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METALEPTEA

THE NEWSLETTER OF THE ORTHOPTERISTS' SOCIETY

President's Message

By ALEXANDRE V. LATCHININSKY
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Dear Society members! Happy new 2017!

Best New Year wishes from the snowy and cold Wyoming, where recently the night temperatures dropped to -32°C! It always amazed me how orthopterans and other insects overwinter in such extreme conditions. Grasshoppers, for example, developed a unique adaptation – an egg-pod, in which the embryos are well-protected by sturdy walls resisting extreme fluctuations in surrounding conditions for many months in a row. But even more amazing and incredible is that some grasshopper species spend long winter months as nymphs!

Anyway, looking out of my window makes me dream about the sunny Brazil where our Society held its 12th International Congress of Orthopterology a couple of months ago. Kudos to the Congress organizers, Prof. Marcos Lhano and his team, who worked really hard and made this Congress a great success. The meeting was smaller than the previous one in Kunming, but some participants considered this as a positive feature allowing for more fruitful discussions among colleagues and new collaborations to be created. As always, the Congress offered a plethora of talks on a very wide array of Orthoptera-related subjects, from taxonomy and evolution to ecology, behavior, and biological control of orthopteran pests. Poster sessions and coffee breaks provided

excellent opportunities to learn about ongoing research and exchange ideas. The choice of the Congress's venue was excellent – right on the beach, so an afternoon swim became mandatory for many participants. Food was great, the gala dinners were entertaining, and the post-conference tour was wonderful. You'll find more information about the Congress activities in this issue of *Metaleptea*.

During the Board meeting, the current state and future directions of the Society were discussed. The financial situation of the Society is quite solid, thanks to the generous bequest of its former President, Ted Cohn, and wise assets management by the Treasurer, Pamm Mihm. One of the most urgent goals is to increase the status of our main outlet, the *Journal of Orthoptera Research* (*JOR*), and make it an impact-factor publication. The *JOR* Editor, Dr. Corey Bazelet, presented her vision of the measures to reach this goal. One of the most important steps in this direction is to

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ensure regularity in *JOR* publication, which is currently issued twice a year. By the way, just a few weeks ago, the next (Vol. 25(2)) *JOR* issue was printed. I am using this opportunity to urge Society members to consider publishing in *JOR*, which offers a fast and competent peer-review of any Orthoptera-related manuscripts. The next issue will appear in June 2017.

Several Society prizes were awarded during the Congress. (see "Awards"). Warmest congratulations to all Society awardees!

As for the 13th Orthopterology Congress, the congress committee is currently considering possible venues, one of them being Agadir in Morocco. More information on the subject will follow in the coming months.

Once again, I would like to wish all Society members and their families peace, great health, prosperity, and a fruitful 2017 year!

Recap

The 12th International Congress of Orthopterology

"*Orthoptera in a Changing World*"

(October 30 - November 3, 2016, Ilhéus, Brazil)

By **MICHAEL SAMWAYS**
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Wow, what a superb congress it was! The tenor was set by the driver of the event, Marcos Lhano with an excellent team, making everyone so welcome at the stunning venue. The whole atmosphere throughout the congress was so scintillating and inspiring, not to mention the real fun events and the most divine cuisine!

Throughout the congress the atmosphere was incredibly interactive, with many excellent debates from many angles and many parts of the world. The first plenary was from Francisco de Assis G de Mello (São Paulo State University, Brazil) on the evolution of orthopterology in South America. This was a fascinating talk that did fine justice to development of the field on the continent, one so rich in so many species in a whole range of ecosystems. Then, Hojun Song (Texas A&M University, USA) gave a superbly presented overview of Orthoptera systematics from its roots, through today and into the future. This had fundamental appeal to everyone, as phylogeny underpins so much of what we all do, irrespective of our fields. Thomas Fartmann (University of Osnabrück, Germany), for his plenary, focused on the biodiversity and landscape ecology of Orthoptera. Many new ideas and strategies for

Group photo of the participants of ICO 2016

conservation were given, based on the fine research done by him and his colleagues and students across the German landscape. This generated much discussion and gave the opportunity for comparison of findings from different parts of the world. Marie-Pierre Chapuis (CIRAD-BIOS, France) gave a penetrating overview of the new methods available for assessment of grasshopper population genetics. This approach has now become so important across a whole range of studies, whether applied or for conservation. The final plenary lecture by Long Zhang (China Agricultural University, China) was delivered by David Hunter (Australia). It was an intriguing exposition of the great advances that have been made in China using environmentally-friendly technology for locust control. It was so interesting to see just how much has been done in China in this very important new field.

There was also a fascinating series of symposia, themed sessions, and workshops. Maria Marta Cigliano and Holger Braun (Museo de la Plata, Argentina) gave feedback on the Orthoptera Species File, an amazing database that covers details of what is known of all described species to date. It is being continually updated and is a very valuable resource for many workers throughout the world. The

Brazilian orthopterists singing at Nations Party

symposium organized by Hojun Song and Ricardo Mariño-Pérez on current orthopteran systematics focused on some intriguing new methodologies, approaches and perspectives. This was then followed by Martina Pocco's session on systematics and taxonomy, focusing particularly on nuclear aspects. Axel Hochkirch (Trier University, Germany, and Chair of the IUCN/SSC Grasshopper Specialist Group (GSG)) then gave us an update on the processes and procedures for placing Orthoptera on the IUCN Red List, with the latest on the great advances made by the very active GSG. Then, in the conservation symposium we heard about not only advances in some Red List activities but also new information technologies and hotspot identification. Corey Bazelet's (Stellenbosch University, South Africa) symposium of ecology and conservation emphasized some of the great advances that have been made in the field in various parts of the world. We even heard about the 'honorary' orthopterans in Russian rivers! There was also a symposium organized by Alex Latchininsky (University of Wyoming, USA) on the challenges of meeting efficacy, economics, and environment all at the same time when controlling locusts. This means good surveillance, using the right options for control, in the right way, at the right time.

Organizers and volunteers of ICO2016

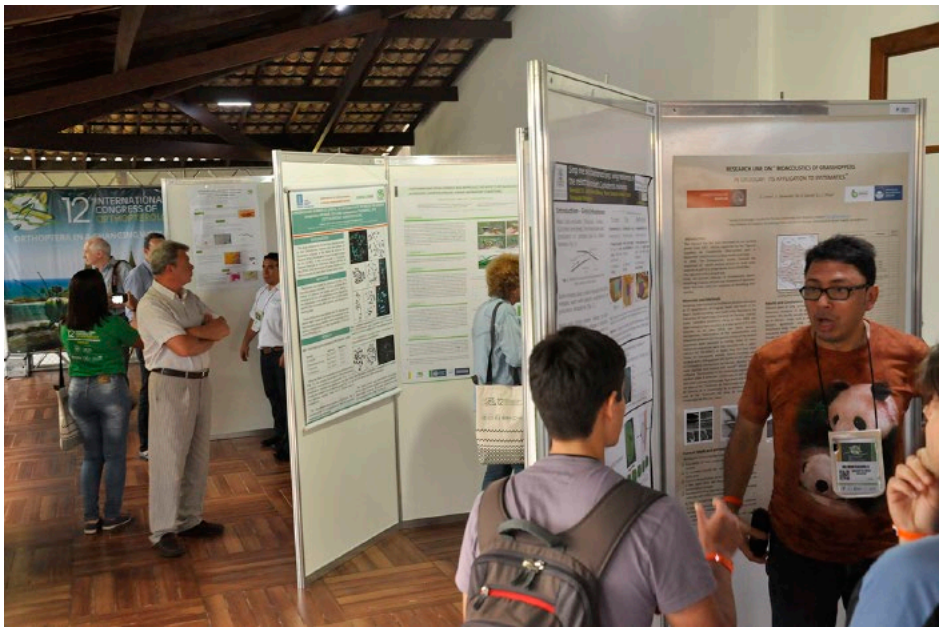
There were three workshops, one on new generation sequencing methods (organized by Ioana Chintauan-Marquier of CNRS MNHN, France), one on recording and signal processing of orthopteran songs (organized by Thorin Jonsson and Fernando Montealegre Zapata of University of Lincoln, UK), and one on the use of the statistical package R (organized by Carlos Sperber, Federal University of Viçosa). There was then a symposium on morphology, molecules and evolution in Orthoptera (organized by Laure Desutter-Grandcolas, Lauriane Jacquelin and Ioana Chintauan-Marquier) covering some of the advances around these penetrating new technologies. Raysa Martins Lima then

chaired a session on integrated pest management of grasshoppers and locusts with updates on the plague situations in several parts of the world. Battal Çiplak and Sarp Kaya (Akdeniz University, Turkey) had a symposium on phylogeography and speciation, with some interesting updates from various parts of the world. Many orthopteran species are highly communicative using sound and/or vibration and this led to a symposium organized by Fernando Montealegre-Zapata on acoustic and vibrational communication from many different perspectives, while we also got an update on the details of the orthopteran ear through the use of very sophisticated new technologies.

We also had a session on phylogeography and speciation (chaired by Beata Grzywacz) and on behaviour and communication (chaired by Ricardo Mariño-Pérez) with various new perspectives. Finally, and fitting, was a session on Brazilian orthopterology organized by Carlos Sperber and Pedro Souza-Dias, which was fascinating for the international audience.

All in all, this was a very wide ranging congress with ample opportunity to catch up on all the latest trends in the field, and opportunity to listen to areas of expertise that are not necessarily one's familiar zone. In total, we had 91 attendants from 25 countries, and 88 presented abstracts. Then, of course, there was the exchange of ideas over coffee, and to acquaint again with old friends and to meet new ones. Yes, what a great congress!

*Please check out more pictures taken during ICO2016 at www.flickr.com/photos/ico2016/albums.



Poster session at ICO2016

One of the scientific sessions at ICO2016

Break between scientific sessions at ICO2016

Hat ceremony, passing of presidency from Past President Samways to Current President Latchininsky

A lively discussion during OSF workshop at ICO2016

Doug Whitman and his wife, representing the U.S.A. during the Nations Party

Participants of locust symposium at ICO2016

Traditional Brazilian dancers celebrating Martina Pocco's birthday

Orthopterists representing Latin America at ICO2016

The Orthopterists' Society Awards presented at ICO2016

By ALEXANDRE V. LATCHININSKY
President
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D.C.F. Rentz Award for Life-time Dedication to Orthopterology is intended to recognize outstanding contributions to Orthoptera research, particularly the work of retired or Emeritus orthopterologists who have devoted their entire life to the study of Orthoptera. In 2016, this prize was awarded to two eminent orthopterologists: Glenn Morris and Thomas Walker.

Glenn Morris holds a Ph.D. degree from Cornell (1967). He worked at the University of Toronto beginning from 1967; currently he is Professor Emeritus at this university (since 2004). Over six decades of research and scholarly publication, Glenn has achieved international prominence for his work on communication systems in the Orthoptera. His work has been very influential and he has published over 50 papers in such prestigious outlets as Science, Animal Behaviour, Journal of Experimental Biology, and the Journal of Comparative Physiology, just to name a few.

Glenn's lifetime commitment to the advancement of orthopterology, and his indefatigable service to the discipline can be evidenced by countless young scientists he has mentored over the years, as well as his active engagement and collaboration with other orthopterists that share his passion for the songs of crickets and katydids. Glenn dedicated many years of service to the Orthopterists' Society as editor of the *Journal of Orthoptera Research*, which he successfully managed since Volume 8 in 1999 through Volume 21 in 2012. During all these years Glenn not only attracted great papers but also worked tirelessly on carefully editing manuscript texts from orthopterists, many of which were non-native English speakers around the world. Overall, Glenn's career as an orthopterologist may be characterized as influential and inspirational.

Thomas J. Walker received his Ph.D. degree in 1957 from Ohio State University. For over three decades he worked as professor at the University of Florida; since 2001 he is Professor Emeritus at this university.

Tom's research throughout his career has focused on investigating the systematics and acoustic behavior of the crickets and katydids of eastern North America. Although he was not the first to use the songs of these insects as windows into their true diversity, he played an essential role in moving this approach into the modern era and, in his characteristic way, applying it thoroughly and systematically. He has published over 150 papers and has made many other important contributions in his career as well. For decades, Tom taught numerous entomological and ecological courses at the University of Florida. Tom is a great mentor, and his numerous students characterize their interactions with him as engaging, inspiring, and stimulating. His life-long career unifies breadth of knowledge, biological insight, and a commitment to public education.

One of his great achievements in advancing orthopterology is his commitment to share his knowledge and love of Orthoptera with the general public. Tom initiated and developed Singing Insects of North America (SINA), a unique website that enables almost anyone to identify species of North American crickets, katydids, and cicadas. The well-done keys on SINA are helpful in learning the characters used to distinguish the subfamilies and genera of many katydids and crickets. Not only is SINA an amazingly easy-to-use website, it was only possible because of Tom's decades of work that produced the detailed recordings, range maps, and text. His effort to digitize countless old publications and make them accessible to

Glenn K. Morris (left) and Thomas J. Walker (right)

anyone deserves particular recognition.

The Sir Boris Uvarov Award in Applied Acridology is a recognition of important accomplishments in the domain of study and practical management of important acridid pests – locust and grasshoppers. In 2016, it went to the Society's Executive Director, **David M. Hunter**.

David holds a Ph.D. from the University of Queensland, Brisbane (1976). Between 1977 and 2004, he was employed by the Australian Plague Locust Commission (APLC) as an Entomologist to conduct research on aspects of locust biology and ecology important in improving our ability to forecast, locate, and treat locust outbreaks. David's role in the APLC developing a program of "preventive control" is crucial, particularly in introducing a biological control component in locust management. He led "Green Team" that used the fungus *Metarhizium acridum* to treat locusts in environmentally-sensitive areas. Over the next 15 years, David was involved in trials with *Metarhizium* and in training courses in Mexico (2000-2007), China (2002-2009), Uzbekistan (2010-12), and Georgia (2010-12).

Besides promoting the biological control of locusts and grasshoppers, David has made important contributions to pioneering remote sensing approaches to locust monitoring as early as in 1983. He has made important insights into the population dynamics and origins of locust plagues in Argentina, developed IPM in locust control in Australia, and advocated preventive strategy as the most viable one to control desert locusts in Africa. The results of his work have been published in more than 60 papers in scientific journals.

Currently, David plays an amazing role as Executive Director of the OS. He has really helped consolidate the OS into a truly workable, international society; furthermore, he is the Society's President-Elect.

The Ted Cohn Award for Excellence as a Young Professional Orthopterist is for young professionals, aged 35 or less, who are at the last stage of dissertation, or doing a postdoc, or even early-stage research, or other relevant professional position. These prizes are new for the Society and were awarded for the first time at the 12th ICO at Ilheus. The first awardees are Ricardo Mariño-Pérez and Martina Eugenia Pocco.

Ricardo Mariño-Pérez is a Ph.D. Candidate at Texas A&M University. Ricardo received his M.S. degree from Universidad Nacional Autónoma de México in 2009. He has already published almost 20 peer-reviewed articles and book chapters; he co-authored a well-illustrated Field Guide to "Grasshoppers, Locusts, Crickets and Katydids of Mexico." Ricardo is one of the rising stars in Orthoptera taxonomy, specializing in a fascinating grasshopper family Pyrgomorphidae as well as the orthopteran fauna of Mexico in general. Over the past three years, he has visited 13 museums in 10 countries with a high- resolution imaging system to photograph type images of various pyrgomorph species, which were later uploaded to the OSF website. As a result, he has single-handedly increased the number of available type images many folds, which is a major taxonomic achievement by itself. According to his major advisor Hojun Song, "Ricardo will lead a way in rejuvenating orthopteran taxonomic expertise."

Martina Eugenia Pocco received her Ph.D. degree from Universidad Nacional de La Plata (UNLP) in Argentina in 2014 under the guidance of Maria Marta Cigliano and Carlos Lange. Her dissertation was devoted to taxonomy, biogeography, and evolution of Neotropical Romaleids. Amazingly, during her research trips, she found and described several new species, which is quite unusual for such a well-studied group. Martina has already published a dozen refereed articles and book chapters. Since 2015, she has worked as an Assistant Researcher at CONICET (Consejo Nacional de Investiga-

David Hunter receiving the Uvarov Award (left) and Ricardo Mariño-Pérez and Martina Pocco receiving the Ted Cohn Award (right)

ciones Científicas y Tecnológicas) of Argentina. Martina is a passionate and devoted orthopterist. Beside the Romaleids, she has vast experience in melanoplines. Currently, her research focuses on such biological traits as aposematic coloration and gregarious behavior in romaleids. She also collaborates with Hojun Song on studies of phenotypic plasticity of the South American locust *Schistocerca cancellata*, which has recently had a major outbreak in Argentina.

BEST POSTER PRESENTATION

First Place: Juliana Chamorro-Rengifo
Neoconocephalus Karny, 1907 (Conocephalinae: Copiphorini): High chromosome diversity and a rare X1x2Y Sex chromosome system in Tettigoniidae

Second Place: Haithem Tlili
Taxonomic study of locusts (Orthoptera, Caelifera) in the regions of Kasserine, Gafsa and Tozeur in Tunisia

Third Place: Pamela de Jesus Conceiçao
Susceptibility of nymphs and adults *Cornops frenatum frenatum* (Marschall, 1836) (Orthoptera: Acrididae; Leptysminae) to fungi *Beauveria bassiana* - lineage CG1303

BEST ORAL PRESENTATION

First Place: Franz Löffler
Survival in a changing environment – effects of Land-use and climate change on Orthoptera in Montane grasslands

Second Place: Natalya Baturina
The stoneflies (Plecoptera) assemblages in the mountain rivers of South Siberia: diversity and altitudinal distribution

Second Place: Vanessa Couldridge
Morphological, acoustic and genetic divergence in the bladder grasshopper *Bullacris unicolor* (Linnaeus, 1758)

12th ICO Awards to recognize scientists who contributed to Brazilian Orthopterology:
Carlos S. Carbonell, Daniel Otte, Michel Lecoq, Maria Marta Cigliano and Laure Desutter-Grandcolas

Post Conference Tour
(5th to 13th November, 2016)

By MICHEL LECOQ
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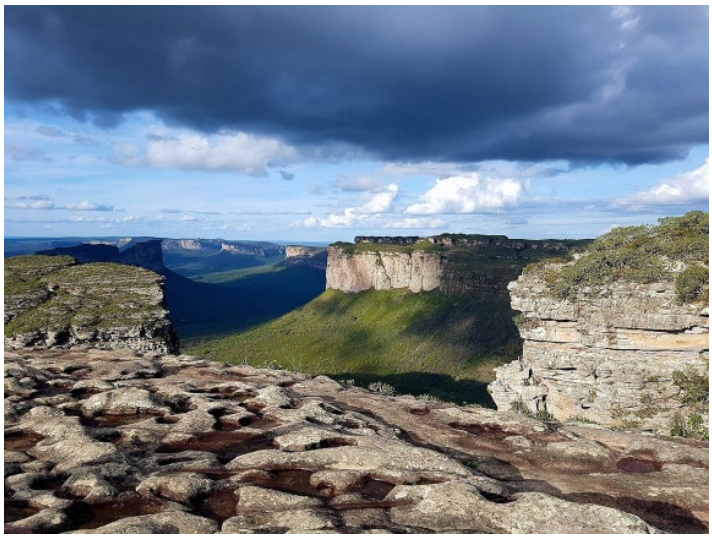
What a tour! But what a tour! Following the excellent 12th international congress of our Society in Ilheus, Brazil, on the 5th of November in the morning, a group of 13 privileged people embarked for a photographic tour through the Bahia State. The tour had been concocted by our organizer, Marcos Llano. The group comprised some veterans, to whom I belonged, and some young Ph.D. students and young scientists, thus adding a mix of generations to that of nationalities: German, Argentinian, Australian, Hungarian, American, and even - last but not least - French. Our first destination was the Chapada Diamantina, a vast mountain range in the heart of the state of Bahia, about 500 km from Ilheus, our starting point.

To reach this area, we left the hotel Praia do Sol in Ilheus - where the congress had taken place - and a long bus day allowed us to discover part of the diversity of plant formations within the Bahia State. We thus progressively moved from the Atlantic forest zone (mata Atlântica) bordering the coast (and where the cocoa plantations are), to enter the caatinga zone, the thorny bush vegetation so characteristic of the semi-arid sertão of the interior. This area, known in Brazil as the "drought polygon", was very well-described by Euclides da Cunha in his famous novel Os Sertões dealing with the war of the Canudos in the 19th century, in the interior of Bahia. A true epic of the life of the sertanejos in their daily struggle for survival in this very difficult region to cultivate, where social relations are particularly harsh and inequalities more glaring than elsewhere.

Along the way, we had lunch at

Lençois (Chapada Diamantina)

A small street of Lençois and its old colorful houses (Chapada Diamantina)



At the top of the Morro do Pai Inácio (Chapada Diamantina)

Valley of the Rio Mucugezinho, in the Chapada Diamantina

Amargosa, a small town of the interior, in the restaurant Outros Sabores. In the dining room we could admire a magnificent bust of Gabriella, famous heroine of the eponymous novel of Georges Amado, one of the greatest Brazilian writers, born in Itabuna, not far from Ilheus. The colleagues who had a small tour of Ilheus must have realized that Georges and Gabriella are omnipresent in the city. But let´s come back to our photographic tour.

We arrived quite late at Lençois, in the heart of the Chapada Diamantina, a small town of about 10,000 people, with its old typical colonial houses of the 19th century. Our hotel, Vila Serrano, was a comfortable pousada of charm, ideally located in a wooded park not far from the city center. At night, Lençois came alive, the shops lit up, and the terraces are filled with amateurs of cachaça and caïpirinhas. It was good to stroll through the narrow streets and let ourselves be carried away by the softness of the colorful dwellings, vestiges of a time when the rich merchants had made the city a stronghold of the diamond trade in the region.

The Chapada Diamantina derives its name from the exploitation of diamond mines, mainly during the 17th century, but also at the beginning of the 20th. At an average altitude of between 800 and 1,200 meters, the region includes a national park of more than 150,000 hectares. The savanna vegetation in the valleys is replaced on the rocky slopes and mountain peaks by the campo rupestre, low and open vegetation, rich in orchids, bromeliads, and cacti. Forest occupies the deep valleys with clay soils. The landscapes are sublime. We stayed in Lençois from 5 to 8 November. The area is ideal for hiking: waterfalls, caves, rivers, sculpted mountains, and villages typical of the colonial era. The stay was very well-occupied: relaxing, walking, breathing clean air, and admiration of the scenery being the main options, and we took full advantage.

Hikes in the area allowed us to admire various caves, including those of Lapa Doce, a limestone cave where we could admire the many concretions, stalactites and stalagmites with strange and beautiful shapes and colors. This cave, of more than 23 km, is considered the third largest in Brazil. And what about the caves of Pratinha and the Blue Cave (Cave Azul) sheltering lakes with magnificent turquoise and crystalline waters?

In the immediate vicinity of Lençois, a walk along an old mining trail going up the Serrano River, allowed us to visit a former gold and diamond mine. It even seems that one of us - emulate of local garimpeiros (a prospector) - found, in the Serrano River, a tiny sample of one of these precious stones! But it is not certain that its sale would have bought a round of caïpirinhas for the whole group.

Another excursion took us down the

Turquoise waters near the Blue Cave (Chapada Diamantina)

Canoe ride in the pantanal of Marimbus (Chapada Diamantina)

valley of the Rio Mucugezinho and led us, after a few hundred meters, to the Poço do Diabo (the Well of the Devil), with its blackish waters ... which did not prevent most of us from bathing. In fact, the possibilities of swimming were varied in the numerous small rivers of the region. These rivers have crystal clear turquoise water near their spring, but become deep black further downstream, due to a high concentration of organic vegetable matter. These rivers deeply cut old sedimentary formations composed of numerous layers of sandstone, conglomerates, limestones... Results of this erosion are an impressive tabular relief and spectacular landscapes. We also climbed the Morro do Pai Inácio - the "postcard" of the Chapada - from the top of which one can admire, in 360°, a sublime landscape where the alignments of huge and impressive rock tables resisting the process of erosion reflect the geological past of the region. The Pai Inacio, which culminates at 1,120 m, is the site of a legend, that of a slave in love with a farmer´s daughter who threw himself from the top of the mountain. A cross at the top was erected in his memory.

After the Lençois region, our bus took us to the small town of Mucugê. On the way we stopped in Marimbus to visit a zone of pantanal, an exceptional wetland in this semi-arid environment. We made a pleasant canoe ride in the middle of nice aquatic vegetation, with pure water reflecting the sunny sky and only a few clouds... And there, while some of us bathed once more, others made a discovery: on the only shrub in the area, quiet on the trunk, a female of *Tropidacris collaris* Stoll, 1813 (Romaleidae), a magnificent insect - undoubtedly one of the largest Orthoptera - who allowed herself to be manipulated and photographed at leisure. After lunch, the afternoon was devoted to the visit of the Sempre Viva project, dedicated to the protection of a variety of Immortelle flowers, endemic to Mucugê and its region (these flowers, sold to excess in the last century, are now almost extinct). There, a small hike in caatinga vegetation led us to the Rio Santo Antonio, its waterfalls, its blackish-yellow waters and its gorges carved deeply into pink conglomerates. We arrived shortly before night to the hotel Pousada de Mucugê, an old house of the 19th century, well-preserved and with colonial charm.

The next day, November 9, after the usual pantagruelic breakfast, we made a long journey to Salvador de Bahia, about 450 km away. But before leaving, we devoted a few moments to visit the Byzantine cemetery Santa Izabel, THE monument of the city, built in 1855 after a cholera epidemic,

A famous Romaleidae grasshopper: *Tropidacris collaris* Stoll, 1813 (Pantanal of Marimbus, Bahia)

and the only cemetery built in this style in the Americas. We also made a brief memorial stop, not far from Mucugê, to a site largely-explored in the past by Carlos Carbonell and Roberts who described many new species of Orthoptera from this place. After lunch in Feira de Santana, we arrived in Salvador a little before night and went to the Hotel Portobello Ondina Praia. Then, in the old historic center of Salvador, a dinner show at the restaurant O Coliseu allowed us to have a glimpse of the Bahianese culture: capoeira (an Afro-Brazilian martial art), candomblé rituals, cangaceiros evoking the two charismatic figures of the Brazilian Nordeste that were Lampião and Maria Bonita, and many other aspects of the local culture.

The next morning, after a visit to the military fort Santo Antonio da Barra, we embarked upon a tour of the old historical center of Salvador with the famous Pelourinho district and its colonial houses, narrow and cobbled streets, and numerous churches, including the church São Francisco and its convent in the Baroque style, with its many gildings and tiles (azuleijos). We passed through the Plaza da Se and the famous square of Largo do Pelourinho, we stopped in front of the no-less-famous Lacerda elevator, and took the inclined plan Gonçalves connecting the upper city with the lower city to visit the Mercado modelo, a large handicraft center. The day ended with a visit to the Senhor do Bonfim Church on the Sacred Hill, one of the centers of the Catholic Faith in Brazil, dedicated to the Senhor do Bonfim, patron of the Bahianese and symbol of the religious syncretism of Bahia. The grids surrounding the church are entirely furnished with famous fitas de Bonfim, which are these small fabric bracelets in various colors. Each color is associated with a special meaning as well as one of the candomble divinities (the orixas), the Afro-Brazilian religion founded by the slaves. The ritual is to wrap the fita around your wrist, tie three knots in it, and make a vow for each of them; when the bracelet breaks naturally, the vows will be realized. Out of the church (with its extraordinary room of the ex-votos), I slipped into one of the stalls of "bondieuseries" located in the vicinity and took advantage (doubtless to the despair of my wife), to complete my collection of religious objects of candomble and umbanda by buying two small statuettes, one from Maria Conga and the other from the Preto Velho.

On November 11, our driver took us along the coast to Praia do Forte to visit the Tamar project, a project to protect marine turtles, to have a look at the ruins of the Garcia d'Avila castle, the only medieval castle built in Brazil... and,

The Byzantine cemetery Santa Izabel at Mucugê (Chapada Diamantina)

São Francisco church (Salvador de Bahia)

Largo do cruzeiro de São Francisco (Salvador)

Largo do Pelourinho (Salvador)

Church of the Blessed Sacrament in Itaparica island (Salvador)

Garcia d'Avila castle, on the coast 70km North from Salvador

Typical orchestra playing forro, popular music of Northeast Brazil (Salvador)

of course, enjoy the beach. Finally, on the last day of our journey, we embarked on a cruise in the Baía de Todos-os-Santos, the bay of all the Saints. The first stop, after an hour and a half on the boat, allowed us to disembark at the Ilha dos Frades (Island of the brothers), which owes its name to two Franciscan brothers, the only survivors of a shipwreck near the island. We visited the small church, enjoyed the beautiful beach and tasted the marvelous small skewers of queijo coalhado cheese of incomparable flavor. A second stopover landed us on the neighboring island of Itaparica, after which we returned to Salvador to the sound of a typical orchestra dragging many passengers into a frenzied dance while, in spite of the waves, a Bahianese woman dressed in white lace, with her tray in her hand, continued to offer passengers glasses of fruit juice and caïpirinha. The arrival at night in the port of Salvador was magical and was the highlight of our journey. We made a souvenir photo of the group on the steps of the hotel and the next day we had to get up early and leave by taxi to the airport where our plane was waiting to take us back to France.

Everyone regretted having to leave each other and to leave a country so endearing. I will long remember the trip, the warm and friendly atmosphere, and this festival of gastronomy of the Nordeste. Without wishing to quote them all, I would like to mention some culinary specialties: the moqueca de camarão (with rice, farofa, pirão, and feijão de corda), the fabulous rodízio de churrasco, the beijos de tapioca, and the acarajés, small donuts of bean flour cooked in dende oil, cut in two and filled with dried shrimps, spiced mayonnaise and small pieces of tomato, often sold at the edge of the streets by Bahianese women wearing their magnificent white lace outfits. And what about caïpirinha, this cocktail of cachaça and lime that became the official drink of the tour? Not to speak of this fantastic restaurant in Salvador, that offered traditional cuisine from the sertão to the sound of a forro orchestra, popular

Our friendly host Marcos in a churrascaria, the traditional Brazilian-style steakhouse restaurant

Nordeste music, popularized by Luiz Gonzaga do Nascimento and his famous song Asa branca.

I think I know a little about Brazil as I lived there for a number of years, especially in the Nordeste where I lived - in Petrolina, Pernambuco - for a year and a half in the years 1985-86. I can say that Marcos managed, in just eight days, to offer us a summary of what the Bahianese culture and biodiversity can have best.

Marcos, thank you for this journey, which has largely contributed to make us live concretely what makes the originality and the attraction of our Society, a society for science, but also for the passion and the friendship through the generations and across the continents. Thank you, Marcos, on behalf of all those who were lucky enough to have you as a companion on this wonderful journey.

Um abraço forte,
Michel Lecoq

Letter of Gratitude

By MARCOS LHANO
President, ICO 2016
entomology@gmail.com

On behalf of the Executive Committee, I want to thank you for attending the 12th International Congress of Orthopterology (ICO) which was held at Hotel Praia do Sol, Ilhéus, Bahia, Brazil, from October 30th to November 03rd, 2016. I hope that you found the ICO informative and worthwhile. The meeting was an overwhelming success, attracting 91 attendants from 25 countries, and 88 presented abstracts, which provided great interaction for the participants. There were many topics covered during the ICO and the presenters did an outstanding job of sharing their expertise with you. The overall theme for this ICO was "Orthoptera in a Changing World", which raised fundamental questions about the current state of knowledge of Orthoptera in different branches of science.

I want to thank my organizing committee, both local and Orthopterists' Society (OS) Committee, for their support and commitment to the overall success of the ICO. Without them, it would have been impossible to organize this meeting. I would also like to extend my sincere gratitude to the Orthopterists' Society for their generous collaboration. I'm proud to take part in this society and I strongly recommend that all scientists who study the order Orthoptera become a member of the OS. It's a real international scientific organization committed to the increase and development of our field. Also, the OS is an organization comprised of friends. For me, this became very clear during our last meeting because the ICO had a warm and friendly atmosphere among the participants conducive for discussion and networking. You were a great group and your enthusiasm and positive spirit helped make our time together both productive and fun.

I also owe much gratitude to the Universidade Federal do Recôncavo

Local organizing committee of ICO 2016

da Bahia (UFRB) for supporting the conference in many direct and indirect ways; to the GT5 Group for the professional excellence and high-quality secretariat besides the dedication for our meeting and for working very professionally in registering all participants, interacting with them on many details, and organizing many aspects of the conference; to the Hotel Praia do Sol as the venue; and again to the OS for selecting Brazil as the venue and believing in my work and my commitment to organize the ICO. I extend heartfelt thanks to you all for granting me the honor of hosting the meeting. Four years ago, you honored me by entrusting me with the responsibility of chairing this conference. I thank you for your trust, your support, your generosity, your cooperation, and your flexibility which, without doubt, were of great help to me in discharging my duty as president of this ICO. In addition to being both an honor and a mission, it was also a great experience in my scientific career, and I hope it contributed positively to orthopterology and the scientific community around the world.

My apologies if something did not work well or some of your expectations were not sufficiently satisfied. Even in a globalized world full of technology, all of us are subject to human error and sometimes the communication does not happen in the time that we need and want. Thank you for your comments and suggestions after the meeting and I assure you that each will be given consideration so that future ICO meetings will be even more of a success. I trust that you found your involvement in the meeting both valuable and rewarding. Please check the photo website https://www.flickr.com/photos/ico2016/albums, so you can enjoy and share the memories about the 12th ICO.

Additionally, I hope that you enjoyed the social events, which were designed to show you a little bit of Brazilian culture and to provide a nice time to you to take advantage of the Brazilian atmosphere. For those who joined the post-conference tour, many thanks for the enjoyable time that we spent together. For me, it was a pleasure to organize the tour, to think about each detail, to select the places, and, above all, make sure that you had the experience to explore different biomes and cultures of Bahia, so it was wonderful to see the happiness emanating from our group. Many thanks, and this trip will remain forever in my memories.

Now it is time to transition to the future and the next ICO that will be planned by the OS. It promises to be another exciting meeting with a wide variety of topics and another opportunity to make orthopterology even bigger. I am now available to channel my expertise from our last ICO to collaborate with the next Chairman and Committee who will take on the wonderful experience of organizing the next meeting.

In conclusion, this ICO has achieved many successes. I would like to congratulate all of you on the overall success of the meeting, and without your support, the conference would not have been the achievement that it was. In this regard, I would like to extend sincerest congratulations to all awarded people during the ICO. Once again, I would like to convey my deepest appreciation for your contributions and wish you good health and happiness in the years ahead until the next ICO. If I can be of help in any way, or if you have questions, please feel free to contact me.

The Theodore J. Cohn Research Fund: Call for applications for 2017
(Deadline : March 31, 2017)

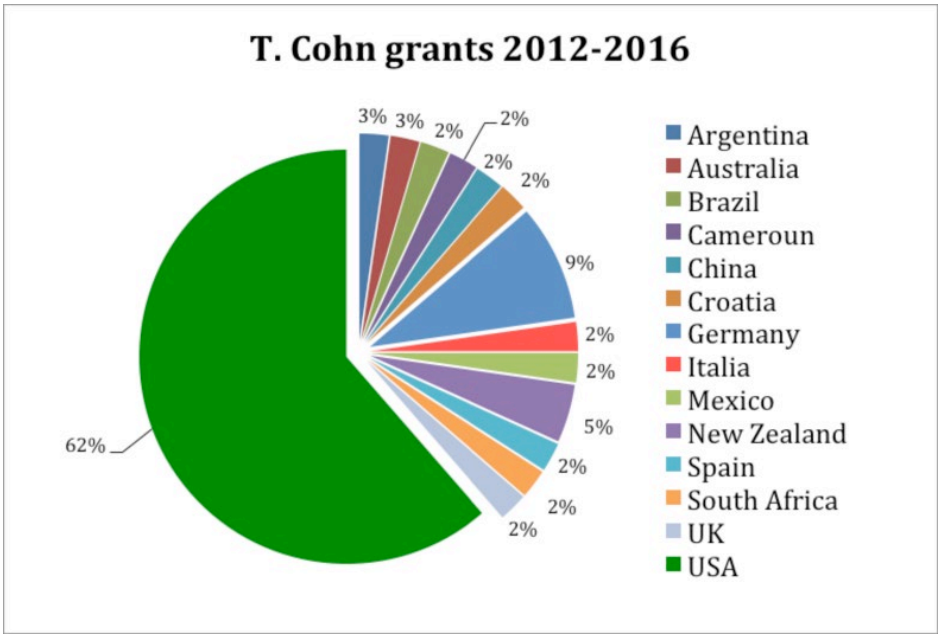
By MICHEL LECOQ
Chair, Theodore J. Cohn Research Fund Committee

Dear Orthopterists,

Once again, I have the pleasure to announce a new call for applications for The Theodore J. Cohn Research Fund. As you know, this research grant is primarily to fund research projects in Orthoptera (*s.l.*) by young researchers, often as part of a masters or Ph.D. project, though Post doctorates may also be funded. A total amount of $15K per year is available and it is possible to fund research grants for up to $1,500 per grantee.

Last year, in 2016, 14 projects were submitted to the Committee and 8 proposals funded. I'm sure, for this call, we will receive, as usual, a lot of projects of high quality. However, I would like to highlight an important point: in recent years, most grants have been awarded to students from U.S. universities (27 of 44 in the past 5 years). The main reason for the dominance of American universities is because a majority of project proposals came from that country. Germany comes second with only 4 grants. We then have a dozen countries with only one or two grants each. Africa and Asia are particularly poorly-represented with 2 and 1 grants, respectively.

I strongly encourage students and young researchers from these continents to apply and I hope that our regional representatives can relay my call to arouse more project applications from these countries. It is not



normal that so few requests come to us from Asia where many researchers work on Orthoptera, and from Africa with its numerous locust and grasshopper problems and its rich Orthoptera fauna. The committee will consider all requests with the same attention and benevolence. The quality of English will not be a criterion and we are ready, at the level of the Committee, to help the students of these countries to better formulate their projects in English, if necessary. In the end, the intrinsic quality and originality of the research project will be the only criteria.

DESCRIPTION (one page)

1. TITLE

2. SIGNIFICANCE, stressing the new ideas and aspects of the proposal, expected contribution to theory, relation to previous work, etc. (applicants should emphasize the nature and significance of their proposal to provide the judges with the basis for weighing different projects, especially in fields outside their expertise)

3. RESEARCH PLAN, including the particular orthopterans to be studied, methods, logistics, etc.

4. TIMETABLE, even if approximate, to give the judges some idea of feasibility.

CURRICULUM VITAE (half page) including name, full address, present position or years in graduate school, education, number of papers published or completed, citation of selected publications pertinent to the proposal to aid the judges.

BUDGET (half page) including justification of items where appropriate (i.e. why special equipment is necessary unless clearly obvious), other funding for the project, etc. Overheads cannot be provided for on Society grants.

The Committee prefers proposals applicable to broad biological problems, even though the actual research may be narrower in scope. Proposals also should include clearly stated hypotheses and aims, and the nature of the evidence to be gathered to test the hypothesi(e)s and possible outcomes. But taxonomic projects may also be funded, particularly coming from African countries (see Hugh Rowell article in this issue).

Proposals from graduate students must include a simple recommendation from their major professor or advisor. Those not affiliated with an educational or research institution should indicate where the work is to be done.

A short report will be required from the successful applicants. It will be written for our newsletter, *Metaleptea*, and be suitable for both orthopterist and non-specialist readers.

Proposals should be submitted to the Chair at the following address: **Michel Lecoq, e-mail : mlecoq34@gmail.com**

Start writing!

Job Opportunity at Arizona State University

Program Manager,
Global Locust Initiative
ASU Wrigley Institute
Tempe, Arizona, United States
Apply by 3 February 2017

The Global Locust Initiative (GLI), a new research and action program at Arizona State University, is designed as a unit to help researchers, international agencies, government organizations, agribusinesses, and farming communities address and mitigate the effects of locust plagues and outbreaks.

The GLI program manager works closely and collaboratively with project principal investigators (PIs) in coordinating and directing the activities and functions of the GLI. Works independently to ensure that various tasks to meet the goals and objectives of the GLI are accomplished in accordance with priorities, time limitations, funding limitations, or other specifications.

Please apply at: https://www.devex.com/jobs/by_permalink/program-manager-global-locust-initiative-469922

Introducing Gerlind Lehmann as the new Representative for Western Europe

By GERLIND LEHMANN
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As the new Representative for Western Europe, following Fernando Montealegre, I am happy to support the Society in my new capacity. The Society has officially appointed Regional Representatives around the world, which serve as ambassadors for their geographical region. I studied Zoology, Ecology, and Botany in Berlin and Braunschweig, Germany and went to Erlangen for my Ph.D., starting my research on bushcrickets under the supervision of Klaus-Gerhard Heller. During my postdoc at the University of Western Australia, Perth, I continued my research on Evolutionary Biology, especially mate choice. Upon returning to Germany I worked at the Natural History Museum and the Free University Berlin. I then changed to Humboldt University Berlin as a visiting Professor, and have worked here since 2012 as a senior lecturer. My research topics are: sexual selection, nuptial gifts, and mate choice, as well as genitalia evolution, morphology, and taxonomy of bushcrickets and grasshoppers.

As your new Western Europe Representative, please always feel free to contact me and do pass on any interesting orthopterological news on species, behaviour, field trips, and so on. Also, if you have any queries in regards to membership or functioning of the Society, I would love to be your first stop for questions.

My first meeting in my new function was at the recent International Congress on Orthopterology in Brazil where we discussed the duty to increase the Society's visibility. I will try my best to do so in the Societies, of which I am a member, including the German Zoological Society (DZG) and the German Society for general and applied Entomology (DGaaE). As a first step, I wrote a short report on the Congress in Brazil for the newsletter of the DGaaE.

Taller regional de manejo de la langosta centroamericana, *Schistocerca piceifrons*

By HOJUN SONG
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The Central American locust, *Schistocerca piceifrons*, is the most devastating locust species in Central America. Like its congeneric species, *S. gregaria*, this species has been affecting the people of Central America for millennia and is vividly recorded in Mayan literature. This species has a permanent gregarious zone in the Yucatan peninsula in Mexico, and it is actively managed by local and state agencies throughout Mexico. In recent years, it is believed that a series of "El Niño" events (drought followed by high precipitation) has created favorable environmental conditions that have led to the increase in locust population density throughout the species distribution. Notably, in 2016, there was a massive outbreak in El Salvador, where locust outbreaks have been infrequent. In response to these locust upsurges, a technical cooperation between Mexico and El Salvador was established and a re-




gional locust management workshop was organized to provide a broad overview of the biology, control, and management of the Central American Locust, which took place in Merida, Mexico on December 6-9, 2016. This workshop also functioned as a meeting for the OIRSA (Organismo Internacional Regional de Sanidad Agropecuaria), which was originally established in 1947 as an international anti-locust organization focusing on Central America called the CICLA (Comité Internacional Contra la Langosta). This event was financed by OIRSA and also co-sponsored by Mexican government agencies, including SAGARPA (Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación), SENASICA (Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria), and CESVY (Comite Estatal de Sanidad Vegetal de Yucatan). The overall workshop was organized by Dr. Mario Antonio Poot Pech at CESVY.

Day 1 of this 4-day workshop consisted of scientific presentations on cultural history, biology and ecology, phase theory, ecological sampling methods, microhabitat structures, the potential use of drones in locust control, remote sensing, epidemiology, as well as locust and grasshopper control efforts in Mexico and neighboring countries. On day 2, there were more scientific presentations on the use of chemical and biological pesticides and theoretical advances in preventative locust management. In the afternoon, there were hands-on demonstrations on grasshopper and locust identification, identification of natural enemies, and the use of fungal pesticides. Day 3 was a field demonstration that took place in the heart of the permanent gregarious zone in the municipality of Buctzotz. This all-day demonstration included various booths focused on sampling, identification, indicator plants, biological control, chemical and mechanical control, as well as drone-based surveys. The last day specifically focused on equipping OIRSA members with tools and management plans to deal with future locust outbreaks. This OIRSA workshop was a truly international event with participants from Mexico, Guatemala, El Salvador, Belize, Honduras, Nicaragua and the U.S. It was a great opportunity to enlarge the network of scientists, government officials, and locust field officers. Finally, important agreements were made to investigate different aspects of locust and management of outbreaks.

Orthopteroid Symposium Recap from ICE, 2016

By DEREK A. WOLLER
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For the third year in a row, there was an orthopteroid member symposium at the annual Entomological Society of America (ESA) conference (in Orlando, FL this time), co-organized, this time, by the two of us. This year was particularly special because the conference was held in conjunction with the International Congress of Entomology (ICE), and the last time ICE was held in the U.S. was in 1976. Over 6,000 entomologists were in attendance, the largest gathering of our brethren in history. The 3.5-hour symposium was entitled "Orthopteroids Without Borders" and adequately reflected two things: 1) the composition of the program, which included presentations on many of the 10 extant orders of orthopteroids: Blattodea (+Isoptera), Dermaptera, Embiidina, Grylloblattodea, Mantodea, Mantophasmatodea, Orthoptera, Phasmatodea, Plecoptera, and Zoraptera. 2) The background of the 11 speakers (Fig. 1): we had a good mix of graduate students and seasoned researchers from six different countries: Brazil, Germany, Italy, Mexico, the U.K., and the U.S.A.

The presentations were all intriguing and the audience was of a consistent size of around 50, which is an excellent turn-out for such a unique symposium. Our keynote speaker, Piotr Naskrecki kicked off the event with a great talk on the importance of natural history observations, followed by Paolo Fontana who gave an entertaining overview of orthopteroids, which set the stage well for the next nine talks (in order of presentation): Douglas Smith, David Robinson, Mario Antonio Poot Pech, Tyler Jay Raszick, Janice S. Edgerly, David Branson, Gerlind U.C. Lehmann, Pedro G.B. Souza-Dias, and Forest Huval. If you'd like to learn more about the presentations, a brief abstract and figure (for most) are provided below (in order of presentation) by each speaker.

Following the final presentation, almost everyone joined up with the majority of speakers from the other two Orthoptera-related symposia at ICE that were co-organized by Arianne Cease and Stephen Rogers of Arizona State University ("From Molecules to Management: New Tools for Understanding Locust Swarms across Species and Research Disciplines" and "Mechanisms and Consequences of Phase Change in the Desert Locust,

Figure 1. Symposium organizers and speakers (left to right): back row: Alexandre V. Latchininsky, Derek A. Woller, Pedro G.B. Souza-Dias, Forest Huval, Tyler Jay Raszick, and David Branson; front row: Janice S. Edgerly, Mario Antonio Poot Pech, Douglas Smith, Paolo Fontana, Gerlind U.C. Lehmann, David Robinson, and Piotr Naskrecki.

Figure 2. The after-symposium celebration at Cuba Libre in downtown Orlando. Thank you, Society! This rowdy bunch had a grand time!

Figure 3. The beautiful Society banners – designs by Piotr Naskrecki and Derek A. Woller, with all images taken by Piotr.

Schistocerca gregaria) and headed out to a wonderful dinner at a local restaurant, Cuba Libre, graciously sponsored by the Society. Good times were enjoyed by all (Fig. 2)! In fact, it really felt like the dinner was a warm-up for the International Congress of Orthopterology.

Alex and I would like to sincerely thank the Society's officers for approving the funding for the after-symposium celebration. Piotr and I would also like to thank the same officers for commissioning the creation of two official Society banners (Fig. 3), which turned out wonderfully, stood outside the symposium rooms, and were enjoyed and commented on by many Congress attendees. This particular set resides with Hojun Song (hsong@tamu.edu) in the Song Laboratory of Insect Systematics and Evolution at Texas A&M University, but if you would like have a set printed where you are locally for a meeting/symposium/etc., the necessary files have been provided to Hojun from whom they can be requested. If you write to the Society's officers and explain what you would like to use the banners for, there is even a strong possibility that they might pay for the printing.

The science of natural history

Piotr Naskrecki (pnaskrecki@oeb.harvard.edu), Museum of Comparative Zoology, Harvard University, Cambridge, MA, U.S.A.

The last thirty years saw the development of groundbreaking methods in phylogenetic reconstruction, and we are now closer than ever to a complete evolutionary tree of orthopteroid insects and other organisms. At the same time, new technologies allow biologists to capture previously impossible to document behaviors, document fleeting physiological processes, and vastly expand the time scales on which we can study organismal behavior and interactions. Techniques, such as stable isotopes and quantitative PCR allow us to examine ecological roles of individual organisms and species, while automated acoustic signal recognition allow us to get an immediate picture of orthopteran diversity in previously-unexplored habitats. A comprehensive phylogenetic framework and a powerful research toolbox make it possible to answer almost any question an inquisitive biologist might ask. But will there be more interesting questions?

In 1985, orthopterist Theodore H. Hubbell lamented over the diminishing role natural history observations were playing in the fields of insect ethology and systematics. The last three decades have not seen much improvement in the standing of natural history among biologists, despite the fact that it was natural history that has led to the formulation of evolutionary theory, island biogeography, sociobiology, and countless other milestones in organismal biology. It is important that current and future generations of biologists pay more attention to the natural history aspects of their study organisms, preferably in their quickly-vanishing natural habitats. If not, then we run the risk of losing the ability to ask biologically-meaningful questions.

Orthopteroid Insects: a perfect group to investigate ecology, conservation, and biogeography

Paolo Fontana (paolo_api.fontana@fmach.it), Edmund Mach Foundation, Technology Transfer Centre, Pergine Valsugana, Trento, Italy

Orthopteroid insects, sometimes known as Polyneoptera Martynov, 1923, constitute an apparently heterogeneous group of orders. Currently, it is composed of the following orders: Blattodea (+Isoptera), Mantodea, Zoraptera, Plecoptera, Embioptera, Grylloblattodea, Dermaptera, Phasmatodea, Orthoptera and Mantophasmatodea. Most of them were original-

Figure 4. The study of different orthopteroid orders requires different collecting techniques, and sometimes tools, often unique for each (or some) of them. These techniques and tools can greatly expand the microhabitats investigated, producing an increase of data within all orders.

ly included in the Orthoptera by Carl Linnaeus and, for many years, entomologists studied this group as a unit, normally excluding the Plecoptera, the sole order with aquatic members. The terrestrial orders assigned to orthopteroids have, however, extremely different habits and ecological needs and, consequently, the study of these orders requires collecting techniques and tools that are often unique to each.

For millennia, men of science have gone through various breaches of human knowledge; they were erudites. Only in recent centuries has specialization in science made its appearance with a strong acceleration in the last few decades. This phenomenon is due obviously to the huge body of knowledge accumulated over time. By analyzing the literature of the last three centuries it can be seen that this specialization has resulted in a move away from "real" nature to improve global and theoretical knowledge. The biologist, the naturalist, the entomologist is no longer the man who studies, in-depth, a given environment at a given time. The extra work required to collect the minor orders of orthopteroids is relatively scarce and wanting to become taxonomists of these small groups on a local scale, it will be initially useful to involve other colleagues truly specialized in some of them. Malaise, pit falls, or light traps can enlarge the number of species detected in several orthopteroid orders (Fig. 4).

The study at the local-regional level of a group of orders like orthopteroid insects that, locally, do not consist of a large number of taxa, may facilitate the understanding of many phenomena. Also, very often, in groups so widely neglected, it will also be possible to discover new species. Furthermore, the knowledge at local scales of such an interesting group of insect orders will enable the transfer of scientific knowledge into concrete actions to safeguard biodiversity.

Ecological factors affecting grasshopper outbreaks in Wyoming

Douglas Smith (dsmith59@uwyo.edu) and Alexandre Latchininsky, University of Wyoming, Laramie, WY, U.S.A.

Since 1944, federal, state, and local agencies have conducted yearly grasshopper (Orthoptera: Acridoidea) surveys throughout the state of Wyoming. This database consists of records from 200 permanent sites that are annually surveyed for grasshopper (all species together) population densities. Since 1993, the surveys also include information on species present and densities of each species. We used this grasshopper survey information and overlaid it with high resolution digital vegetative, soil, precipitation, slope, and elevation (DEM) maps to find correlation between ecological factors and grasshopper outbreaks as well as the grasshopper assemblages of the outbreaks.

Wyoming grasshopper outbreak maps were generated based on a 22-year (1993-2013) survey data using ArcGIS ArcMap 10.2. Soil, vegetation, DEM, precipitation, and slope layers were projected in NAD 1983 spheroid projection. ArcGis Geostatistics with multivariate regression analysis was conducted to reveal ecological layers pertinent to grasshopper outbreaks. Preliminary results indicate that previous year's precipitation, soil type, and vegetation type are primary drivers for fluctuations of grasshopper densities. Species composition of grasshopper outbreaks changes dramatically from year to year. Similarities and differences between the results of our analysis (1993-2013) and a similar analysis conducted by Schell (1994) for the period between 1944 and 1992 were discussed.

Ultrafast, ultrashort, and ultrasonic - the ecological and evolutionary implications of an enigmatic acoustic communication system in a bush cricket

David Robinson (david.robinson@open.ac.uk)[1], Patricia Ash[2], Marion Hall[1], Jürgen Rheinlaender[3], [1]The Open University, Milton Keynes, U.K., [2]The Open University in the South, Oxford, U.K., [3]Nordkirchen, Germany

The tettigoniid *Leptophyes punctatissima* is a flightless European phaneropterine. It has an acoustic communication system that has a number of features that are counter-intuitive. Our studies are designed to provide explanations of the selective advantage of these features. The sound-producing apparatus seems to have evolved separately in the sexes. The male song is ultrasonic and very brief, consisting of a few syllables each of 1 ms duration. Females respond to male calls with an even briefer ultrasonic call lasting around 1 ms, but unless the male receives the reply within a narrow time window the female is ignored (Fig. 5). The calls would appear to offer only a limited prospect of mate selection by acoustic means.

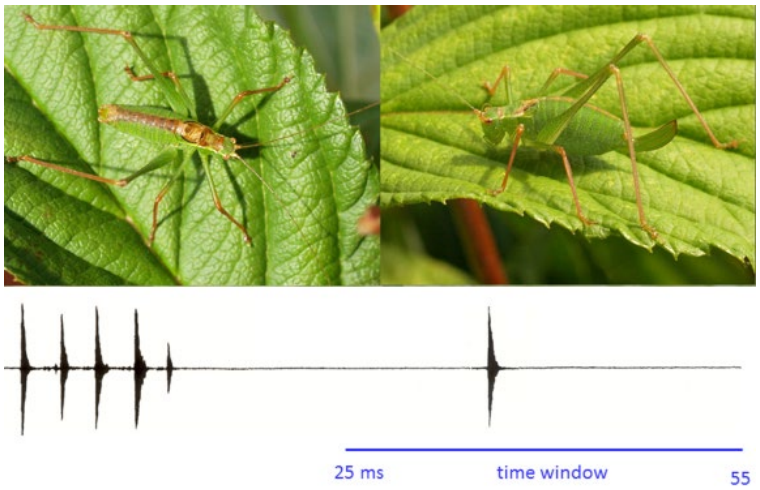

Figure 5. Oscillogram of a male call and female reply within the time window of 25 to 55 ms.

Figure 6. Swarm of the Central American Locust, *Schistocerca piceifrons*.

The behaviour and ecology of the species has been investigated in the U.K. and Germany, both in the field and in the laboratory, using wild-caught and laboratory-reared individuals. Laboratory experiments have focused on reproductive success, comparing males and females fed a diet supplemented with concentrated protein with those on an unsupplemented diet.

The results of detailed acoustic and ecological observations, together with a range of experiments, have provided insights into the life history of the species and the possible selective pressures that have shaped its evolution. Field observation have shown that mating may take place as high as 14m in trees but eggs are laid close to the ground. Laboratory experiments have not so far demonstrated any direct influence of body size, song frequency or syllable length on mate choice. Diet does affect reproductive success. Supplemented males get more matings, possibly because they are more able to produce spermatophores or more active in searching for females. Unsupplemented females lay fewer eggs than supplemented females unless they get at least 5 matings. As a result, unsupplemented females may be more highly motivated to mate, which may explain why unsupplemented females get more matings than supplemented females. Although mate choice is not necessary to explain these results, it cannot be excluded as a possibility. If, however, diet does influence mate choice, the mechanism by which it operates is unclear. Our studies thus show that the mating system in *L. punctatissima* remains something of an enigma.

Indicator plants in solitary phase and migration behavior of *Schistocerca piceifrons* in Yucatán, México

Mario A. Poot Pech (mpootpech@gmail.com), Esaú Ruíz Sánchez, and Horacio S. Ballina Gómez, Conkal Technological Institute, Conkal, México

The Central American Locust, *Schistocerca piceifrons* (Orthoptera: Acrididae) (Fig. 6), is one of the most harmful plant pests in Mexico. The Yucatan Peninsula is an important gregarious zone where *S. piceifrons* oviposits, develops, and gregarizes to swarm. The present work was carried out to associate plant species abundance with *S. piceifrons* density in solitary phase within different localities of the gregarious zone in the Yucatan Peninsula, as well as to discover the migration direction of *S. piceifrons* swarms. The plant abundance and locust density were obtained by field surveys. Seven sites were sampled during three seasons (Summer, Winter, and Spring) and predictive models with multiple regressions were established. In the next generations, the swarms were followed and geopositioned, before control was enacted by the Locust Campaign of Yucatán Plant Health, and displayed in a distribution map. A partial positive correlation was observed between *S. piceifrons* density and abundance of the grass *Panicum maximum*. The migration direction of the first generation was northeast and the second southwest. In conclusion, in solitary phase, the density of *S. piceifrons* was correlated with the plant abundance of grass *P. maximum*, which provides shelter, and, in gregarious form, the swarm's migration behavior is opposite between the first and second generation.

Transcriptomic profiling of the chemosensory organs in grasshoppers with diverse feeding strategies

Tyler Jay Raszick (tjraszick@gmail.com) and Hojun Song, Texas A&M University, College Station, U.S.A.

Chemosensory organs in herbivorous insects play a critical role in providing information about the suitability of potential host plants. Among

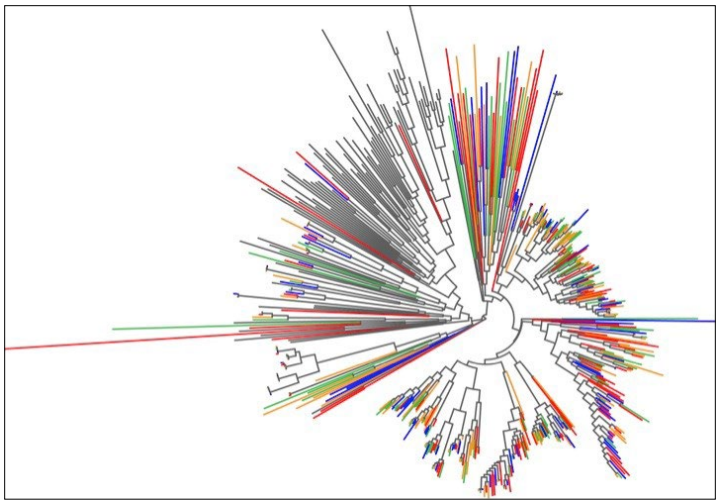

Figure 7. Phylogeny of 441 putative grasshopper GR genes (each color represents a single subfamily) and 85 outgroup GR genes from other insects (grey).

these organs in grasshoppers are the mouthparts (labrum, hypopharynx, maxilla, and labium), which have high densities of gustatory receptors essential to the detection of nutrients and plant secondary compounds. These secondary compounds may act as attractants, feeding-stimulants, or deterrents to insects with different feeding strategies. Foraging behavior and perception of host plant quality is likely mediated by differential transcription of chemosensory genes. Gustatory receptor (GR) genes, in particular, may play a central role in determining grasshopper diet breadth and nutritional intake. Thus, it is likely that the number, type, and expression of GR genes will vary across species with diverse feeding habits. Here, we investigate the evolution of GR genes across 4 acridid subfamilies with distinctly different diets using a phylogenetic framework.

Wild grasshoppers were collected and field-euthanized during late morning and early afternoon (normal grasshopper foraging hours) from a number of locations in central Texas. Individuals of a single lab-reared species were also euthanized during normal foraging hours. Total RNA was extracted from the mouthparts of three individuals per species (three biological replicates) for a total number of 12 specimens. RNA-seq for all 12 individuals was carried out on two replicate lanes of Illumina HiSeq at the Texas A&M Genomics and Bioinformatics Service. After rigorous quality control (QC) processing, transcript assemblies for each species (combining data from all 3 individuals) were created using Trinity. Assemblies were further analyzed using Geneious 8.0. Using a custom local BLAST search, we identified roughly 100 putative GR genes in each species (after QC and removal of duplicates and multiple isoforms). We then generated species-specific phylogenies using the GR genes as terminal taxa, and included 85 other well-described GR genes from across the insects as outgroups. We also created a phylogeny using all 441 putative GR genes from all four species (Fig. 7).

Our data show that there is a GR gene expansion that is associated with Acrididae, and is independent of host plant use. While all grasshopper subfamilies do share orthologs with the other insects, there is also clearly a large derived clade representing a grasshopper-specific expansion of GR genes, which, in turn, has three major monophyletic groups nested within it. Furthermore, all four of our sampled subfamilies are represented in each of these three nested expansions, suggesting that the overall expansion of GR genes is an ancestral condition, and each subfamily has made its own modifications. Future work will include taxa from other Caelifera and from Ensifera, as well as other polyneopterans, in order to further resolve the timing of the expansion in the context of the evolution of the Orthoptera.

Characterization of the Nanofiber Silk of Embioptera

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Embiopterans construct domiciles by releasing silk from glands in their front feet. Depending on habitat, they use silk to stitch leaves, line burrows, or create coverings on tree bark (Fig. 8A) where they gain protection from the elements and predators. Reliance on silk appears to relate to the colonial tendency of females and to care for young who develop more quickly when sharing silk with their mothers. Their silk displays features typical for this type of biopolymer: repeat motifs and beta-sheets aligned along the fiber axis. Our recent research seeks to characterize chemical properties of silk and how those properties relate to embiopteran natural history. Of particular interest to us is the ability of the silk of the tropical species *Antipaluria urichi* (Fig. 8B) to act as a waterproofing protective covering in their rain forest habitat.

Using various analytical tools, we determined that the extremely fine silk fibers (90 nm) are coated with a hydrocarbon-rich layer--likely used as waterproofing. But the silk also has the ability to latch onto water, which sticks in very high relief drops to the surface (Fig. 8C). Water droplets stick to rose petals in a similar fashion - that interaction has been named the "rose petal effect" because of this. With assistance from our colleague Konrad Rykaczewski at Arizona State University, we used cryo-SEM and other microscopy techniques to determine if the water droplet penetrates the spun silk fibers in the same way that it penetrates the micro-scale grooves on rose petals. To our sur-

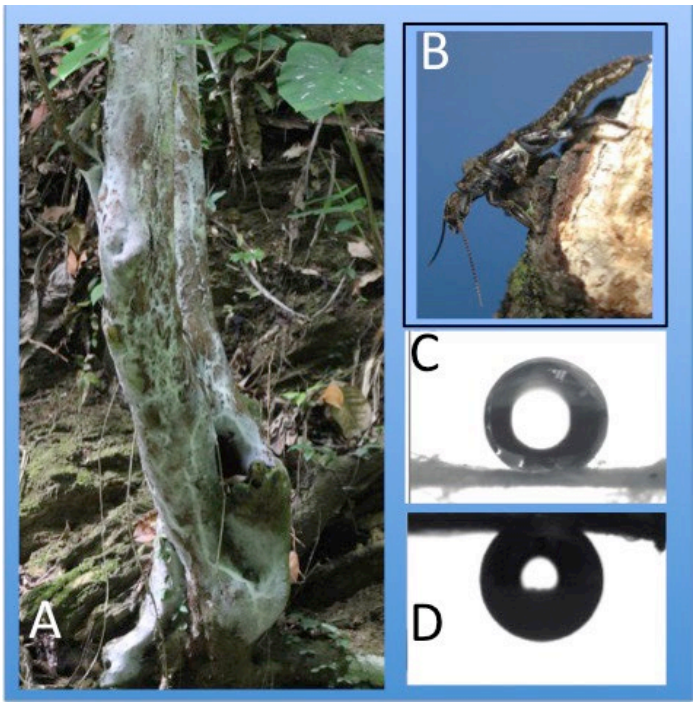

Figure 8. Optical images of water drops on the surface of *Antipaluria urichi* silk sheets. (A) Silk in the field in Trinidad, (B) Adult female (1.7 cm long), (C) Water droplet on silk fibers spun onto a glass slide, and (D) Droplet turned upside down, but still adhering to the silk fibers. (For more information, see Popp et al. 2016. Surface and wetting properties of embiopteran (webspinner) nanofiber silk. Langmuir. http://pubs.acs.org/doi/ipdf/10.1021/acs.langmuir.6b00762)

prise, water drops sit directly on top of the silk fibers, without penetrating. What causes the drop to stick there was determined by examining frozen droplets stuck to the silk. Surprisingly, the nano-scale fibers are pulled together at the interface between the drop and the silk and act to pin the drop in place, so much so that the silk can be turned upside down (Fig. 8D) and the drop stays stuck to the pinning sites along the edge of the drop. In the field, water droplets stick to the silk covering of A. urichi; when the insect living dry beneath the silk needs to drink, she cuts a small hole beneath the drop and sucks it into her mouth. After quenching her thirst, she then patches the hole with silk. The interaction between the silk fibers and water is a novel mechanism and is probably due to the fineness of the silk fibers (the finest silks produced by any animal).

Effects of precipitation manipulation and biotic factors on grasshopper populations: Implications for responses to climate change

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Global climate change is predicted to significantly modify patterns of precipitation, making it critical to develop a better understanding of how this will modify biotic interactions. Short term to decadal scale weather patterns can impact grasshopper population dynamics, but drought impacts on grasshoppers have rarely been studied in manipulative experiments. Three cage experiments were conducted in eastern Montana to examine the impact of competition, herbivory, predation and precipitation manipulation treatments on grasshopper population dynamics. Two experiments manipulated precipitation and grasshopper density, while the third experiment manipulated precipitation and spider predation to examine the impact of drought on trophic cascades.

In studies manipulating drought and grasshopper densities, drought typically had stronger negative effects on individual body size and future reproduction than survival, with abundant late summer precipitation enhancing reproduction. Spider predation interacted with drought to affect grasshopper survival, but the presence of trophic cascades was not affected by an interaction between precipitation reduction and predation. The results of the studies reinforce the need to examine drought manipulations to better predict grasshopper population changes due to changing climate conditions.

Bushcricket genitalia: morphology, function, and their role in species isolation and female choice (Orthoptera: Ensifera: Tettigoniidae)

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Genitalia are rapidly-evolving morphological structures most likely under sexual selection. Males of certain bushcrickets possess sclerotized internal genital devices termed titillators. We comparatively studied the relationship between copulation duration, complexity of titillators, spermatophore mass, and male body mass. Additionally, we studied the role of the titillators during copulation in the context of four a priori hypotheses for their function: (1) act as anchors to secure matings; (2) facilitate sperm removal; (3) stimulate females during copulation; and/or (4) assure an accurate spermatophore transfer.

For the comparative analysis, we assembled data from published papers. For the possible function during copulation, we studied the bushcricket *Metrioptera roeselii* (Hagenbach, 1822) using a novel combination of independent techniques and manipulations. We took video recordings of unrestrained copulating pairs. Furthermore, copulating pairs were snap-frozen and scanned by X-ray micro-computed tomography (μCT). We also studied the impact of multiple male characters including titillators on the mating success in *M. roeselii*. We found comparative evidence for

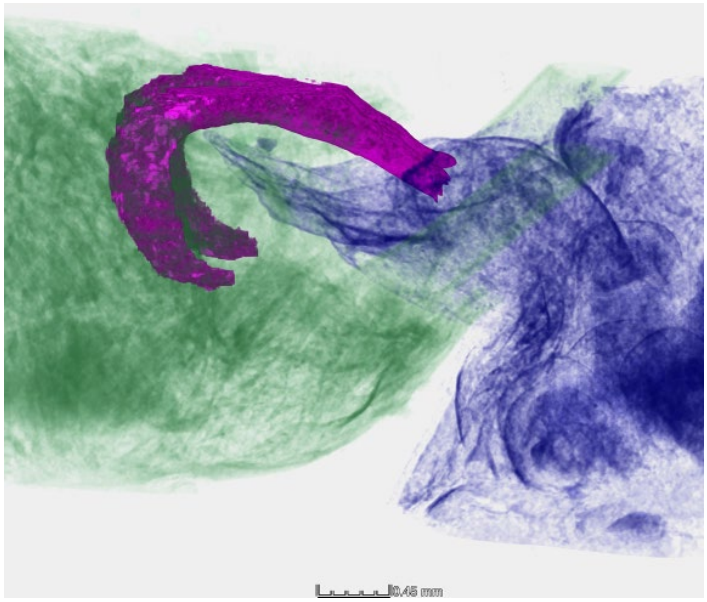

Figure 9. A male *Metrioptera roeselii* (green, left side) has inserted his titillators (purple) in a female's subgenital fold (right side, violet). This fold is held open during mating with the help of the titillators, which do not harm the female's tissue.

longer copulation duration in species with titillators than those without, but complexity had no influence on mating duration. Within a species, male titillators were rhythmically inserted into the female's genital chamber during copulation (Fig. 9). Titillator manipulation reduced the capacity of a male to attach the spermatophore and led to female resistance behaviours. We therefore conclude that titillators function as tools to stimulate the females and accurately place the spermatophore. Additionally, we found that larger, heavier males bear longer titillators.

Phylogeny of Neotropical Phalangopsidae (Ensifera, Grylloidea)

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The family Phalangopsidae occurs in tropical areas around the world, is one of the major lineages of Grylloidea, and is considered the largest taxon of crickets in the Neotropical Region. In the Neotropics, Luzarinae comprises the most diverse subfamily in terms of number of species and ecological adaptations. However, the evolutionary relationships between its internal groups are unknown due to a lack of phylogenetic hypotheses. Based on these issues, this study aimed to perform the first cladistic analysis of Phalangopsidae using morphological characters, mainly the genital characters, in order to propose a suprageneric classification for this group. The study of the male phallic complex allowed the proposition of 83 genital characters. The cladistic analysis was performed using 142 characters (83 genital + 59 external morphology) and 60 species, 5 of which were used as outgroups. The ingroup was composed of 10 species of Phalangopsinae and 45 belonging to Luzarinae. The analyses were performed in TNT using both equal weights and implied weights for the morphological + genital characters and only genital characters.

The monophyly of Phalangopsidae and Luzarinae were recovered. Phalangopsinae, however, was recovered as paraphyletic, in accordance with the results of Chintauan-Marquier et al. (2015). The "Phalangopsinae" genera *Laranda* and *Ectecous* were recovered as monophyletic. Regarding Luzarinae, all genera analyzed were recovered as monophyletic, except the genus *Endophallusia*, nested within *Eidmanacris*. The resulting topology will allow the proposition of taxonomical changes within Luzarinae. The main propositions are the description of a new tribe comprising the Aracambiae genera group, and the elevation of subtribes to tribes, as subtribe Lernecina and subtribe Luzarina. These results will be formally presented in a manuscript, which is being prepared.

Cockroaches (Blattodea) of Southern Louisiana: morphology, diversity, and life histories

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The state of Louisiana has both temperate and subtropical climates while containing six distinct ecoregions. Two ecoregions that comprise the central southern part of the state were surveyed. This faunistic survey of cockroaches was done to gain a better understanding of the morphology, diversity, life histories, and also taxonomy, of both adults and nymphs. Blattodea, excluding the newly included epifamily Termitoidae, is an understudied order of insects in spite of the importance of infamous peridomestic pest species. Complete information on life histories is lacking for the majority of species.

Survey methods used included hanging Malaise traps, pitfall traps, mercury vapor light traps, and hand collecting. These methods were utilized monthly, spring through fall, with first collections starting in summer, 2014. To date, 505 field-collected specimens representing 16 species have been examined and identified. These, along with specimens examined from the Louisiana State Arthropod Museum collection, have been used to re-describe species with out-of-date descriptions and create a key to adult males, adult females, and nymphs of all cockroach species statewide. Significant findings include an expanded distribution of *Euthlastoblata gemma* (Hebard), which had previously been recorded

only from Orleans Parish and detailed documentation of the life cycles of species viewed in the field and reared in the lab. This research on central southern Louisiana cockroaches will contribute to the global knowledge of the diversity and life history of insects that are increasingly being viewed as model organisms.

Update on Journal of Orthoptera Research

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For those who attended the fabulous 12th ICO in Bahia, Brazil, you may recall that there was a lot of discussion in the sessions and the breaks about the status, direction, and future of the *Journal of Orthoptera Research* (*JOR*), the journal published by our Orthopterists' Society continuously since 1992, and the world's only journal dedicated solely to publication of original research on the Orthoptera and related taxa. There is also a good chance that I approached you directly at some point during the congress to request (cajole) the promise of a manuscript from you. Whether we spoke directly or not, I did make a commitment to update the OS community about the status of *JOR* over time, and that is the purpose of this short article.

First and foremost, as expressed at the 12th ICO, my first priority for *JOR* remains to get an impact factor (IF) and indexing in Thomson Reuters' Science Citation Index for *JOR*. Although the merit of the IF system has been debated widely, including within our own society, the consensus among people I spoke with at the ICO is that, without an IF, the future of *JOR* is uncertain. Several OS members commented to me during the course of the ICO that they would happily publish in *JOR* if it only had an IF, but that their positions at their institutions of employment necessitate publication within IF journals only. This is an unfortunate reality of academia today.

In terms of the stated requirements for IF, there are several which JOR accomplishes already, and several which can be improved in order to enhance our chance of success. For example, Thomson Reuters' requires novel subject matter, a peer-review process, attractive layout, and that that the journal be of international interest and relevance. *JOR* accomplishes all of these goals handily. Another low-hanging fruit is to publish issues regularly. I am now doing all that is in my power to send completed issues to the publishers on the 15th of June and the 15th of December annually. Furthermore, we have improved our time to first decision on a manuscript from 15 weeks in 2014 to 4.57 weeks in 2016 and our time to acceptance of an article from 51 weeks in 2014 to 13.57 weeks in 2016.

In two meetings at the ICO, the Orthopterists' Society Board decided to make *JOR* a priority for the OS for the years to come, and contributed invaluable ideas, suggestions, and the promise of financial support, which will undoubtedly help to strengthen *JOR* into the future. I also received numerous suggestions from society members, some of which I am in the process of implementing and others which I hope to implement in the near future. I hope that you will see the fruits of these conversations in the coming year.

As of mid-January, when you submit an article to *JOR* you will be asked to select a "Journal Section". The traditional options of "original research" and "review" are available as always. Nancy Morris, *JOR*'s editorial assistant has also added three new sections: "short communications" are pieces which do not constitute full-length articles but are still of general interest to the orthopterist community. These can include news

items or preliminary data of particular interest. The "forum" section will be used to invite groups of articles – often review articles – which will form a cluster on a specific topic within a regular issue. "Special issues" are entire issues dedicated to a specific topic. These issues are often edited by guest editors and papers are usually invited. At the moment, a special issue is underway on "Orthoptera Response to Grazing" and is being edited by myself and Dr. Tim Gardiner. We hope that this special issue will be published as Vol. 26(2) in December, 2017. All of these types of articles will be subject to peer review.

So what changes can you expect to see soon from *JOR*? The volume size is beginning to climb out of its slump, a trend that we hope will continue. Vol. 26(2), published in December, 2016 with a modest 8 articles, was the largest volume since June, 2013 Vol. 22(1). Thanks to all those that contributed in one way or another to this success. Within the coming

month, I plan to begin the IF application process. This process has recently been amended and now begins with application to the Emerging Sources Citation Index, the feeder index into the IF. The OS Board and I are also beginning to examine the possibility of upgrading to a more user-friendly online submission system and possibly to an Open Access publication model. So watch this space!

Finally, as always, without our loyal and committed society, and board members, authors, reviewers, and editors, *JOR* would not be able to continue. Thank you for all your contributions and support over the years and please **continue to submit manuscripts**. Author guidelines for submission can be found at this link: http://140.247.119.225/OrthSoc/JOR.html and for manuscript submission, please follow this link: http://www.utm.utoronto.ca/~utmjor/. If you have any questions about the suitability of work for publication in JOR, please do not hesitate to contact me.

Theodore J. Cohn Research Grant Reports

Taxonomic revision of the Neotropical grasshoppers of the genus *Sphenarium* Charpentier, 1842 (Orthoptera; Pyrgomorphidae)

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The genus *Sphenarium* Charpentier (1842) comprises a group of fusiform, brachypterous, and closely-related grasshopper species, which are distributed from central Mexico to northwest Guatemala. These grasshoppers are part of the Pyrgomorphidae, a family of Gondwanic origin that is mostly diverse in the Old World tropics: *Sphenarium*, with its ten extant species, represents the most diverse genus of the New World Pyrgomorphidae (Kevan, 1977).

The species of *Sphenarium* can be an excellent system to study patterns of local adaptation. For instance, these grasshoppers show a remarkable variation in body size, coloration, and life history traits (Kevan, 1977; Sanabria-Urbán et al., 2015) (see Fig. 1), suggesting high levels of adaptation to environmental heterogeneity. On the other hand, their low dispersal capabilities, high sensitivity to temperature changes, and distribution across a region with a complex geologic and climatic history provide the opportunity to explore the relative importance of historic events on the diversification of Neotropical grasshoppers.

In addition, *Sphenarium* grasshoppers have a notable cultural and economic importance in Mexico. For example, local people have traditionally eaten these grasshoppers since pre-Columbian times (Ramos-Elorduy and Moreno, 1989). On the other hand, *Sphenarium* is the only genus of the New World Pyrgomorphidae known to have outbreaks and whose species are included among the long-known agricultural pests for corn (Zea mays) and beans (Phaseolus vulgaris) that are also fundamental elements of the Mexican diet (Kevan, 1977).

Despite the biological, cultural, and economic importance of the genus *Sphenarium*, its taxonomy has remained incompletely

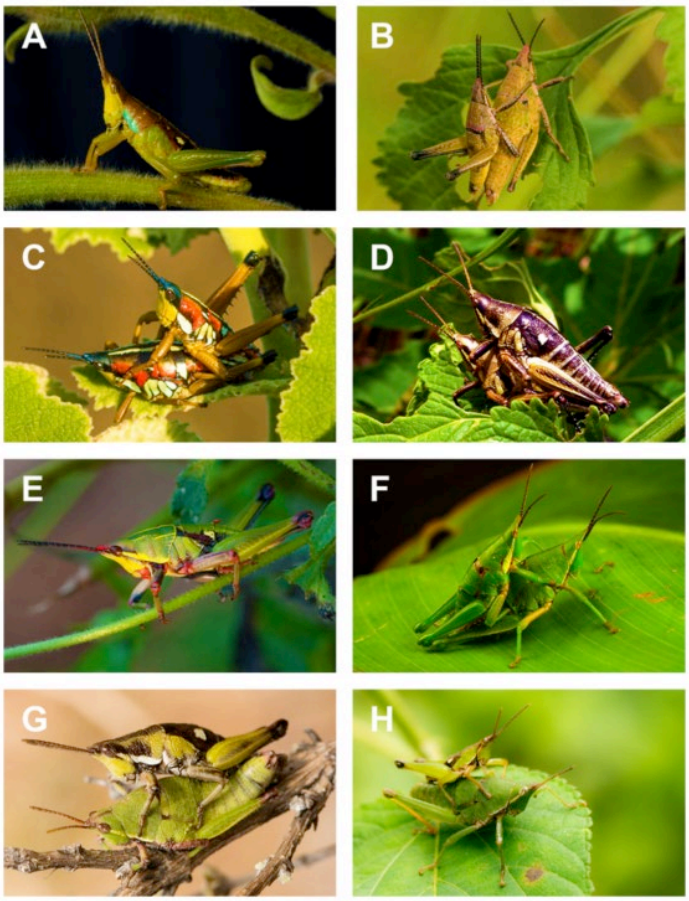

Figure 1. Common coloration patterns of some species of *Sphenarium*: **A**, *S. adelinae* sp.n.; **B**, *S. borrei*; **C**, *S. histrio*; **D**, *S. purpurascens*; **E**, *S. rugosum*; **F**, *S. totonacum* sp.n.; **G**, *S. variabile*; **H**, *S. zapotecum* sp.n.

Figure 2. Fieldwork conducted during fall 2016 in the Mexican states of Oaxaca, Veracruz, and Guerrero.

resolved. The last taxonomic revision of the genus was only partially published (Boyle, 1974; Kevan, 1977) complicating the identification of species. For almost four decades, there have been no additional taxonomic descriptions, but recent molecular studies have suggested some taxonomic rearrangements to the classification of *Sphenarium* and multiple putative new species have been identified but these still await taxonomic description (Pedraza-Lara et al. 2015; Sanabria-Urbán et al. 2015). Therefore, so far, there is no consensus on the identity and numbers of species to be recognized within the genus.

For these reasons, and thanks to the T.J. Cohn Research Grant, I have studied and comprehensively revised the grasshoppers of this genus. For this study, I examined the type material of all described species of *Sphenarium* (*S. affine, S. barretti, S. bolivari, S. borrei, S. bruneri, S. carinatum, S. crassipes, S. histrio, S. ictericum, S. macrophallicum, S. magnum, S. marginatum, S. mexicanum, S. minimum, S. planum, S. purpurascens, S. rugosum* & *S. variabile*) along with collections of this genus housed at four museums, in Mexico (UNAM) and the U.S.A. (ANSP, UMMZ, and FSCA). In addition, *Sphenarium* grasshoppers were collected across the Mexican Neotropics between 2008 and 2016 and were examined as well. All of this material was used to analyse the levels of morphological differentiation and geographic variation in terms of external traits and internal male genitalia. In addition, levels of genetic differentiation and evolutionary relationships within the genus were analysed using nucleotide sequences of five loci (CO1, CO2, 12S, H3 and ITS2), in combination with a wide geographic and taxonomic sampling. Following an integrative taxonomic framework, limits and numbers of independently-evolving lineages were inferred with the obtained morphological and phylogeographic evidence.

The provided funding allowed for the improved morphological, genetic, and geographic sampling of this study principally for the newly-described species (Fig. 2). Overall, the revised material consisted of 3,869 *Sphenarium* specimens collected from 513 Mexican and Guatemalan localities. Moreover, nucleotide sequences for 64 *Sphenarium* specimens were newly-generated and combined with our previously-published dataset (Sanabria-Urbán et al., 2015). In total, 129 *Sphenarium* specimens collected from 94 Mexican sites (Fig. 3) were genetically-analysed. The results of this study have led to the recognition of 17 valid species of *Sphenarium*, nine of which corresponded to previously-described species and eight represent new species in the genus. Based on these results, the species concepts of the genus were redefined and new synonymies were proposed. In addition, general patterns of morphological and genetic variation

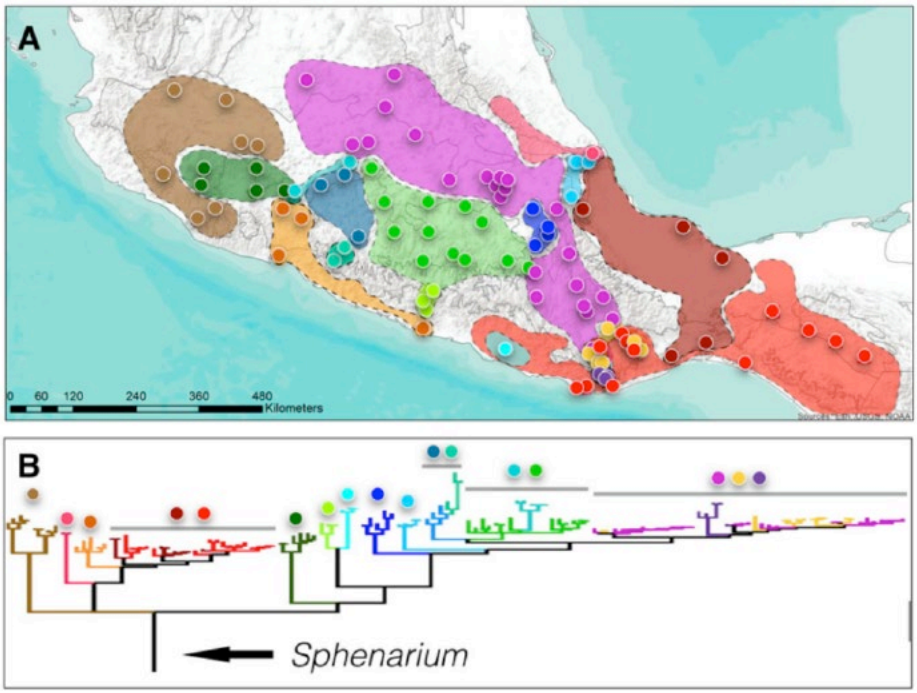

Figure 3. Sampling localities (coloured circles) for the genetic analysis (**A**) and phylogenetic relationships of the 17 species of *Sphenarium* recognized (**B**). Different colours in the map and phylogeny represent different species. Areas below the circles represent the approximate known geographic distribution of each species.

within species were described and the knowledge of the biogeographic patterns and evolutionary relationships among *Sphenarium* species was updated (Fig. 3).

The results of this study also provided evidence that the genus *Sphenarium* is an assemblage of lineages with different levels of morphological and genetic divergence, which suggest a complex interplay between evolutionary forces during the evolution of the genus. Moreover, the patterns of intraspecific variation observed suggest several instances of on-going speciation processes in the genus. This study opens the opportunity to further explore the process and mechanisms involved in diversification of Neotropical grasshoppers. Currently, this study is under revision for its publication in an ISI-indexed journal. The genetic data and material associated with this study will be available after its publication.

Acknowledgements

Thanks to the Orthopterists' Society for funding, which allowed for the completion of this study, and especially to Michel Lecoq and Pamm Mihm. Also thanks to M.F. O'Brien, J.D. Weintraub, E. Mariño-Pedraza, and R. Mariño-Pérez for the facilities provided to examine the museum specimens and to Hojun Song and his Laboratory for the help provided, without which this study would not be possible. Finally, thanks also to M. Arenas-Navarro, T. Sánchez-Cruz, E. Aguilar, A. Blanco, A. Diaz-De la Vega, A. Pingarroni, F. A. Rivera-Ortiz, P. Gomez-Ruiz, P. Fontana, and V. Jiménez-Arcos for their support in the fieldwork and laboratory work. This research was also supported by the following projects: PAPIIT-UNAM IN220214 and U.S. National Science Foundation Grant IOS-1253493 (to Hojun Song).

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Ring speciation and evolutionary history of the genus *Lluciapomaresius* Barat, 2012 (Orthoptera: Tettigoniidae)

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Ring species have been prized as a clear demonstration of the gradual nature of species formation (Pereira & Wake, 2009). They are characterized by including a series of populations at intermediate stages of divergence around a geographic barrier, reaching reproductive isolation at the end of the ring (Monahan et al., 2012). Generally, they display characters (e.g., morphological, molecular, ecological, behavioural, etc.) that diverge progressively along the ring. The taxonomy of these species complexes is usually complicated and different numbers of species can be recognized depending on the criterion of the taxonomist (Kuchta & Wake, 2016). In literature, just two dozen examples of species rings have been reported (Irwin & Wake, 2016). However, recently-unstudied topographic barriers have been associated with ring diversification processes and characterized by using modeling approaches (Monahan et al., 2012). One of these such 'candidate ring barriers' is the Northern Plateau of the Iberian Peninsula. Several potential species complexes have been described from the area surrounding the North Plateau, for which diversification processes are not yet well-established. This is the case for some species of *Lluciapomaresius* Barat, 2012 (Orthoptera).

The genus *Lluciapomaresius* belongs to the family Tettigoniidae and is endemic to the Iberian Peninsula. Currently, it comprises 7 recognized species, of which *Lluciapomaresius anapaulae* (Schmidt, 2009), *L. asturiensis* (Bolívar, 1898), *L. nobrei* (Bolívar, 1898) and *L. stalii* (Bolívar, 1877) are distributed around the Northern Iberian plateau. They were described based on morphological characters that are known to have a very high intraspecific variability, and the phylogenetic history of these taxa remain unknown. The morphological delimitation of these species has generated many uncertainties (Barat, 2012).

My Ph.D. project was focused on the influence of demography, landscape, and historical factors in the evolutionary history of organisms, using Iberian amphibians as a study model. However, I have always been fascinated with bush-crickets (Tettigoniidae) due to their great morphological variability and endemism richness, and this project reflects my long-

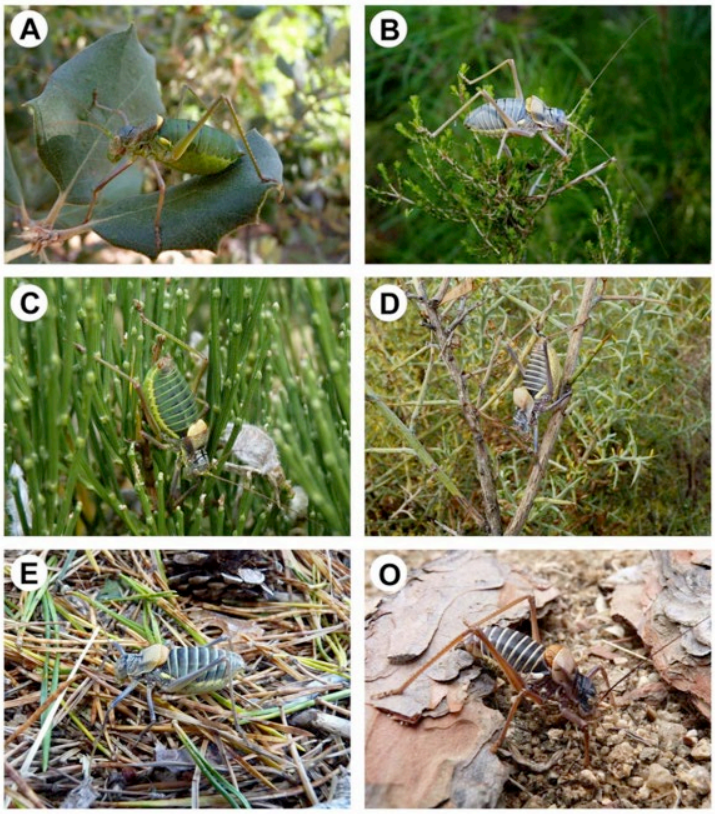
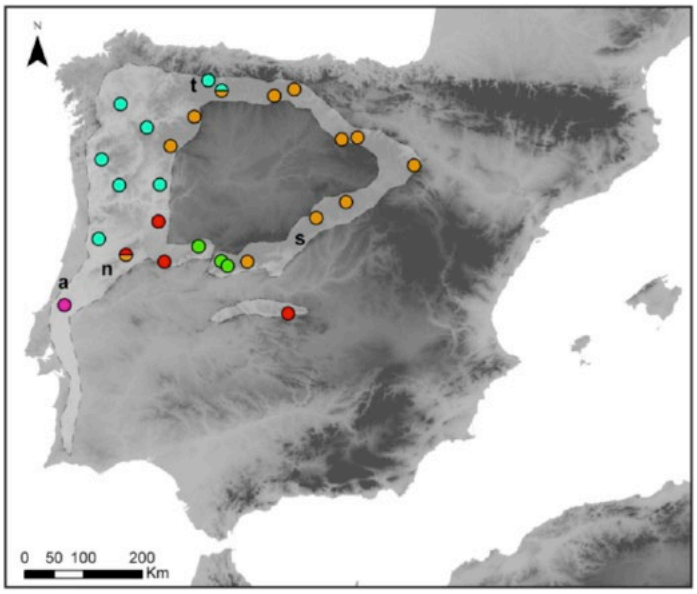


Figure 1. Adult males of each mitochondrial lineage studied of the species complex (A, B, C, D, E lineages) and *Lluciapomareius eclipticus* (O).



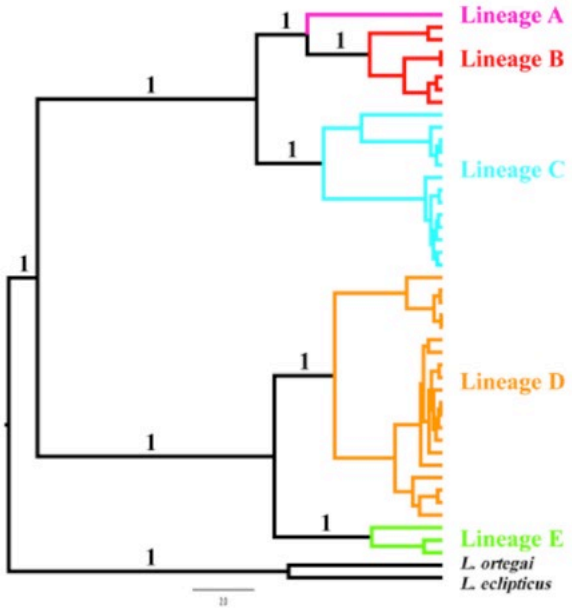


Figure 2. Top: Geographic distribution of the sequenced populations showing the distribution of the mtDNA lineages. The type locality of *L. anapaulae* is represented with letter "a", "t" for *L. asturiensis*, "n" for *L. nobrei* and "s" for L. *stalii*. Bottom: Bayesian phylogenetic analysis with two fragments of mitochondrial genes (Cox1 and ND2) using Beast 1.8. Values above branches represent Bayesian Posterior Probabilities (BPPs).

standing interest in these organisms. This study is being carried out in collaboration with Ricardo J. Pereira (University of Copenhagen) and Mario García París (Museo Nacional de Ciencias Naturales, MNCN-CSIC, Madrid) and involved: a) quantifying habitat suitability for *Lluciapomaresius* species in the Iberian Peninsula to predict current and historical distributions around the barrier using Geographic Information Systems; b) using molecular markers to reconstruct the evolutionary history of these taxa and to test predictions for genetic patterns resulting from ring diversification in this species complex; and c) assessing if diversification processes resulted in congruent patterns of morphological diversification using scanning electron microscope (SEM) imaging and male calling songs.

We collected all the species of the genus and 250 specimens from more than 50 localities of the species involved with the North Iberian plateau barrier (Fig.1). We initially sequenced around 50 specimens from 25 populations for two mitochondrial genes (Cox1 and ND2). The species *L. ortegai* (Pantel, 1896) and *L. eclipticus* (Barat, 2004) were used as outgroups for rooting the phylogenetic tree. Preliminary phylogenetic analyses with mitochondrial genes showed five main lineages around the barrier with high correspondence with described species (see Fig. 2). Lineage A corresponded to the species *L. anapaulae*, B with *L. nobrei*, C with *L. asturiensis*, D with *L stalii*, and E with a new species or subspecies proposed by Pfau (1996). Several lineages showed well-supported sublineages geographically-structured, as with the case of C and D. Some populations contained more than one mitochondrial lineage and it is possible to identify hybrid zones between species, as is the case with lineages C and D in the north part of the ring distribution and between lineages B and D in the southwestern area. Once these interesting evolutionary areas were identified, additional sampling was carried out to obtain more specimens and new populations. Additionally, male calling songs were recorded in at least 25 locations around the northern plateau barrier

along most of the distribution of the species complex, including intensive sampling at the localities with several mitochondrial lineages.

Currently, we are expanding the number of specimens for genetic analyses to properly understand the diversification processes that generated the genetic pattern, paying special attention to the possible hybrid zones. We are sequencing several nuclear genes to determine the level of geographical correspondence between mitochondrial and nuclear markers or the existence of hybridization processes between lineages. However, we do not find genetic differentiation with the internal transcribed spacers (ITS1 and ITS2) nor with the 5.8S ribosomal DNA over most of the distribution, so we are testing other nuclear genes. We will continue to proceed to review the diagnostic morphological characters commonly used in this family by means of electronic and light microscopy. The different steps will lead to the fundamental objective of answering the main question of this study: does the diversification process within *Lluciapomaresius* species complex represent a case of ring speciation?

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The Orthoptera Species File Grant Reports

Illustrating Neotropical Acridoidea species with emphasis on Romaleinae in Orthoptera Species File

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The Acridoidea fauna from South America comprises about 1,768 species (Cigliano et al., 2016). One of the most important collections of the Neotropical Acridoidea is at The Academy of Natural Sciences of Drexel University (ANSP), in Philadelphia, PA, U.S.A. The ANSP was founded in 1812, and the Entomology Department's collection currently contains more than 3,500,000 specimens of which more than 11,000 are primary types. The type collection is particularly rich in Hymenoptera and Orthoptera orders, representing more than 70% of the total composition of the primary types.

Regarding the Acridoidea described from South America, the Orthoptera collection at ANSP contains type specimens of about 399 species, most of them described by S. Scudder, L. Bruner, J. A. G. Rehn, M. Hebard, C. S. Carbonell, D. Otte, M. M. Cigliano, C. Amédégnato, M. Descamps, R. A. Ronderos, H.R. Roberts, C.H. F. Rowell, and D. Perez-Gelabert, among others.

The Orthoptera Species File (OSF) (http://Orthoptera.SpeciesFile.org) includes images of type specimens of a large number of species within Neotropical Acridoidea. This is mostly due to the contributions of Prof. Carlos S.

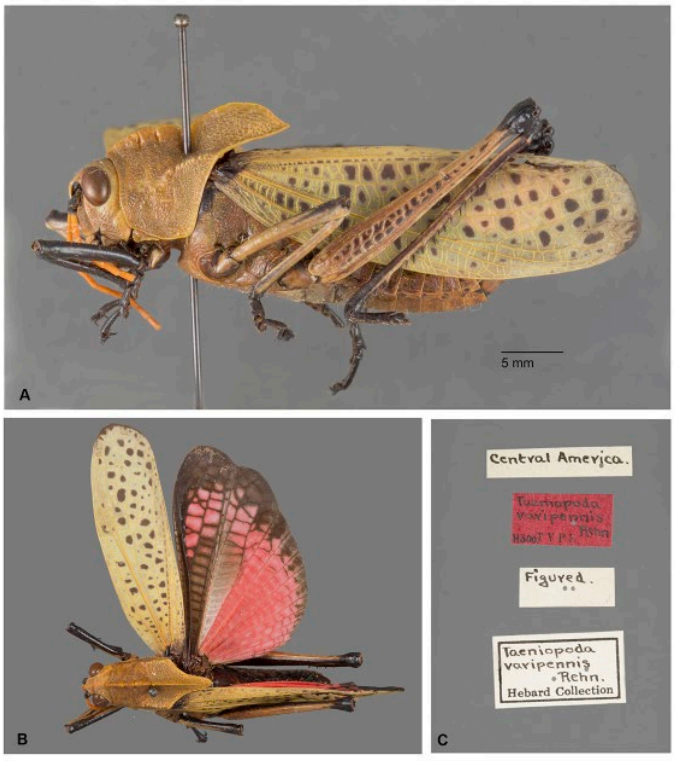

Figure 1. *Taeniopoda varipennis* Rehn (male, ST), ANSP. A, habitus, lateral view; B, habitus, dorsal view; C, labels.

Figure 2. *Aplatacris colorata* Scudder (male, ST). ANSP. A, habitus, lateral view; B, habitus, dorsal view; C, labels.

Figure 3. *Prionacris erosa* Rehn (male, HT). ANSP. A, habitus, lateral view; B, habitus, dorsal view; C, labels.

Figure 4. *Agriacris magnifica* Hebard (male, HT). ANSP. A, habitus, lateral view; B, habitus, dorsal view; C, labels.

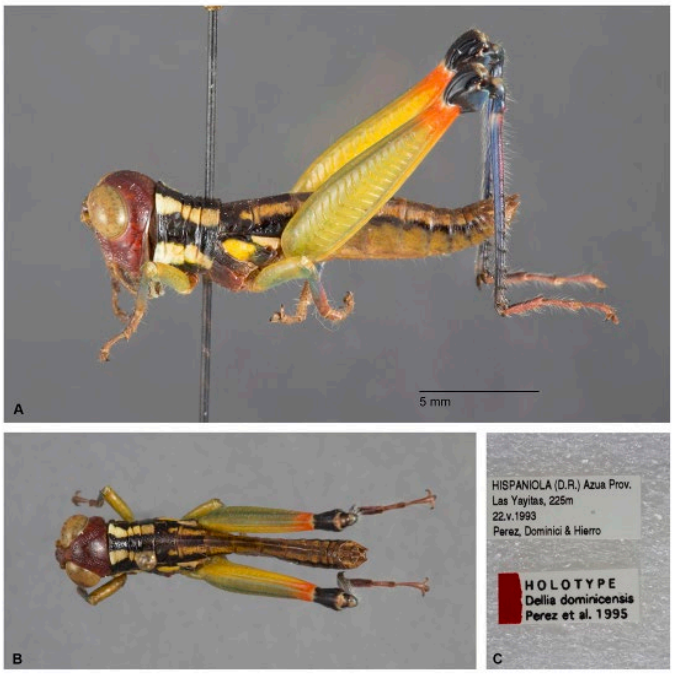

Figure 5. *Dellia dominicensis* Perez-Gelabert, Dominici, Hierro & Otte (male, HT), ANSP. A, habitus, lateral view; B, habitus, dorsal view; C, labels.

Carbonell, who photographed most of the types of Neotropical Acridoidea species deposited at the most important grasshopper collections, including ANSP (that he visited in 1966 and 1970).

Since my research interest is focused on the subfamily Romaleinae (Romaleidae), which includes the largest and most colorful representatives within Neotropical Acridoidea, the main objective of this project was to add data for this group to OSF, providing photographs of type specimens of the species deposited at ANSP collection. This project was also aimed at adding images of those types of Neotropical Acridoidea species deposited into the ANSP between 1970 and 2014, but without available OSF images.

Thanks to an OSF grant, I had the opportunity to visit this amazing collection in April, 2015. Once there, I was able to take photographs of type

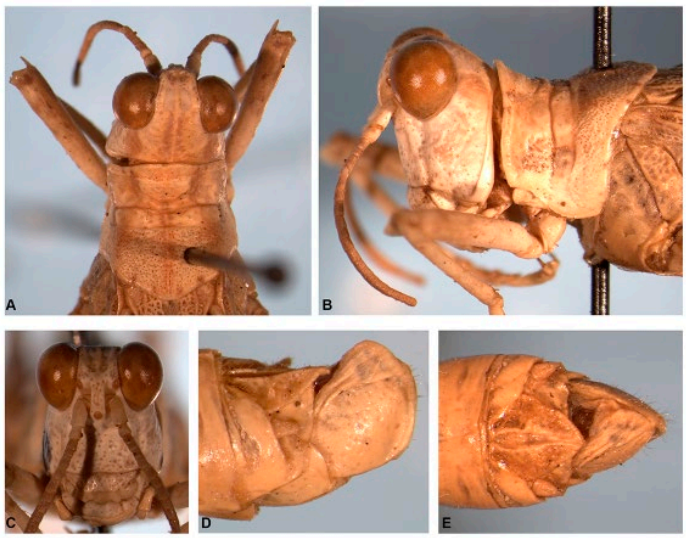

Figure 6. *Spaniacris deserticola* (Bruner), male. Images of diagnostic characters from head and pronotum (A-C) and male external genitalia (D,E).

specimens of 70 species of Neotropical Acridoidea, of which 40 belong to the subfamily Romaleinae. For each type (88 specimens in total, including primary types and paratypes), I took three photographs (lateral and dorsal views of the habitus and labels, Figs. 1-5) and, in some cases, additional images (of diagnostic characters) were taken, obtaining a total number of 264 images of type specimens. All these images were then processed with the program Adobe Photoshop CS6 before uploading them to the corresponding taxa to OSF.

I really appreciated the great warmth and hospitality of Jason Weintraub, collection manager of the Entomology Collection, who provided me with everything I needed to carry out my activities properly. I am very grateful for his generous support and kindly help throughout my visit to the ANSP.

During my stay in the U.S., I also had the opportunity to visit the Acridoidea collection at the Smithsonian Institution National Museum of Natural History (formerly named as the United States National Museum or USNM), in Washington D. C. In the course of this short visit (a day-long visit), I was able to photograph 26 types belonging to 20 species of Neotropical Acridoidea (of which 15 were Romaleinae), reaching a total number of 79 images. My thanks to David Nickle for his kindness and cordial welcome at the Smithsonian's Museum Support Center (MSC) in Suitland, Maryland, where the Orthoptera collection is currently located.

In addition, during my visit to these collections, I transcribed about 200 specimen records (from labels) and captured images of specimens of more than 40 Romaleinae species and their diagnostic characters (Fig. 6), deposited in the general collection of both museums (that I am still uploading to OSF). I was really fascinated by the great collections of Romaleinae (to get an idea of this, the curated part of the Romaleinae at the ANSP exceeds 10,000 specimens, including primary types and paratypes).

Finally, I would like to thank the Orthopterist's Society for funding this project, and the Society's Treasurer, Pamm Mihm, for all her help in the administrative matters.

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Recent advances in the management of locusts and grasshoppers in China

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There is a long history of locust plagues in China, with there being more than 800 plagues recorded in the last 2,700 years. The most common locust pest is the migratory locust (Locusta migratoria), which can form dense bands (Fig. 1) and swarms. However, in the past few years, there have been major advances in the management of both locusts and grasshoppers in China, including the integration of biological control as part of a preventive management program. In the past, treatments of locusts and grasshoppers almost exclusively used chemical pesticides, but work by Dr. Long Zhang and his group has led to a substantial shift away from chemicals with their harmful effects on natural enemies and ecological biodiversity, such that now about 30% of treatments are with biological alternatives. Dr. Zhang conducted many trials with both the protozoan *Paranosema*

Figure 1. Band of Migratory Locusts

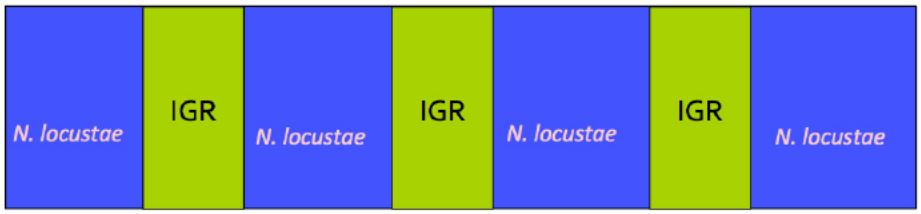

Figure 2. Treatments using *N. locustae* and IGRs. At high densities of locusts (>5 individuals/m^2) or grasshoppers (>15 individuals/m^2), *N. locustae* and IGRs are used in alternate strips.

locustae and the fungus *Metarhizium acridum* and was responsible for setting up the mass production system for *P. locustae*. With *P. locustae*, higher mortalities are obtained than in the past (in the order of 80%) due to the use of new local strains that are more virulent to locusts and grasshoppers and to the development of new water-based formulations. Studies have been conducted on the various ways of using biopesticides, including the use of mixtures of *P. locustae* and *M. acridum*, and using Insect Growth Regulators (IGR) in narrow strips with *P. locustae* in-between in a modification of the RAATs system used in the U.S.A. (Fig. 2). Strong advocacy of the use of biopesticides by Dr. Zhang and his group has led to their widespread application, such that they are used to treat more than 100,000 ha of locust and grasshopper infestations per year in China. This is more than the amount of bio pesticides used against acridids in all of the rest of the world combined—a world-leading achievement.

But, of course, actual treatments are just the final step in the integrated pest management of locust and grasshopper pests. The first step is to know the location of the densest infestations, so that they can be treated in a timely manner. It is critically important that officers involved with locusts and grasshoppers are trained in the most up-to-date methods of survey, including the use of GPS to locate sites with locusts and the use of Differential GPS (DGPS) by aircraft to accurately delineate the precise location of areas treated. Survey and control data are integrated into a national computer-based Geographic Information System (GIS), so that the densest infestations are identified and then treated in a timely, efficient manner. Through this GIS, one of the largest locust and grasshopper workforces in the world (involving more than 2,000 technicians at 127 locust and grasshopper control stations) are organized well and are able to provide China with a highly efficient, intelligent, and precise system for the preventive management of these pests.

Dr. Zhang and those that work with him have taken methods and technologies used elsewhere for locust and grasshopper management and added a number of innovations such that, major swarm invasions of crops by swarms of locusts are rare in China—a substantial achievement that is matched in few other places in the world. Continuing work by the many researchers on locusts and grasshoppers in China will continue this innovation and increase the effectiveness of treatment programs against these pests.

The lost birthday: Archival research reveals the true date of birth of Sir Boris Uvarov, K. C. M. G., F. R. S.[1]

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Not unlike their fellow scientists, historians of science are familiar with the joy of an empirical discovery. Time and again, a stubborn document found in an archive, or an over-sophisticated, apparently-prochronistic clockwork mechanism discovered underwater, or an ancient coin found in an archaeological site challenge established generalisations and force scholars to renegotiate what should be accepted as a matter of fact. Discoveries of this sort are even more surprising when they concern recent events, which are supposed to be better known than the obscure dealings of the ancient world.

Sir Boris Uvarov's name rings a

[1] K. C. M. G. stands for the Knight-Commander of The Most Distinguished Order of Saint Michael and Saint George, F. R. S. for the Fellow of the Royal Society

Figure 1. Boris Uvarov's University Transcript title page. Handwritten remarks reveal his immatriculation as an external student in 1906 and change of his status to that of a student in 1907. Archival reference: Central State Historical Archive in St. Petersburg (Tsentralnyi Gosudarstvennyi Istoricheskii Arkhiv), Fond 14 (St. Petersburg University), Opis' 3, Delo 50126. List. 16 – 17.

bell for every orthopterist and he needs no special introduction in the Orthopterists' Society newsletter. An outline of his biography based on the posthumous reports of his associates is well-known. However, already the very first publications disagreed over a seemingly minor, but actually important detail, his date of birth. While in the obituary published by the Anti-locust Research Centre, it was indicated as November 5, 1888 (Anti-Locust Research Centre 1970), Sir Vincent Wigglesworth, in his obituary note published in the *Biographical Memoirs of the Fellows of the Royal Society*, used November 5, 1889, commenting:

"In the passport issued to Uvarov by the Government of the Republic of Georgia, when he was leaving that country for Great Britain in 1920, the date of birth was given as 5 November 1888. To have tried to correct this error would have caused delay in his departure and might even have prevented it. He was therefore obliged to use this date in all official papers; but he took steps to ensure that the true date of birth might be recorded by the Royal Society." (Wigglesworth 1971, p. 713)

Until very recently, this most authoritative account was unchallenged. However, in a brief discussion that followed our publication (Kouprianov, Fedotova, 2015) of Sir Boris's letter to his teacher and friend, Andrey Semenoff Tian-Shanski (1866–1942), Professor Sergei Fokin, a protozoologist devoting a considerable share of his research effort to a study of the history of zoology in the St. Petersburg University, mentioned a still-different date. In a private communication, he noted that 1886 was consistently used as student Boris Uvarov's birth year in the university papers.

This demanded some clarification. November 5, 1889, indeed, posed certain problems for the interpretation of early stages of Sir Boris's career. Taking 1889 as the basis of the calculations one might conclude that Sir Boris graduated from the secondary school when he was under 13 (1902), and entered the Higher Mining School in Ekaterinoslav when being still under 15 (1904). It is beyond dispute that Boris Uvarov was perceived by his fellow students as a gifted young researcher, but nobody, it seems, considered him as a *Wunderkind* being several years younger than his classmates.

Sir Boris Uvarov, at the beginning of his career, was a civil servant for the Ministry of Agriculture. To identify the birth date and some other details of the biography of an Imperial state official is not a particularly complicated task provided that the records are available. Anastasia Fedotova managed to find both the Student file of the future Sir Boris Uvarov and a number of documents concerning his service for the Ministry. Among other documents, there was an excerpt from the Registry book of the Alexander Nevskii Orthodox church in Uralsk (now Oral, Kazakhstan), which should be considered as the most authentic evidence pertaining to the date of birth. In this excerpt, it was stated that "in the chapter No. 203 of the male sex, by Titular Counsellor Petr Petrov Uvarov and his lawful wife Alexandra Vukolova, both Orthodox, their son Boris is registered born on the twenty second (22) day of October, eighteen hundred eighty six (1886), and baptised on the second (2) day of November of the same year." (Excerpt from Registry book).

It is worth noting that, in the date of birth indicated in the excerpt from the registry book, not only the year is different from the one indicated in standard biographies but the day too. In Russia, the Gregorian Calendar was adopted from February 14, 1918 on. The difference for the 19th century comprises 12 days, thus the Gregorian date of birth for Sir Boris is November 3, 1886. Often, the dates for this period are written in the format including both calendars: 22 October (3 November) 1886. The date provided by Sir Vincent Wigglesworth (November 5) does not correspond to the date of baptism either and is

Figure 2. A band of wingless Moroccan locust crosses a locust-fighters' tent (reproduced from Uvarov 1913).

Figure 3. Vermorel horse-driven sprayer pumps (reproduced from Uvarov 1913).

apparently incorrect. A further inquiry in the Archives brought more details on Sir Boris Uvarov's early career and his activities in the field of applied entomology in Russia. However, this shift of the most basic dates (frequently, the dates of birth and death are the only biographical details communicated in a brief mention of a person) for a well-known historical figure has got a merit of its own. It is even more remarkable as it apparently catches off-guard those willing to celebrate the 130th anniversary of the Leader of anti-locust armies (as one of the biographers called him, see Kryzhanovskii 2001) in 2019. This quasi-anniversary date was quietly passed by in the fall of 2016.

Perhaps the date of birth itself is not too important, but, as historians of science, we hope that the small 'domestic' details of the early Uvarov's biography would allow us to see a live person behind an idealised figure of a brilliant scientist and administrator. In our case, Sir Boris Uvarov turns from an unusually single-minded young genius led by the providence itself or, at the very least, by the wisdom of the imperial state to the inevitable final victory over the locust armies into a youngest of the three sons of a humble provincial bank clerk. His early life is full of uncertainty, random walks through blind alleys, and uneasy moments of unpleasant choices. Boris Uvarovs' letters to his friends and colleagues from the early 1910s kept at the Academy of Sciences Archive in St. Petersburg reveal these uneasy early steps of his career. His way to the university diploma was anything but smooth. He had to take an extra year at the secondary school (he attended a second-rate school of the Ural Cossack Host, and even to enter a Higher Mining School, an extra year was needed). His studies at the Higher Mining School in Ekaterinoslav were interrupted by the revolutionary upheaval of 1905. He was not readily admitted to the St. Petersburg University because without a classical gymnasia background he was allowed to enter as an external student only, and he had to take additional exams in Latin to become a valid, full-time student. Right after the graduation from the University, already burdened with family, he had to seek employment in a less prestigious field of applied entomology. Already after turning from a zoogeographer into an applied entomologist, he moved to the Stavropol province in Southern Russia, not because he was sent there by the wise government as an experienced anti-locust fighter, but because he was desperately looking for better-paid employment to escape from a miserable salary and hostile bureaucratic environments (his first position was at the Murgab Entomological Station in Turkmenistan under the auspices of the Ministry of Imperial Court). It was only in Stavropol where he managed to put together for the first time a complex socio-technical locust control machine, which involved skilled professionals and modern insecticides, and performed markedly better than the old system based on local dwellers' forced labour and inefficient 'mechanical' means of locust extermination. The machine he time and again rebuilt later in Transcaucasia, North Africa, and elsewhere – and which made him The Sir Boris Uvarov we know, the Father of Modern Acridology.

Acknowledgments

The authors are thankful to Dr. Alexandre Latchininsky for his comments on an early version of this article.

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Can we help Orthoptera taxonomy in the tropics?

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The great majority of biologists have grown up and been trained in the North or South Temperate Zone. For a variety of historical and geographical reasons, these zones have countries that are relatively rich, and have had some academic culture for a considerable time. One of the consequences is that there is a general popular knowledge of natural history; the more obvious parts of the fauna and flora are known and named, and most people assume that it has always been thus. There is little obvious need for further research, and taxonomy and systematics are not self-evidently useful occupations.

When the temperate zone biologist first goes to the Tropics, he or she is faced with a quite unfamiliar situation in which none of the above generalisations are true. Most organisms are unfamiliar and there is no relevant literature to help, apart from the inevitable handbooks of local birds and of flowering trees and shrubs, which are aimed at the "eco-tourist". Most people one meets are unfamiliar with local plants and animals, and if by chance they do have a name for them, it is likely to be in an indigenous language inaccessible to the visitor. Apart from hunters and traditional herbalists, no one knows any natural history. If you are persistent and seek out a local biologist, you may find, to your astonishment, that the organism has no scientific name; it has not yet been described. Suddenly you realise that taxonomy is a valid subject - still!

So, given all the above, can we expect to find thriving laboratories of systematics in the Tropics? Sadly, no - tropical graduate students who resist the siren call of fashionable molecular biology training abroad are likely to end up in some branch of applied ecology, censusing populations of vectors or crop pests, which can plausibly be presented to local politicians and purse-string holders as useful or conducive to "development". Some of them come to grief because they cannot reliably distinguish the taxa they come into contact with, or belatedly realise that their study organism is embedded in a vast ecological network that they cannot access, due to a lack of knowledge of the relevant names. And sometimes, such a young ecologist will feel the need to acquire taxonomic skills, as an adjunct to the techniques he or she already has. Then dawns the realisation that most practising taxonomists are located in the Temperate zone - to say nothing of the type specimens that largely reside in Temperate Zone Museums - and that there is effectively no source of funds to provide access to them.

I am well aware of this situation, largely because of my 50-plus-year connection with Makerere University in Uganda, where I held my first university lectureship in the '60s. Allow me to mention a couple of examples. I recently was a member of the thesis committee of a Ph.D. student in Makerere who worked on the population ecology of Ugandan forest moths - and of forest grasshoppers. Why the grasshoppers? Simply because I was available periodically to identify them and provide some acridological background to her work. Now she is the only Ugandan who can identify any of the grasshoppers found in her country. We would have liked to include some training in cladistics and working with genitalia, but there was no funding to allow either of us to visit the other's laboratory. Another example - in 2005, I described in the J*ournal of Orthoptera Research* (*JOR*) a new Ugandan species of the forest grasshopper genus *Pterotiltus*. That *JOR* article came to the attention of a Cameroonian student busy censusing the grasshoppers of the South Cameroon plateau, which is about the centre of distribution of the genus, and last year he wrote to me. Could I advise on where to find literature on *Pterotiltus* and how to identify the different species? No, unfortunately: the genus has never been revised, there are only the original descriptions, in a medley of European languages, including Latin. So, we decided to work together and make a revision. The problem was the airfare. An application to the T. Cohn fund of our Society was unsuc-

cesful. Eventually, the Cameroonian borrowed the money for a return flight to Switzerland from within his family - a huge sum for the average African family. He duly arrived with his collection in September, I borrowed as many of the *Pterotiltus* types as I could, and showed him how to dissect and prepare the phallic complex of grasshoppers - and the revision was underway. We soon found that one of the "known" species was actually two or three distinct taxa and discovered three more undescribed species in his Cameroon collections. Now he is back in Yaoundé, spreading the word and the technical know-how, and there is a real chance that some of that amazing and little-known fauna will soon be competently studied. I regard the month I spent showing him the taxonomic ropes as a very rewarding use of my time.

I gather that there may be a coming change of heart in the administration of the T. Cohn fund, and that in the future it may make more such "apprenticeship" grants to allow students to work in an established systematics lab. That would be a very desirable situation which might have dramatic effects on the discipline.

Report for 2016 OS Board on Membership

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There are currently 522 entries in our membership database and 1,800 people who are involved in the Orthopterists' Society Facebook page.

Of the 522 entries, only about half are current members (264). While some have officially resigned, there has been no contact with many others for 3 years. Some of these have moved or changed their emails, though I have found some of the latter through Google or Linked-in.

Membership has been quite consistent over the past 6 years according to the records on the File Maker Pro database--2011: 240; 2012: 259; 2013: 255; 2014: 246; 2015: 254, 2016: 264. I have counted as Members those who have paid in the current year, plus those who paid in the past year, plus Life (18) and Emeritus (17) members. I have found that most of those that have not paid for one year have just forgotten and do pay at the next reminder.

North America (NAM: 90) and Western Europe (WEU: 64) have the largest memberships. And of the current 264 members, 170 receive the *Journal of Orthoptera Research* (*JOR*) as print copies (plus have access to *JOR* online) while another 65 only receive *JOR* online.

Membership Management: Reminders for Membership dues are sent out in late March, which is after Pamm Mihm's end of financial year busy period. A second set of reminders for those who did not pay on the first round is sent out with either the May or September *Metaleptea* and this usually picks up more. Membership dues collected January through mid-September, 2016 were $3,700 for membership and $2,700 for *JOR* either as print copy plus online or online only. Note that students and concessional members have *JOR* included in their $10 membership.

Expanding our membership has been a perennial problem. The fact that there are 1,800 members of our Facebook page means that there are many people with at least some interest in Orthoptera. *Metaleptea* is posted on the Facebook page as a good advertisement for our Society and what we are involved in. Exactly how to get more Facebook members to become members of our Orthopterists' Society is uncertain, but many societies are finding that there are many more people on Facebook than in the society itself.

A proscopiid found during a day trip to Cachoeira do Tijuipe during ICO 2016

Report for 2016 OS Board on Investments and Earnings

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This report is an outline of how the generous $1.24 million in gifts from the Ted and Jean Cohn estate were initially invested, and earnings used, to enhance the activities of the Orthopterists' Society which Ted spent so much effort to promote. The investments were in a range of funds with a strategy of spreading the risk over different investment classes and, during 2015, included investment of earnings in lower risk money market funds as an insurance against times of stock market decline and gave a source of immediately-available funds. Until we had a clearer idea as to how much the investments earned, the initial decision was to spend only earnings from the investments, but in 2016, the Board decided that when a particularly worthy project comes up, then some moneys can be drawn from the principal: with a limit of 3% of the principal in a given 12-month period and a total of 6% in any 3-year period.

The Orthopterists' Society financial position after the Ted Cohn gifts

The Orthopterists' Society is in an excellent financial position in having:

- University of Illinois allocation, which is used to fund the Orthopterists' Species File
- Endowment from a former Board member that funds most costs of the Treasurer
- Ted Cohn gifts of $400,000 and $840,000

Prior to the first of the Ted Cohn gifts, the Orthopterists' Society Vanguard and Wells Fargo investments totaled $120.3K: a $10.9K Uvarov Award account, a $25.7K Research Grant account, a $60.7K Operating account, and a $23.0K endowment fund.

Ted Cohn's gifts consisted of $400K in late 2013 and another $840K in late 2014. To the **Research Grant** account were added $200K from each of the Ted Cohn gifts, giving a total of $425.7K. These funds are restricted for use to fund the Research Grants, which Ted supported for many years, and which are now called the Theodore J. Cohn Research Grants in his honor. To the **Operating** account were added $185K from the first and $640K from the second of Ted Cohn gifts giving a total of $885.6K. Of the Ted Cohn gifts of $1.240 million, $15K went to cover immediate expenses for grants and operations in early 2014, and the remaining $1.225 million were invested.

The investment strategy for Orthopterists' Society moneys

The moneys in both the "Restricted" Research Grant accounts and the "Unrestricted" Operations accounts, were invested in a range of funds with a strategy of *spreading the risk over different investment classes*:

1. Vanguard: National Stock Market Index Fund (VTSAX)—wide range of U.S. equities
2. Vanguard: International Stock Index Fund (VTIAX)—wide range of worldwide equities
3. Vanguard: Intermediate & High Yield Bonds--medium-high grade bonds (VFIDX), along with some high yield bonds (VWEHX)
4. Wells Fargo: Preferred Securities (PGF)-- Shares likely to give more dividend income
5. Wells Fargo: ISHARES Core US Value (IUSV): Shares likely to increase in value
6. Money Market Funds: So as to have a readily available source of cash even at times of market volatility (and during times of *decline* as during 2008), it was decided in mid 2015 that *earnings* from the above Vanguard funds (but not increases in value) be placed in a Vanguard Money Market Fund while earnings from the Wells Fargo investments go into Wells Fargo money market accounts. These funds remain as Reserve Cash Fund until required to cover immediate and short-term expenses. When required, they can be quickly transferred to the Working Cash account for ready use.

The initial investments and tracking of changes in value 2014-2016

Table 1 outlines the sources of the initial investments at Vanguard and Wells Fargo, which totaled $1.345.3 million.

Table 1. Amounts in Investments: Initial investment was $1,345.3K consisting of:

AAAI Uvarov Award acct: 10.9K initial	10.9K
Research grant acct: 25.7K initial + 200K 1st T Cohn gift + 200K 2nd gift =	425.7K
Operations acct: 60.7K initial + 185K 1st T Cohn gift + 640K 2nd gift =	885.7K
Endowment acct:	23.0K
Total initial investment	$1.345.3K

Since the time of the investments, there has been some variation in the amounts in the funds: the initial investment of $1.345 million increased to $1.405 million by March 2015 then declined to $1.322 million by Sept 2015 (Table 2). As mentioned above, it was decided that, with the need for certainty in the availability of funds, especially at times of International Congresses, the investment earnings for each quarter be moved into Reserve Cash Funds, with separate accounts for grants and operations. From the time the Reserve Cash funds were set up in August 2015, the amount in these Reserve funds gradually increased and in May 2016, the Reserve moneys available at the time ($39K) were transferred to the Working Cash Account to fund the 2016 Research Grants and Congress expenses: that meant that there was $42.2K in the Working Cash Account by the end of June 2016 (Table 2).

Table 2. Changes in the amounts in the Vanguard and Wells Fargo Accounts since the time of the initial investments in late 2014.

Date	Total of all Investments	Reserve Cash in Investment Accounts	Working Cash Account
Initial investment	1,345,322	0	11,179
Dec 2014	1,373,944	0	15,179
March 2015	1,405,574	0	10,603
June 2015	1,403,156	0	23,357
Sept 2015	1,321,966	10,913	14,016
Dec 2015	1,368,968	18,984	10,733
March 2016	1,388,597	24,006	12,906
June 2016	1,380,704	6,905	42,203

Board Decisions on the strategy for Spending of Investments

Until we had a good idea as to the rate of investment earnings, it was initially decided that only funds in excess of that could be spent. Market volatility might mean total funds go below this base amount of $1.345.3 m ($1.345 m rounded off) at times, but funds were to be restored as soon as possible.

However spending only earnings could be considered a false economy because the purchasing power of the funds will gradually erode because of inflation. Therefore, at the 2016 Board meeting, it was decided that, while the principle of mainly spending only earnings continues, when a particularly worthy project comes up, then some moneys can be drawn from the principal: with a limit of 3% of the principal in a given 12 month period and a total of 6% in any 3 year period.

The moneys invested are in two separate parts: "Restricted" accounts that are used only for the Ted Cohn Research Grants and "Unrestricted" accounts that are used for society operations.

"Restricted" Research Grant Account

Each year, ~$15K is used to fund the Theodore J. Cohn Research Grants. The $15K is about 3.5% of the $425K "Restricted" Research Grant Accounts, which is the level of earnings we might expect on average.

It has been noted that in the past there have been relatively few applications for Research Grants from certain regions, particularly Africa and Asia: and it is there that a grant can be particularly valuable in that it can have high purchasing power locally. Regional representatives could contact people as part of encouraging more applications from students and young researchers in their regions.

"Unrestricted" Operating Accounts

Initially, there was $886K invested in the "Unrestricted" accounts: these funds can be used for society operations and at a 3.5% earning rate; the earnings might be expected to be just over $30K per year on average. In the past few years, **$10K/year** has been to cover operational expenses (~$40K) that are not quite covered by income from Dues (3.7K), *Journal of Orthoptera Research* (*JOR*) subscriptions ($2.7K) and Publications/*JOR* Royalties (24K). In addition, each year $2.5K is set aside to cover the $7,500 worth of Awards (2 x $2,500 for Young Professional Awards and the $2,500 Uvarov Award) presented once every three years at the Congress and $5-7k/yr is set aside to cover $15-20K of Congress expenses.

This gives a total ~$17.5-19.5K/yr for these three expenses. This leaves some room to fund additional worthy projects. At the Board meeting it was decided that a priority is the upgrading of the *Journal of Orthoptera Research*, so that it earns an impact factor. A number of options are being investigated and there are funds available to support such options as part of advancing our journal.

As well, it is important that we give some support to those who really cannot afford to come to the Congress--such support was regularly provided by Ted Cohn, as the "Anonymous Donor". So we could have 5-10 travel grants of several thousand dollars mainly for students, but we reserve some for young professionals and members from developing countries that have insufficient funds for travel to our Congress. As part of increasing the visibility of our Society, support could be provided for symposia at other meetings, such as the recent and very successful presentations at the 2016 International Congress of Entomology (ICE). And we could also support other worthy projects, including the publication of high quality books on Orthoptera.

The aim will be to use the generous legacy that we have in ways that ensure sustained growth for our Orthopterists' Society.

Treasurer's Report

By PAMELA MIHM
Treasurer
p.mihm@regencyapartments.com

The Statement of Assets as of December 31, 2016 and the 2016 Summary of Cash Receipts and Expenditures are shown below. The largest cash activity was in support of the Orthoptera Species File. This is funded by an allocation of endowment income from the University of Illinois. The second largest use of cash was publishing the *Journal of Orthoptera Research*. This activity operated at a deficit in 2016 due to a substantial decline in royalty and revenue sharing. You will note that the Society made a $10,700 contribution to the Congress in Ilheus and incurred $14,379 in travel costs for the Congress. These Congress costs are not an annual obligation and will occur every three years as the Congress is currently scheduled. The financial position of the Society has been greatly enhanced by the generous bequest from Dr. Theodore Cohn and from generous contributions over the years from other members. If you have any questions, please contact me at p.mihm@regencyapartments.com.

Orthopterists' Society
Statement of Cash Receipts and Expenditures
(1/1/16 through 12/31/16)

Cash Receipts	
Dues	$4,090.00
Publications	3,080.00
Page charges	276.00
Community Foundation endowment	8,625.94
Royalty and revenue sharing	17,328.47
Book reimbursements	240.00
Donations	230.00
Transfer cash from Vanguard & Wells Fargo	47,544.02
Proceeds from sale of investments	12,000.00
Contribution for OSF grants	10,000.00
University of Illinois allocation	100,000.00
Total Cash Receipts	$203,414.43
Cash Expenditures	
Publisher JOR	$4,735.44
JOR assistance	21,000.06
Research grants (Ted Cohn)	11,967.00
Executive director remuneration	1,500.00
Ed. Metaleptea remuneration	1,500.00
Webmaster remuneration	300.00
JOR editor remuneration	3,000.00
Maintenance of Orthoptera Species File	77,000.00
Grants-Orthoptera Species File	35,131.00
Professional fees (income tax preparation and audit)	6,295.00
Accounting reimbursement	12,000.00
OS retractable banners	519.35
ICE 2016 speaker travel expense	2,107.25
Contribution to Ilheus Congress	10,700.00
Travel-Int'l Congress	14,378.62
Uvarov Award	2,500.00
Young Professional Award	2,500.00
Other	3,004.91
Total Cash Expenditures	$210,138.63
Excess of Cash Receipts over Cash Expenditures	$(6,724.20)
Beginning Cash Balance	11,134.33
Ending Cash Balance	**$4,410.13**

Orthopterists' Society
Statement of Assets
(As of December 31, 2016)

Cash	
Paypal cash balance	$281.69
Midland States Bank	4,128.44
	$4,410.13
Investments at market value	
Vanguard:	
Grants (Note 1)	$370,801.38
Operating (Note 2)	714,890.62
	1,085,692.00
Wells Fargo:	
AAAI (Note 3)	11,555.37
Endowment (Note 4)	28,070.40
Operating (Note 2)	224,638.17
Grants (Note 1)	71,999.00
	336,262.94
Total assets	**$1,426,365.07**

Note 1: This fund is restricted and can only be used for research grants.
Note 2: This fund is nonrestricted.
Note 3: This fund can only be used for the Uvarov Award made at each int'l meeting.
Note 4: The income in this account is available for Society expenses; can extract capital but must have a plan for repaying it within 3 years.

Editorial

By **HOJUN SONG**
Editor, *Metaleptea*
hsong@tamu.edu

The International Congress of Orthopterology is my favorite scientific meeting, which I have attended continuously since the Montpellier meeting in 2001. I have participated in this meeting as a graduate student, as a postdoc, and as a professor with my own students. At every meeting, I have met new orthopterists who have since become my friends and colleagues. So, for me, this meeting is more than just a scientific meeting, but more like a reunion. I am sure many of us feel this way. The sense of community is something that I have always felt with my fellow orthopterists.

The Orthopterists' Society is the best taxon-based society within the field of entomology. There is no other insect society that supports as many students and young researchers as we do, has a comprehensive taxonomic database as we do, or has a financial situation as robust as we do. We might not be as large as coleopterists or lepidopterists, but we do everything better. How have we achieved this feat? It is all because of our members. Our members truly care about the future of our society and the field of orthopterology. Throughout the society's history, many of the members have been visionaries, in terms of developing and maintaining amazing tools such as OSF as well as financially supporting the society through generous endowments. I am so proud to be a part of this great society.

At the ICO meeting in Brazil, I met many young orthopterists who were eager to learn and conduct high-impact research, but also quite limited in obtaining necessary resources. It is disheartening to see bright young orthopterists not able to do the types of research they desire to conduct just because they live in countries with limited funding for science or the technology is not easily approachable. I believe that this sort of issue is not intractable and our society has a role to play to address the problem. Maybe that is the next challenge where a new vision is needed. I think Hugh's article also echoes this sentiment.

As always, this issue is full of interesting contents, including the recaps of ICO 2016, ICE 2016, OIRSA meeting, and more. This is probably one of the largest issues in recent years. As you can read, we are a vibrant society with a lot of things happening around the world. I believe that we have a bright future ahead of us.

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. Derek recently joined the USDA: APHIS, PPQ, CPHST as part of their Rangeland Grasshopper and Mormon Cricket Management Team, so please drop a line to congratulate him.

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 May of 2017, so please send me content promptly. I look forward to hearing from you soon!

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