The GSG Newshopper

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Red List status of South African Katydids

Threatened Orthoptera on the Seychelles

The rescue of the Lord Howe Island Stick Insect

The discovery of the Mexican grasshopper *Liladownsia fraile*

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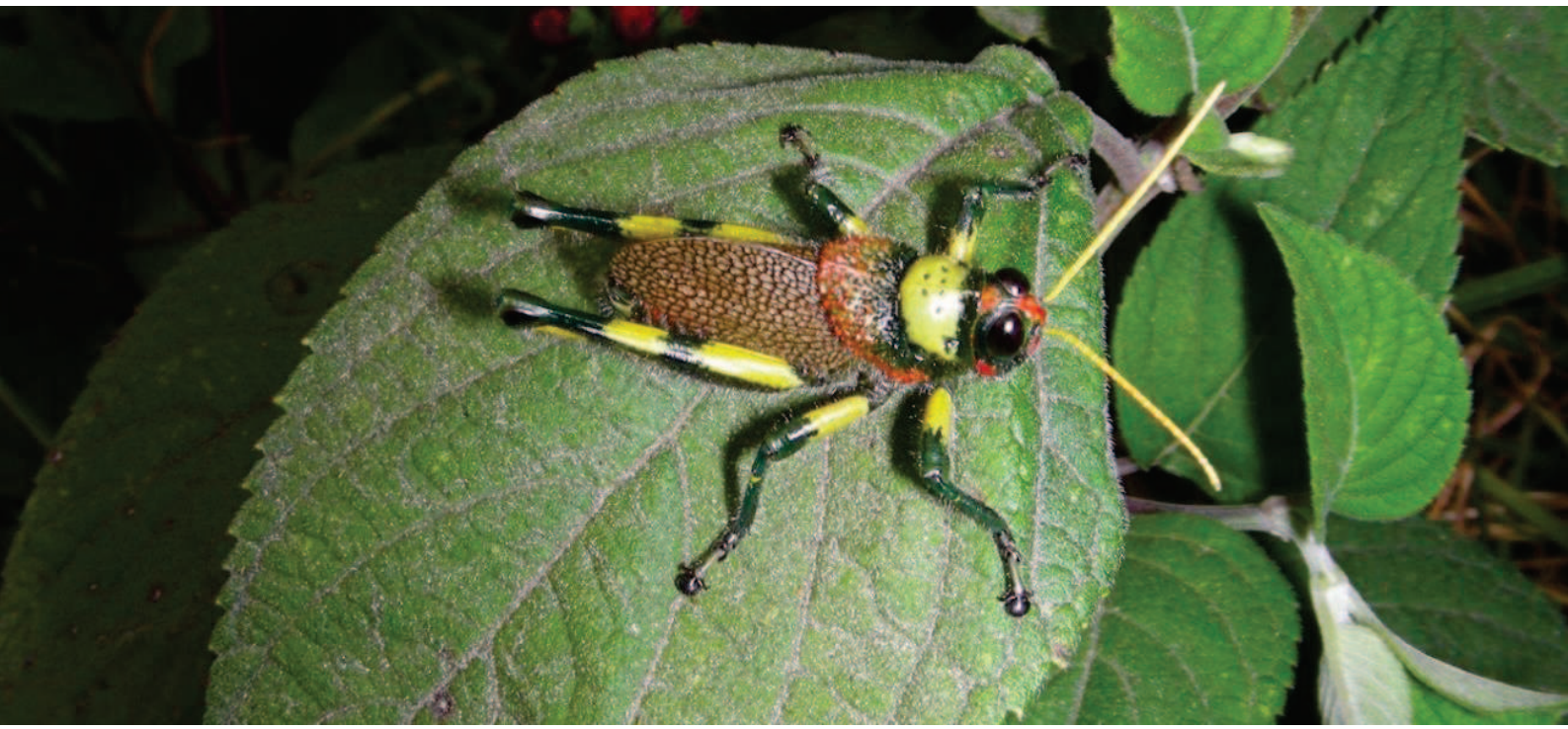

***Liladownsia fraile* adult male (photo – P. Fontana)**

Mexico is an extraordinary country. There you can find many things but, more interestingly, at the end you can also find things that you were not looking for. Nature, history, people, food, ancient and modern life, handicraft, art, science, music, drinks, peace, passion, adventure, rest, danger, religion, friendship… all of this is merged in a full colour masterpiece, such as Michelangelo's Sistine chapel ceiling or an Eduardo Ribera fresco. We had the great fortune of not only travelling in Mexico on vacation, but also to study the nature of the country and to discover the essence of it. The world is so complex, intricate and interconnected that studying even one natural aspect of a country such as Mexico you end up having an overall image that is very sharp, bright and charming. Mexico, in short, is a mega-diverse country, with all of its diversity stemming from its natural biodiversity. The biodiversity of a place in turn influences the cultural diversity of the people who inhabit it; the variety of plants and animal species, climates, raw materials, scenarios and horizons of Mexico has shaped a constellation of cultures, languages and traditions that, even after centuries of human history and cultural influences, are still alive and vibrant. If we pay attention to the colour of the flowers, birds, reptiles and insects of Mexico, we understand that the vitality of the churches of Puebla, or the splendour of the costumes of the state of Oaxaca are a direct link between biodiversity and human culture. The wilderness is not only a pleasant place for relaxation or adventure, but it also reminds us that to preserve the biodiversity of our planet does not mean we should abstain from our atavistic pleasure to experience nature. Nature has shaped and shapes us, gave us the past and gives us a future because we are nature and this became tangible at every step, at every stop, travelling in Mexico.

Paolo Fontana with *Liladownsia friale*

Throughout the visit we travelled thousands of miles, sometimes together and sometimes solo. We travelled between towns and villages, ranging from the seashores to the peaks of high mountains, visiting every habitat we could from deserts to tropical forest, along the banks of rivers to dry, stony areas. It wasn't all plain-sailing however, encountering "chiggers", mosquitoes and even fields with many rattlesnakes! Over the course of the trip we met many people from all walks of life, all curious about our research and willing to help or give advice where they could. We did a great deal of work on Mexican insects, focusing especially on grasshoppers, bush crickets and crickets, praying mantids and stick insects. Our research into the insects of Mexico gave us new challenges every day and has been crowned by the successes of many discoveries and even rediscoveries; the biodiversity of Mexico is widely known, but equally there remains much to discover. During our field expeditions we have found many new species and several new genera and during the study of our collected material and comparing it with that found in the collections, we have found many more.

***Liladownsia fraile* habitat (photo – P. Fontana)**

***Liladownsia fraile* male nymph (photo – P. Fontana)**

The discovery of a new species is always done by accident, but sometimes the circumstances of a new discovery are really unusual if not ridiculous. A “pit-stop”, possibly to fulfil a physiological need, can result in a significant event for the expedition. Secluded behind a bush, you shout to your companions to grab the net, the camera, the bottles – “hurry, it's not a joke, move!” Or when in the evening, tired from such a hectic and challenging day that all you can think of is a plate of frijoles and tortillas, you see a small area that seems to be unconsciously and instinctively inviting you to take a look… and you stop abruptly the car, parking it in a probably not so orthodox way and after a few moments, you realize that the real work of the day begins right there, where you search for, collect and photograph until the last ray of light allows it.

Very often new species, such as children to their parents, are beautiful and fascinating only or primarily for those who have made the discovery. The skilled entomologist understands the uniqueness of a population or a single individual perhaps, from small details; a tinge of colour, a protuberance more or less pronounced, or maybe a quick review with a simple lens of the male genitalia, and here's a new species which appears to be identical to another already known. For those who work in this field, for they who have a passion for natural science and try to give a contribution, no matter how small, to the unveiling of biodiversity the discovery of a new species, even based on the identification of characters imperceptible to non-specialists, is always a source of great joy and pride. The paper of the newly described taxa makes the taxonomist as proud as a soldier of

the medals pinned on his chest or indeed, as the list of love conquests of Don Juan (*Madamina, il catalogo è questo delle belle che amò il padron mio….*) because the taxonomy could best be compared to a loving rather than military conquest!

After all of these ramblings arising from our most vivid experiences, our article can only arrive at one of our most beautiful and beloved discoveries; the finding, the study and description of the grasshopper which we gave the scientific name of *Liladownsia fraile*. We found this species of grasshopper truly unique, both for its vibrant coloration and also for other ecological and biogeographical characteristics during an expedition in Mexico organized by the University of Central Florida (UCF), the Fondazione Edmund Mach (Centro Trasferimento Tecnologico) and the World Biodiversity Association (WBA onlus) in December 2011. The species was found in a mountainous area in the southern part of the Sierra Madre del Sur, in the state of Oaxaca, and close to the village of San José del Pacífico. The first site where the species was collected was a small clearing at the roadside, characterized by an intense flowering of several herbaceous plants, which fortunately was also one of the few places where you could park a car. The outcome of this stage of the expedition seemed likely to be poor, having regard to the winter season and the disappointing results of earlier stages in similar areas, until Paolo Fontana (FEM-CTT and WBA), who led the expedition which was

***Liladownsia fraile* nymph (photo – P. Fontana)**

Adult female *Liladownsia fraile* (photo – P. Fontana)

attended by Ricardo Mariño-Pérez and Derek A. Woller (PhD Candidates at UFC) and Paola Tirello (University of Padova and WBA) found a juvenile specimen of grasshopper that appeared immediately as something extremely interesting and new. We decided to spend the rest of the evening in the area and after some minutes we finally found one adult, then another and so on. Then night came and we had to sadly finish. The next day we returned early in the morning and we found even more adults.

The study of the collected material has revealed to be a new species and a new genus of Melanoplinae, a group of grasshoppers that in Mexico counts a large number of genera and many species are endemic. The research on this new grasshopper were also carried out on a molecular basis by Dr. Hojun Song (UFC) and his collaborators, allowing us to ensure its uniqueness but also its affinity in the context of other kinds of Melanoplinae from Mexico and from the Americas in general. A new field expedition took place in December 2013, allowing us to find new material and to verify the distribution of the new species which was found always just on the outskirts of San José del Pacifico, between 1200 and 1600 m above sea level. This new species lives in a region characterized by extensive forests of oak and pine, and seems to feed on grasses, mainly Lamiaceae, and in particular of *Salvia elegans* the so-called Pineapple sage, a plant native to the mountainous regions of Mexico. The relevance of this new species comes from its restricted geographical

distribution and its ecological needs which see it as a typical inhabitant of forests of oaks and pines areas. Furthermore the new species seems to be able to feed on plants largely characterized by the presence of essential oils that possibly could lend the grasshopper a kind of chemical protection that would explain the vivid coloration; vivid coloration is typically used by insects to signal to predators some form of chemical defence. Another important aspect of this new species comes from its phylogenetic position, in fact, the study of its DNA is allowing us to better understand the relationships between different kinds of grasshoppers in Mexico and therefore the relevant mechanisms of speciation. Molecular taxonomic study, like the ecological, phenological and geografical data of this new genus and new species has now been published in an international journal, Zootaxa (Woller et al., 2014).

The intrepid explorers: (l-r) Paola Tirello, Paolo Fontana, Ricardo Marino Perez and Derek A. Woller

The new genus, which has been assigned the scientific name of *Liladownsia* n. gen. was dedicated to Mexican singer Ana Lila Downs Sánchez, in art Lila Downs, who also hails from the state of Oaxaca. Lila Downs is an international artist, having won a Grammy award amongst other such accolades, and takes to stages all around the world the many indigenous languages of Mexico such the Mixtec and Zapotec and uses traditional costumes in her performances. She also has great sensitivity towards different social issues, which she portrays most often through images drawn from nature and ancient traditions of her land, such as in the song "Árbol de la vida". The tribute to this great artist is also a tribute to the nature and culture of Mexico, both extraordinary and characterized by great diversity, richness and originality. The new species has been given the scientific name of *fraile*, so the full name is *Liladownsia fraile* Fontana et al., 2014. "Fraile" is Spanish for “friar”, and this is the common name that the inhabitants of the area of San José del Pacífico give to this insect, which was until now unknown to science but certainly not to the inhabitants of the region in which it lives. Another common name used locally is "Chapulín de Capucho" meaning “grasshopper with a hood”. *Liladownsia fraile* is in fact characterized by a kind of hump which may just seem like a monk's hood. In

addition to common names, talking to the locals, it was possible to have a lot of important information on the biology of this new species.

Since the area of San José del Pacífico is characterized by intense tourism but also unfortunately deforestation in order to clear the field for crops and herds of cattle and sheep. The natural environment in which *Liladownsia fraile* lives is seriously threatened and that's why we proceeded immediately to assessing this new species for the Red List produced by the IUCN. The original geographical distribution of *Liladownsia fraile* is already fairly restricted and with human pressure is becoming smaller and smaller.

The discovery, study and description of this species is not only an example of how biodiversity is still only partially known but also of how, during scientific expeditions, respect for and dialogue with local people is essential to achieve important scientific goals and for all aspects related to nature conservation. Also it is imperative to let the general audience know about the discovery of new species. Just as an example, after the news of this discovery was covered in social media such as Facebook and Twitter, people started to upload pictures and videos of *Liladownsia fraile*. This new information provides us new localities (close to San José del Pacífico) which we haven't visited yet. Also, in some pictures additional information is provided such as a new colour form for the male. Without a question, new technologies such social media are not only telling people in which place you are eating or what movie are you watching but also are helping to improve the assessment of endangered species.

As humans, we take care of what we love, and we love only what we know. The IUCN Red List is the perfect way of letting people know about this grasshopper and by consequence people will begin to take care of species such as *Liladownsia fraile*.

Type locality habitat of *Liladownsia fraile.* (photo – P. Fontana)