no distinct autapomorphic differences that can be used in diagnosing separate species. We assume that the enlargement of its range has been very recent, during the Pleistocene in either the last or in previous interglacials. However, since the species is found in Sicily, Corsica and Sardinia, the range expansion has probably occurred when terrestrial connections between the mainland and these islands were provided during glacial maxima, when sea level decreased (for geological statements see KALLEL et al. 2000). The presence of *E. chabrieri* in France, Switzerland, Northern Balkans and Bulgaria is probably the result of a range expansion during the last warm period.

Examining the distribution in the map, surprisingly a broad area without records is found in Croatia. It probably results from low collecting efforts in this area, but should be checked in future studies. There are no indications for other irregularities in the distribution. However, even different species are not separated by gaps or geographical borders that could be recognised easily. As it is typical for *Eupholidoptera* (CIPLAK et al. in prep.), different species are mostly allo- or parapatrically distributed. The species are probably ecologically so similar that they normally are not able to co-exist in one place. Therefore the sympatric occurrence of *E. smyrnensis* and *E. chabrieri* in southwestern Bulgaria and surroundings (Fig. 2) deserves special mention. First described by PAVICEVIC (1983) for Macedonia, now more data are available (see Appendix) with both species captured together in pit-fall traps. It will be interesting to study the ecology and behaviour of both species in this area to understand their probably subtle differences.

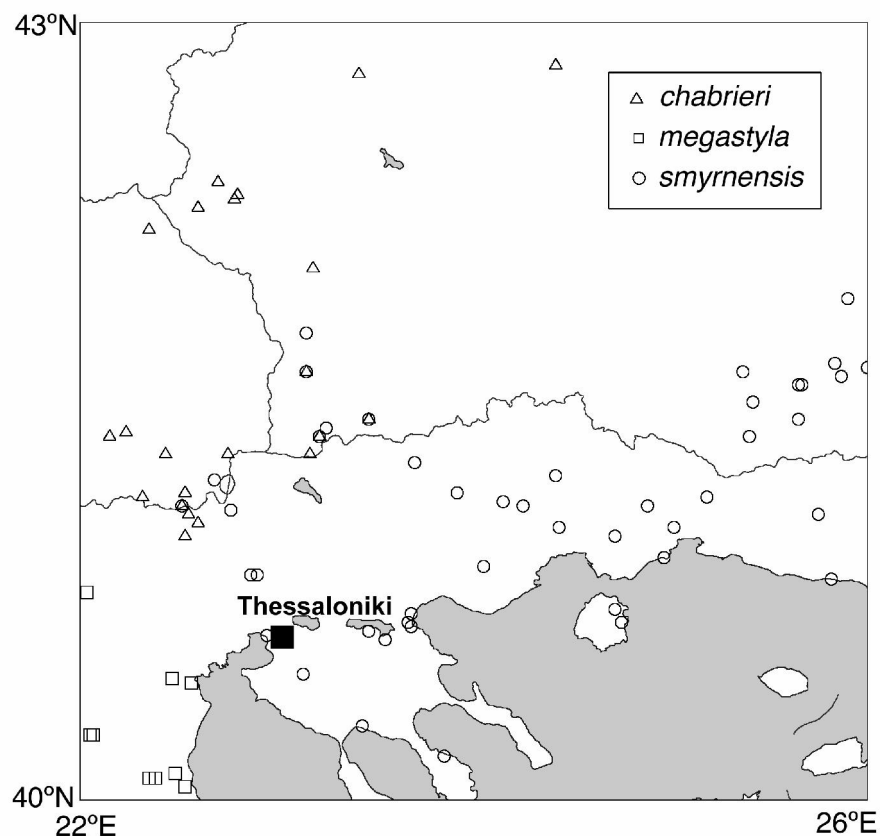


Fig. 2:
Contact area of *Eupholidoptera chabrieri* and *E. smyrnensis*.

Acknowledgements

We are very grateful to Dr. Alexi Popov, National Museum of Natural History, Sofia, for the possibility to examine the types of *E. marani* and *E. beybienkoi*. In addition, we thank Dr. Branislava Mihajlova from MMNH for her help with the collection and Roy Kleukers for his help with the Italian localities. Research visits of Battal Ciplak to NHM and ZMB were supported by the EU-Infrastructure SYNTHESYS (GB-TAF and DE-TAF respectively). During these visits Dr Michael Ohl, Isolde Dorandt and Silke Kays from ZMB, and Dr George Beccaloni and Judith Marshall from NHM provided a great help and all facilities for his work.

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Appendix: Unpublished localities

Eupholidoptera chabrieri

ALBANIA; 1 ♀, Mat county, Mat gorge, Vashës bridge, bush around a sidespring of River Mat at the confluence of Stream Gurri i Bardhit, 350m, N41°28'03.3" E20°06'16.8", 09.10.2004, leg. Z. Fehér, J. Kontschán, D. Murányi, Museum Budapest; 2 ♀♀, Tepelenë county, 1km SW of Bencë, dry grassland along the road from Tepelenë to Progonat, 270m, N 40°14'57.0" E 19°59'38.3", 11.10.2004, leg. Z. Fehér, J. Kontschán, D. Murányi, Museum Budapest;

BULGARIA: 1 ♂, Predbalkan Mountain range, near Zlatna Panega Vill. (Lovech distr., Yablanitsa municipality), 26.07.2005, leg. D. Chobanov; 2 ♂♂, Sofia Plain, Voinegovtsi Vill. (Sofia distr. and municipality) (42°48'N, 23°25'E), 1-30 ix 1997, leg. I. Stoimenov.; 2 ♂♂, Strouma Valley, Zemen gorge, Razhdavitsa Vill. (Kyustendil distr. and municipality), 12.09.1999, leg. D. Chobanov; 1 ♀, Lisets Mt., "Kyustendil" forestry (Kyustendil distr. and municipality), 5.vii.2003, photo D. Doychev; 4 ♂♂, 2 ♀♀, 1 ♂ & 1 ♀ nymphs, Strouma Valley, 2 km S of Kamenitsa Vill. (Blagoevgrad distr., Stroumyani municipality), 170-240 m alt., v.-x.2002, 2003, pitfall & tree traps, leg. D. Chobanov, N. Simov, M. Langourov & S. Beshkov; 1 ♂, Belasitsa Mt., Belasitsa hostel above Petrich (Blagoevgrad distr.), 700 m alt., 6.x.2001, leg. D. Chobanov; 10 ♂♂, 13 ♀♀, 13 ♂♂ & 9 ♀♀ nymphs, Pirin Mts, Kalimantsi Vill. (Blagoevgrad distr., Sandanski municipality), 450-510 m, v.-x.2002, 2003, leg. M. Langourov, D. Chobanov & N. Simov;

CROATIA; 1 ♂, 1 ♀, Primorsko-goranska zupanija, Otok Krk, Draga Bascanska, young pine forest, 12.vii.2005, leg. Otto Merckl (topotype *chabrieri us*); 1 ♂, 1 ♀, Primorsko-goranska iupanija, Krk Island, Draga Ba æanska, young pine forest, 12.07.2005, leg. O. Merckl, Museum Budapest; 1 ♂, Abbazia (old name of Opatija, Croatia), 10.1900, *Thamnotrizon chabrieri* Charp., det. Kuthy; 2 ♂♂, 1 ♀, Krk Island, Dobrnij (probably Dobrinj), 05-10.09.1965, leg. J.Fernbach; 1 ♀, Samobor b. Zagreb, 8.1929 (W. Ramme), ZMB; 1 ♂, Senj (Adria), Ende, 4-500 m, 8.1929 (W.Ramme), ZMB; 1 ♂, Zengg (Senj), 1912 (M. Padevieth), ZMB;

GREECE; Ioannina: 1 ♀, Mt.Mitsikeli between Kavalari & Anthracitis, 680m, 9.vii.2001, F. Willemse; 1 ♂, 1 ♀, Mt.Mitsikeli, 2 km E of Potamia, 520m, WGS84 N 39°42'58.2" E 020°58'24.7", 9.vii.2001, F. Willemse; 1 ♂, Vitsa (Mt.Timfi), 1000m, 16.vii.2003, P. Fontana, R. Kleukers & F. Willemse; 9 ♂♂, 4 ♀♀, 4 km W of Aisti, 700 m, F. Willemse, 29.vi.1986; 4 ♂♂, 3 ♀♀, 750 m, 14.vii.2000, F. Willemse; 3 ♂♂, 2 ♀♀, 2 km E of Vrosina, WGS84 N 39°38'58.8" E 20°31'29.4", 11.vii.2002, D. & L. & F. Willemse; 4 ♂♂, Mt.Tomaros above Varyiadhes, 1250-1450 m, WGS84 N 39°28'18.4" E 020°47'02.8" [parking site], mountain slopes, 11-12.viii.2004, D. & E. & J. & L. Willemse & T. Blauw; 1 ♂, 10 km S of Ioannina, road side, 11.viii.2004, J. Willemse; 7 ♂♂, 1 ♀, Hotel in village of Kotstisi, halfway betw. Serviana & Pramanda, 26-27.vii.2003, D. & E. & J. & L. & F. Willemse & T. Blauw & 12.viii.2004, Doke & Stijn Willemse; 2 ♂♂, 1 ♀, 6 km N of Skilvani, 530 m, (NW side Mt.Xerovouni), WGS84 N 39°26'23.8" E 020°56'11.3", 11.viii.2004, D. & F. & J. & L. Willemse & T. Blauw; 2 ♂♂, Skilvani, W side of Mt. Xerovouni, 680 m, WGS84 N 39°25'22.7" E 020°56'51.8", 11.viii.2004, D. & F. & J. & L. Willemse & T. Blauw; 1 ♂, 1 km north of Klimatia (20° 39' E, 39° 43' N), coll. A. Vedenin; 2 ♂♂, Dodona (20° 45' E, 39° 33' N), coll. Heller & Volleth; 1 ♂, Ioannina, Campingplatz am See (20° 51' E, 39° 40' N), coll. Heller; 1 ♂, Timfi-Geb. (20° 53' E, 39° 54' N), coll. Heller; 1 ♂, Timfi-Geb. 5 km NW of Monodendron, above Vikos-Schlucht (20° 43' E, 39° 54' N), coll. K.-G. & M. Heller; Thesprotia: 4 ♂♂, 2 ♀♀, Mt.Soulion, 900-1100 m & surr. Gliki, 12 & 13.vii.1986. L. Willemse; 2 ♂♂, 2 ♀♀, 2 km W of Koritiani near Thiamis river, 25 m, 8.vii.2001, WGS84 N 39°30'59.5" E 020°22'37.0", F. Willemse; 2 ♂♂, Mt. Chionistra, 1400-1600 m, above Elataria, N. of Paramithia, WGS84 N 39°31'31.1" E 020°30'35.1", rocky slopes, 25.vii.2003, D. & E. & J. & L. & F. Willemse & T. Blauw; 2 ♂♂, lake Paramithia, road from Kefalovriso to Grika, 440 m, WGS84 N 39°28'55.4" E 020°28'04.2", 24.vii.2003, D. & E. & J. & L. & F. Willemse & T. Blauw; 1 ♂ lake near Morfio (E of Parga), 24.vii.2003, D. & E. & J. & L. & F. Willemse & T. Blauw; 1 ♂, 1 ♀, 11-12 km W of Vrosina, 620 m, WGS84 N 39° 36'18" E 20°29'45", pass, 11.vii.2002, D. & L. & F. Willemse; 2 ♂♂, 3 ♀♀, 1 km W of Koritiani, WGS84 N 39°30'59" E 020°22'35", 11.vii.2002, D. & L. & F. Willemse; Kilkis: 1 ♂, Platania, 4 km N of Axioupolis, 100 m, 9.vii.1987, F. Willemse; Kerkyra: 1 ♂, 1 km west of Zigos (19° 47' E, 39° 44' N), coll. K.-G. & M. Heller; 3 ♂♂, 1 ♀, above Spartilas

(19° 50' E, 39° 44' N), coll. K.-G. & M. Heller; 4 ♂♂, 2 ♀♀, near Agios Spiridon (in the north of Kerkyra) (19° 50' E, 39° 48' N), elev. 5 m, coll. K.-G. & M. Heller; 1 ♂, Roda (camp site) (19° 47' E, 39° 47' N), elev. 5 m, coll. K.-G. & M. Heller;

MACEDONIA: 1 ♂ (collected as nymph), Bistra Mt., above Lazaropole vill., 1800 m alt., subalpine shrub vegetation (*Juniperus communis sibirica* etc.), 2.viii.2004, leg. D. Chobanov, CC.; 1 ♂, 2 ♀♀, Galichica Mt., Elšani Vill., 900 m alt., 14.vii.2003, leg. L. Stefanov, CC.; 1 ♂, 1 ♀, Galichica Mt., above Leskoec Vill., 1050 m alt., xerophyte coppices of *Quercus* sp., *Q. trojana*, 16.ix.2001, leg. D. Chobanov, CC.; 1 ♂, Ivanje (Osoj) Mt., above Matka gorge, ~800 m alt., xerophyte scrub, 8.vii.2004, obs. D. Chobanov.; 1 ♀, Treska River valley, Matka Gorge, 11.viii.1957, coll. FNSM (Faculty of Natural Sciences and Mathematics, Skopje); 1 ♀, Vodno Mt., above Nerezi Vill., 600-700 m alt., 25.vii.2004, leg. D. Chobanov; 1 ♂, Jakupica Mt., 11., 17.-19.vii.1999, between Nezhilovo Vill. And Cheples chalet, 700-1400 m alt., leg. D. Chobanov; Nymphs observed, Kozhuf Mt., between Konsko and Uma Vill., 700-750 m alt., 17.vii.2004, obs. D. Chobanov; 1 ♂, Gradishtanska Planina Mt., Crni Vrv Peak near Katlanovo Vill., 400-750 m alt., 22.vii.1971, leg. Chingovski, coll. (MMNH); 1 ♀, other specimen observed, Slan Dol Region, NE of Bekirlija Vill. along Bregalnica River, 170 m alt., 30., 31.vii.2004, leg. et obs. D. Chobanov, CC.; 4 ♂♂, 1 ♀, Vardar Valley, Gjavoto Vill. near Gevgelija, 80 m alt., 10.-22.vii.2004, 10 pitfall & 10 tree traps, leg. M. Lagourov; 1 ♀, Gradeshka-Plauš Mt., near Udovo Vill., 150 m alt.; 1 ♂, Osogovska Planina Mts, Koshari Vill. in Durachka Reka Valley, 17.ix.1975, leg. Čingovski, MMNH.; 7 ♂♂, 2 ♀♀, Demir-Kapia, 100 m, 12.vii.1986 & 9.vii.1987, F. Willemse; 8 ♂♂, 6 ♀♀, W of Titov Veles, Izvor, 1-3 kmW, (near Babuna river), 400 m, 26.vii.1965 & 13.vii.1969, F. Willemse; 1 ♀, 7 km NE Titov Veles, 200 m, 13.vii.1969, F. Willemse; 1 ♀, above Tetovo, 800 m, vii.1939 (W. Ramme), ZMB;

MONTENEGRO: 1 ♂, above Petrovac na moru, macchia, 08.08.2004, leg. D. Murányi, Museum Budapest;

SERBIA: 1 ♂, Suha Planina, above Suschnik, 1200 m, 24.vii.1937 (W. Ramme), ZMB;

Eupholidoptera smyrnensis

BULGARIA: Nymphs observed, Struma Valley, 2 km S of Kamenitsa Vill. (Blagoevgrad distr., Stroumyani municipality), 150 m alt., 8.vi.2003, obs. D. Chobanov; 4 ♂♂, 4 ♀♀, Struma Valley, Harsovo Vill. (Blagoevgrad distr., Sandanski municipality), xerophyte *Rubus*-thicket, 250 m alt., 3.viii.1997, leg. D. Chobanov; Struma Valley, near Roupite Vill. (Blagoevgrad distr., Petrich municipality), mesoxerophyte thickets and riverbank vegetation, 70-200 m alt., leg. et obs. D. Chobanov; 1 ♂, Pirin Mts, Kalimantsi Vill. (Blagoevgrad distr., Sandanski municipality), 450-510 m, 12.viii.-11.ix.2003, pitfall traps, leg. M. Langourov; 1 ♂ nymph, E Rhodopi Mts, Ada Tepe Hill (Kardzhali distr., Krumovgrad municipality), xeromesophyte oak wood, 480 m alt., 4.vi.2005, leg. D. Chobanov; 2 ♂♂, 4 ♀♀, E Rhodopi Mts, Ada Tepe Hill (Kardzhali distr., Krumovgrad municipality), 480 m alt., 14.viii.-7.ix.2005, 7.ix.-22.x.2005, pitfall traps, leg. M. Langourov & D. Chobanov; 2 ♂♂, 1 ♀, 3 ♂♂ & 2 ♀♀ nymphs, E Rhodopi Mts, Boynik Planina Mt. above Potocharka Vill. (Kardzhali distr., Krumovgrad municipality), 396-425 m alt., 4.vi.-3.vii.2005, 3.vii.-14.viii.2005, 14.viii.-6.ix.2005, 6.ix.-21.x.2005, 16.iv.-17.vi.2006, pitfall & tree traps, leg. M. Langourov & D. Chobanov; 1 ♂ nymph, E Rhodopi Mts, Studen Kladenets Vill. Along Arda River (Kardzhali distr., Krumovgrad municipality), 162 m alt., 14.viii.-6.ix.2005, pitfall traps, leg. M. Langourov & D. Chobanov; 1 ♂, 1 ♀, E Rhodopi Mts, Dolni Glavanak Vill. (Haskovo distr., Madzharovo municipality), xeromesophyte wood, 360 m alt., 13.viii.-6.ix.2005, 6.ix.-21.x.2005, 21.x.2005-15.iv.2006, pitfall traps, leg. M. Langourov & D. Chobanov; 1 ♀ nymph, E Rhodopi Mts, Mandritsa Vill. (Haskovo distr., Ivaylovgrad municipality), mesophyte meadow, 5.vi.2005, leg. D. Chobanov; 1 ♂, Tundzha River valley, S of Srem Vill., (Haskovo distr., Topolovgrad municipality), mesophyte thicket, 16.viii.1999, leg. D. Chobanov.; Dabovets village, E Rhodope Mts – unpublished (data Chobanov); Pelevun village, E Rhodope Mts – unpublished (data Chobanov); Svilengrad, Maritsa valley – unpublished (data Chobanov).

GREECE: Evros: 1 ♂, 2 ♀♀, Amovouno, along Ardas river, N 41°34'53.0" E 026°16'34.2", 17.vii.2001, F. Willemse; 3 ♂♂, 2 ♀♀, SE of Mikrochori (E of Didimotiko), 40 m, verge of dike along Evros river, military zone, WGS84 N41°19-20'17.5-47.6" E 026°34-36'41.4-45.0", 16.vii.2001, F. Willemse; 1 ♂, 2 km W od Filakion, 100 m, trench between road & cultivated land, WGS84 N41°35'29.4" E 026°18'03.1", 17.vii.2001, F. Willemse; 1 ♂, Evros, Orestiada, garden hotel, singing at night, 16.ii.2002, F. Willemse ; 1 ♂, 3 ♀♀, Dadia Ecotourist Centre, at night, garden around buildings, 15.vii.2001, F. Willemse; 1 ♂, 3 ♀♀, Evros, Tukheron 40 m, 18.vii.1977, F. & L. Willemse; 1 ♂, 1 ♀, Evros, delta river from Poros to Monastiraki road, 1-4 m, 7.vii.2000, F. Willemse & V. Kati; Xanthi: 2 ♂♂, Paralia Avdiron, 2 m, 30.vi.2000, shrubs of garden restaurant near beach, F. Willemse; Rhodopi: 1 ♂, 1 ♀, 8 km NEE Nea Sanda, 250 m, dry rocky slope, trees, shrubs, grazed, 1.vii.2000, F. Willemse & V. Kaki; Kavalla: 1 ♀, Nestos river, S of Xerias, 20 m, verge of dike, parallel to river, about 9 km before end, 19.vii.2001, F. Willemse; Thasos Island: 2 ♂♂, 2 ♀♀, Kinoira, sea level, G. Theophilidis, vii.1988; Khalkidhiki: 4 ♂♂, 2 ♀♀, Koutloumoussi southeast of Vourvourou (camp site Lacara) on Sithonia (40°10'N, 23°51'E), 2 m, 19-20.vii.2004, coll. K.-G. & M. Heller; Thessaloniki: 1 ♂, Stavros (40°41'N, 23°40'E), 26.vii.2001, coll. K.-G. & M. Heller; 2 ♂♂, Stavros bei Asprovalta (40°40'N, 23°41'E), 20 m, 19.vi.1984, coll. v. Helversen;

MACEDONIA: 1 ♂, Gjavoto village, Vardar valley, 10.-22.vii.2004, 80 m alt., M. Langourov; 4 ♀♀, Gjavoto village, Vardar valley, 10.-22.vii.2004, 80 m alt., M. Langourov; 1 ♂, Stari Dojran, Dojran lake, 1.-4.vi.1967, Chingovski, MMNH (18/6);

TURKEY: 2 ♂♂, Gallipoli (Çanakkale-Gelibolu), 1.vi-10.viii.1923 (M.J. Martin), NHM.