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METALEPTEA

THE NEWSLETTER OF THE ORTHOPTERISTS' SOCIETY

President's Message

By DAVID HUNTER
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Dear Society members,

Without doubt, 2021 continues to be a challenging year but remember that the flu was prevalent 100 years ago as well and that was followed by the celebrations of the "roaring" twenties. But of even greater import a century ago is that 2021 is the 100th anniversary of the breakthrough publication by Boris Uvarov regarding phase change in locusts, in which he demonstrated that the isolated and gregarious forms of *Locusta migratoria* (migratory locust) in Russia were the same species. Many thanks to our past president, Alexander Latchininsky for his anniversary article on Boris Uvarov.

I would also like to officially welcome Teresa Yawn who will be working with us on the maintenance and routine upgrades of the Singing Insects of North America (SINA) site. SINA has been linked to our Orthopterists' Society website for nearly two years and from now on the site and its maintenance are part of our work. You can find the SINA site on the Orthopterists' website under Resources and then Links or you can go directly to SINA via https://orthsoc.org/sina for a most comprehensive data set on crickets, katydids, and cicadas.

Of course, there continues to be various levels of limitations on our activities depending on where you live. But there is hope for the future based on the rebound in activities of all kinds that followed the aforementioned flu from a century ago. And we have had an unexpectedly good range of vaccines developed that are

beginning to have an effect on the course of the pandemic. From my detailed analysis of this disease (remember that for the past 20+ years, I have been working on ways of *increasing* the virulence/spread of *Metarhizium* disease for locust control), high levels of vaccination will be critical in bringing life back to normal. For example, for measles, 93-95% of a population must be vaccinated to achieve herd immunity. We do not know the figure yet for COVID-19, especially the more contagious Delta strain, but current vaccination levels seemingly fall far short. And modelling by the Doherty Institute in Australia (Peter Doherty, Nobel Prize Physiology/Medicine 1996) indicates that even at 80% of adults vaccinated = 65% of all, a level of social distancing along with contact tracing & quarantine will continue to be important until vaccination levels are much higher.

So, with many areas opening up, we all have been continuing our work as best we can. It is with great pleasure that I present another excellent *Metaleptea*, thanks once again to the tireless efforts of Hojun Song and Derek A. Woller!

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"Jago's Grasshoppers of East and North East Africa" volume 5 now available!

The fifth volume of "*Jago's Grasshoppers of East and North East Africa*" by Hugh Rowell and Claudia Hemp is now available to purchase from on-demand printing site Blurb. This volume focuses on Acrididae subfamily Acridinae and it represents an important contribution to our field. For the rationale and history behind this publication, please see Hugh Rowell's article in *Metaleptea* 35(3).To order, please visit the following links:

Volume 1: Pneumoridae, Pyrgomorphidae, Lentulidae, Pamphagidae and Dericorythidae: http://www.blurb.com/b/7826846-jago-s-grasshoppers-of-east-and-north-east-africa

Volume 2: Acrididae: Teratodinae, Hemiacridinae, Spathosterninae, Tropidopolinae, Calliptaminae, Oxyinae, Coptacrinae, and Eyprepocnemidinae: http://www.blurb.com/b/7789277-jago-s-grasshoppers-of-east-and-north-east-africa

Volume 3: Acrididae: Catantopinae: https://www.blurb.com/b/8845563-jago-s-grasshoppers-locusts-of-east-and-north-east

Volume 4: Acrididae: Euryphyminae, Cyrtacanthacridinae, and Oedipodinae: https://www.blurb.com/b/9995517-jago-s-grasshoppers-of-east-and-north-east-africa

Volume 5: Acrididae: Acridinae: https://www.blurb.com/b/10795180-jago-s-grasshoppers-of-east-and-north-east-africa

Regional Reports - What's happening around the world?

East Europe - North and Central Asia

By MICHAEL G. SERGEEV
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In almost all countries of the region, the general situation with COVID-19 and vaccinations remains complicated. However, borders between countries are partly opened and in some cases, we (and our students) may visit our neighbors. In any case, we can use on-line communication systems to connect with our colleagues as well as attend meetings and conferences. For instance, several orthopterists from the region attended two Virtual Meetings of the IUCN SSC Grasshopper Specialist Group and the 1st International Electronic Conference on Entomology. Besides, several talks (including

The meadow steppe in the southern part of the Baraba steppe near the Karasuk River — the habitat of *Onconotus laxmanni* (M.G. Sergeev)

the plenary one) were presented offline during the International Steppe Forum of Russian Geographical Society (Orenburg, Russia) and the 8th All-Russian Conference on Mountain Ecosystems (Nalchik, Russia).

Several groups of orthopterists continued field studies of Orthoptera, their distribution, ecological preferences, dynamics, and acoustic communications. The group of orthopterists from Novosibirsk State University crossed the so-callled Baraba steppe in its central part and found several interesting species, namely *Onconotus laxmanni* (Pallas) and *Conocephalus fuscus* (Fabricius). Our colleagues from the Institute for Information Transmission Problems (Moscow) tried to collect new data concerning acoustic signals of several grasshoppers, especially from the genus *Stenobothrus* Fischer (mainly *Stenobothurs eurasius* Zubovsky s.l. — in the steppes of the Middle Volga River Basin, and *Stenobothrus newskii* Zubovsky — over high altitudes of the Altai Mts.).

Two PhD theses concerning orthopteran insects were also defended: "Evolution of karyotypes and systems of sex chromosome determination of the family Pamphagidae (Orthoptera, Acrididae" by O. Buleu at the Institute of Systematics and Ecology of Animals (Novosibirsk) and "Ecology, distribution and economic importance of the acridid grasshoppers in southwest Tajikistan" by Kh. Khairov at Tajik National University (Dushanbe).

Australia, New Zealand & Pacific Islands

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There has been quite a bit of grasshopper activity Down Under despite winter and COVID-19 restrictions. A new PhD student, Hiromi Yagui, has arrived in Mike Kearney's lab from Lima, Peru to study morabine (matchstick) grasshopper conservation. She has been working online since August last year but was very lucky to get permission to travel to Australia and also to find a flight. Together with Mike and Ary Hoffmann, she has been undertaking experimental translocations of *Vandiemenella viatica* from a remnant that is to be subdivided for housing to various re-vegetated areas around Melbourne. So far, they have collected 2,000 individuals. Hiromi will apply what she learns with *Vandiemenella* to develop strategies for translocation of the endangered, ecologically very similar species *Keyacris scurra* (especially once Victorians can travel to New South Wales and the Australian Capital Territory, where most of the *K. scurra* populations are!).

In other news from Mike Kearney's lab, Gordon Berg has recently submitted his PhD dissertation for examination. The project is titled "The phenology of outbreaks of the Australian plague locust, *Chortoicetes terminifera* affecting Victoria." It examines the phenology of *C. terminifera* and what factors determine whether outbreaks will, or will not, affect Victoria when source populations exist in other states. Additionally, it investigates whether there are identifiable spatial and temporal patterns ("phenology") of outbreaks and recessions in Victoria, as well as influencing factors, including the presence of source populations in southern NSW, climate, weather, and control interventions that can affect migration into Victoria. Finally, the project utilises qualitative, quantitative, recent, and historical data from a range of sources covering a period of over 80 years.

The process of transcribing Ken Key's field notes continues in the Kearney lab as well, with all the notebooks from Western Australia now completed by Anwar Hossain who is busy analysing the results to understand patterns of species richness and turnover across Australia.

In Canberra, our president, David Hunter has also gotten involved in the Key's Notebook transcriptions and is lending his first-hand knowledge of many of the places Key went to on some of the first locust surveys in western Queensland during the 1940s. David notes how Key and company not only found locust swarms but also found several ways of getting bogged on outback roads. Yes, getting bogged is part and parcel of looking for locusts in outback Australia! David says that except for the past month they have had freedom of movement in Canberra and he managed a bit of a holiday to the Griffith wine region. Being winter, no field work has happened, but he has kept busy working with colleagues in Argentina, USA, and France on a review of locust management in Argentina in the past and during the current *Schistocera cancellata* upsurge. He has also been having many Zoom meetings with colleagues in Pakistan as part of an Asian Development Bank project on effects on strengthening food security in view of effects of the recent locust upsurge, the COVID-19 pandemic, and climate change.

Kosciuscola restrictus, a now-fully-recognized species endemic to Mt. Buffalo, VIC. (Photo credit: Hojun Song)

In Sydney, Kate Umbers (with Hojun and others) published a study of the phylogenomics of the skyhoppers (*Kosciuscola*) across their whole range and uncovered a total of not 5, but 14 species. They are in the process of describing all the new species and redescribing all the existing species. In May, they assessed the conservation status for all the putative species and most will be listed as threatened in the next 6-12 months on the IUCN Red List.

In Memoriam: Professor Zhemin Zheng

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Professor Zhemin Zheng, a well-known Chinese insect taxonomist, professor of Shaanxi Normal University, and honorary dean of the School of Life Sciences, died of illness in Xi'an, Shaanxi, China, on September 16, 2021, at the age of 90.

Professor Zhemin Zheng was born in Huzhou City, Zhejiang Province in February 1932. He graduated from the Department of Biology, East China Normal University in 1955, and from the Animal Research graduate program of the Department of Biology, Beijing Normal University in 1957. He taught in Shaanxi Normal University until his honorable retirement in 2019.

Professor Zhemin Zheng had been engaged in the research of invertebrate zoology, insect taxonomy, locust ecology, and control. He was a board member of the Chinese Entomological Society and the director of the Taxonomy Committee of the Chinese Entomological Society. He was awarded the "Lifetime Achievement Award of the Chinese Entomological Society." He mentored 38 doctoral students and 78 master students, and most of them have now become active researchers in entomology. He traveled all over China, collected more than 100,000 orthopteran specimens, and established 75 new genera and 1,019 new species of Orthoptera insects. He was the author of two volumes of "Zoological Fauna of China: Orthoptera: Acridoidea," "Taxonomy of Acridoidea," and 17 other monographs, and nearly 900 peer-reviewed journal papers.

In 2014, the Chinese Entomological Society awarded Professor Zheng Zhemin the Lifetime Achievement Award (from: https://tinyurl.com/5yyhz4r8)

Professor Zheng's autobiography (in Chinese) can be found at https://tinyurl.com/5yyhz4r8.

Theodore J. Cohn Research Grant Reports

Studying the effects of wildfires on the population trends of *Psalmatophanes barretoi* (Tettigoniidae) on Madeira

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Disturbances are main drivers changing the shape of ecological communities around the world. Hence, disturbances provide unique opportunities to study diverse questions in evolutionary biology and conservation biology, such as the survival abilities of species under different disturbance regimes. Disturbances may act directly (e.g., death) or indirectly (e.g., habitat modification) (Hochkirch & Adorf, 2007). Therefore, any research about the relationship between disturbances and survival rates of biota (e.g., population trends or changes in species richness or evenness, etc.) is very crucial. Wildfires represent an extreme type of disturbance and may be a major threat to biodiversity. Scientific evidence for this is reflected by the fact that fire regimes are not independent from other anthropogenic drivers (McDonald et al., 2012, Kelly et al., 2020, Ward et al., 2020). Due to careless behaviour by humans and increasing drought caused by global warming, the number of wildfires has been increasing dramatically in many areas. For example, the number of wildfires in the U.S.A., Australia, and Africa are proliferating faster than ever during drought periods and a lot of endemic and/or endangered species in the areas may suffer from the fires (Kelly et al., 2020). Orthoptera are not exempt from this situation, even though some species may benefit from fires (Bieringer, 2002, Nadeau et al., 2006, Hochkirch & Adorf, 2007).

The Atlantic island Madeira is a volcanic island that's estimated to be 4.6 million years old and maintains many endemic species. On Madeira, wildfires occur annually (Institute of Forests and Nature Conservation in Madeira) and, therefore, the island represents an ideal setting to study the effects of wildfires on biota. The Madeira green bush-cricket (*Psalmatophanes barretoi* Chopard, 1938 (Tettigoniidae)) is endemic to Madeira (Lange, 1990, Pfau & Pfau, 2005, Hochkirch et al., 2016) (Fig. 1). Because of its small range size, low number of known locations, and an inferred continuing decline of the population size, the species has recently been assessed as Vulnerable on the IUCN Red List of Threatened Species (Hochkirch et al., 2016). This red list assessment is based on the assumption that the increasing wildfire frequencies negatively affect the species. Consequently, in order to better understand the relationship between wildfires on Madeira and population trends of the species, distribution data of *P. barretoi* were collected in the

Figure 1. (left) a male and (right) a female of *Psalmatophanes barretoi*.

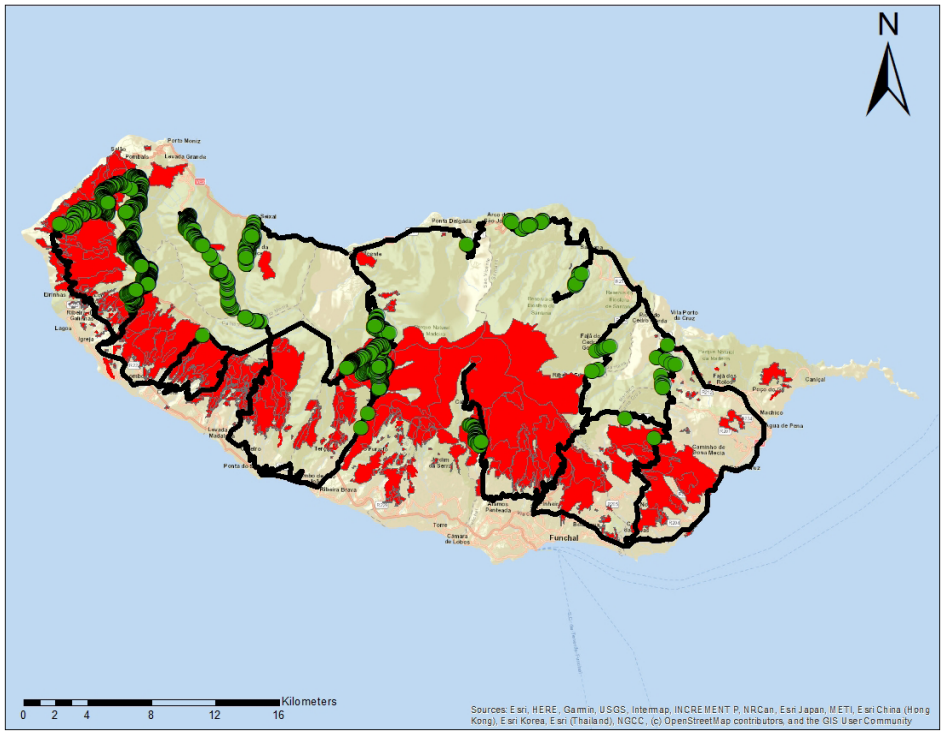

Figure 2. The map of the field data and fire data on Madeira: Individuals of *Pslamtophanes barretoi* (green circles), wildfires from 2006 to 2019 (red) and survey routes (black lines).

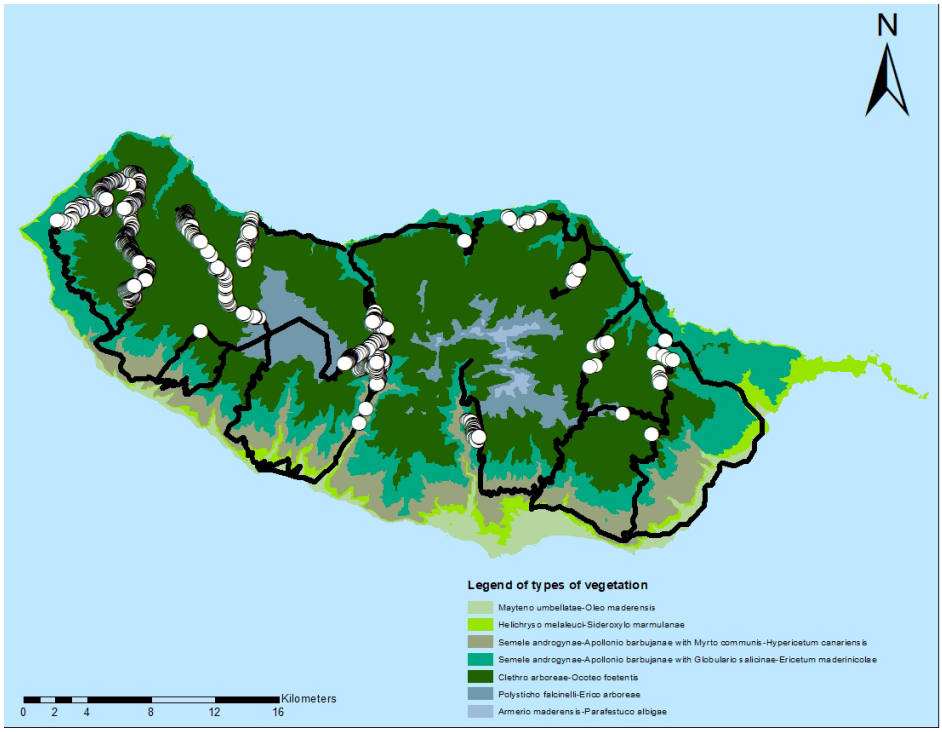

Figure 3. The map of the field data and vegetation types on Madeira: Individuals of *Pslamtophanes barretoi* (white circles) and survey routes (black lines).

field in 2020. These data were used for an overlap analysis with fire from 2006 to 2019 and vegetation data (Fig. 2, Fig. 3).

Methods

I made an initial survey on the island of Madeira in August 2019. During this survey I found that males of the species sing only during night (further confirmed during the 2020 field study). Thus, to find the species, acoustic and visual monitoring was used at night starting at 9:00 PM. For mapping the distribution of the species, I recorded the data with the mobile device application "ObsMapp" directly in the field and uploaded the data on www.observation.org. The field study was done between August 6 and September 2, 2020. To find populations of the species on Madeira, I first scouted all roads by car before conducting more detailed research. Before my study, the distribution of the species was unclear as the only published study on occurrences is rather old (Lange, 1990). If individuals produced sounds with huge space amongst each other, I recorded their occurrence from the car directly. However, if areas along roads had higher population densities, I investigated the same areas during the next night at the same time by walking, as it was difficult to collect such detailed data precisely by car. The route of each survey was tracked using Google Maps Timeline. Fire from 2006 to 2019 and vegetation data in Madeira were provided by the Institute of Forests and Nature Conservation in Madeira. The mapping for the field data with the fire data was carried out with ArcGIS (Esri, 2020).

Results and future directions

A total of 1,019 individuals were detected during the field trip in 2020. The map showed that the species occurs mainly in the north and at higher elevations (Fig. 2). The map shows some gaps in distribution in burnt areas, but also some occurrences that overlap with past fires. Areas with the tree species *Clethro arborea* and *Ocoteo foetensis* may be a major habitat of the bush cricket species because, despite many areas with those trees not being occupied by the bush cricket, a high number of individuals in the map are overlapped with the trees (Fig. 3). Consequently, advanced statistical analyses will be conducted in the future considering wildfire year, seasonality, vegetation types, etc. I hope that these data will help to better understand the roles of wildfires in the species' population trend and develop adequate conservation strategies for the species.

Acknowledgement

I would like to thank the Institute of Forests and Nature Conservation in Madeira for allowing me to collect data and the Orthopterist' Society for the Theodore J. Cohn Research Fund award.

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CODE- Conservation of Orthoptera Diversity in central Epirus, Greece

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Greece hosts 378 Orthoptera species (35% of Europe), with an impressive degree of endemism (37%) and a great proportion (37%) of red-listed species after IUCN (Kati and Willemse, 2020). However, knowledge of grasshopper distribution and ecology in Greece is scarce, hampering conservation action for this biological group. Our project aimed at exploring the grasshopper diversity patterns and the environmental factors that affect the Orthoptera communities on a mountain in northwestern Greece (Mitsikeli Mt.). In addition, we focused on tracking endangered species and species of ecological interest. Finally, we attempted to assess the impact of grazing on grasshopper communities, as livestock grazing is among the most imminent threats for Orthoptera, according to the European Red List of grasshoppers (Hochkirch et al., 2016).

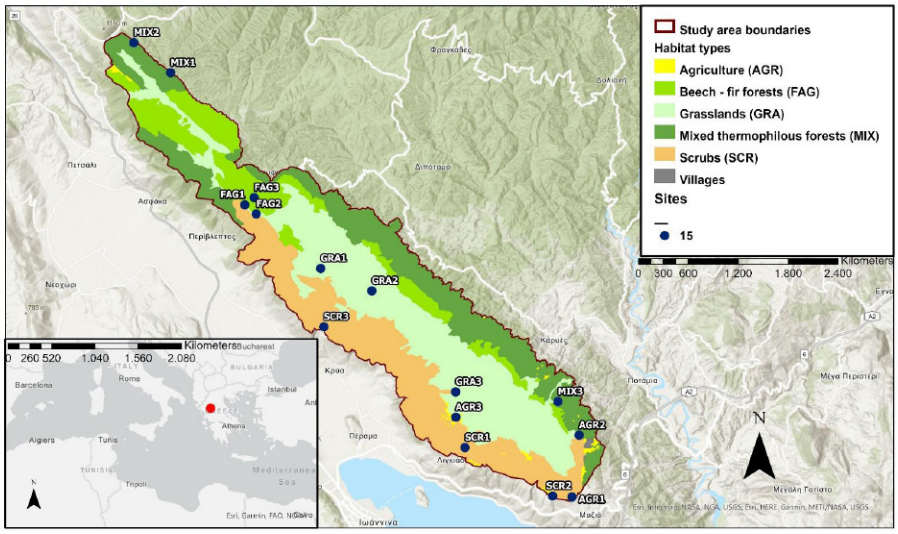

Figure 1. Map of the area of Mitsikeli and a mini map indicating the point in the wider Mediterranean region. The boundaries of the study area (Natura network area - GR2130008), habitat types and sampling sites are shown.

Study area

Our study area, Mitsikeli Mt., is situated in Epirus, in northwestern Greece and extends to the mountainous areas of the Ioannina city. It covers 8,436 ha and it is a protected site of the European network NATURA 2000 (GR2130011), with an altitude varying between 600m and 1810m. Mitsikeli comprises five main habitat types: scrubs, mixed thermophilous forests, beech-fir forests, mountain grasslands, and agriculture lands (Gerasimidis and Korakis, 2009).

Sampling

We selected 30 quadrats, to represent the five main habitat types of Mitsikeli. Each habitat type was sampled by three sites of one ha and sampling took place in two quadrats of 10 m x 10 m, randomly located within each of the above sites (Fig. 1). Sampling was repeated twice, during August of 2019 and 2020, at the peak of adult activity, and a rapid survey was conducted in late spring (May-June) of 2020, to complete the species list of the area for early appearing species.

Results: grasshopper diversity

Sampling found 34 Orthoptera species that were evenly distributed between the two suborders, with 17 of them belonging to Ensifera and the other 17 to Caelifera (Fig. 2).

Paracaloptenus caloptenoides (Fig. 3a), an annexed species of the European Directive (92/43/EC) and classified as Near Threatened on the European Red List of Grasshoppers (Hochkirch et al., 2016), was recorded for the first time on Mitsikeli Mt. On the other hand, *Prionotropis willemsorum* (Figure 3b), an endemic flightless pamphagid species of Greece with an Endangered conservation status (EN) (Willemse et al., 2018) that had been reported from Mitsikeli Mt several decades ago (unknown coordinates) was not recorded.

The richest habitat was the beech-fir forest, hosting 18 species of Orthoptera in forest openings (Fig. 5) and the majority of Ensifera, which are

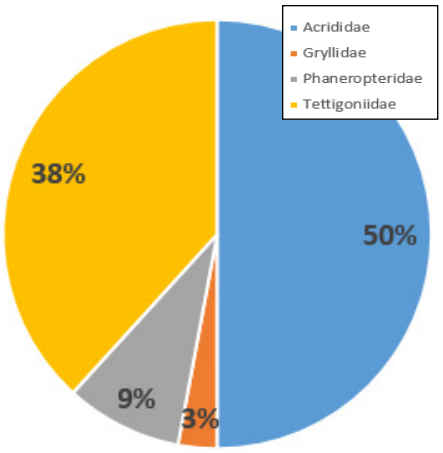

Figure 2. The species found in our study area represent four of the 12 Orthoptera families hosted by Greece.

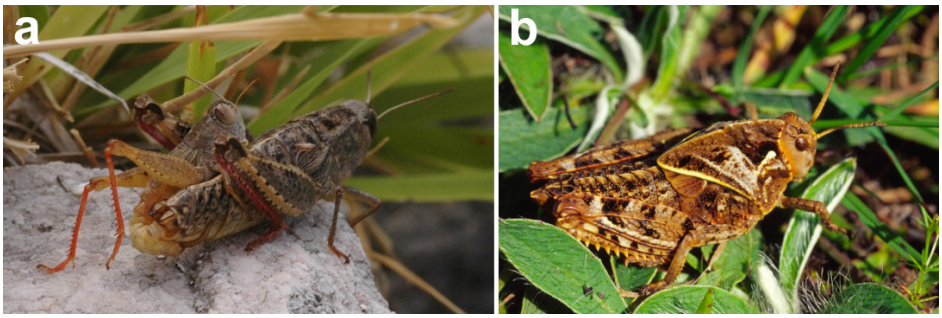

Figure 3. (a) *Paracaloptenus caloptenoides*, an annexed species of the European Directive (92/43/EC). (Photo: V Kati) (b) *Prionotropis willemsorum*, an endangered endemic grasshopper to northwestern Greece. (Photo: Michèle Lemonnier-Darcemont)

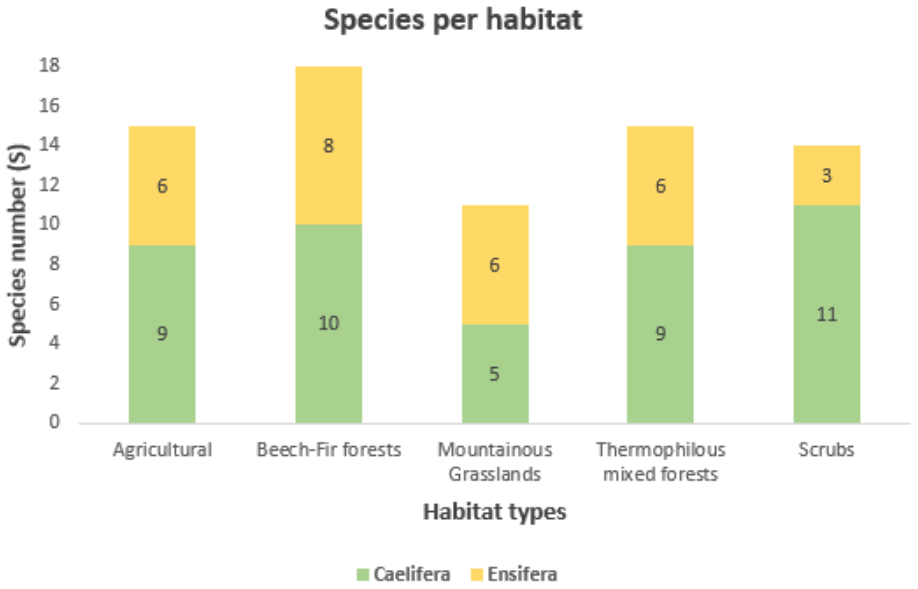

Figure 4. Histogram with the number of species per habitat type, including the number of Caelifera and Ensifera.

Figure 5. Beech-fir forests had the greatest diversity of Orthoptera.

Figure 6. Cattle grazing was predominantly in the mountain grasslands.

known to favor shrubs (Bieringer and Zulka, 2003). Mountainous grasslands were the poorest sites, hosting only 11 species (Fig. 4).

Results - conservation

We found that grazing was present in all habitat types, except mixed thermophilic forests. Mild grazing was more frequent (43.3% of quadrats) than intensive grazing (6%) or no grazing (49%). The intense cattle grazing of the mountain grasslands seems to regulate the patterns of Orthoptera in the study area. Intensively grazed sites showed low species diversity and a strong dominance of thermophilic Caelifera, such as *Chorthippus dichrous*. Mild disturbance regimes, such as those generated by occasional grazing or mowing can be consistent with grasshopper communities' conservation (Kati et al., 2012). However, intensive livestock grazing and cattle grazing in particular (Fig. 6) may have detrimental effects on rare and endemic grasshopper species in Greece (Lemonnier-Darcemont et al., 2018). This might be the reason for the potential local extinction of *Prionotropis willemsorum* from Mitsikeli Mt., although further research is needed to confirm the extinction of the species from the study area (Willemse et al., 2018).

Overall, this study estimated grazing to be the greatest threat to the Orthoptera community on Mitsikeli Mt., in conjunction with the abandonment of agricultural land and the spread of forests. We suggest grazing management and its return to a mild and occasional form, which will allow the creation of forest openings that will ensure the conservation of agricultural mosaics. More detailed data on grazing are considered necessary to develop a management plan and achieve good conservation of Orthoptera-hosting habitats in the area.

Acknowledgements

We are grateful to the Orthopterists' Society for the financial support through the Theodore J. Cohn Research Fund. Thanks to Luc Willemse for his valuable support and help in specimen identification during the Orthoptera sampling. We also thank the Management Body of Lake Pamvotis for field assistance. The present study was carried out at the Biodiversity Conservation Lab of the University of Ioannina, under the supervision of Prof. Vassiliki Kati.

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Orthoptera Species File Grant Reports

From Russia with Love - New images of types of band-winged grasshoppers (Caelifera: Acrididae: Oedipodinae) from Russian collections

By LARA-SOPHIE DEY[1], MICHAEL SERGEEV[2,3], ANDREY GOROKHOV[4], ANDREY L. OZEROV[5] & MARTIN HUSEMANN[1*]

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Many famous Orthoptera taxonomists have worked in the collections in Russia, specifically in St. Petersburg. This has led to a large accumulation of type material and other interesting samples from a variety of Orthoptera taxa. However, due to the relatively remote location and the previously difficult political situation, the Russian collections are not well-documented and few images are available of types housed in these collections. Many types were even recorded as lost or type depository locations were not known. Therefore, we visited three of the most important Russian collections in St. Petersburg, Moscow, and Novosibirsk to record data of types held in these collections and take images to be included in the Orthoptera Species File (http://orthoptera.speciesfile.org/). Our specific focus was the band-winged grasshoppers (Oedipodinae) and all types were recorded from the collections in Moscow and Novosibirsk.

All three collections were interesting, but for different reasons. While the collection in Novosibirsk only houses a few types, it represents an important local collection and receives new regional material regularly. The types found here are from M. Sergeev and S. Yu. Storozhenko. In Moscow, several types from the V. v. Motschulsky collection were rediscovered (e.g., syntypes of *Meconema albicornis* and *M. subpunctata*). Additionally, a lot of material collected by N. Ikonnikov and D. Dovnar-Zapolskijis is located here. Also, some specimens declared as types may, however, not be valid, as the corresponding publications could not be found. Finally, the collection in St. Petersburg is undoubtedly the most important in the region, as most orthopterists have worked or visited the collection at one point. As the collection houses several hundreds of types we had to focus on the Oedipodinae here. Of specific interest was the material worked on by B. Uvarov, G. Bey-Bienko, and L. Mistschenko since they have described large num-

Figure 1. Lara (right) and Martin (left) standing in front of the collection in Novosibirsk.

bers of species of Bryodemini and Sphingonotini. Further, several types or tentative types by H. de Saussure, G. Fischer von Waldheim, and E. v. Eversmann are in this collection. Besides the known types, material from other famous researchers is deposited here and the collection would deserve some deeper investigations, which likely would lead to the rediscovery of additional type material.

During our two-week trip through Russia, we photographed a total of 275 individuals belonging to 188 species, including 95 holotypes, 5 neotypes, 24 syntypes, and 9 lectotypes. Furthermore, we photographed 27 allotypes, 101 paratypes, 9 paralectotypes, 4 unspecified primary types, and 1 topotype. Altogether 1,083 images of type material were provided to the community via the OSF with funding from an OSF Grant.

Figure 2. Label and syntype specimen of *Xya obscura* Motschulsky, 1866 (synonym of *Xya japonica* (Haan, 1844)) housed in the collection in Moscow.

Figure 3. Label and syntype of *Leptopternis gracilis* (Eversmann, 1848) housed in the collection in St. Petersburg.

Book Review:
Les Sauterelles-feuilles de Guyane: Mimétisme
By Serge Xiberras and Pierre Ducaud

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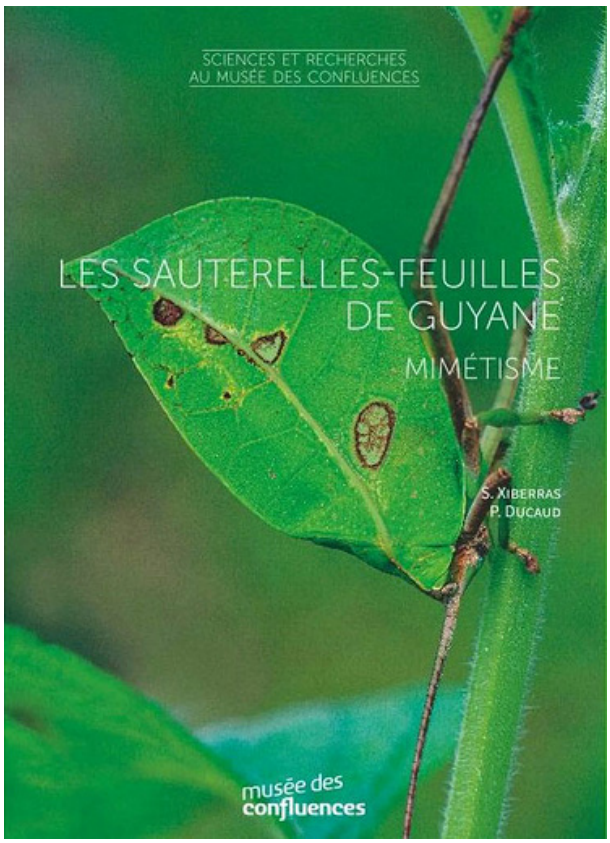
Working all alone in the laboratory for months, in an almost deserted museum, it was a very nice surprise when one Monday in April a beautifully illustrated book arrived: ***Les Sauterelles-feuilles de Guyane***, with a friendly handwritten dedication on the second page.

The name "sauterelles-feuilles," meaning "leaf grasshoppers" or, rather, "leaf katydids," was introduced by the French biologist Paul Vignon (1865-1943), who published almost 20 papers on the leaf-mimicking specialists Pterochrozinae, a small group of neotropical tettigoniids (less than 100 species distributed from southern Mexico, across the northern part of South America, to Bolivia and the northeastern tip of Argentina). They have brought the imitation of a leaf to perfection, including signs of decay, like discoloration, mildew, eroded margins, holes (transparent spots), and other microscopic details.

S. Xiberras and P. Ducaud have been raising and studying pterochrozines in French Guiana for many years. They resolved the synonymy of the exceedingly color-polymorphic species *Pterochroza ocellata*, the only species of its genus, described under 12 additional names (Xiberras & Ducaud 2004). Within the diverse genus *Typophyllum* they described two new species and also resolved some synonymies (Xiberras & Ducaud 2014a, b). All three papers come with beautiful plates.



Now the authors present a book that summarizes their work and manifold observations, accompanied by numerous drawings and plenty of photographs.

The book comprises three major parts followed by about 70 pages with photographic plates of live individuals as well as pinned specimens. The four chapters of Part 1 present the pterochrozines living in French Guiana (*P. ocellata*, *Cycloptera speculata*, and five species of *Typophyllum*), describe their mating behaviour, oviposition (including information on clutch size, number of clutches per female, incubation time, etc.), eclosion and development of nymphs, and, finally, natural history and behaviour. Everything is illustrated with photos and drawings. Part 2 comprises two chapters: the first deals with all possible aspects of mimesis and camouflage of nymphs and adults, both morphological and behavior-related. The second is about intraspecific color variation and intermediate forms. This part also comes with many illustrations. Part 3 provides detailed descriptions of all observed variations and many intermediate forms of the different species (with references to corresponding figures). Most of the last quarter of the book is made up of 51 full pages of photos of live individuals, followed by 20 magnificent plates of meticulously prepared specimens (6 to 12 specimens each, with all wings spread and antennae carefully aligned).

I am still in Part 1 with my reading, proceeding slowly due to my rusty French. It is an attractive piece of work that I enjoy thumbing through in the evening sometimes with a glass of wine. Apart from all the pictures, the amount of data it contains is impressive, including interesting aspects I would probably never have noticed. Relevant bibliography is comprehensively considered. The above-mentioned dedication is true in that I will appreciate the content of this book in particular (the little walking leaves and larger pterochrozines belonging to my favourite katydids). I can recommend it also to other orthopterists interested in neotropical katydids, especially such that look like six-legged leaves, color polymorphism, sophisticated camouflage accessories, and unique photographs (even though some command of French is certainly helpful, unknown words can easily be looked up on the Internet).

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The centennial of Sir Boris Uvarov's locust phase theory

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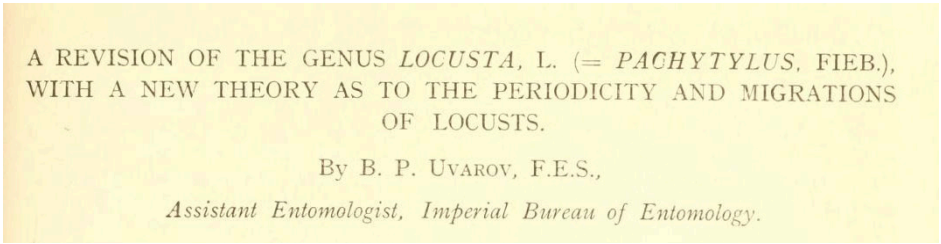
In midsummer of 1920, after a very long and tiring trip from the capital of Georgia Tbilisi to London, Boris Uvarov, already skilled, but yet not a very well-known entomologist, started to work for the Imperial Bureau of Entomology. Despite numerous complications, resulting from his relocation, he enthusiastically embarked on his activities at the Bureau. By 1921, he had already published 16 articles on very diverse aspects of orthopterology, from taxonomy to ecology, biogeography, and control (Wigglesworth, 1971). Some of them were prepared on the basis of his huge unpublished manuscript on Orthoptera of the Caucasus written during his work in Tbilisi. Two of his articles published in 1921, namely "A revision of the genus *Locusta* L. (= *Pachytylus* Fieb.), with a new theory as to the periodicity and migrations of locusts" (Uvarov, 1921a) and "The geographical distribution of orthopterous insects in the Caucasus and in Western Asia" (Uvarov, 1921b), became iconic for several generations of orthopterists.



A REVISION OF THE GENUS *LOCUSTA*, L. (= *PACHYTYLUS*, FIEB.), WITH A NEW THEORY AS TO THE PERIODICITY AND MIGRATIONS OF LOCUSTS.

By B. P. Uvarov, F.E.S.,

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The first article became particularly significant. Uvarov tried to prove the conspecificity of three different forms in the genus *Locusta* Linnaeus, namely *L. migratorioides* (Reiche et Fairmaire), *L. migratoria* (Linnaeus), and *L. danica* (Linnaeus) (= *L. cinerascens* Fabricius). The suggested synonymy was based on some ideas

Sir Boris P. Uvarov
1889-1970

of F.T. Köppen (1870), Uvarov's own field observations in southern Russia in 1911-1920, and his examination of numerous museum collections. The most revolutionary and far-reaching insight was that local populations of the migratory locust, or *L. migratoria* sensu Uvarov, might change drastically over several generations. Behavior, morphology and coloration of individuals in a population could be quite different across several successive generations, and the status of each population (dense or scattered) might vary considerably. Following the advice of Sir Guy Marshall, Uvarov proposed to designate such strikingly different forms of the same species as "phases." However, in the 1921 article he still continued to use the "taxonomic" designations for two different phases of the migratory locust (phase *danica* for the solitarious individuals, and phase *migratoria* or *migratorioides* for the gregarious ones). Uvarov also attempted to discuss the evolutionary history of the migratory locust and suggested that *migratorioides* was (or is similar to) the ancestral form of the species. Finally, he emphasized the applied aspects of the new theory, in particular, the key role of phase transformation (from solitarious to gregarious) in the genesis of the locust mass outbreaks. Later, Uvarov (1927, 1928) discussed main ecological issues of the theory and focused on problems of plant protection associated with it. In 1929, he and B.N. Zolotarevsky (Uvarov, Zolotarevsky, 1929) proposed general and independent of International Code of Zoological Nomenclature names for main variants of the phases: *solitaria*, *transiens*, and *gregaria*.

Phase theory was accepted by many acridologists, particularly those who dealt with applied aspects (Faure, 1923, 1932; Predtechensky, 1928; Tarbinsky, 1932). At the same time, certain orthopterists criticized Uvarov's idea and believed that two the forms of the migratory locust (*L. danica* and *L. migratoria*) were genetically different and actually belonged to two separate species (Plotnikov, 1927).

One of the problems with the phase theory persists in that it has never been clearly formulated. For this, Uvarov was criticized by Key (1950). In addition, some early hypotheses of Uvarov appeared to be erroneous. He thought that solitarious individuals always develop continuously without embryonic diapause, while gregarious ones always have embryonic diapause in their life cycle. Also, he believed that once started, phase transformation (e.g., from solitarious to gregarious phases) will continue to increase as a "snowball," and cannot be interrupted or reversed by external factors. Nevertheless, the central thesis of the phase theory regarding the locusts as polymorphic insects capable of changing their way of life under different densities holds true. Depending on the density, locusts can be present in populations in a variety of forms, differing in behavior, coloration, and morphology. Such expression of intraspecific variation is now called locust phase polyphenism. One hundred years after the seminal publication of Uvarov, traits of phase polyphenism are found in about 20 species in five subfamilies of Acrididae family (Cyrtacanthacridinae, Calliptaminae, Melanoplinae, Gomphocerinae, Proctolabinae) (Song, 2011).

Although some specialists considered phase changes merely the consequences of differential density (Key, 1950), the fundamental, primary role of the phase phenomenon in the origin and development of locust mass outbreaks and plagues is now supported by numerous experimental evidence (see the review by Cullen et al., 2017). Thus, Uvarov's discovery was instrumental in elucidating locust biogeography and population dynamics (Waloff, Popov, 1990).

The occurrence of locust phase polyphenism is very complex and expressed in different ways in different locusts (Cullen et al., 2017; Pflüger, Bräuning, 2021). While we have gained considerable knowledge of this phenomenon from the studies of the desert and migratory locusts, for most other locust species the behavioral and physiological mechanisms governing phase polyphenism remain poorly understood (Song, 2011). Uvarov's phase theory provides a solid and yet sufficiently flexible conceptual foundation to assimilate newly accumulated knowledge for future studies of locust bioecology.

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Hunting high and low! *Omocestus viridulus* (Acrididae) in Scotland

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Several articles report observations of the wide range of altitudes at which the common green grasshopper *Omocestus viridulus* (Acrididae) has been found in the UK (Gardiner & Gardiner 2008; Burton 2010; Haes 2010; Horsfield 2010; Gardiner 2011; Gardiner 2020). The highest observation is from Ben Lawers in the Scottish Highlands (1214 m), which is not surprising as in Switzerland it commonly persists at altitudes > 2400 m (Berner 2005). At these high altitudes (> 2000 m above mean sea level) it appears that egg hatching and adult maturity are reached much later than at lower altitudes (Berner 2005). Hatching and maturation to adulthood can also be severely affected by cloudy weather (low amount of sunshine) at high altitudes, with poor weather severely affecting reproductive success (Berner et al. 2004). However, high altitude *O. viridulus* nymphs may have a much shorter period from egg hatching to adulthood (quicker nymphal maturation) than their lower-altitude counterparts, therefore maximising their chances of survival (in essence, quicker development is necessary due to more unfavourable climate) (Berner et al. 2004).

On smaller hills, there is ample scope to study the factors that determine the abundance of *O. viridulus*, even low summits of less than 100 m are likely to have diverse environmental conditions depending on altitude, aspect, and habitat management. The study of zonation from low to high altitudes could be crucial in our understanding of how the insect may respond as our climate warms. It is possible that as the insect declines in drier areas of the UK (e.g., the south-east, Gardiner 2010), the upper altitudes of mountains could be the wetter refuges it requires in the north and west, which receive higher rainfall.

Figure 1. Lower altitude (up to 620 m) slopes of Ben Nevis where *Omocestus viridulus* was abundant - photo: Tim Gardiner

Figure 2. Summit of Ben Nevis (1345 m), no favourable habitats for Orthoptera - photo: Joseph Gardiner

On a trip to the Scottish Highlands in August 2021, a range of sites from near sea level to the summit of Ben Nevis (1345 m) were visited to gain an idea of the altitudinal range of *O. viridulus* in the area. On Ben Nevis itself, *O. viridulus* was heard stridulating from 26-620 m along the pony track (main tourist path to summit; Fig. 1) with no males

Figure 3. Culloden Battlefield, suitable tall grassland habitat for *Omocestus viridulus* and *Bombus muscorum* at a low altitude (c. 150 m) - photo: Tim Gardiner

Figure 4. Sea level (c. 4 m) flower-rich grassland at Ganavan Bay near Oban – photo: Tim Gardiner

detected beyond the halfway lochan (Lochan Meall an t-Suidhe) where the mountain becomes devoid of vegetation with only scree along the zigzag track to the summit (Table 1, Fig. 2). The meadow grasshopper *Pseudochorthippus paralleus* was also heard stridulating up to around 350 m.

Away from the moorland slopes of Ben Nevis and the grassland of Glen Nevis, *O. viridulus* was detected from 4-155 m in association with the moss carder bee *Bombus muscorum*, a scarce "priority" bumblebee species in the UK. Grassland and mire at Culloden Battlefield near Inverness were particularly favourable for *O. viridulus* and *B. muscorum* (Fig. 3) as were flower-rich "machair" sites near Oban (Fig. 4), close to sea level (4-12 m). These ancient unimproved grasslands may be key for both species on the west coast of Scotland.

In conclusion, it appears that *O. viridulus* is widespread at a range of altitudes on the west coast of Scotland (4-620 m) in damp habitats, such as wet grassland, moorland, and grassy scrub edge. Added to the observations from the inland Ben Lawers, the altitudinal range is 4-1214 m in the Scottish Highlands. Altitudinal limits on particular mountains such as Ben Nevis may be imposed by an absence of favourable moorland habitat and replacement with unvegetated scree/boulders nearer the summit and the harsher climate (Fig. 2).

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Table 1. Altitudinal range of *Omocestus viridulus* sites in the western highlands of Scotland, August 2021.

Site	Altitude observed (m AOD)	*Bombus muscorum* present	Habitat
Ben Nevis sites			
Glen Nevis, Achintee	26	No	Wet grassland
Glen Nevis, youth hostel	178	No	Scrub edge
Ben Nevis pony track	324	No	Grassland
Lochan Meall an t-Suidhe	620	No	Moorland
Other sites			
Culloden Battlefield grassland	155	Yes	Grassland
Culloden Battlefield mire	148	Yes	Moorland
Ganavan Bay, Oban	12	Yes	Grassland
Oban shore edge	4	Yes	Grassland

AOD = Above Ordnance Datum, essentially above mean sea level

Gaudy grasshoppers on book covers

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I have been always curious about the presence of Orthoptera in different aspects of human culture, such as stamps, coins, paintings, handicrafts, food, etc. Of particular interest, due to my dissertation research, is the family Pyrgomorphidae, which includes very colorful species, and as a logical consequence, is featured in a variety of human artifacts. Through my PhD studies, I started to compile images of book covers with pyrgomorphids.

Twenty book covers are presented in Figs. 1 & 2. The African pyrgomorphid *Zonocerus elegans* is the most frequent (eight covers). In general, adults are shown but in some cases, but nymphs are featured as well (Fig. 1). Due to its striking colors and its importance as a plague in Southern, East-central, East Africa and Madagascar, this species is quite popular and commonly known as the Elegant Grasshopper.

In Fig. 2, the rest of the book covers are shown. In the first row from left to right, the first book cover depicts the pyrgomorphid *Phymateus viridipes*. Again, this species is of economic importance (known as the Green Bush Locust) in tropical East, Central and South Africa. The second and third covers feature *Phymateus leprosus*, a species with a characteristic inflated pronotum (hence, its name leprosus). This species is also considered a pest in Southern Africa. The four book cover portrays *Petasida ephippigera,* an Australian pyrgomorphid. It is not known to be economically important, but often called Australia's most colorful grasshopper, which is distributed in the Central part of Northern Australia.

In the middle row of Fig. 2 from left to right, the first and second book covers illustrate the pyrgomorphid *Aularches miliaris*, also known as the Coffee Locust. It is an important plague in Pakistan, India, Nepal, Bangladesh, Sri Lanka, Myanmar, Thailand, Cambodia, Vietnam, Malaysia, Indonesia. The third book cover shows a species of the genus *Atractomorpha*. The fourth book cover features the species *Poekilocerus pictus*, of economic importance in India and Pakistan.

In the bottom row of Fig. 2 from left to right, the first three book covers display a very charismatic species, *Maura rubroornata*, which is not as large as the other species shown in these book covers, has a very distinct and attractive color combinations. This species is quite common in South Africa, Lesotho and Eswatini. It has a high variation in color patterns and tegmina development, and shown here are only the more reddish and short winged form. Finally, the last book cover depicts *Dictyophorus*

Figure 1. *Zonocerus elegans* on different book covers.

Figure 2. Different pyrgomorphs on book covers. FROM LEFT TO RIGHT. TOP ROW. *Phymateus viridipes, Phymateus leprosus* adults, *Phymateus leprosus* nymph, *Petasida ephippigera*. MIDDLE ROW. *Aularches miliaris* (2), *Atractomorpha* sp. *Poekilocerus pictus*. BOTTOM ROW. *Maura rubroornata* (3), *Dictyophorus spumans*.

spumans, a species of some economic importance in Southern Africa. This species possesses many color pattern variations as well.

In general, apart from the economic importance, the species of pyrgomorphs featured in the book covers have striking colors and are medium to large in size. The great majority of the species mentioned here possess chemical defense mechanisms, such as foam emission or glands that excrete milky substances. Pyrgomorphs, together with romaleids and locusts, are the most common grasshoppers found in book covers.

Florida collectin' - solving Orthopteran mysteries and uncovering new ones in the Sunshine State

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After a long year of being cooped up at home due to the (unfortunately still ongoing) COVID-19 pandemic, any entomologist would be itching to get outside and do some collecting. I had just arrived at Texas A&M University as a new graduate student in Hojun Song's lab, and specimens were in demand for a number of different projects: *Melanoplus differentialis* (Acrididae) for colleagues in South Korea, cricket and katydids for an Ensifera phylogeny, and live crickets to study acoustic behavior. Since international travel remains mostly on hold, Hojun and I decided to look a little closer to home for our collecting needs. We planned an itinerary that would take us from College Station, Texas, all the way to the Florida Keys and back within the span of two weeks during August 2021. It was an ambitious trip, but one that promised a great diversity of insects.

On our way to Florida, we stayed overnight in Gulfport, Mississippi in search of *Hubbellia marginifera*. One of the most rarely seen North American katydids, this species resides in the longleaf pine forests of the southeastern U.S. What I had not realized was how high up they were. We must have heard hundreds

of singing males, but each one was sequestered at the very top of some of the tallest pine trees I had ever seen. Hours of searching turned up a few other interesting insects, but no *Hubbellia*. Oh well - we'd be passing through the area again on our return trip, so we'd have another chance.

After a quick stop in the morning to collect *Melanoplus differentialis* in Missisippi (and narrowly escaping the coronavirus in the most crowded Buc-ee's gas station ever in Alabama), we moved on to Florida. We spent a full day collecting in Ocala National Forest, a large mix of sandhill and scrub habitats, meeting up partway through the day with Arturo Santos, who has collected and photographed many of Florida's endemic orthopterans. The sandhill habitats provided us with a large diversity of grasshoppers during the day and night collecting yielded many different katydids and crickets. I collected specimens of a scrub-inhabiting *Neotridactylus* (Tridactylidae) that may represent an undescribed species closely related to *N. archboldi*. We also made a quick stop to see *Schistocera ceratiola*, the Florida rosemary grasshopper, which is an extreme host plant specialist on Florida rosemary, *Ceratiola ericoides*. One other target for the day involved a bit of sleuthing and some natural history knowledge: *Inscudderia strigata*, the Guinea-cypress katydid. There were no reliable recent reports, but this katydid is also a host plant specialist, this time on Peelbark St. John's Wort, *Hypericum fasciculatum*. I had identified a location within Ocala where there were a number of iNaturalist observations of this plant. We arrived at the coordinates and I immediately spotted the plant we were looking for. Within maybe ten minutes, we had our first *Inscudderia*, and, in fact, they turned out to be relatively common once we acquired a search image.

After good success at Ocala, we moved on to Archbold Biological

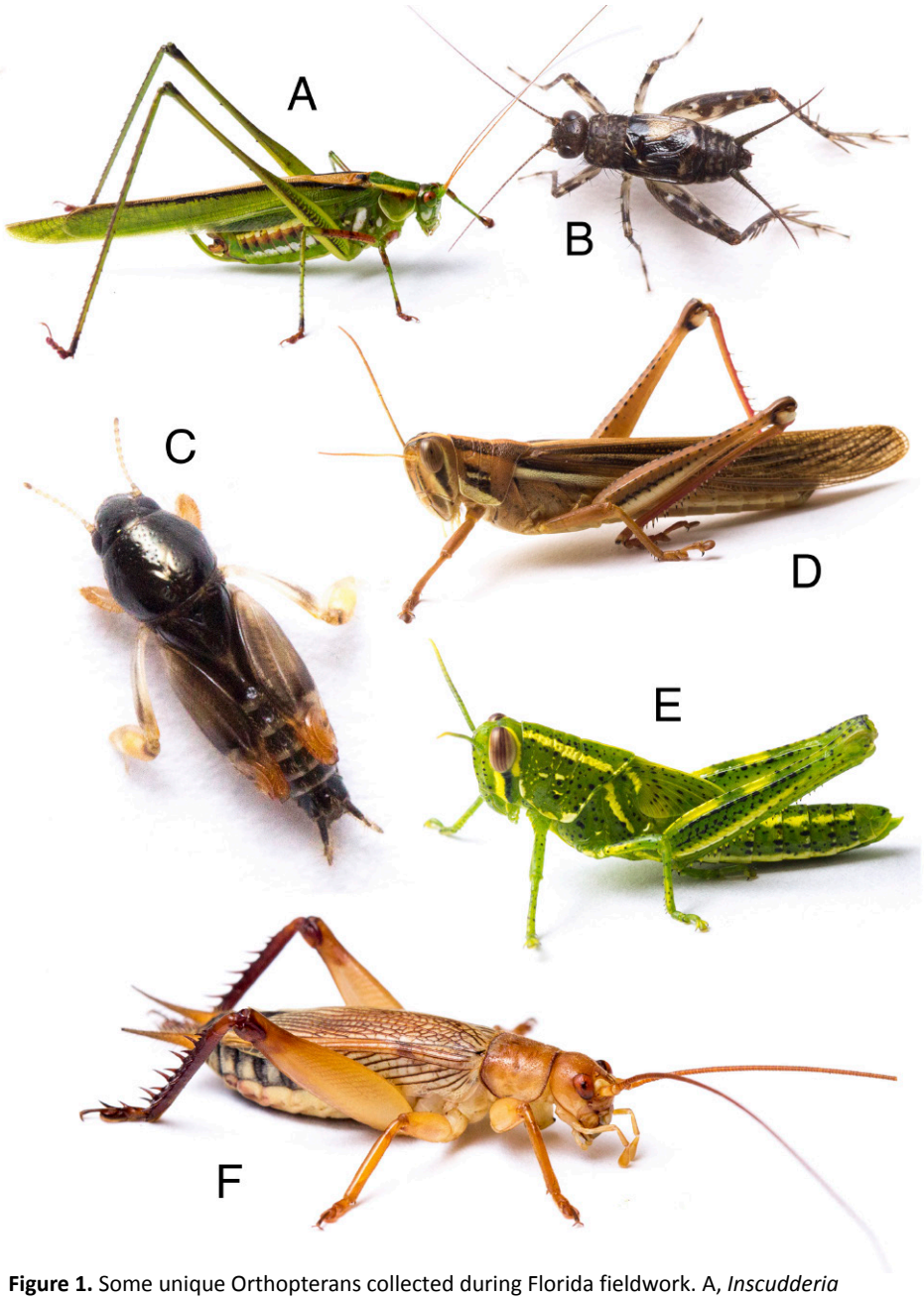

Figure 1. Some unique Orthopterans collected during Florida fieldwork. A, *Inscudderia strigata*. B, *Hygronemobius alleni*. C, *Neotridactylus* nr. *archboldi*. D, *Schistocerca pallens*. E, *Schistocerca ceratiola* (nymph). F, *Tafalisca eleuthera*.

Station in Lake Placid, a world-renowned center of research on Florida scrub ecology and probably one of my favorite places on the planet. Blacklighting and night collecting here was productive for a number of specialist scrub species. While collecting katydids, I found an odd-looking *Schistocerca* perched on a low plant. At first glance I took it for the common *S. americana*, but something looked off. Closer inspection revealed a rather different color pattern. When I caught up with Hojun, I showed him the insect. It took him all of about six seconds to exclaim "This is *pallens*! WTF?!". I had accidentally discovered the first U.S. record of *Schistocerca pallens*, a non-swarming Central and South American species never before seen in this country. Repeated search of the area turned up no additional individuals, so it remains to be seen whether this species is actually established in central Florida or simply a vagrant.

We spent two nights at Archbold,

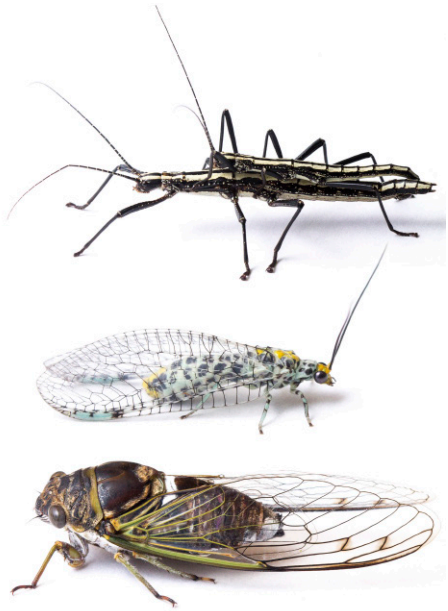

Figure 2. A few other insects encountered in Florida. From top to bottom: *Anisomorpha buprestoides* (southern two-striped walkingstick), *Abachrysa eureka*, *Diceroprocta biconica* (the Keys cicada)

taking a brief sojourn to Bunche Beach Preserve in Lee County to collect the Mangrove ground cricket, *Hygronemobius alleni*, in a dense mangrove swamp, which was a decidedly unpleasant experience with swarms of biting flies, intense heat and humidity, and hundreds of tiny crabs distracting us from the crickets. Following this craziness, we pressed southward to an idyllic-sounding location: Patch of Heaven Sanctuary. I had never been to this place, but after getting a tip from a friend on iNaturalist (and receiving permission to collect from the landowners), we arrived at this small preserve. And what a preserve it was! Beautiful gardens of native and exotic plants, coupled with a relict tropical hardwood hammock forest and an open meadow, made this place truly live up to its name. Night collecting was awesome, with a great diversity of Caribbean cricket species at the northern edges of their ranges in Florida.

The next day was somewhat uneventful, with some surprisingly poor collecting at a site I thought would be better, but the day afterward made up for it in spades. We headed even further south, into the Florida Keys, targeting a few rarely seen native crickets only found in mangrove branches. After a quick stop to see some neat endemic birds, the white-crowned pigeon and gray kingbird, we proceeded to No Name Key. Several hours of breaking apart mangrove twigs yielded lots of interesting insects, but very few crickets, and certainly not the big one we were after: *Tafalisca eleuthera*, an unusual animal that has completely lost the tympana in both sexes. After encountering basically the same fauna on Big Torch Key, we decided it'd be best to wait until nightfall.

While waiting for the sun to set, we took a drive over to Key West and viewed the southernmost point in the continental U.S. In Key West, the pandemic was apparently over, at least judging by the fact that absolutely no one was wearing a mask and huge crowds of vacationers clogged the streets and restaurants. Needless to say, we did not partake in the festivities, opting instead to grab some seafood takeout and head back to Big Torch Key. Following a pleasant dinner in the quiet mangrove swamp, we set about collecting once again. The biting flies came out in force and it was a challenge to keep them away as we carefully inspected mangrove branches for orthopterans. After probably two hours of collecting, I had almost given up on *Tafalisca* - until I suddenly saw a big female right in front of me! I was unprepared for the frankly enormous (for a North American cricket) size of this insect, as I had never seen a specimen before. Continued collecting over the next hour produced a few more individuals, but they were not common.

The next day it was time to start heading back, but, of course, we had to try again for *Hubbellia*. Our second attempt was in Tallahassee, where once again we heard numerous males singing from pine trees. I followed song after song, finding each time that they were always issued from a tall pine tree, never in a shorter one. At one point I had tracked a male's song to a somewhat smaller tree, but it was

Figure 3. Other animals, native and non-native, spotted in Florida. Clockwise from top left: gray-headed swamphen (*Porphyrio poliocephalus*), Peter's rock agama (*Agama picticauda*), snowy plover (*Charadrius nivosus*), oak toad (*Anaxyrus quercicus*), white-crowned pigeon (*Patagioenas leucocephala*).

still way too tall to climb. A bit of movement at the top of the tree caught my eye. Could that be *Hubbellia*? I frantically reached for my binoculars as I tried to keep my headlamp on the spot. When I focused on the green pine needles, I saw only a blur at first. Then, suddenly, there it was, a beautiful male *Hubbellia*, moving effortlessly through the vegetation. It practically swam through the luxurious longleaf pine needles, quickly winding its way through several branches before disappearing out of sight.

We closed out our trip with one final *Hubbellia* hunt in Mississippi, which ended as they always seemed to do: empty-handed. On the way back to Texas, we sampled *Melanoplus differentialis* populations in Louisiana and east Texas as the last brief stops. Despite our frustration at missing *Hubbellia*, our trip was an amazing success in every other regard. This journey placed the power of iNaturalist on full display. Although many of our collecting sites were ones I had previously visited, others were places I never would have known about without enthusiastic naturalists posting their photos to iNat. I encourage everyone to consider using iNat, whether as a tool to help you find collecting localities, a way to get your own photos of various plants and animals identified, or even to contribute by identifying orthopteran photos. With the sheer amount of folks posting photos of unknown insects, there are a lot of hidden gems just waiting to be discovered.

Figure 4. Some of the varied habitats we visited in Florida. From top to bottom: oak hammock at Long Key; mangrove swamp at No Name Key; sunrise over scrubby flatwoods at Archbold.

Investigating Unmanned Aircraft Systems (UAS) for enhanced survey and treatment

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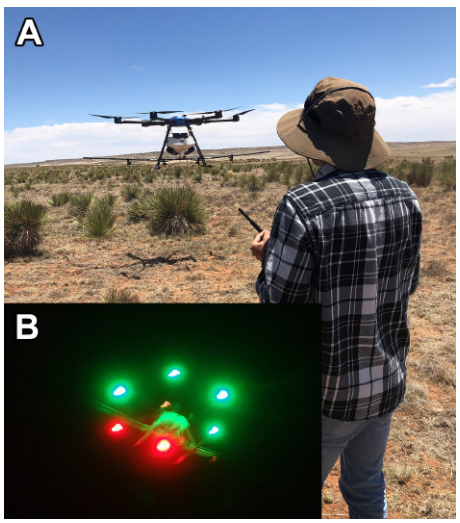
Our team has been experimenting with Unmanned Aircraft Systems (UAS) towards the goal of possibly enhancing survey and treatment abilities for U.S.-based grasshopper and Mormon cricket management programs. During the summer of 2021, we set up replicated 10-acre plots and treated some with an insecticide late at night to potentially: increase efficacy due to the target orthopterans being dormant at night, avoid winds that can cause spray drift, and avoid the majority of non-target pollinators, which are also dormant.



(A) Roberto Rodriguez remotely piloting and monitoring the UAS (Precision Vision 35, Leading Edge Aerial Technologies) during treatments; (B) UAS in flight for the nocturnal experiments, the red lights indicate the front of the aircraft, allowing the pilot to keep track of forward movement. Photos and caption by Derek A. Woller (Associate Editor)

Editorial

By HOJUN SONG
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While the COVID-19 pandemic is still raging, especially with the Delta variant affecting many unvaccinated people as well as causing breakthrough cases among the vaccinated, life has slowly returned to a certain level of normalcy, at least in the U.S. University classes are being taught fully in person, and labs are operating at full capacity. Fieldwork has resumed, although international travel is still not allowed for some. We still have to be careful and should not let our guard down, but I am cautiously optimistic that we will get through this crisis in the near future.

My summer season was quite busy. Because I could not do any fieldwork in the summer of 2020 due to travel restrictions, I was eager to pack my 2021 summer season with as many travels as possible to make up for what was lost last year. It started with fieldwork in Idaho to conduct RNAi experiments on Mormon crickets with my students. Then, in July, I spent many days and nights collecting crickets and katydids in southern Texas. I needed to collect many different species of Ensifera for characterizing tibial tympana transcriptomes. I actually became quite good at locating singing males by hearing their calling songs, although I soon learned that locating them does not necessarily equal to collecting them. Then, in August, my new graduate student Brandon and I went on a 3,000-mile roundtrip expedition to Florida to collect crickets and katydids (see Brandon's travelogue in this issue). This was my first time collecting orthopterans in Florida since I moved to Texas and it reminded me of how amazing the Florida orthopteran fauna was.

While all these trips were going on, I was also busy with expanding locust research as part of the NSF-funded Behavioral Plasticity Research Institute (BPRI). Now my lab has colonies of the desert locust and the Central American locust, as well as three other *Schistocerca* species, in both crowded and isolated conditions, and there are 5 graduate students and 1 postdoc associated with the BPRI here at Texas A&M. I expect to share exciting research coming out of the BPRI soon, so please stay tuned.

I have always kept my lab relatively small so that I can manage effectively, but, I feel that those days are over. Right now, I have 6 graduate students, 2 postdocs, and 5-6 undergraduate students working constantly on various projects. I am learning to handle a larger lab, although I am finding it challenging to delegate responsibilities and manage time well. I am sure I will eventually get better at this...

This issue of *Metaleptea* is filled with interesting reports and stories contributed by our members. I would also like to thank our Associate Editor, Derek A. Woller, for his continued assistance in the editorial process.

To publish in *Metaleptea*, please send your contribution to hsong@tamu.edu with a subject line starting with [**Metaleptea**]. As for the format, a MS Word document is preferred and images should be in JPEG or TIFF format with a resolution of at least 144 DPI. We welcome any content, such as personal essays, travelogues, stories, photos, or anything you want to share with fellow orthopterists. The next issue of *Metaleptea* will be published in January of 2022, so please send me content promptly. I look forward to hearing from you soon!

Officers of the Orthopterists' Society