**ARTICULATA 2018 33: 107–119** **FAUNISTIK**

# Observation apps to boost faunistical data: a case study of the Orthoptera of Khios (Greece)

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## Abstract

Using ObsMapp, an observation app for Android phones, the Orthoptera fauna of the Aegean island of Khios (Greece) was monitored for 7 days in May 2018. A total of 288 observations were stored and made available online. In total 34 species were observed, 14 of which recorded for the first time from Khios. Current faunistic information for each species known from Khios is presented. The use of observation apps to collect and store observational data is discussed.

## Zusammenfassung

Mit Hilfe von ObsMapp, eine Beobachtungs-App für Android-Handys, wurde die Heuschreckenfauna der ägäischen Insel Khios (Griechenland) im Mai 2018 sieben Tage lang inventarisiert. Insgesamt wurden 288 Nachweise gespeichert und online zur Verfügung gestellt. Von den 34 beobachten Arten wurden 14 erstmals auf Khios festgestellt. Die aktuellen faunistischen Informationen jeder von Khios bekannten Art werden vorgestellt. Die Verwendung von Beobachtungs-Apps zum Sammeln und Speichern von Funddaten wird diskutiert.

## Introduction

Apps like ObsMapp (https://play.google.com/store/apps/details?id=org.obsmapp&hl=en) offer a modern alternative to a fieldbook for storing species occurrence records. Using an app makes it very easy to quickly record observations of species and specimens encountered in the field exactly when and where they are being observed. Especially for specialists who can recognize species on the fly often without the need to capture them, recording species occurrence data with a mobile app is the ideal tool. The apps are intuitive, userfriendly and besides taxonname and temporal (date, time) and spatial (coordinates) information also allow to store additional information like number of individuals and whether individuals were adult or juvenile. There is a possibility to link an image or audio recording and if there is access to internet records can be uploaded to a website. The uploaded records, if accompanied by an image can eventually be checked by a specialist. Mobile phone apps have been around for quite a while now and the idea to use them to accumulate faunistical data more efficiently and rapidly arose when preparing a fieldguide on the Greek Orthoptera.

The Greek Orthoptera fauna, although well known, is expected to still contain a few more undiscovered species. Faunistically there are still some bigger challenges to be tackled in Greece. The recently published fieldguide (WILLEMSE et al.

2018) was based on a total of 17,500 records accumulated over some 150 years. This may sound like a fair number but when taking into account the surface area of Greece and the number of species occurring in Greece this is a very low number indeed if compared with countries like Austria and The Netherlands (Table 1).

Table 1: Comparison of faunistic data available for Austria, Greece and The Netherlands in relation to surface area and species richness.

| | Austria | Greece | The Netherlands |
|---|---|---|---|
| surface (in $km^2$) | 84.000 | 132.000 | 42.000 |
| number of species | 139 | 378 | 50 |
| number of records | 308,000 | 17,500 | 320,000 |
| records per $km^2$ | 3,7 | 0,15 | 7,6 |
| records per species | 2216 | 46 | 6400 |
| reference: | ZUNA-KRATKY et al. 2017 | WILLEMSE et al. 2018 | BAKKER et al. 2015 |

Among the challenges regarding faunistic data for Greek Orthoptera is the skewness in species records from the individual Greek islands. An example of a faunistically well documented island is the small Cyclade island of Iraklia south of Naxos (18 $km^2$) where fieldwork between 2008-2016 revealed the presence of 20 Orthoptera species (ALEXIOU 2017). On the other hand, Khios, the fifth largest island of Greece (842 $km^2$), with 26 species of Orthoptera, observed between 1887 and 2017, is an example of a faunistically rather poorly documented island. Apart from the difference in size between Iraklia and Khios, the skewness in species records becomes even more evident when taking into consideration that Iraklia is an isolated southern Cyclade island and Khios is situated very close to the Turkish mainland which makes the possibilities to settle on the island from elsewhere much more likely. Considering Orthoptera species not yet known from Khios but reported from surrounding islands (Lesvos, Ikaria, Samos) a small list of species can be made of species likely to occur on Khios but not yet reported from the island like *Aiolopus strepens, Conocephalus fuscus, Incertana incerta* and *Tettigonia viridissima*. To check for the presence of such species and improve the faunistic knowledge of Khios, the author visited Khios between 24 May and 1 June 2018. Another reason for the visit was to use and check a mobile app in a consistent way to store all occurrence records of species/specimens encountered. Khios was believed to be a good testing ground as local species can be easily recognised and species numbers and densities were expected not to be too high.

## Material and Methods

Between 24 May and 1 June 2018, the Orthoptera fauna of Khios was monitored by car and by a few hikes. Monitoring roughly took place between 10 in the morning and 6 in the evening. Routes were decided upon at the start of each day taking care that after the 7 day visit all the major regions of the islands had been visited. Like the routes, stops were not fixed or planned beforehand but made as and when considered useful. At each stop which lasted between 5 and 30 minutes, surrounding habitat was walked through, vegetation inspected and species seen or heard recorded in ObsMapp (for instance *Saga natoliae* https://observation.org/waarne-

ming/view/157613368). The taxon name was picked from a list, the coordinates, date and time were automatically recorded on the fly. Choosing a species from a list is a matter of entering the first letters of the genus and the first letters of the species epithet and is done in seconds. ObsMapp did not yet store altitudes which however can be looked up any time later using Google Earth. Likewise, verbal details of the location where a species or specimen was observed, the vicinity of the nearest village or the name of the mountain were looked up afterwards as in some cases they were needed to print labels for specimen that were collected. During hikes species were recorded as and when they were seen or during short brakes. Species considered interesting or useful for DNA samples were collected. All 34 species encountered could be easily identified directly on sight, after a short inspection with a hand loupe (e.g. *Acrometopa* or *Platycleis*) or by the male calling song (*Chorthippus* spp.*, Tettigonia viridissima, Decticus albifrons*). This and the relatively low overall number of species make Khios a perfect island to quickly monitor grasshoppers without the need of collecting specimens to assess their identity.

## Results

Prior to 2018 26 species were known from Khios. During the May 2018 visit 14 species have been added, three of which only at the genus level because they were juveniles (*Acrida* sp., *Pezotettix* sp.) or because the exact species still needs to be assessed (*Ovaliptila* sp.). Another two species (*Conocephalus fuscus* and *Incertana incerta*) were only observed as juveniles but have been included as species.

Over a period of 7 days altogether 288 occurrence records for Orthoptera were stored for Khios through ObsMapp. The observation data were uploaded at the end of each day and are accessible via https://observation.org. The number of observations stored each day were: 25/05: 45; 26/05: 42; 27/05: 35; 28/05: 35; 29/05: 32: 30/05: 50; 31/05: 49. Altogether some 50 specimens have been collected. These included 40 specimens collected for DNA samples, specimens collected as juveniles to be reared in captivity to adult and a few specimens kept alive for sound recordings and photography (fig. 1-6).

Annex 1 summarizes numerically the faunistic results of the May 2018 survey as well as the Orthoptera records reported for Khios prior to 2018. A summary of the species currently known from Khios is presented below.

### 01. *Acrida* sp.

*Acrida* had not yet been recorded from Khios prior to 2018. In 2018 a juvenile *Acrida* was only found once in an area just adjacent to the beach in Limena Lithiou. Based on the distribution pattern of the two species recorded from Greece the juvenile most likely belonged to *A. ungarica*.

### 02. *Acrometopa servillea servillea*

The species was collected on Khios on 11 June 1934 (WERNER 1934) and 30 June 1936 (WERNER 1937). In both papers no locality details were presented other than "Chios". In 2018 the species was observed on 16 localities across the island. Identity was checked by looking at the male cercus which differs distinctively between

*A. servillea* and *A. syriaca* (WILLEMSE et al. 2018). Besides adults, juveniles were also encountered but these were not recorded as they may have belonged to *A. syriaca*.

**03. *Acrometopa syriaca***
The species was recorded from Khios on 20 July 1933 (WERNER 1933) and again on 20 May 1995 by K.-G. Heller at Sidirounta (unpublished data). In 2018 the species was not found although juveniles spotted across the island could have belonged to this species.

**04. *Acrotylus insubricus***
Recorded for the first time from Khios. The species was only seen at two sites in the southern half of the island and seems to be rather scarce. Identification was based on the specimens being rather compact (WILLEMSE et al. 2018, one female being collected.

**05. *Acrotylus longipes***
The species has been collected by Schmalfuss on Chios (unpublished data). The species only becomes adult late in June or early July. Juvenile *Acrotylus* observed on some of the beach areas in 2018 may have belonged to this species but they have not been recorded

**06. *Acrotylus patruelis***
The species is recorded for the first time from Khios, only seen at two sites in the southern half of the island. Identification was based on the specimens being rather slender (WILLEMSE et al. 2018).

**07. *Aiolopus strepens***
Although very common throughout Greece, not yet recorded from Khios. The species was observed at two sites. Identification based on the wide hind femur (WILLEMSE et al. 2018). At several sites *Aiolopus* juveniles were spotted but these have not been recorded as the species could not be assessed.

**08. *Aiolopus thalassinus***
Collected for the first time on Khios (as "Chios" without any details) on 2 July 1936 (WERNER 1937). In 2018 the species was only observed once. Identification based on the slender hind femur (WILLEMSE et al. 2018). At several more sites juvenile *Aiolopus* were spotted but these have not been recorded as the species could not be assessed.

**09. *Anacridium aegyptium***
First recorded from Khios (as "Chios" without further details) on 11 June 1934 (WERNER 1934). A second observation (incl. an image) was made of a juvenile on 10 September 2011 (R. Poels). Another two observations of adult specimens were made in 2018.

**10. *Anadrymadusa ornatipennis***
The species was described in 1926, as *Paradrymadusa ornatipennis,* based among others on a female from Volissos (RAMME 1926). Additional material from "Chios" without details was mentioned in the same paper. The species was again recorded as *Drymadusa ornatipennis* on 11 June 1934 in Khios (as "Chios" without additional details) (WERNER 1934) and 30 June 1936 (WERNER 1937). In May 2018

it was found as juveniles at three additional sites. One female juvenile was collected and became adult 12 June. Probably the species is widespread across the drier and higher parts of the islands hiding during the day in low shrubs.

**11. *Arcyptera labiata* (fig. 1-2)**
Collected fort the first time on Khios ("Chios" without details) on 10 June 1934 (WERNER 1934). In 2018 it was noticed at several sites in the northern half of the island between 175 m and 600 m being quite common in the Maradhovounos area. Compared to the size of specimen of this species from the Peloponnese, animals from Khios are very small and also dark coloured.

**12. *Calliptamus barbarus***
First recorded from Khios (as *Calliptamus siculus*) in 1933 (WERNER 1933) and later found on 11 June 1934 (WERNER 1934) and 30 June 1936 (WERNER 1937). Most likely *C. barbarus* is a very common species on Khios but at the end of May still juvenile, only just starting to become adult. At 9 sites adults of *C. barbarus* were found which could easily be separated from *C. coelesyriensis* by the colouration of the hind legs.

**13. *Calliptamus coelesyriensis***
Collected fort the first time on Khios ("Chios" without details) on 30 June 1936 (WERNER 1937). In 2018 it turned out to be common and was found across the entire island. The black colour form was found regularly and at Salagona in the southwest constituted some 30-40% of all the specimens seen.

**14. *Chorthippus bornhalmi* (fig. 7)**
Collected (as *Staurodérus bicolor*) on Khios ("Chios" without details) on 10 June 1934 (WERNER 1934) and 30 June 1936 (WERNER 1937). By far the most common *Chorthippus* species in Greece but in May 2018 in Chios only found as adult at two sites in the northern half of the island above 600 m.

**15. *Chorthippus vagans dissimilis* (fig. 8)**
Collected for the first time in Khios (1 km W Karies, 300 m, 2.vii.1989) (WILLEMSE et al 2009). In May 2018 the species was very common, found at most sites across the islands from sea level up to 700 m.

**16. *Conocephalus fuscus***
Reported for the first time for Khios. A single juvenile was found along Fana Bay southwest of Pyrgi. Being a juvenile of a longwinged species, *C. fuscus* is the only species that occurs in the area also having been reported from Lesvos and Samos (WILLEMSE et al. 2018).

**17. *Decticus albifrons***
Although only mentioned once for the island (as "Chios" without any details) in 1934 (WERNER 1934) the species is common across the entire island, Toward the end of May 2018 the species was becoming adult. Observations have been based both on juveniles and adults that were either seen or heard.

**18. *Eupholidoptera prasina* (fig. 9)**
Collected (as *Pholidoptera prasina*) on Khios (as "Chios" without any details) for the first time on 11 June 1934 (WERNER 1934) and again on 30 June 1936. The species is common across the island at times occurring in quite high densities. At

several sites observed together with a second *Eupholidoptera* species from Khios, *E. smyrnensis*.

**19. *Eupholidoptera smyrnensis* (fig. 10)**
Reported for the first time for Khios which fits nicely in the known distribution area of the species which includes Lesvos to the north and Samos to the south. Like *E. prasina* the species was becoming adult toward the end of May and has been observed as juvenile and adults. At several sites for instance north of Volissos found together with *E. prasina*.

**20. *Gryllus bimaculatus***
The species was collected by Schmalfuss on Chios (without additional details) (unpublished data). The species was not observed in 2018.

**21. *Incertana incerta***
Not yet reported from Khios. At three sites where there was abundant (herbal) vegetation, juveniles were seen of this species. The known distribution of the species includes neighbouring Lesvos and Samos so the occurrence in Khios was to be expected.

**22. *Leptophyes lisae***
The species was collected (as juvenile) near Mesta on 24 May 1995 (WILLEMSE & WILLEMSE 2008) and it has not been observed again since.

**23. *Myrmecophilus ochraceus***
Mentioned from Khios (as "Chios") without further details (WILLEMSE 1984).

**24. *Notostaurus anatolicus***
The species is widespread across the eastern part of the Greek mainland and for the Aegean islands so far reported from Ikaria and Samos. In 2018 adults of this species were found at 4 sites on Khios, like *Arcyptera labiata* being noticeably smaller than conspecifics from mainland Greece.

**25. *Oedipoda caerulescens***
Up to 2018 a single record was known from Khios (as "Chios" without further details) where it was collected on 10 June 1934 (WERNER 1934). In 2018 the species was found at several sites across the island often together with *O. miniata*.

**26. *Oedipoda miniata***
Collected at Khios (as "Chios" without any details) on 26 July 1933 (WERNER 1933), on 10 June 1934 (WERNER 1934) and on 30 June 1936 (WERNER 1937) and in 1989 by Schmalfuss (unpublished). In May 2018 found across Khios apparently somewhat more common than *O. caerulescens*.

**27. *Ovaliptila* sp.**
In the recent past two males of this cave cricket have been collected, one at Sykia Cave, near Lithi, Chios, Greece, December 2003 and one at a cave near Agio Galas in on April 2016. (Kostas Magos, pers. comm. May-September 2018). Identification based on the male genitalia will confirm whether the specimens belong to *O. wettsteini*, a species recorded from Ikaria, or a yet undescribed species.

**28. *Paranocarodes fieberi* (fig. 5-6, 11)**
Found for the first time on Khios on 11 June 1934 (WERNER 1934), the same paper also mentions Mt. Plaka on Chios as a second locality for this species. On 28 May 2015 a photograph was taken of a female near Moni Agiou Markou (A. OUWENS & D. OUWENS: https://observation.org/waarneming/view/102795337). In May 2018 a single male was found and collected in open pine forest north of Nea Moni close to Moni Agiou Markou where the female was found in 2015. Again, much to my surprise, males and females of the species were found crossing the road that runs around Mt. Amani, northwestern Khios between Pirama and Kourounia. Orthoptera crossing roads in Greece is a well known phenomenon for species where high population densities do occur (*Poecilimon, Eupholidoptera, Calliptamus, Dociostaurus*) or carnivorous species like *Saga* and *Decticus* which feed on roadkills. It is the first time that a Pamphagid species was found crossing the road over a distance of over 25 km. Contrary to *Poecilimon* or *Calliptamus* where numbers crossing the road can be substantial, numbers of *Paranocarodes* were mostly singletons. A total of 9 males and 5 females were seen, most likely crossing the road simply because it runs through suitable habitat.

**29. *Pezotettix* sp.**
*Pezotettix* is found all over Greece including the islands in the Aegean Sea being represented by three species. In May 2018 *Pezotettix* juveniles were found southwest of Emporios. The species could not be assessed as this requires comparison of adult genitalia.

**30. *Platycleis affinis***
A species widespread in Greece and also known from various Aegean islands including Lesvos and Samos but not yet reported from Khios. In 2018 a single female was found along Fana Bay southwest of Pyrgi and identified in the field by the shape of seventh sternite which carries a bulge.

**31. *Platycleis intermedia***
Recorded from Khios (as "Chios" without further details) on 26 July 1933 (WERNER 1933) and 10 June 1934 (WERNER 1934). A common species for Khios and in 2018 found across the island below sea level and 700 m. Like *P. affinis*, the presence of the species was confirmed by catching a female and checking for the presence of two small ridges on the seventh sternite.

**32. *Poecilimon unispinosus* (fig. 3-4, 12)**
The species was first collected on Khios 20-24 May 1995 at 5 different sites (HELLER et al. 2011, WILLEMSE & WILLEMSE 2008). The species is common and widespread on Khios. In 2018 found across the island at 20 different sites between altitudes of 50 m and 560 m.

**33. *Pyrgomorpha conica***
A species reported from many of the Aegean islands including Psara but not yet from Khios. Found at five sites, three along the coast but two more inland near Mesta and Armolia at 140 m and 170 m altitude respectively.

**34. *Rhacocleis distinguenda***
A juvenile female collected 10 June 1934 from "Chios" was used in the description of *R. distinguenda* (WERNER 1934). In 2018 juveniles of *Rhacocleis* were observed

at two sites with very different habitats, the first one at 550 m in open pine forest with undergrowth of small shrubs close to the turnoff to Nea Moni, the second one next to the sea in a small piece of wasteland near the airport at Lefkonia. At the latter site a male and two females were collected, only the male being reared to adult. The calling song has been recorded and it has been sampled for DNA. Preliminary findings suggest this is *R. distinguenda*.

**35. *Saga natoliae***
Recorded from Khios (as "Chios") where it was collected in July 1887 by von Oertzen (KALTENBACH 1967). On 1 June 2015 a photograph was taken by A. Ouwens & D. Ouwens of a male just south of Pirama and the record stored in Observado (https://observation.org/waarneming/view/113365650). In 2018 found at several sites between 160 m and 570 m altitude, most specimens being observed when crossing the road. All specimens observed were adult.

**36. *Sphingonotus* sp.**
Recorded as *Sphingonotus coerulans* from Khios (as "Chios" without additional details) on 26 July 1933 (WERNER 1933),10 June 1934 (WERNER 1934) and 30 June 1936 and 2 July 1936 (WERNER 1937). In 2018 adults were found at two beach areas south of Sidirounta and one more inland at 620 m.

**37. *Sporadiana sporadarum***
Collected in 1887 by von Oertzen on Khios (WERNER 1933, as "Chios"). In 2018 juveniles were collected on 30-31 May at two sites in open rocky habitat where they were hiding inbetween small shrubs and sparse herbs between 450 m and 700 m. The specimens became adult around 10th June.

**38. *Tetrix depressa***
Reported for the first time from Khios. A single female was found at one site around a small well on the northern slopes of Mt. Pelineo. The species is not yet known from the neighbouring islands.

**39. *Tettigonia viridissima***
Prior to 2018 not yet reported from Khios but already from a great many other Aegean islands including Lesvos and Ikaria. The species is common across the island, observations having been based on singing males as well as visual sightings of adult and juveniles.

**40. *Tylopsis liliifolia***
The species is widely distributed across mainland Greece and many of the islands but had not yet been reported for Khios. It is common throughout the island. Half of the sightings were still juveniles which however can be easily recognised.

## Discussion

During a 7-day trip in 2018, using the mobile app Obsmapp, nearly 300 new occurrence records (without images) have been collected relatively easily, each record containing coordinates accurate within 25 metres of the spot where the specimen was observed. This is in sharp contrast with the period of 130 years (1887-2017) in which a total of 47 published and 4 unpublished (*Acrotylus longipes; Gryllus bimaculatus; Ovaliptila* sp.) records of Orthoptera representing 26 species were

reported from Khios. Not only is the number of records prior to 2018 extremely low, 35 (69%) out of these 51 records did not contain any details about the location on Khios, 7 carried a locality name whereas only 9 had coordinates attached to them. In a period of a mere 7 days the number of faunistical records for Khios increased not only almost sixfold in number but each record collected in 2018 was also accurate within 25 metres. Mobile apps like ObsMapp have been developed to store the most relevant faunistical information (taxon, coordinates, date, time) efficiently and quickly. Time required to record the presence of a species is a matter of seconds, if one wants to add additional information on number of individuals observed, their sex or the development stage or wants to add an image it will take longer. By having coordinates stored accurately on the fly to within meters where one has observed a species, additional information, like altitude, the nearest village or even habitat, can be checked or looked up even afterwards using Google Earth. As soon as observations are uploaded to the web, loss or damage of the phone, how terrible it may be, will have no effect on the recorded observations.

Recording a large number of observations was realized because the observer was familiar with the local grasshopper fauna and local species as a rule could be easily identified. This situation will not always apply. There are (quite some) species that cannot be identified easily in the field not even by specialists and of course not everyone is a specialist of a local fauna. Yet, even for those completely ignorant of grasshoppers or unfamiliar with the local grasshopper fauna, posting an observation via a mobile app on internet accompanied by an image can lead to an additional confirmed presence of a species.

When comparing (mobile app) observations with the collecting specimens, observations especially the ones that do not include an image have the disadvantage that validation remains an issue that never can be solved completely. Even if an image is available there may still be difficulties in confirming identities. An image may not show the essential character(s), may be taken from a bad angle, may not be in focus or have a resolution that prevents zooming in on details. All these issues are encountered when trying to identify specimens on images posted on websites with observations like Observado (//observation.org/), iNaturalist (www.inaturalist.org/) or Biodiversidad Virtual (www.biodiversidadvirtual.org/insectarium/). Even when an image is in focus, showing essential characters, taken from the right angle and can be zoomed in, identification up to the species level may still be impossible because characters to separate species require large magnifications or are situated on invisible internal sexual structures.

Mobile tools like ObsMapp offer a very welcome alternative to a fieldbook especially to store information for easy recognisable species, more so probably for specialists than for non-specialists. For non-specialists mobile apps offer the possibility to store findings only if accompanied by an image, to get them identified and share these findings with the community at large.

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## Number of species occurrence records of Orthoptera from Khios

| Period: | 1887-2017 | | 25-31 May 2018 | |
|---|---|---|---|---|
| | 1* | 2* | 1* | 2* |
| 01 Acrida sp. | 0 | 0 | 0 | 1 |
| 02 Acrometopa servillea servillea | 2 | 0 | 0 | 15 |
| 03 Acrometopa syriaca | 1 | 1 | 0 | 0 |
| 04 Acrotylus insubricus | 0 | 0 | 0 | 2 |
| 05 Acrotylus longipes | 1 | 0 | 0 | 0 |
| 06 Acrotylus patruelis | 0 | 0 | 0 | 2 |
| 07 Aiolopus strepens | 0 | 0 | 0 | 2 |
| 08 Aiolopus thalassinus | 1 | 0 | 0 | 1 |
| 09 Anacridium aegyptium | 2 | 0 | 0 | 2 |
| 10 Anadrymadusa ornatipennis | 3 | 0 | 0 | 3 |
| 11 Arcyptera labiata | 1 | 0 | 0 | 7 |
| 12 Calliptamus barbarus | 3 | 0 | 0 | 9 |
| 13 Calliptamus coelesyriensis | 1 | 0 | 0 | 13 |
| 14 Chorthippus bornhalmi | 3 | 0 | 0 | 2 |
| 15 Chorthiopus vagans dissimilis | 1 | 0 | 0 | 46 |
| 16 Conocephalus fuscus | 0 | 0 | 0 | 1 |
| 17 Decticus albifrons | 1 | 0 | 0 | 20 |
| 18 Eupholidoptera prasina | 2 | 0 | 0 | 25 |
| 19 Eupholidoptera smyrnensis | 0 | 0 | 0 | 13 |
| 20 Gryllus bimaculatus | 1 | 0 | 0 | 0 |
| 21 Incertana incerta | 0 | 0 | 0 | 3 |
| 22 Leptophyes lisae | 0 | 1 | 0 | 0 |
| 23 Myrmecophilus ochraceus | 1 | 0 | 0 | 0 |
| 24 Notostaurus anatolicus | 0 | 0 | 0 | 4 |
| 25 Oedipoda caerulescens | 1 | 0 | 0 | 9 |
| 26 Oedipoda miniata | 4 | 0 | 0 | 15 |
| 27 Ovaliptila sp. | 2 | 0 | 0 | 0 |
| 28 Paranocarodes fieberi | 2 | 1 | 0 | 14 |
| 29 Pezotettix sp. | 0 | 0 | 0 | 1 |
| 30 Platycleis affinis | 0 | 0 | 0 | 1 |
| 31 Platycleis intermedia | 2 | 0 | 0 | 10 |
| 32 Poecilimon unispinosus | 0 | 5 | 0 | 20 |
| 33 Pyrgomorpha conica | 0 | 0 | 0 | 5 |
| 34 Rhacocleis sp. | 1 | 0 | 0 | 2 |
| 35 Saga natoliae | 1 | 1 | 0 | 5 |
| 36 Sphingonotus sp. | 4 | 0 | 0 | 3 |
| 37 Sporadiana sporadarum | 1 | 0 | 0 | 2 |
| 38 Tetrix depressa | 0 | 0 | 0 | 1 |
| 39 Tettigonia viridissima | 0 | 0 | 0 | 16 |
| 40 Tylopsis liliifolia | 0 | 0 | 0 | 13 |
| | 42 | 9 | 0 | 288 |
| Total number of species | 26 | | 34 | |
| Total number of observations | 51 | | 288 | |

*1: records without any details or only a locality name
*2: records with coordinates

1

2

3

4

5

6

Fig. 1: *Arcyptera labiata*, female. Khios: ca. 2 km N of Volissos. Photo Roy Kleukers.

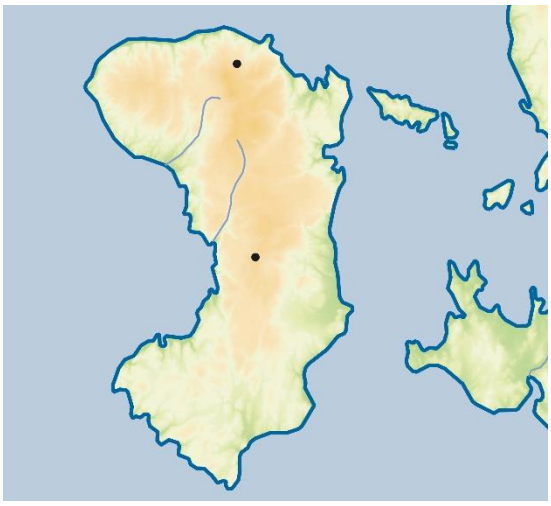
Fig. 2: *Arcyptera labiata*, male. Khios: at turnoff to Nea Moni. Photo Roy Kleukers.

Fig. 3: *Poecilimon unispinosus*, female. Khios: ca. 0.3 km SE Kosmados. Photo Roy Kleukers.

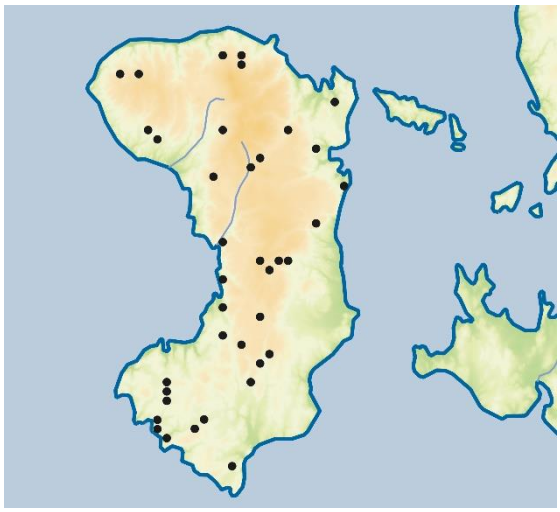
Fig. 4: *Poecilimon unispinosus*, male. Khios: ca. 0.3 km SE Kosmados. Photo Roy Kleukers.

Fig. 5: *Paranocarodes fieberi*, female. Khios: between Pirama and Parparia. Photo Roy Kleukers.

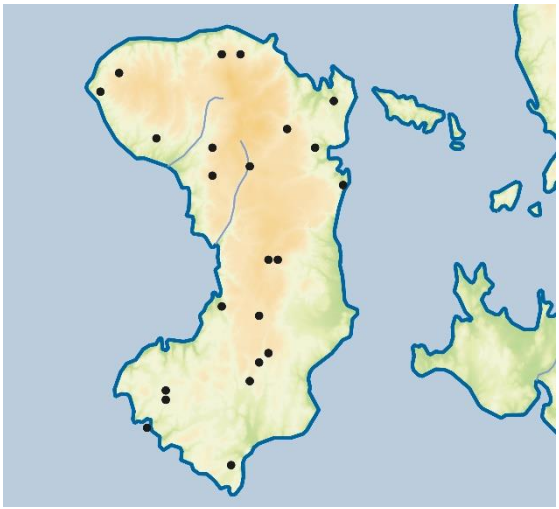
Fig. 6: *Paranocarodes fieberi*, male. Khios: ca. 1 km S of Parparia hills. Photo Roy Kleukers.



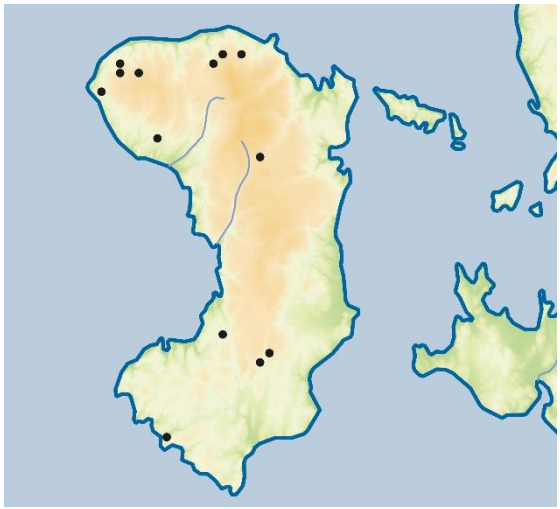
*7: Chorthippus bornhalmi*



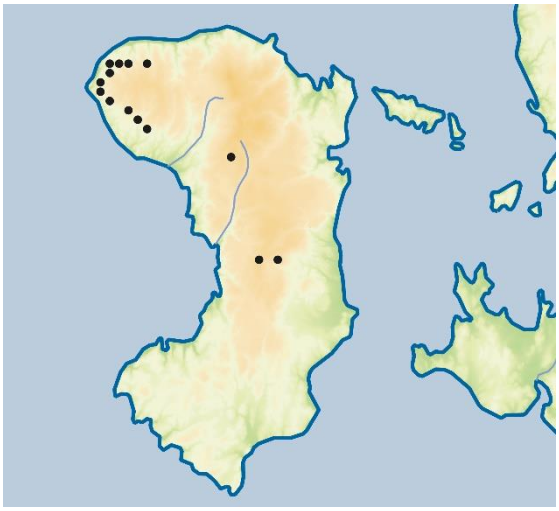
*8. Chorthippus vagans*



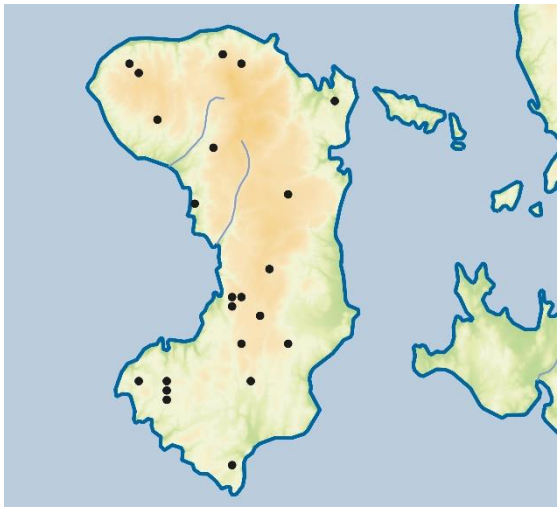
*9. Eupholidoptera prasina*



*10. Eupholidoptera smyrnensis*



*11. Paranocarodes fieberi*



*12. Poecilimon unispinosus*

Fig. 7-12: Distribution data for 6 Orthoptera species on Chios.