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METALEPTEA

THE NEWSLETTER OF THE ORTHOPTERISTS' SOCIETY

President's Message

By ALEXANDRE V. LATCHININSKY
President
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Dear Fellow Orthopterists,

The autumn starts, which means that the preparations for the 13th International Congress of Orthopterology are going at full speed. I would like to take a moment and provide some important reminders. Please note that all the information regarding the Congress can be found at its website at ico2019morocco.com. Besides the scientific program, details of accommodations and fees, there is a wealth of touristic information including the description of a breath-taking post-Congress tour.

First and foremost, the deadline for submitting your abstracts is just around the corner. Don't forget to submit them to orthoptera2019@uiz.ac.ma by 31st of October using the template that can be found at "Call of Contributions" at the Congress website. If you want to apply for an Orthopterists' Society Travel Grant to attend the Congress, you should do so by sending your application electronically by 31st of October directly to davidmhunter100@gmail.com. The application should include an estimate of travel costs plus a copy of the abstract that you have already submitted by 31st of October deadline. The Travel Grants are mainly, but not exclusively, for students or young professionals (aged 35 years or less). Hurry up - Society travel funds are limited!

Furthermore, I would like to remind that at the Congress several prestigious OS awards will find their recipients. In particular, the 2019 Ted Cohn Award for Excellence as a Young Professional Orthopterist, 2019 DCF Rentz Award for Lifetime Dedication to Orthopterology, and 2019 Sir Boris Uvarov Award in Applied Orthopterology. Details about each award and the nomination requirements can be found at the Congress website in the "Awards and Grants" section. The deadline for these three award nominations is the 31st of January, 2019 and they should be sent electronically to davidmhunter100@gmail.com. Travel grants and society awards became possible thanks to the generous gift of the Orthopterists' Society's late President, Ted Cohn.

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Lastly, I would like to share some personal news. After 23 years of working in research and extension, I retired from the University of Wyoming to take a position of an Agricultural Officer, Locust Management at the Food and Agriculture Organization (FAO) of the United Nations. Together, with my family, we moved from Laramie, WY to Rome, Italy, in early July 2018. Ready to face new international challenges!

ICO2019 - Join our next Congress
Be part of an exceptional scientific event in Africa

By AMINA IDRISSI
President
Local Organizing Committee of ICO 2019
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Dear Colleagues,

In the last issue of *Metaleptea* we announced the theme of our Congress: "Challenges in front of climatic and environmental changes" and the outline of a very attractive scientific program with 5 plenary lectures, 11 symposia, 3 workshops, and, of course, the traditional oral sessions on the main themes of orthopterology as well as poster sessions.

After the period of summer calm, the pace is accelerating and I invite you to register as soon as possible, to send us the summary of your communications, and to reserve your accommodation. We recommend "The Palais des Roses" where the Congress will be held. This is also the hotel for which we were able to negotiate particularly interesting rates, but, of course, the accommodation is your responsibility.

This Congress is already announced as a very rich platform for discussion on all the main topics dealing with Orthoptera insects and as an event that should highlight African scientific news.

I remind you of the address of the Congress website: **http://www.ico-2019morocco.com/**

There you will find all the practical information, the complete scientific program, registration formalities, call for papers with the template to write your abstract, the procedure to book your accommodation in the official conference hotel, and a touristic program during and after the congress.

I draw your attention to the post-congress tour which, over 7 days, will take you to the doors of the Saharan desert to the famous dunes of Merzouga, continue through the high Atlas Mountains, will allow you to visit many Moroccan villages, discover the ancient and fascinating imperial city of Marrakech, and much more.

Payment by bank transfer (as mentioned in the last issue of *Metaleptea*) remains, of course, a possibility.

Finally, I want to point out that several symposium organizers have already invited their speakers to co-sign, on the theme of their symposium, a synthesis article that can be submitted for publication in the *Journal of Orthoptera Research (JOR)*. I hope that all the symposia organizers will be able to mobilize their participants for writing such syntheses, which could lead to the publication of a special issue of this scientific journal.

I'm waiting to welcome you all in Agadir from March 24-28, 2019.

ATTENTION!

ABSTRACTS: The deadline for the submission of abstracts has been extended to October 31, 2018.

REGISTRATION: Online payment by credit card, directly on the congress website, is available soon.

The 2018 ESA Organized Meeting on orthopteroids draws near!

By BERT FOQUET
Texas A&M University, USA
bert.foquet@gmail.com

Fellow Society members, the annual Entomological Society of America (ESA) conference is approaching swiftly! Running from November 11-14, it will be held in Vancouver, British Columbia, Canada in cooperation with the entomological societies of Canada and British Columbia: http://www.entsoc.org/events/annual-meeting. I am pleased to announce that I am co-hosting the fifth orthopteroid-focused event at the ESA meeting. As the symposia of the last four years were a success, we decided to turn it into an Organized Meeting ("Orthopteroids: Small Orders, Big Ideas"), with the goal of making this gathering of orthopteroid researchers a yearly happening. The general

idea stays the same: a full afternoon of interesting talks from a good mix of seasoned researchers and students. The current idea going forward is to have two permanent co-hosts: Dr. Derek A. Woller (Associate Editor of *Metaleptea*), who also co-hosted the last four orthopteroid symposia, and Dr. Hojun Song (Editor of *Metaleptea*), and then invite a rotating student to be the primary organizer and host, which is what my role has been.

If you'll be attending the conference this year, we encourage you to stop by and support your fellow orthopteroid researchers by finding out more about the neat things they're working on. The Organized Meeting will be held on **Sunday, November 11, from 1:30 - 4:30 PM in the Vancouver Convention Centre, Meeting Room 202** (subject to change – please check the official schedule of our Organized Meeting: https://esa.confex.com/esa/2018/meetingapp.cgi/Session/32719). The event will consist of 9 invited talks (15 minutes each) covering a number of fascinating topics, and a 30 minute keynote presentation to top it all off given by Dr. Fernando Montealegre-Z, who is traveling all the way from the United Kingdom to join us. As in previous years, we plan to also have an after-event celebration at a near-by restaurant (location to be determined) that all attendees are welcome to join, so please stay tuned for that announcement after the symposium.

We truly hope that everyone who comes to this year's ESA meeting will also be able to attend at least a portion of the Organized Meeting. Audience size goes a long way in convincing conference organizers to continue to shine the spotlight on Orthoptera and its related orders and, so far, we have done well with that. If anyone has any questions prior to the event, feel free to contact me. If you can only make it to the after-event, that'd be wonderful as well as they serve as great opportunities to network with your fellow orthopterists.

The Organized Meeting's schedule is currently as follows:

1:30 PM - 1:45 PM
Orthoptera in ecological foodwebs and crop systems, over 50 years: analysis of annual data on abundance, hatching, weather, climate, and seasonal patterns in Alberta, Canada
Dan Johnson (dan.johnson@uleth.ca), Seyer Meyhoff and Celeste Barnes, University of Lethbridge, Lethbridge, AB, Canada

1:45 PM - 2:00 PM
Do specialized orthopteroid herbivores co-speciate with their host plant?
Timothy K. O'Connor (tim.oconnor8@gmail.com)[1], Robert Laport[2] and Noah Whiteman[1], [1]University of California, Berkeley, CA, [2]Rhoades College, Memphis, TN

2:00 PM - 2:15 PM
Defining the nutritional landscape of grasshopper communities in Eastern Australia.
Douglas Lawton (ddlawton@asu.edu)[1], Marion Le Gall[1], Cathy Waters[2] and Arianne Cease[1], [1]Arizona State University, Tempe, AZ, [2]Orange Agricultural Institute, Orange, Australia

2:15 PM - 2:30 PM
The genetic basis of physiological niche conservatism in ice crawlers (*Grylloblatta*).
Sean Schoville (sean.schoville@wisc.edu), University of Wisconsin, Madison, WI

2:30 PM - 2:45 PM
Cretaceous fossils shed light on the evolution of Tridactyloidea (Orthoptera: Caelifera).
Nathalie Baena-Bejarano (ntbaena@gmail.com) and Sam W. Heads, University of Illinois, Champaign, IL

2:45 PM - 3:00 PM
Life in the frozen lane: *Gryllus veletis* as an emerging model for insect freeze tolerance.
Jantina Toxopeus (jtoxopeu@uwo.ca)[1] and Brent Sinclair[2], [1]University of Colorado, Denver, CO, [2]University of Western Ontario, London, ON, Canada

3:00 PM - 3:15 PM
Break

3:15 PM - 3:30 PM
The evolution of aggressive behaviour and weaponry in North American field crickets.
Kevin Judge (judgek3@macewan.ca)[1,2], Briana Smith[2], Shawna Ohlmann[3], Alexandria Kellington[3] and William Cade[2], [1]Grant MacEwan University, Edmonton, AB, Canada, [2]University of Lethbridge, Lethbridge, AB, Canada, [3]MacEwan University, Edmonton, AB, Canada

3:30 PM - 3:45 PM
Innovation and adaptive loss of a novel sensory organ during evolutionary transitions among ecological niches in a praying mantis lineage.
Sydney Brannoch (sbrannoch@case.edu)[1], Julian Katzke[2], Evan Economo[3], Yuri Kato[4], Ajay Narendra[4] and Gavin J. Svenson[1], [1]Cleveland Museum of Natural History, Cleveland, OH, [2]Case Western Reserve University, Cleveland, OH, [3]Okinawa Institute of Science and Technology, Okinawa, Japan, [4]Macquarie University, Sydney, Australia

3:45 PM - 4:00 PM
Effects of community composition on Orthoptera.
Laurel Symes (laurel.symes@dartmouth.edu), Dartmouth College, Hanover, NH

4:00 PM - 4:30 PM
The acoustic world of the three cousins: crickets, humpback-crickets, and katydids.
Fernando Montealegre-Z (fmontealegrez@lincoln.ac.uk), University of Lincoln, Lincoln, United Kingdom

Summer Time Updates from the Global Locust Initiative!

By ARIEL RIVERS
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RICK OVERSON
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ARIANNE CEASE
GLI Founding Director, Arizona State University, USA
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As is likely true for many members of the Orthopterist's Society, we had a busy summer at the Global Locust Initiative! Our ASU-based team has been conducting field work on three continents, been busy sourcing funds for new projects (which we hope will be a platform for continued collaboration with many of you), and planning several activities for the coming year! We encourage you to check our webpage (locust.asu.edu) frequently for notes from the field and information about upcoming events.

Taking advantage of the summer break, several ASU-based GLI members were off collecting, identifying, feeding, mapping, and experimenting with a multitude of orthopterans this summer. Deanna Zembrzuski (Fig. 1) worked with the U.S. Department of Agriculture's (USDA) Science and Technology (S&T) division's Phoenix Lab (USDA-APHIS-PPQ-S&T-CPHST) to conduct a variety of experiments with the Rangeland Grasshopper and Mormon Cricket Management Team. Douglas Lawton spent the summer in Australia with the New South Wales Department of Primary Industries (NSW DPI) and the Australian Plague Locust Commission (APLC), using historical data to map favorable Australian plague locust habitats. Finally, Marion Le Gall returned to Senegal to study the nutritional ecology of the Senegalese grasshopper (*Oedaleus senegalensis* Krauss – see Fig. 2), continuing our collaborations with the Plant Protection Directorate (DPV). More information about each of their summers are available in the news tab on our webpage. We also look forward to highlighting GLI member events, job openings, student opportunities, and other relevant information. Please check back regularly and send us your news to share!

Figure 1. Deanna Zembrzuski in the field. Photo © Lonnie Black, USDA-S&T, 2018

In project updates: through the US Agency for International Development's (USAID) Office of Foreign Disaster Assistance (OFDA), the GLI was recently awarded a project to pilot the use of soil amendments as a method for management of the Senegalese grasshopper in the Kaffrine Region of Senegal. This grasshopper is one of the most devastating pests of the Sahel, frequently reducing millet stands early in the season and regularly consuming the grain late in the growing season. The project builds on the research of Arianne Cease (GLI Founding Director) and others. Counter to the N-limitation hypothesis, high nitrogen plants suppress locust growth and survival. Improving soil provides an opportunity for farmers to decrease locust crop damage while augmenting crop yields and food security. Through various training activities, the publishing of a locust and grasshopper identification guide, and the development of village-level approaches to monitoring and management of locusts, this project will provide an excellent opportunity for GLI members to further partner with the global network of orthopterists. Please contact Ariel or Arianne if you would like to be involved!

Figure 2. The Senegalese grasshopper *Oedaleus senegalensis*. Brown individuals tend to be more numerous at high density than green ones, although little is known about coloration in this species. Photo © Marion Le Gall, ASU, 2018

Additionally, we have been fortunate to partner with the National Institute of Agricultural Technology (INTA) and the National Service of Agricultural Health and Food Safety (SENASA) in Argentina to continue studying the nutritional ecology of the South American locust *Schistocerca cancellata* Serville. The recent 60-year upsurge of the South American locust provides an excellent opportunity to study the relationship between locust nutritional ecology and population dynamics across a wide range of South America. Pending locust activity, members of our ASU team expect to return to Argentina this fall to conduct additional studies in collaboration with INTA and SENASA. The GLI will again be hosting a networking event at this year's Entomological Society of America (ESA) annual meeting, to be held this year as a joint conference with the Entomological Society of Canada (ESC) and the Entomological Society of British Columbia (ESBC) in Vancouver, Canada, November 11-14, 2018. We look forward to seeing you on **Tuesday, November 13, 5:00-7:00 PM** in the Fairmont Waterfront Hotel, Room Mackenzie II to meet other GLI members, catch-up on each other's activities, and discuss future opportunities for collaboration.

The GLI would also like to acknowledge the efforts of the organizing committee for the 13th International Congress of Orthopterology, led by President Prof. Amina Idrissi. We will host a workshop at the Congress that will provide opportunities to forward GLI's global objectives and discuss specific projects and opportunities for collaboration with members of the Orthopterists' Society. Please feel free to contact Rick or Arianne if you would like to assist in planning this workshop. We look forward to seeing you there!

If you would like to be involved in the GLI, we encourage you to visit our website for more information about the initiative, events, and news. There is a contact inquiry form (in English and Spanish) that we ask all interested partners to complete. We use this information to guide the activities of the GLI and connect people who may be interested in working together. Please feel free to email the three of us at any time with questions about our research and facilities or to be a part of the GLI!

Workshop Annoncement: Orthopteroid Insects: Biodiversity and Ecology evolution in a changing environment

By FILIPPO MARIA BUZZETTI
Fondazione Museo Civico di Rovereto, ITALY
buzzettifilippo@fondazionemcr.it

Dear Friends,

The Fondazione Museo Civico di Rovereto announces the workshop "Orthopteroid Insects: Biodiversity and Ecology evolution in a changing environment" to be held on October 20, 2018 at the Museum.

Participation is free and a poster session is scheduled. The posters must measure width 70 cm x height 100 cm at max and the relative abstracts must reach the museum by October 13. The abstracts of the posters and the papers of the talks will be published in a volume of the Acts of the Accademia Roveretana Degli Agiati. We encourage students and professionals to participate in this event at the Museum which preserves two large collections of Orthopteroid insects with many types: the Galvagni collection (30,000 specimens, Palearctic) and the Fontana collection (25,000 specimens, Palearctic, Nearctic and Neotropical).

Pleasae send all correspondence to buzzettifilippo@fondazionemcr.it.

Looking forward to hearing from you, the warmest greetings from Italy.

Antonio Galvagni - Legacy

15 - 21.10.2018

CONFERENZA
Venerdì 19 Ottobre | Friday, October 19th

LA COLLEZIONE GALVAGNI ACQUISIZIONE

18.00 – 18.15
Saluti iniziali
Alessandra Cattoi (Fondazione Museo Civico di Rovereto), Sandro Feller (Fondazione Alvise Comel), Stefano Ferrari (Accademia Roveretana degli Agiati), Comune Rovereto

18.15 – 18.30
«Antonio Galvagni e il Museo Civico di Rovereto»
Franco Finotti

18.30 – 19.00
«L'importanza e lo stato delle collezioni naturalistiche in Italia»
Stefano Mazzotti (Museo di Ferrara)

19.00 – 19.30
«Lo stato dell'arte della collezione Galvagni e la sua importanza»
Filippo Maria Buzzetti (Fondazione Museo Civico di Rovereto)

CONFERENZE RICONOSCIUTE AI FINI DELL'AGGIORNAMENTO PER GLI INSEGNANTI E DEL CREDITO FORMATIVO PER STUDENTI DELLA SCUOLA SECONDARIA DI II GRADO
- **FONDAZIONE MUSEO CIVICO DI ROVERETO SALA CONVEGNI "FORTUNATO ZENI" B.GO S. CATERINA, 41**
- **DALLE ORE 18.00 ALLE 20.30**
- **INGRESSO LIBERO**

INTERNATIONAL WORKSHOP
Sabato 20 ottobre | Saturday, October 20th

ORTHOPTEROID INSECTS: BIODIVERSITY AND ECOLOGY EVOLUTION IN A CHANGING ENVIRONMENT

9.00 – 9.15 **Opening**
Alessandra Cattoi (Fondazione Museo Civico di Rovereto), Gionata Stancher (Fondazione Museo Civico di Rovereto)

9.15 – 9.45 **«Working with Antonio»**
Paolo Fontana (Fondazione Edmund Mach),

9.45 – 10.15 **«European Orthoptera Conservation»**
Axel Hochkirch (Trier University),

10.15 – 10.45 **«Spatio-temporal origins of high-frequency calls in crickets»**
Tony Robillard (Muséum National d'Histoire Naturelle)

10.45 – 11.30 **Coffee break + poster session**

11.30 – 12 **«Mediterranean Orthoptera: state of the art»**
Bruno Massa (Università di Palermo),

12.00 – 12.30 **«Distribution patterns in Mediterranean Mantodea»**
Roberto Battiston (Musei del Canal di Brenta)

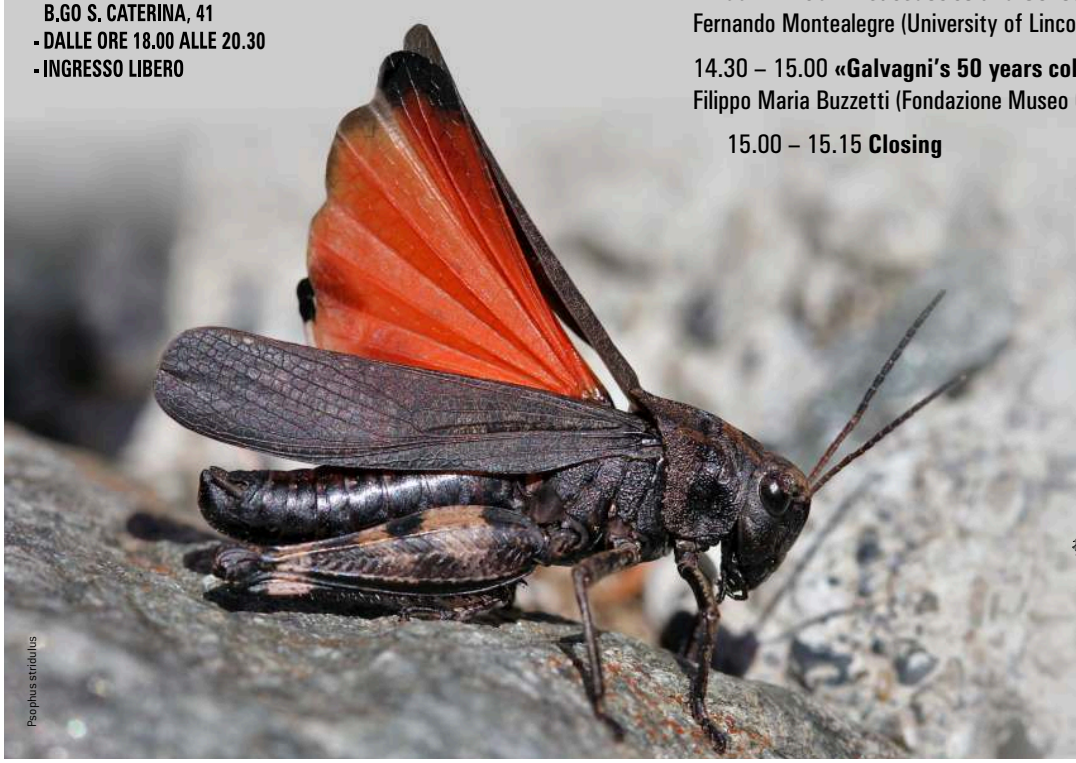
12.30 – 13.00 **«Molecular phylogeny and classification of *Chelidurella* Verhoeff, stat. restit. (Dermaptera)»**
Markéta Kirstová (University of Ostrava)

13.00 – 14.00 **Lunch**

14.00 – 14.30 **«Bioacoustics and Sensory Biology»**
Fernando Montealegre (University of Lincoln)

14.30 – 15.00 **«Galvagni's 50 years collecting: study perspective»**
Filippo Maria Buzzetti (Fondazione Museo Civico di Rovereto)

15.00 – 15.15 **Closing**

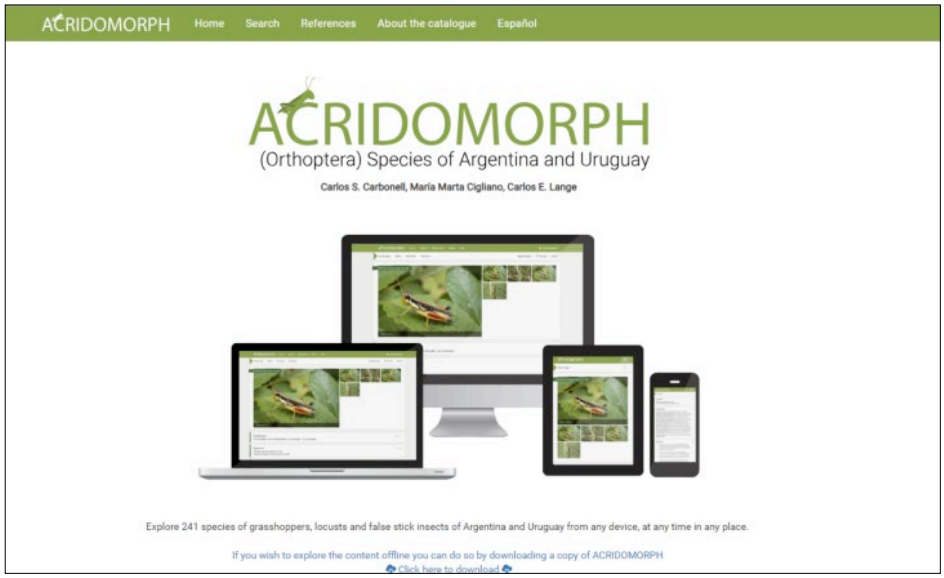

Psophus stridulus

fondazione museo civico di rovereto
SOCIETÀ MUSEO CIVICO ROVERETO
Fondazione Alvise Comel
Accademia degli Agiati
Comune di Rovereto
world biodiversity association onlus
UNIVERSITY OF LINCOLN

New updated version of "Acridomorph (Orthoptera) species of Argentina and Uruguay"

By MARIA MARTA CIGLIANO
Museo de La Plata, División Entomología, FCNyM-UNLP
CEPAVE, CONICET-CCT La Plata, ARGENTINA
cigliano@fcnym.unlp.edu.ar

An updated second edition of "Acridomorph (Orthoptera) species of Argentina and Uruguay/Especies de Acridomorfos (Orthoptera) de Argentina y Uruguay". Carbonell, C.S., Cigliano M.M. & Lange, C.E. CD-ROM. Publications on Orthopteran Diversity. The Orthopterists' Society. ISBN 987-05-0546-5 has been updated and released in a new online format version to be used on PC, tablets and cell phones. Names of genera, species, and subspecies have been listed. For each species, the classification, synonyms, geographic distribution, main host plants, economic importance, observations, and the most relevant bibliographical references is given. The species are illustrated with photographs of male and female individuals, and the habitat, when they have been taken in nature. The new version can be explore and/or freely downloaded from https://biodar.io/acridomorph/.



Regional Reports - What's happening around the world?

China

By YINWEI YOU and LONG ZHANG
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Establishment of Committee of Orthopteroidea in the Entomological Society of China

The Committee of Orthopteroidea was founded by the Entomological Society of China on the 23rd of August, 2018. Dr. Long Zhang, regional representative of the Orthopterists' Society in China and Korea regions, promoted the establishment of the committee and he was elected as the director of the first committee. This committee consists of 45 committee members who are distributed widely across China. The missions of this committee are (1) to promote academic progress in orthopteroidea; (2) to promote the culture of orthopteran insect; (3) to promote education of orthopteroidea; (4) to promote the control of orthopteran pests. It will realize these aims through the combination of science and culture, the combination of academics and public science education, as well as the combination of academics and industry.

The first plenary session of this committee was held on the same day as its founding in Chengdu, China. More than 20 committee members attended this session. During the meeting, three divisions were established to carry out the work under this committee: 1) International Academic Exchange Working division, 2) Popular Science Working division to spread Chinese culture of acoustic insects, and 3) Youth Work division. The committee members agreed to a plenary session every two years.

Theodore J. Cohn Research Grant Reports

Clearing up taxonomic uncertainties surrounding primary and alternate male morphs within the orthopteran family Pneumoridae

By M. LAUBSCHER, V.C.K. COULDRIDGE, & A. ENGELBRECHT
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University of the Western Cape, SOUTH AFRICA
mlaubscher65@gmail.com

Extreme differences between the sexes resulting from sexual selection is well known within the animal kingdom (Darwin 1871). However, polymorphism in one sex (normally the male) also occurs, often linked with alternate mating strategies (Cook et al, 1997). The occurrence of alternate male phenotypes comprises significant physiological, morphological, behavioural, and developmental differences, leading to the existence of several male phenotypes in a single species (Donelson & van Staaden, 2005).

Bladder grasshoppers are a long-distance acoustic signalling family endemic to southern Africa (Dirsh, 1965). Certain species have been shown to exhibit distinct discontinuous polyphenism, resulting in two discrete male morphs, utilizing different mating strategies (Donelson et al, 2008). Primary males (larger in body size and more numerous in the population) make use of acoustic communication to advertise themselves to females (Couldridge & van Staaden, 2004). They have an enlarged, inflated abdomen which acts as a resonator, allowing a calling range up to 2km (van Staaden & Römer, 1997). Primary males also have well developed wings for long distance phonotactic flight towards responsive females (Alexander & van Staaden, 1989). However, morphologically distinct secondary (alternate) males have been observed in some species. These males are significantly smaller, do not have flight wings, and are silent; employing instead a "sneaker" or satellite strategy (Donelson & van Staaden 2005).

Figure 1. Alternate males of *Paraphysemacris spinosus* (A), *Parabullacris vansoni* (B), and *Pneumoracris browni* (C)

There are currently three species of bladder grasshopper (*Parabullacris vansoni*, *Paraphysemacris spinosus* and *Pneumoracris browni*) that only have an alternate male morph (Fig. 1), but lack the primary. However, the validity of these species descriptions has come into question with the discovery of alternate male morphs in at least three other species that also have primary males (*Bullacris discolor*, *B. membracioides*, and *B. obliqua*). Hence, the above named species are suspected to be alternate males of other species. To date, there have been no studies looking at the genetics of alternate males that would conclusively establish their taxonomic position. The aim of the study was to examine both genetic relationships and morphological differences between primary and alternate males for

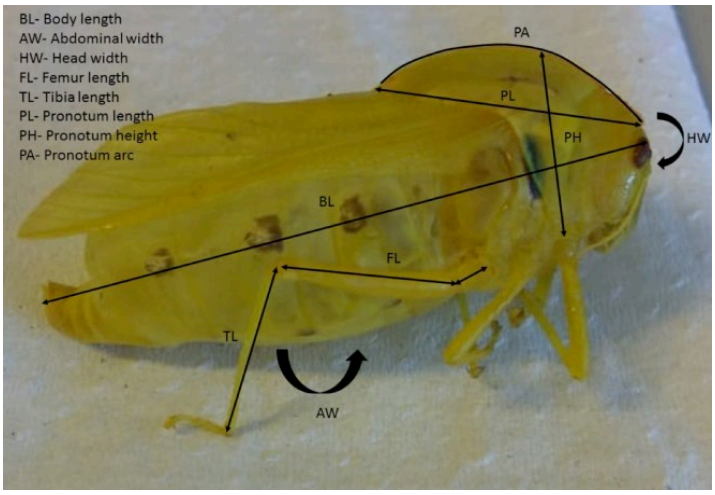

Figure 2. *Bullacris discolor* showing the eight anatomical measurements

Figure 3. Primary (upper) and alternate male (lower) of *Bullacris discolor*

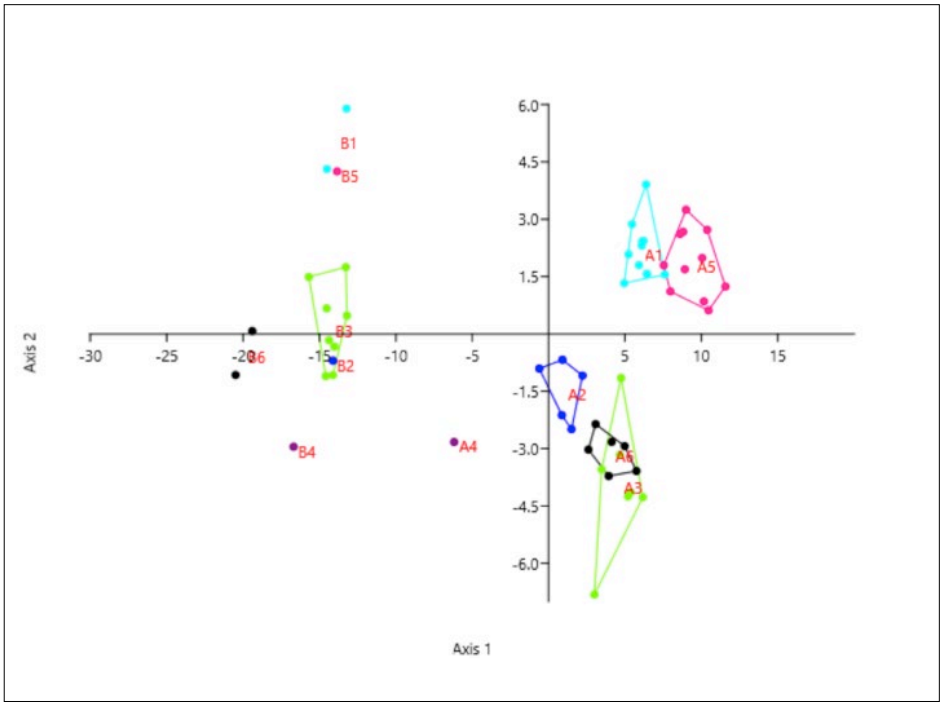

Figure 4. Canonical centroid plot of the discriminant function analysis (DFA) for species and male morph morphology [Primary morphs (A1-6), alternate morphs (B1-6) - *B. discolor*, *P. variolosa* (*P. spinosus*), *B. unicolor* (*P. vansoni*), *P. namaqua* (*P. browni*), *B. membracioides*, *B. obliqua*]

all species where alternate males have been observed. The results will help to resolve taxonomic uncertainties and misclassifications surrounding alternate males.

Bladder grasshoppers are most abundant in the summer months, therefore two field trips took place in September, 2017 and in December, 2017 for 10 days each to the Eastern Cape of South Africa. Unfortunately, these trips were not hugely successful. This was most likely due to the severe drought South Africa was experiencing at the time of sampling. Additionally, alternate males are relatively rare and make up a low proportion of the population. This, combined with their crypsis, makes them difficult to locate in the field. Thus, the majority of specimens used for this study were from previous collections that had been preserved in ethanol, as well as pinned museum specimens from Iziko Museum, Albany Museum, and Stellenbosch University. However, alternate males are also relatively poorly represented in museum collections.

Species included were those for which both primary and alternate males have been observed to occur (*Bullacris membracioides*, *Bullacris discolor*, and *Bullacris obliqua*), those that only have alternate males (*Parabullacris vansoni*, *Paraphysemacris spinosus*, and *Pneumoracris browni*) and their suspected corresponding conspecific primary males (*Bullacris unicolor*, *Physemacris variolosa*, and *Peringueyacris namaqua*, respectively). The cytochrome *c* oxidase I (CO1) mitochondrial gene and internal transcribed spacer (ITS) nuclear gene regions were used in this study for the genetic analysis. They have had significant success with previous studies on phylogenetic relationships, including those on insects (Folmer et al., 1994; Wörheide et al., 2004).

Eight measurements were made for the morphological analysis, as seen in Figure 2. Through visual observations of the various species used in this study it is obvious that the two male morphs are distinct with regards to body length, pronotum length, height, and shape, as well as flight wings and an inflated abdomen being present only in the primary male (Fig. 3). Multivariate analysis demonstrated that common morphological features differentiate the two male morphs for all species (Pillai's Trace=2.269; $F(4, 984)=35.000$; $P<0.005$). Canonical centroid plots using discriminate function analysis (DFA) illustrate that the species and male morphs cluster out separately for the most part. The same pattern of morphological similarity is evident for both primary and alternate males, in that species pairs which have morphologically similar primary males also have morphologically similar alternate males (Fig. 4). Preliminary genetic analyses of CO1 confirm that the dimorphic males are conspecific for the species observed to have both primary and alternate males (*B. membracioides*, *B. obliqua*, and *B. discolor*), and also reveal that species described as only having alternate males (*P. vansoni* and *P. spinosus*) are invalid and are instead conspecific with other known species (*B. unicolor* and *P. variolosa*) (Fig. 5). Preliminary genetic analysis of the ITS gene region is in agreement as well. Sampling and genetic analysis is still ongoing to include *P. browni*/*P. namaqua* and to create a larger sample size of alternate males for a more comprehensive morphological and genetic analysis.

These results provide much needed clarity on the true taxonomic diversity within the Pneumoridae and confirm

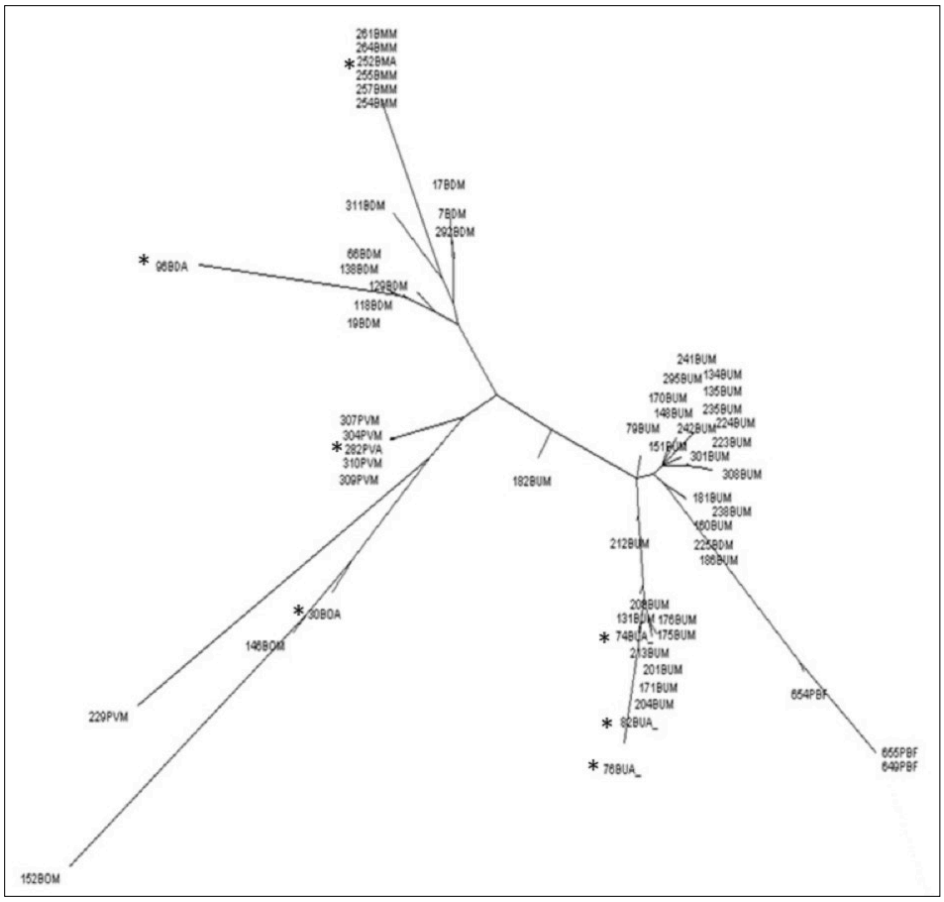

Figure 5. Phylogenetic analysis of CO1 gene region using SplitsTree4 (* marking alternate males) BDM – *B. discolor* primary male, BDA – *B. discolor* alternate male, PVM – *P. variolosa* primary male, PVA – *P. spinosus* alternate male, BUM – *B. unicolor* primary male, BUA – *P. vansoni* alternate male, PBF – *P. namaqua* female, BMM – *B. membracioides* primary male, BMA – *B. membracioides* alternate male, BOM – *B. obliqua* primary male, BOA – *B. obliqua* alternate male

the existence of dual male phenotypes in at least six species and three genera.

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Understanding the adaptive capacity of alpine grasshoppers under climate change

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The impacts of climate change, human-modified landscapes and increasing local temperatures on biodiversity are evident (IPCC 2013). Species ability to adapt is essential to cope with rapid environmental changes (Hoffman & Sgrò 2011). Amongst all, mountain ecosystems are highly sensitive to these changes and are extremely important, being home to several distinct flora and fauna. Montane ecosystems are often regarded as "islands" surrounded by unsuitable, fragmented intermediate habitat, which may provide a barrier to dispersal and restricted gene flow in species. The exchange of genes and evolutionary potential are the determining features of how populations are going to respond to rapidly declining habitats. Therefore, determining the evolutionary capacity of species

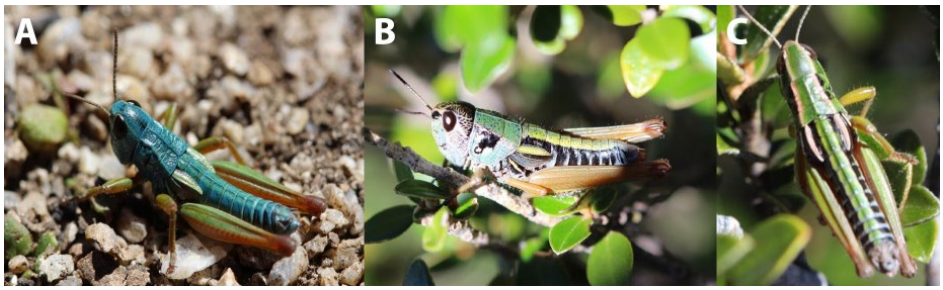

Figure 1. Photos of study species; a) *K. tristis* male grasshopper, b) *K. tristis* female grasshopper, c) *K. usitatus* female grasshopper

Figure 2. Photos of field sites in the Australian Alps.

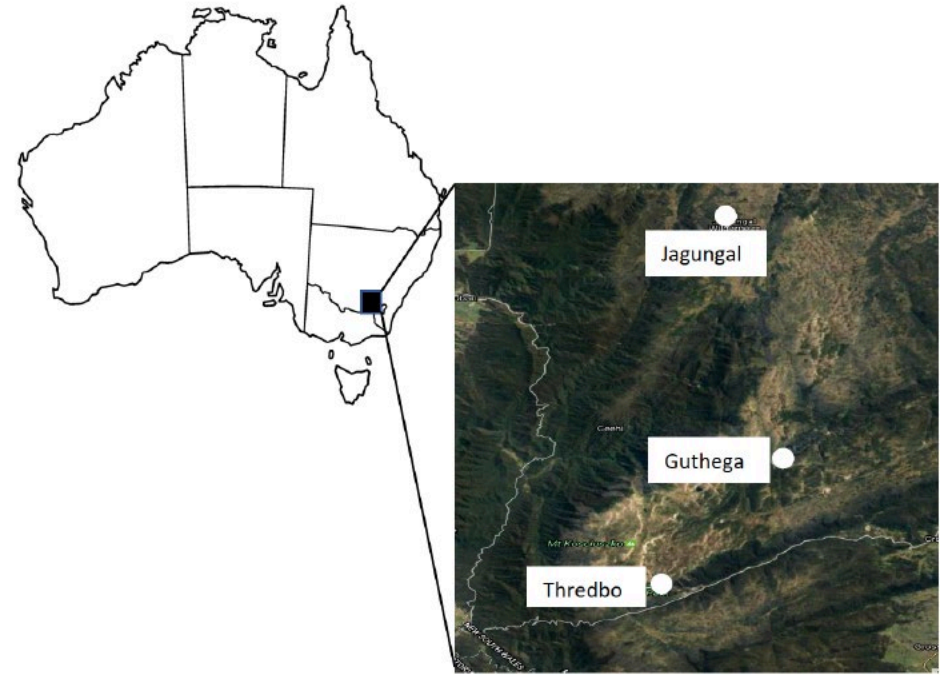

Figure 3. Map showing three study mountain ranges in the Australian Alps.

is essential for conservation planning (Hoffman et al. 2015).

In this study we aim to investigate patterns of genetic differentiation and genetic diversity across two mountain ranges in two species of grasshoppers: *Kosciuscola tristis* (Fig. 1a,b) and *Kosciuscola usitatus* (Fig. 1c) both endemic to Australian Alps. In doing so we aim to characterize both neutral and adaptive genetic variation in relation to elevational niche breadth and fine-scale understanding of site densities and morphological variation. To date, we have used a combination of ecological data collected from fieldwork and genomic sequencing to identify the extent of genetic connectivity. These two species also occupy similar elevational and environmental niches (Slatyer et al. 2016), thus another of our objectives was to check for evidence of hybridisation between two species. This research is going to broaden the understanding about the contribution of adaptive genetic processes in driving evolutionary responses in insects in the face of climate change threats.

Methods

K. tristis and *K. usitatus* were collected from three alpine regions: Thredbo, Guthega, and Jagungal mountain ranges, and three transects were covered at each mountain (except in Jagungal where two transects were covered) in Kosciuszko National Park, New South Wales, Australia (Fig. 2, Fig. 3). Grasshoppers were collected every 50 meters along the transects, covering an elevation gradient ranging from 1450 m asl to 2000 m asl. Grasshoppers were captured using small plastic containers for a maximum of 20 min at each point, and spatial coordinates and elevation of the collection sites were recorded using a handheld GPS device (Garmin E-Trex). Details of collected samples (such as species and sex) were recorded and samples were stored in 90% ethanol for subsequent measurements, identification verification, and DNA sequencing. A total of 141 samples of each species were sequenced using Restriction Site-Associated DNA sequencing (RADseq: Miller et al. 2007) at Diversity Array Technologies (DArT) sequencing facility located in Canberra, Australia. To examine hybridisation, another set of data with Single Nucleotide Polymorphism (SNP) markers common in both species was obtained. The funding provided by the Orthopterists' Society was used to sequence 38 samples of *K. tristis* in a 96 well plate. The filtered high-quality SNP dataset was then tested for the presence of FST outliers (using OutFLANK: Whitlock and Lotterhos and BayeScan: Foll and Gaggiotti, 2008) and outliers were removed before undertaking genetic differentiation analysis. PCA analysis was carried out to identify genetic differentiation between individuals sampled across two mountain ranges.

Genetic structure was further analysed using fastSTRUCTURE (Raj et al. 2014).

Results and Discussion

Due to a low number of grasshoppers collected from the Jagungal alpine region only samples from Thredbo and Guthega were sequenced. Sequencing data for 136 and 130 individuals were obtained for *K. tristis* and *K. usitatus* because some of the samples were removed due to low quality DNA extraction and poor sequencing. In the case of *K. tristis*, a total of 4,410 high-quality SNPs were obtained and, similarly, for *K. usitatus*, 4,437 SNPs were obtained after filtering low-quality SNPs. In another dataset, a total of 4,800 SNPs were obtained, which were common in both the species and used to examine hybridisation. SNPs present on the same DNA fragment were removed, and only one SNP per DNA fragment was used for genetic structure analysis to account for linkage disequilibrium.

Based on pairwise F_{ST}, we found stronger genetic differentiation in *K. tristis* (0.03) as compared to *K. usitatus* (0.02) between the two mountain ranges of Thredbo and Guthega. PCA analysis indicated the presence of two strong genetic clusters in *K. tristis* and weaker, though still strong, differentiation in the case of *K. usitatus* between two mountain ranges (Fig. 4a, b). Genetic structure analysis using fastSTRUCTURE also indicated the same pattern of genetic differentiation amongst sampled individuals across two mountain regions, with stronger genetic differentiation in *K. tristis* and more admixture between mountain regions in *K. usitatus* (Fig. 5a, b). Therefore, our genetic differentiation analysis indicates different patterns of gene flow for these two species across the two mountain ranges. Furthermore, structure analysis indicated no evidence of hybridisation between the two species (Fig. 6). In the case of *K. tristis*, mean allelic richness (Ae) was slightly higher in Thredbo (mean Ae = 1.98) than the Guthega population (mean Ae= 1.88, Fig. 7a), whereas allelic richness in *K. usitatus* was slightly higher in Guthega (mean Ae = 1.94) compared to Thredbo (mean Ae = 1.90, Fig. 7b).

The genetic structure between two alpine regions indicated restricted gene flow across mountain regions in these two endemic, alpine grasshopper species. The observed pattern of genetic differentiation is likely due to the high elevation of the Kosciuszko alpine region partitioned by sub alpine open habitats over a geographic distance of ~50km. Furthermore, stronger genetic differentiation in *K. tristis* as compared to *K. usitatus* reflects lower genetic connectivity in this species and suggests *K. tristis* may have limited dispersal capacity. Given its high elevational distribution, this information suggests that *K. tristis* may be more susceptible to climate change effects as it can-

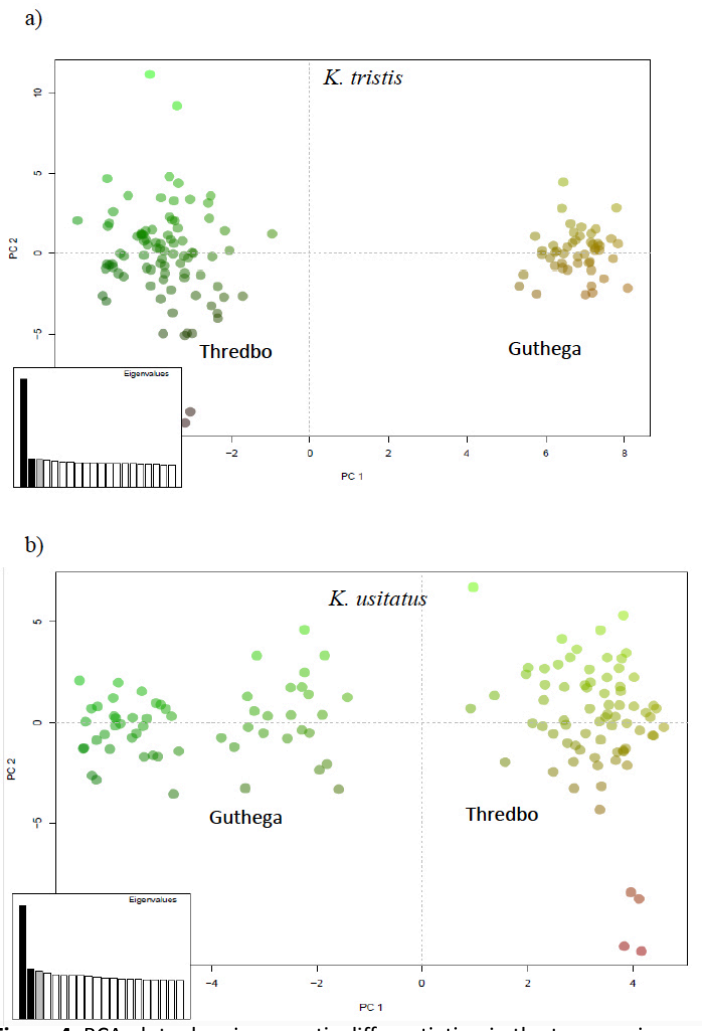

Figure 4. PCA plots showing genetic differentiation in the two species across two mountain ranges a) *K. tristis*; b) *K. usitatus*.

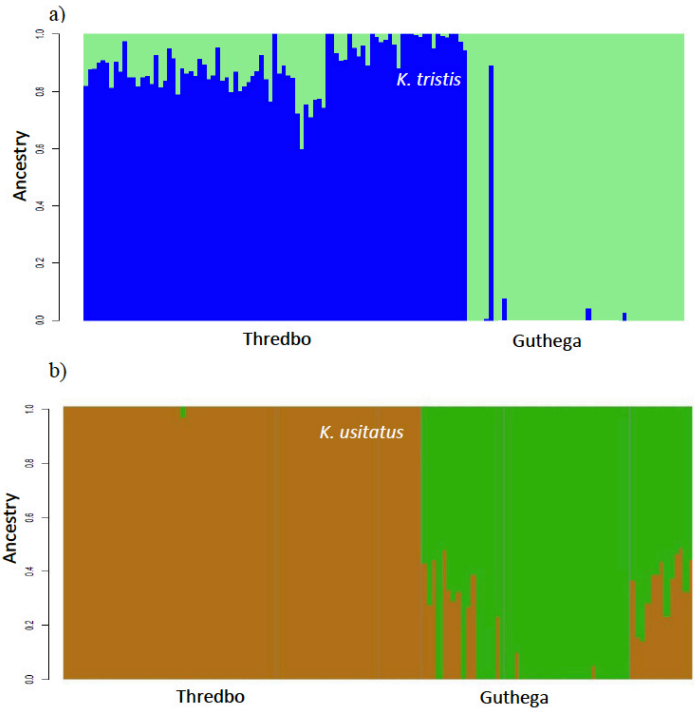

Figure 5. Barplots showing genetic differentiation in the two species across two mountain ranges a) *K. tristis*; b) *K. usitatus*.

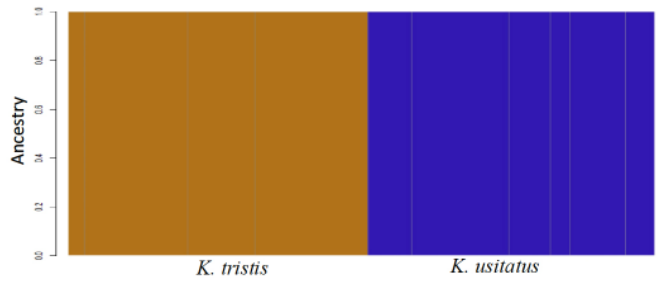

Figure 6. Barplot showing no admixture between two species occupying same environmental and elevation gradient.

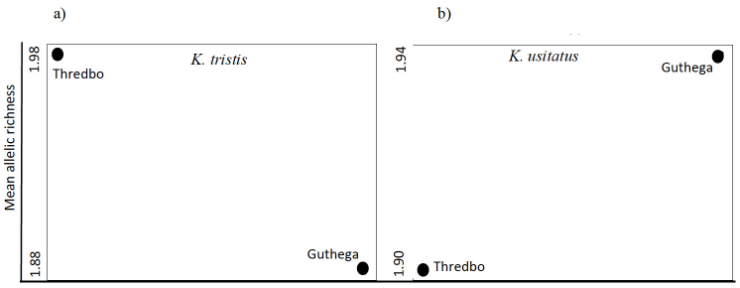

Figure 7. Plots showing mean allelic richness for a) *K. tristis*; b) *K. usitatus*

not readily disperse between mountains and is a high elevation specialist.

We demonstrated species specialized to alpine regions show limited gene flow and high genetic differentiation across small spatial scales in the Kosciusko National Park. This may have follow-on effects on the adaptive capacity of these species, which we plan to examine in the future. Using a landscape genomics approach, we will examine how landscape, elevation, and climatic factors, such as temperature, influence local adaptation in these two species. We will also examine change in relative abundance and body size in both the species along the elevation gradient to understand distribution patterns and fine scale adaptation.

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Orthoptera Species File Grant Reports

Type diversity of Pyrgomorphidae IV: Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy

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As a continuous effort since 2013 to visit entomological collections harboring Pyrgomorphidae type material, this time I was able to visit the natural history museum of Genova, Italy (MCSN). During two days in September of 2017, I had the pleasure to go through the drawers of this interesting collection. It is the most important collection in Italy concerning type material, closely followed by Museo Regionale di Scienze Naturali di Torino (MRSNT), which harbors 209 species of Orthoptera (161 valid and 43 synonyms) mainly by the efforts of E. Giglio-Tos (1865-1926) with strong emphasis in South America and Africa.

Founded in 1867, the MCSN collection is worldwide in scope but with strong emphasis in Europe, Africa, and Australasia. There is type material of 207 species of Orthoptera (175 valid and 34 synonyms) mainly due to the efforts of C. Brunner von Wattenwyl (1823-1914), L. Redtenbacher (1814-1876), Ignacio Bolívar y Urrutia (1850-1944), L. Chopard (1885-1971) and most recently by Baccio Baccetti (1931-2010) and Bruno Massa (1948-). Additionally, the collection of B. Baccetti (19 valid species and 4 synonyms) is also housed here. For Pyrgomorphidae there is type ma-

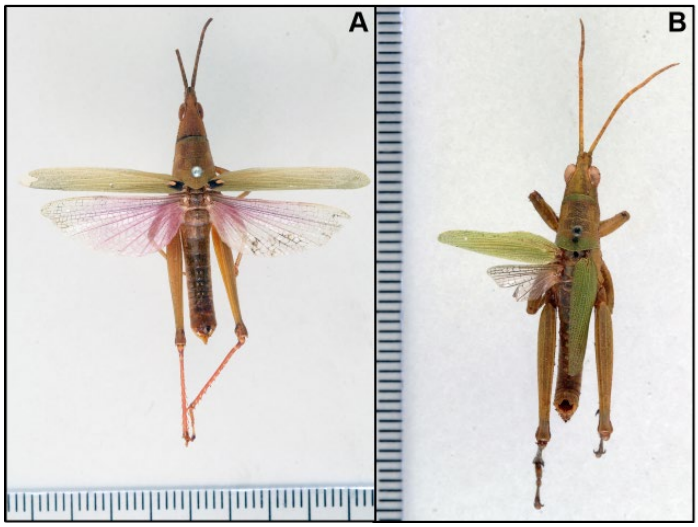

Figure 1. Pyrgomorphidae types from MCSN. A. *Pseudomorphacris notata* (Brunner von Wattenwyl, 1893) (♂, LT) Myanmar. B. *Chlorizeina unicolor unicolor* Brunner von Wattenwyl, 1893 (♂, ST) Myanmar.

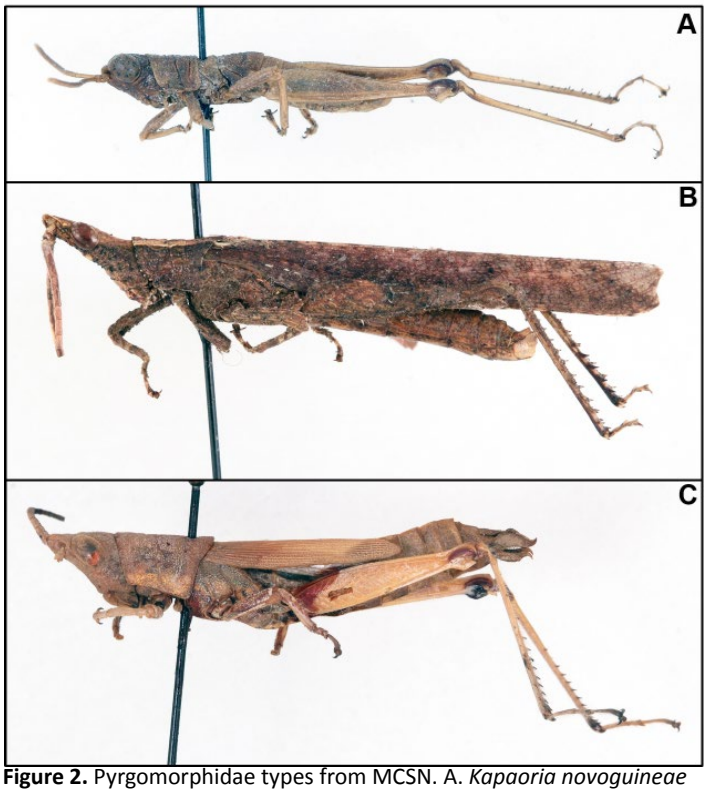

Figure 2. Pyrgomorphidae types from MCSN. A. *Kapaoria novoguineae* Bolívar, 1898 (♂, HT) Indonesia. B. *Doriaella cinnabarina* Bolívar, 1898 (♂, HT) Papua New Guinea. C. *Mitricephala vittata* Bolívar, 1898 (♀, HT) Indonesia.

terial of 10 valid species, two of them described by Brunner von Wattenwyl from Southeast Asia (Myanmar) (Fig. 1) five described by Bolívar from Malesia and Papuasia (Fig. 2). Regarding Africa, one described by Salfi from Ethiopia (*Parasphenula boranensis*) and two described by Baccetti from Somalia (Fig. 3).

In Figure 1, type material of two typical species from Myanmar are shown. These species have a fusiform body with both tegmina and hind wings developed. Heads are conical and wings have a certain reddish coloration. Both species are the type species of their respective genera which have a restricted distribution to Myanmar, Thailand, and southern areas of China.

In Figure 2, type material for the peculiar Malesia and Papuasia fauna are shown. In this area of the world, the pyrgomorph forms are away from the typical pyrgomorph you have in mind. For instance, in Figure 2B a typical member of the tribe Desmopterini where the body is flattened laterally is shown and in Figure 2A and 2B the pyrgomorphs are more elongated and cylindrical with enlarged hind tarsomeres.

In Figure 3, type material of two endemic species from Somalia are presented. These species are related to the tribe Pyrgomorphini and are characterized by reduced tegmina and absence of hind wings. For the case of *Megalopyrga monochroma*, the genus is only known from this unique female holotype (Fig. 3B).

As usual, three images per species were taken, dorsal and lateral views of the specimens, plus the labels. They were already uploaded to Orthoptera Species File.

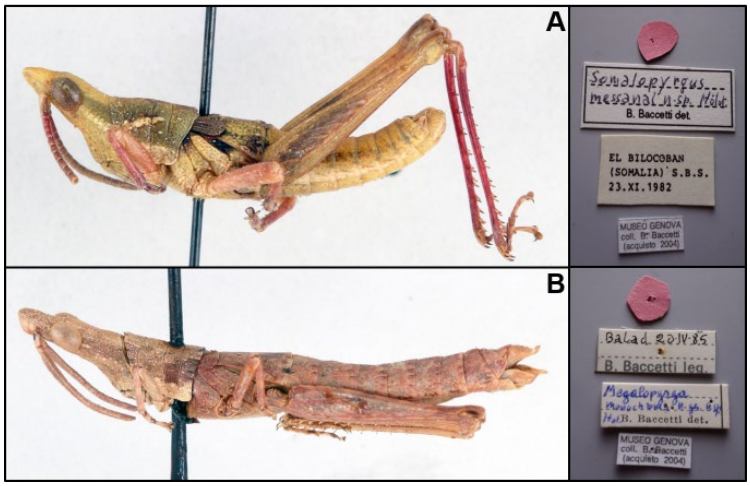

Figure 3. Pyrgomorphidae types from MCSN. A. *Somalopyrgus messanai* Baccetti, 1985 (♂, HT) Somalia. B. *Megalopyrga monochroma* Baccetti, 1985 (♀, HT) Somalia.

Acknowledgments

I thank the curators of the collection, Maria Tavano and Roberto Poggi, for all their assistance in the logistics of this visit. I also thank Hojun Song for his help in the cabinet work.

An effective biological control method of yellow-spined bamboo locust (*Ceracris kiangsu*) has been developed in Lao PDR and Vietnam

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Yellow-spined bamboo locust (YSBL) (*Ceracris kiangsu*) is a serious pest of more than 30 species of plants, such as bamboo, rice, corn, and some grasses in China, Lao PDR, and Vietnam, often resulting in high losses to crops. The YSBL outbreak in Lao PDR has been spreading since 2014 from a few provinces to about 5 provinces of about 500 locations and 3 provinces of about 50 locations. These caused huge economic losses that threatened food security and were affecting poverty alleviation programs in these countries. These conditions are becoming worse since YSBL can migrate long distances to infest wider areas, coupled with a lack of technical knowledge on stopping the YSBL outbreak available in Lao PDR and Vietnam. To support Lao PDR and Vietnam in managing the YSBL outbreaks, the U.N.'s Food and Agricultural Organization (FAO) has approved a regional Project to strengthen the surveillance capacity and implement biological control of YSBL (TCP/RAS/3607).

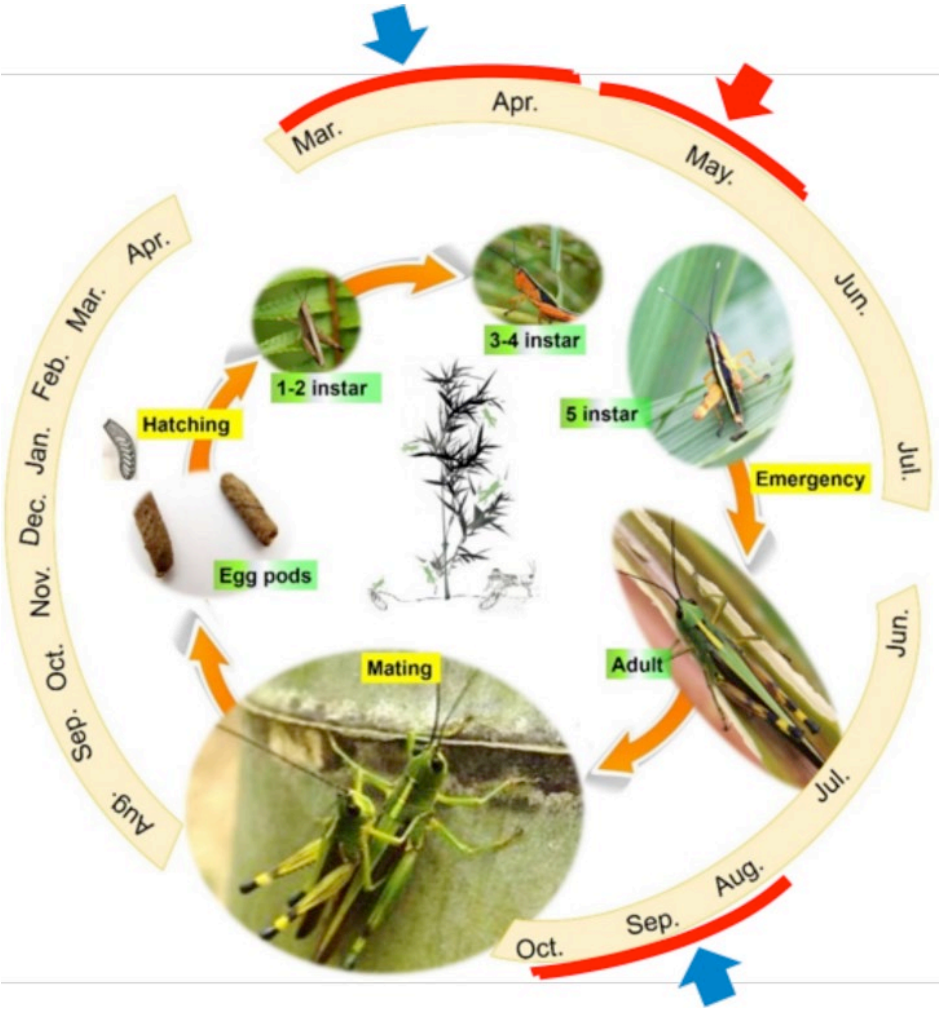

Figure 1. The critical time points for monitoring and control action in YSBL life cycle in Lao PDR and Vietnam. Red curved lines are the critical periods, red arrow is the critical time point for biocontrol action, blue arrows are critical time points for monitoring.

Nosema locustae is a microsporidian parasite of over 100 orthopteran species, including locusts and grasshoppers (Wittner and Weiss, 1999). The use of *N. locustae* for controlling grasshoppers was first developed in the United States (Henry and Oma, 1981) and commercially produced as a microsporidian biocontrol agent both in the U.S. and China since the 1980s (Henry, 1990; Zhang et al, 2001). *N. locustae* has been considered as a long-term control agent against grasshoppers and locusts in the U.S, Canada, Argentina, and China, although it acts slowly and produces low mortality. This strategy has been applied to more than 1.3 million ha to control grasshoppers and locusts in China. However, its efficiency is limited when grasshoppers and locusts are at high density. Besides, YSBL occurs in higher mountains at higher temperatures in Lao PDR and Vietnam, and whether *N. locustae* is effective in these conditions via current methods of unuse is still unclear.

Dr. Long Zhang, the Orthopterists' Society's regional representative for China and the Koreas, was invited to implement the mission of the Project. During the mission he performed 10 training courses, as well as field survey and biological control of YSBL in Lao PDR and Vietnam. Fortunately,

the biological control method for YSBL has now been established in these countries after the mentioned efforts.

1. YSBL life cycle and critical periods for monitoring and critical time point for application of biocontrol agents

Since 2015, Zhang has performed field surveillance for YSBL 4 times in Lao PDR and Vietnam and proposes a YSBL life cycle in Lao PDR and Vietnam as shown in Figure 1. YSBL only has one generation in these countries. They mainly lay eggs in soil under bamboo trees and then first instar nymphs hatch from eggs in March. The two critical periods for monitoring YSBL population dynamics have also been determined in Lao PDR and Vietnam. One period is from March to April. In this period, YSBL is at 3rd to 4th instar, which is proper for monitoring the density and development, and for preforming the biocontrol action. Another period is from August to September. In this period, YSBL is at adulthood and is proper for monitoring egg-laying which will provide useful information of YSBL distribution area and density for the next year.

2. An effective control of YSBL by *N.locustae* in field

N. locustae was applied about 10th of May at a dosage of 2×107 spores/ml, 1.5 L/ha where locust densities were over 100 individuals/m^2 in bamboo forest at 3rd to 4th instar. After 17 days of application, field surveys in the treated area (Phongsaly) showed that plenty of dead locusts were found (Fig. 2) and the density of locusts in the treated area was much lower than that in the blank control area. The average density in the treated area was less than 10 individuals/m^2, with the reduction at more 90% compared to that in blank control. This means that *N. locustae* is effective in controlling high densities of YSBL in bamboo forest. The dead locusts collected from treated plots were checked in the laboratory at China Agricultural University, Beijing, China and spores of *N. locustae* were observed in all dead locusts. The average infection grade is 3 of 5 grades, which belongs to serious disease grade. The infection rate of locusts in the blank control area was 0%. This provides strong evidence that these dead locusts were killed by *N. locustae*. Furthermore, a longer effect of *N. locustae* had been checked during of July 29-31, 2018 in Lao PDR. 46% of surviving YSBLs in treated plot were infected by *N. locustae*, which means that *Nosema* infection could possibly be persisting in YSBL populations as a long-term control factor. The density at this time was very low at about 0-2 individuals/m^2.

Figure 2. Plenty of dead locusts were found in the treated area with *N. locustae*. Many ants were found to eat dead locusts indicating *N. locustae* is safe for non-target insect, ants.

These results indicate that (1) *N. locustae* is effective and should be one of the best choices for controlling YSBL in Lao PDR and Vietnam; (2) Lao PDR has found a proper spraying machine to spray *Nosema*; (3) This is the first successful field trial for controlling YSBL with a biocontrol agent, which shows great potential in YSBL control programs in Lao PDR and Vietnam.

Acknowledgements

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A case of non-diapausing development of eggs of the two-striped grasshopper, *Melanoplus bivittatus* (Say)

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The two-striped grasshopper, *Melanoplus bivittatus* (Say), is a major acridid pest throughout North America (Latchininsky and Schell, 2006). Univoltine throughout its entire range, *M. bivittatus* exhibits a two-year cycle at higher altitudes over 1,500 m a.s.l. in British Columbia and the Rocky Mountains (Pfadt, 2002). Normally, its eggs would not hatch without a certain period of exposure to low temperatures (e.g., approximately 20 days at 5°C) (Church and Salt, 1952). However, under laboratory conditions at the University of Wyoming (UW), we observed hatching of *M. bivittatus* eggs, which occurred soon after oviposition and did not require exposure to low temperatures.

A female of *M. bivittatus* was collected on October 21, 2013 from a backyard in Laramie, WY and placed into a cage in the insectarium of the UW to obtain eggs. The female was kept in an environmental chamber at a constant temperature of 27±1°C, relative humidity of 15-31%, 16 hours of light, and 8 hours of darkness daily. She was fed ad libitum with fresh wheat leaves and wheat bran. A 200-ml glass cup filled with three parts vermiculite and one part white sand was placed in the cage for egg-laying. The female laid the first egg-pod on October 30, 2013 (Fig. 1). The cup containing the substrate and the eggs remained in the cage, and 20 days later, on November 20th, eggs started to hatch. During the first day, there were 37 hatchlings. Hatching continued until December 3rd; in total, 66 hoppers hatched from the first egg-pod.

On the same day (November 20), the female laid the second egg-pod, which was kept under the same conditions. Its eggs started to hatch on December 14; i.e., 24 days after oviposition. In total, 17 hoppers from the second egg-pod hatched between December 14, 2013 and January 5, 2014.

Figure 1. Ovipositing female of *Melanoplus bivittatus* (Say). Photo: Wahid Dakhel.

In recent years, cases of continuous (non-diapausing) development of eggs in otherwise univoltine locusts and grasshoppers were reported for *Melanoplus sanguinipes* from Arizona (Jech, 2015) and for *Locusta migratoria migratoria* L. from Russia (Stamo et al., 2013) and Uzbekistan (Gapparov, 2012). In all these cases, the acridids managed to produce the second annual generation, which was completed in the case of *M. sanguinipes*. The fate of the second generation of *L. m. migratoria* remained unknown. These examples appear to illustrate the ability of certain acridids to react to climate warming and increase their pest potential (Latchininsky, 2017).

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Did Leo Zehntner really name a new species of grasshopper in his own honour?

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During his sojourn in the Dutch East Indies (now Indonesia), the entomologist Walter Roepke (1882-1961) found several mentions of *Acridium zehntneri* Krauss in the applied entomology literature (Zehntner, 1897, van Deventer, 1912) but could not trace the original publication (Roepke, 1951). After the end of the First World War he contacted Hermann Krauss directly and was told that Krauss had been sent specimens by Leo Zehntner and had intimated that he would dedicate the species to its finder, but that Zehntner had published a description before his own was ready! Krauss considered that Zehntner had given an adequate description and never published his own description of the species.

Leo Zehntner (1864-1961) was a Swiss entomologist who became a pioneer in tropical applied entomology. After studies in Basel and Bern, he became assistant scientist at the Muséum d'histoire naturelle in Geneva (MHNG), and appears to have mainly worked under the patrician amateur Henri de Saussure rather than the curator Emil Frey-Gessner (Zehntner, 1954). In 1894, he took the post of entomologist at the Proefstation Oost-Java (East Java Research Station) at Pasuruan in the Dutch East Indies. At this time the research station was wholly funded by the sugar industry. Zehntner published details of the biology and ecology of the main pest species of sugarcane and their parasitoids; many species were new to science, but because the works were intended to be used to create practical guides for plantation managers he often gave descriptions of known species as well. Howard (1930) remarked upon the accuracy of Zehntner's work, especially given that he was based in rural Java, far from libraries and museum collections. Zehntner returned briefly to Europe in 1900 and again worked with Saussure (apparently at the latter's expense), then returned to Java to found a Cocoa Research Station at Salatiga. At the end of 1905 he moved to Brazil to lead a new Agricultural Institute in Bahia State and then retired back to Switzerland in 1920 (Zehntner, 1954).

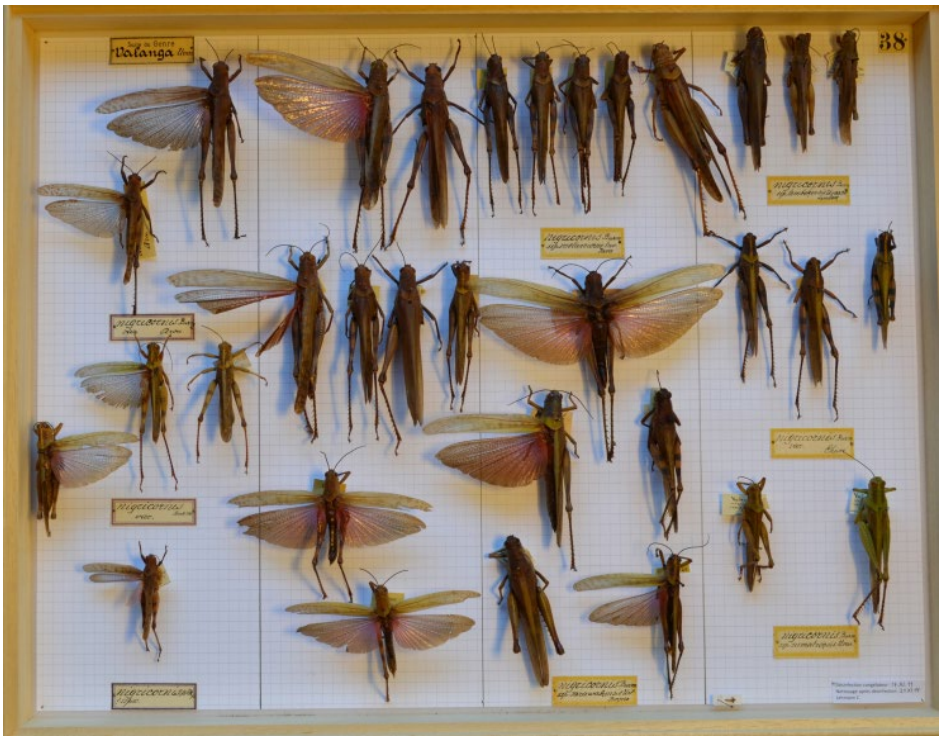

Figure 1. MHNG specimens of *Valanga nigricornis melanocornis* collected by Zehntner in Java

Given the delays in communication between Java and Europe in the 19th century, the confusion between Krauss and Zehntner is not particularly surprising. In his list of the animal pests of sugarcane (Zehntner, 1897), number 80 was *Acridium zehntneri* H. Krauss, with a brief description on page 43. Zehntner did not think he was describing a new species and so gave no measurements and no locality data (which he normally did include for explicitly new species).

Roepke could not find any specimens of *A. zehntneri* in the Pasuruan Research Station collection, but did find two unlabelled specimens of a large grasshopper in the Salatiga Research Station collection which he rather loosely considered to be "lectotypes" (Roepke, 1951). The station at Salatiga was ravaged by fire in 1902, and Zehntner's collections and notes were destroyed (Zehntner, 1954), so the specimens Roepke brought back to Europe in 1919 when he started work in Wageningen were definitely not the types of *A. zehntneri*. These two specimens were identified by both Boris Uvarov and Cornelius Willemse as *Varanga nigricornis melanocornis* (Serville, 1838). Roepke and his col-

Figure 2. MHNG specimens of *Patanga succincta* collected by Zehntner in Java

league P. A. Blijdorp concluded that this was the true identity of *Acridium zehntneri* Zehntner, 1897 (Roepke, 1951). Willemse (1957), however, considered the type series lost and basing his diagnosis on the description, placed *Acridium zehntneri* Zehntner, 1897 as a junior synonym of *Patanga succincta* (Johannson, 1763).

In his 1897 paper Zehntner included four *Acridium* species: 78 *A. roseum* Degeer, 79 *A. luteicorne* Serv., 80 *A. zehntneri* H. Krauss, 81 A. unnamed species. Zehntner sent or brought many specimens to the MHNG, and it seems likely that grasshopper species abundant enough to be considered potential pests would have been included. This part of the MHNG collection was revised by Uvarov (presumably while he was working on the material collected by Carl and Escher in southern India; see Uvarov, 1929) and the identification labels are his. The MHNG collection includes two ♂♂ and five ♀♀ specimens of *Chondacris rosea* (DeGeer, 1773) and one ♂ and nine ♀♀ specimens of *Patanga luteicornis* (Serville, 1838) collected by Zehntner in Java, but no specimens under the name collection *zehntneri* Krauss. The other specimens collected by Zehntner in Java include four ♂♂ and six ♀♀ specimens identified by Uvarov as *Valanga nigricornis melanocornis* (Fig. 1), and three ♂♂ and two ♀♀ specimens identified by Uvarov as *Patanga succincta* (Fig. 2). Although the specimens are superficially similar, the hindwings of the examples identified as *P. succincta* are a brighter red, and all have an obvious yellowish stripe on the pronotum, while those identified as *V. nigricornis melanocornis* have hind wings of a duller red and no obvious stripe. Roepke (1951) remarked that his specimens also lacked the stripe mentioned in the original description and it seems clear that they had been correctly identified by Willemse and Uvarov and were not *A. zehntneri*. As the description of the unnamed species is much closer to *V. nigricornis melanocornis*, it seems almost certain that Willemse was correct in identifying Zehntner's species as *P. succincta*.

The conclusion, therefore, is that Zehntner did not consciously name a species in his own honour, but did this inadvertently assuming the species had already been described by Krauss. Given the constraints under which Zehntner was working it is easy to understand this apparent lapse in etiquette.

Acknowledgments

Thanks are due to Anita Hollier for comments on the text, and Holger Braun whose rhetorical question led to this article.

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2018: 200th birthday and rebirth of the Museu Nacional

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This should be a different text. I would say that I got the position of professor at the Universidade Federal do Rio de Janeiro (Federal University of Rio de Janeiro), researcher and curator of the Museu Nacional (National Museum), and that, for the first time, the biggest collection of Orthoptera in Brazil would have a curator specialist in Orthoptera. It would be a celebration text.

However, the tragedy of September 2nd forced me to change it. It is with deep sadness and perplexity that I will try to tell a little about the Museu Nacional and what we lost that day. I don't intend to discuss the big economic, political, and moral crisis in Brazil; the chronic and historical lack of investment in education and science; or the great difficulty in insisting on making science in Brazil. Although it is a sad text, I intend to talk about our Museum, hope and reconstruction.

Museu Nacional, Universidade Federal do Rio de Janeiro

The Museu Nacional is under the administration of the Universidade Federal do Rio de Janeiro (MNRJ). It is the oldest scientific institution in Brazil, and the biggest national history museum in Latin America, with a collection of more than 20 million artifacts and specimens (Fig. 1).

Its history is closely related to the history of Brazil. The main building, the Palácio de São Cristóvão (São Cristóvão Palace), was the residence of the Portuguese Royal Family when the entire Portugal royal court moved to Brazil running from the Napoleonic troops, in 1808. After Brazil's independence, it continued to be the residence of the Brazilian Imperial Family, until 1889, when the republic was proclaimed. In that Palace lived four Portuguese monarchs (D. Maria I, D. João VI, D. Pedro IV, and D. Maria II) and two Brazilian emperors (D. Pedro I and D. Pedro II), and their families, including Princess Isabel, daughter of D. Pedro II, known for signing the abolition of slavery in 1888. Moreover, it was in that Palace that Princess Leopoldina (first wife of D. Pedro I, daughter of the Austrian emperor Francis II) signed an independence decree of Brazil from Portugal in September 2nd 1822 (days later, in September 7, D. Pedro I officially declared Brazil free from Portugal), and where Brazil's first Constitution was written during the Republican Constituent Assembly (1889-1891, just after the Proclamation of Republic and banishment of the imperial family).

Figure 1. São Cristóvão Palace, Museu Nacional, before the fire. Photo: Museu Nacional.

The MNRJ completed 200 years of existence in 2018. The escape of the Portuguese court to Brazil in 1808 was a crucial moment to the country's history because it started a period of great transformations, in which Brazil ceased to be a Portuguese colony and Rio de Janeiro became the capital of the Reino Unido de Portugal, Brasil e Algarves (United Kingdom of Portugal, Brazil, and Algarves). During that period the first main national institutions were created, as were banks, courts, government and administration buildings, press, libraries, schools and universities. Brazil was also destination of artists, teachers, scientists, doctors, lawyers, and several professionals that were hired to raise the new country, as the French Artistic Mission in 1816. In that period, the so-called Museu Real (Royal Museum) was founded in June 6, 1818

With the Republic proclamation in 1889, the Museu Nacional moved to the Palácio de São Cristóvão (São Cristóvão Palace) in 1892, where it still stands today. The history of the Museum is also closely related to scientific development in Brazil, and received the visit of some famous foreign scientists, like Albert Einstein

and Marie Curie. Moreover, the Museum graduated thousands of scientists in several fields of knowledge throughout history and is one of the most important institutions for Brazilian science and education. Currently, it runs six Graduation Programs: Archaeology, Botanics, Geosciences, Linguistics and Indigenous Languages, Social Anthropology, and Zoology.

Therefore, the tragedy that destroyed the Palace represents not only a scientific loss, but the loss of part of the memory and history of Brazil. The Palace housed the exhibition, administration offices, departments, and the main scientific collections, involving 90 main researchers and a community of hundreds of people, among them researchers, technicians, and students.

The Museu Nacional houses (or housed):

- The biggest collection of Egyptian artifacts in Latin America, including mummies, sarcophagi, statues, and stone carvings.
- An impressive ethnographic collection, with more than 42,000 artifacts from Rome, Pompei, Greece, Africa, Asia, and Oceania; and artifacts, mummies and skeletons of pre-Colombian people and Brazilian indigenous tribes, some of them now extinct.
- An unparalleled linguistic collection, with unique records of extinct indigenous tribes.
- The most important Social Anthropology Library in Brazil.
- Thousands of pieces and artifacts from Portuguese and Brazilian courts, such as the throne of D. João VI, king of Portugal.
- Thousands of historical documents.
- Important geological collections, including a collection of meteorites.
- Massive paleontological collections, with fossils and skeletons of dinosaurs (including the complete skeleton of *Maxakalisaurus topai*, the largest Brazilian dinosaur) pterosaurs, Pleistocene megafauna, insects, plants, and invertebrates.
- Unique archaeological and anthropological collections, including the oldest human remains found in the Americas, the 12,000 year-old-skeleton named Luzia.
- Collections of Carcinology, Arachnology, and Malacology, among other invertebrates.
- One of the main entomological collections in Brazil, with more than 5 million specimens.
- Thousands of scientific projects, in all levels and in several fields of knowledge.
- One of the main herbariums in the country.
- A large central library, with more than 15,000 rare pieces.
- Large and historical herpetological, ichthyological, ornithological, and mammology collections.

The fire burned down the entire Palace, including the exhibition, administration and department offices, three entire departments (including all the laboratories and facilities), and the main collections (Fig. 2). The only things not destroyed were the vertebrate and some invertebrate collections, the central library, and the herbarium.

Until now, few things were removed from the Palace. Almost all the types of the Carcinology and Malacology collections were saved in the beginning of the fire. Considering the proportion and magnitude of the fire we can't exactly quantify yet what was lost and what can be restored. It will take several weeks for the work of search and rescue of the collections among the debris. The searches will be conducted by the researchers, followed by a team of archaeologists. Sadly, the MNRJ is now an archeological site. Another point is that the area of the MNRJ is isolated and several experts from governmental agencies are investigating the tragedy.

The Entomology Department

The Entomology Department has 11 professors, one emeritus professor, 7 technicians, dozens of students (graduate and undergraduate), and postdoctoral researchers. Except two laboratories of Diptera and part of their collection (families Muscidae and Cecidomyidae), the entire department, including the laboratories, research facilities, and the collections, were consumed by the fire.

The Department was located on the 3rd floor, which collapsed due to the intensity of the fire. The large compactor, which stored a large part of the collection, is now on the 2nd floor and is severely damaged. Although it is premature to consider the loss of the entire collection since we have not yet accessed the area, it is unlikely that anything should remain in the debris.

Figure 2. São Cristóvão Palace, Museu Nacional, after the fire. The highlighted area was the Entomology Department (3rd floor). Photo: Reuters.

Figure 3. Logo of the Orthoptera Laboratory.

We were hit by an unprecedented catastrophe, and we are living the worst nightmare for a scientist. Our collection, with more than 5 million specimens and more than 2,200 types, is certainly lost. We have no words to express the magnitude of this tragedy. Some articles related our losses with the loss of the Library of Alexandria, but the truth is that for us this is incomparable. We never passed through anything like this. We are facing a massive loss of types, and if we consider the types of other collections (like Arachnology, Paleontology, etc.), this is probably the biggest loss of types in a single event in recent history. We are devastated.

The Orthoptera Collection

A few weeks ago, our emeritus professor, Professor Miguel Monné, published the list of the orthopteran types of MNRJ. He presented the types of 273 species: Acrididae (171), Eumastacidae (5), Proscopiidae (13), and Romaleidae (84). The Orthoptera collection had approximately 24,000 mounted specimens (14,200 Acrididae, 600 Romaleidae, 350 Ommexechidae, 345 Proscopiidae, 295 Pyrgomorphidae, 65 Pamphagidae, 60 Eumastacidae), and more than 10,000 specimens in cotton beds. This was the biggest Orthoptera collection in Brazil.

The Orthoptera collection also has an interesting history, which is closely related to the emergence of orthopterology in Brazil. As said by Dr. Monné (2018): "the history of the Orthoptera collection (…) began with a visit to Brazil of the orthopterist Marius Descamps (…) for a trip to collect and study grasshoppers in the state of Minas Gerais. This was the first contact that urged Dr. Carlos Alberto Campos Seabra and myself to initiate intensive collecting trips, mainly in the Amazon, and later in central, southern and eastern Brazil. The collection surged in volume with the donations of the Academy of Natural Sciences of Philadelphia and from the Muséum National d'Histoire Naturelle, Paris. Posteriorly, the collection received the visit of Dr. Carlos S. Carbonell, who described many species, with Ricardo Ronderos, Marius Descamps, Christiane Amédégnato, and H. R. Roberts. The largest donation received by the Museu Nacional was the collection of Carlos Alberto Campos Seabra, who collected Orthoptera for more than 10 years. The contributions of naturalists that collected for Campos Seabra are extremely important. Here I mention the most active ones: Olmiro Antonio Roppa, Bento Silva, Francisco M. Oliveira, M.V. Cerdeira, E.S. Lima and A. Peixoto".

Thus, it is a very important and unique collection, from a historical and scientific point of view. Its loss is irreparable.

Future

The images of that day are vivid in our minds, and it will certainly never leave our memory. We passed through deep sadness to anger, and these feelings will disappear, but the emptiness sensation is something that we may never lose. Our Museum is gone and this is irreversible. But, above all, a museum is made of people, and we are still here. We are ready to rebuild the Museum. The dust is settling down and we are working hard, despite grief and pain. Our main activity now is to support the students, write proposals, and try to get funding for the new department, field works, and collection.

My first official day of work was September 3rd, just one day after the tragedy and Biologists Day in Brazil. My first day was, literally, a beginning for me and the Museum. I'm still a researcher of MNRJ, head of the Orthoptera Laboratory (Fig. 3) and curator of the collection, although I don't have a collection anymore (for a while). Assuming a position in MNRJ is the greatest achievement of my life and I'm extremely proud! The Orthoptera Lab is working! In a few weeks we will travel for field work and start a new collection for the next generations. My mission is to rebuild the collection, an opportunity to effectively contribute to the orthopterology in Brazil and the rebirth of the MNRJ (Fig. 4).

We are still here. And we will resist. The Museu Nacional lives!

P.S. I want to express my gratitude for the many messages of support I've received. Each support is very important for us, and is good to know that we are not alone. Thank you very much!

Figure 4. #museunacionalvive. Photo: Museu Nacional

Book Review:
The Grasshoppers of Greece

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For many people living in North and Central Europe, Greece is a preferred holiday destination, not only because of its ancient sites and its beaches, but increasingly more also because of its nature. Due to the combination of high mountains on the one side and countless islands on the other its fauna is unusually diverse. This high number of species, however, poses a problem for the accidental visitor: how to recognize and identify what one has found? This is not so much a problem for naturalists like birders – there are a lot the field guides covering all of Europe. For insects, and especially for Orthoptera, the situation is not so comfortable. There is no book allowing an easy pictorial identification, even only to genus level. The strongly out-dated volumes of Harz (1969-75) were made for specialists and require knowledge and special equipment for their use. For those specialists, Greece was even one of the highlights of Europe. Fer Willemse, the father of the first author of the present volume, published a two-volume set in 1984 and 1985, a catalogue with distribution maps, and a key with hundreds of drawings. As with the books of Harz, both were not made for fast identification, but they give a clue to the diversity of Orthoptera in the country: about 313 species were treated.

Now, more than 30 years later, things have changed. Much new information is available and also the technical possibilities have greatly improved. Digital photographing and sound recording are widespread. At the same time the number of persons interested in nature and nature conservation has become much larger. So the time was ripe for a new, improved, and updated presentation of current knowledge.

In the new field guide 378 grasshopper species (not counting subspecies) are listed, all found in Greece. Thus, Greece is probably the country with the highest number of species in Europe. For their identification, the book starts with an introduction to morphology and biology of grasshoppers, a term used by the authors in a wide sense corresponding to Orthoptera. After a few pages about sounds and Greek habitats there follows an especially interesting small chapter entitled "Challenges". Here, mysterious species are listed that were found only once as well as taxonomically problematic species including those within hybrid zones. The authors also give lists and maps of 89 of the most important islands and 94 of the most important mountains. In an online appendix they present species lists for these localities, which will be hopefully updated from time to time. In the following list of the Greek species the endemic ones are marked in red – an impressive array! At the beginning of the key the six size categories are defined, from very large (>35 mm) to tiny (< 5 mm), a seldom seen, but very useful service. The key itself is equipped with many (585) beautiful photos at all scales, in many cases supplemented by arrows, marking lines or even coloring of important structures. With the main key, typical genera are identified, while for

Willemse L.P.M., Kleukers R.M.J.C., Odé B. 2018. The Grasshoppers of Greece. EIS Kenniscentrum Insecten & Naturalis Biodiversity Center, Leiden. Soft cover, 439 pp., 1864 color photos, b/w illustrations and b/w distribution maps.

ISBN-13: 978-90-76261-15-7

Ordering may be most easy via EIS (https://www.eis-nederland.nl/publicaties/overige-uitgaven; € 37.50 + postage) or via Natural History Book Service, London (https://www.nhbs.com/the-grasshoppers-of-greece-book; $(US) 71+ postage, checked Sept 2, 2018)

species identification additional keys are often provided. However, for genera with many local forms the reader sometimes has to use geographical information. For example, for identification of cave cricket species belonging to the genera *Troglophilus* and *Dolichopoda* one has to use the list of the caves with the respective endemic species given in Appendix 3A. For the 45 species of the genus *Poecilimon* the geographic information (Appendix 3B) alone is certainly not sufficient, but in this case the beautiful photographic review of the cerci shapes of all Greek species (pages 182-3) will help.

Some of these impressive comparative figures (in my view, most beautiful for tettigoniinae genera, p. 204-5, and for *Rhacocleis*, p. 247) are found in the central part of the book, the "Treatment of genera". Here, for all genera, information is given about etymology, distribution, morphology, song, habitat, and recording (how to find), together with short remarks about altitude and phenology and with excellent habitus photos of many species.

At the end of the book are oscillograms of the calling songs for most singing species, followed by detailed distribution maps for all species. Sound files (as mp3 at normal speed and 10 times slowed down) are electronically available via https://www.grasshoppersofeurope.com/.

To sum up: A very fine book. Buy it now so that you can discuss interesting findings with the authors at the Agadir congress in March!

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Don't mind me!

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The plains lubber, or *Brachystola magna* (Girard, 1854) (Orthoptera: Romaleidae), is quite a robust grasshopper. I can tell you from experience that the rigid spines on the posterior edge of its hind tibiae can be quite painful when a full kick is unleashed into the greedy hand you're trying to use to pick one up. They also have the ability to raise their wings to a degree and unleash a menacing hiss, often while waving their hind legs in the air ready to smash into the first thing foolish enough to get too close. I was delighted to recently encounter a very scattered population of these mini-beasts while doing some field work with unmanned aircraft systems on a ranch near Edgemont, South Dakota, U.S.A. They were few and far between, and would often just seemingly appear near my feet as I walked across the grassy rangeland habitats. In fact, I almost stepped on the female in this photo! Luckily, I didn't because I was able to snap several decent pictures of this oviposition event while she completely ignored me. I rarely get to see this happen in the field, so I was excited to have the chance.

Editorial

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The September issue of *Metaleptea* published in 2009 (volume 29, issue 2) was the first issue that I published as the new incoming Editor of the newsletter. It featured reports of the 10th International Congress of Orthopterology in Antalya, Turkey along with several other interesting articles. At that time, I was still a postdoc, struggling to find a faculty position. While putting together the current issue, I realized that this issue (volume 38, issue 3) will be my 10th September issue! It is difficult for me to believe that I have been serving in the role of the Editor of *Metaleptea* for the past 10 years. Of all the service activities that I perform, being the Editor of *Metaleptea* is by far the most enjoyable thing that I do because it gives me the firsthand opportunity to appreciate how vibrant our orthopterist community is all over the world. I particularly enjoy reading the Ted Cohn Grant Reports from young orthopterists who are carrying out amazing research. Of many taxon-focused scientific societies, our Society is probably the most forward-thinking group in terms of investing in the future generation of orthopterists. In the past, I was very worried about the field of orthopterology because not many young people studied Orthoptera. Within the last 10 years, we have witnessed the gradual increase of the number of students who study this fascinating order of insects and now some of these students are starting research programs of their own. I believe that our Society indeed has a bright future ahead.

I am sure that many of the readers have heard about the tragic news about the destruction of the Museu Nacional in Brazil. I watched the video footage of the fire in horror and sadness. I can't even imagine how devastated my friend Pedro Souza-Dias must have been when this happened right before he started as the new curator of the Orthoptera collection, which included 34,000 specimens and 273 types. What we have lost in this tragedy is irreplaceable and there are many challenges ahead to rebuild the collection. But, like Pedro said in his article, the Museu Nacional lives, as long as there are dedicated researchers like Pedro and many Brazilian orthopterists, who are willing to rebuild. I also feel strongly that our orthopterist community should contribute to this rebuilding, which will certainly take many years.

This is another fine issue of *Metaleptea* and I would like to thank all those who have contributed to this issue as well as our Associate Editor, Derek A. Woller, for his continued assistance in the editorial process, who is celebrating his 7th anniversary with Metaleptea. He began unofficially editing articles in 2012 and was given his official title in 2013.

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. The next issue of *Metaleptea* will be published in January of 2019, so please send me content promptly. I look forward to hearing from you soon!

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