



ARTS: Litter Bugs: revisionary and phylogenetic research on the least studied true bug infraorder (Insecta: Hemiptera: Dipsocoromorpha)

Litter Bug Newsletter Oct. 2014

- Project Progress
- IHS Meeting/ Dipso workshop
- Collaborators
- Slide mounting workshop
- Undergraduate research
- Museum Visits
- Collecting trips

Project Progress: Numbers

Specimens acquired: >17,000!!

Extracted: **~230** *Chinannus trinitatis*

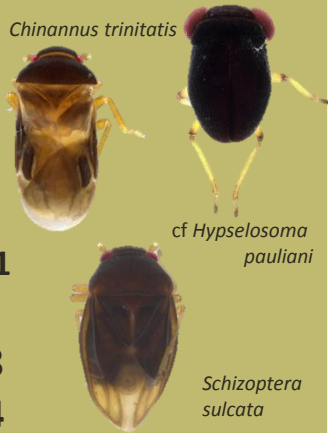
Imaged: **370**

- Habitus: **275**
- SEM: **30**
- Confocal: **34**
- Compound: **31**

Dissected: **54**

Slide-mounted: **58**

Databased: **2,384**



IHS Meeting & Dipsocoromorpha Workshop

In July 2014, the 5th quadrennial **International Heteropterists' Society** meeting took place at the United States National Museum. Alex, Stephanie and Rochelle gave talks on their work on *Chinannus*, *Schizoptera* and Hypselosomatinae, respectively. Stephanie won 2nd place in the student competition. At the meeting, the "UCR crew" was able to meet and interact with a number of the project collaborators.

A one day **Dipsocoromorpha workshop** took place on July 25th that allowed 12 team members (see collaborators below plus UCR crew and a few guests) to discuss issues concerning head, wing and abdominal homologies. Christiane, Alex, David Rédei and Stephanie summarized homology and terminology problems based on comparative images of Dipsocoromorpha. Discussions were energetic and overall productive. The UCR crew is in the process of producing additional documentation (drawings, SEM, etc.) and will engage other team members in comparative morphological synopses.

Rochelle presenting at IHS

Alex presenting at IHS

Stephanie's presentation title



TOP-DOWN INSTEAD OF BOTTOM-UP: TOWARDS A SYSTEMATIC REVISION OF SCHIZOPTERA FIEBER (HETEROPTERA: SCHIZOPTERIDAE)

Stephanie Leon & Christiane Weirauch
University of California, Riverside



Collaborators (present at the IHS meeting)



Petr Baňář



Dimitri Forero



Tom Henry



José Antonio Fernandes



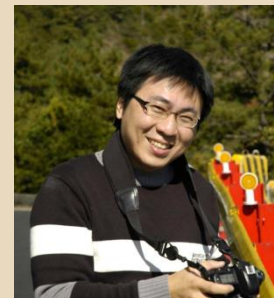
Dávid Rédei



Toby Schuh



Pavel Štys

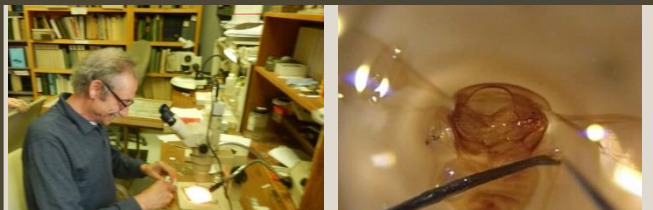


Jingfu Tsai



ARTS: Litter Bugs: revisionary and phylogenetic research on the least studied true bug infraorder (Insecta: Hemiptera: Dipsocoromorpha)

Slide mounting workshop



Left: Vladimir demonstrates how to dissect a specimen for slide-mounting. **Right:** Wings are removed from *Kokeshia* sp. in clove oil.

In early March, Christiane organized a workshop during which Serguei Triapitsyn (UCR, Entomology Museum) and Vladimir Berezovskiy, both experts in slide-mounting microhymenoptera, trained the UCR crew in slide-mounting techniques. Fifty specimens representing 20 taxa were slide-mounted. Together with Serguei and Vladimir, the UCR crew has started preparing a manuscript on slide-mounting techniques for small Hemiptera based on the workshop.



Emsley slide (left) vs. our slide (right)

Undergraduates: work and research

Bridget Gonzales and **Bryan Vanderveer** continued with sample sorting, imaging, and databasing of specimens for the project. **Walena Logan** joined the team by sorting samples and is now imaging specimens. In addition, three undergraduates were involved in research projects: **Mariana Romo** (winter quarter 2014) helped assemble well-illustrated identification keys to genera of the *Corixidea* group and subgenera of *Schizoptera* Fieber. Walena Logan (spring quarter 2014) scored the Dipsocoromorpha literature for wing types; these data, together with our own observations will be important for ancestral state reconstruction of wing types across Dipsocoromorpha.

Well-illustrated Identification Keys



Sarah Frankenberg (summer REU 2014) sorted, imaged and databased specimens of *Guapinannus* Wygodzinsky and *Peloridinannus* Wygodzinsky in an effort to determine species-level diversity in these two genera. Results on *Peloridinannus* were presented as a poster at Student Seminar Day (Entomology Department; September 2014). Some of the results and conclusions: Male specimens of *P. margaritatus* were documented for the first time; males and females show very limited sexual dimorphism in this genus. In addition to *P. margaritatus*, 4 undescribed species of *Peloridinannus* were discovered. Male and female genitalic features and wing structure and venation appear to provide reliable species-diagnostic characters. *Peloridinannus margaritatus* ranges from Costa Rica to Peru. As more specimens are collected, we expect other species to show wider ranges as well.



Imaging techniques to document *Peloridinannus*: (A) Habitus (B) confocal image of abdomen (C) SEM of head

Museum Visits

In March 2014, **Stephanie** traveled to the **USNM** for one week. She sorted through pinned material as well as ethanol-preserved fogging material from Ecuador. A whopping 1,215 schizopterids were "pulled" from the fogging samples, indicating that schizopterids are quite common in the forest canopy! Stephanie also imaged 40 schizopterid type specimens including 24 *Schizoptera* types. Tom Henry was a superb host and assisted in the preparation of a large loan (~1,400 specimens).

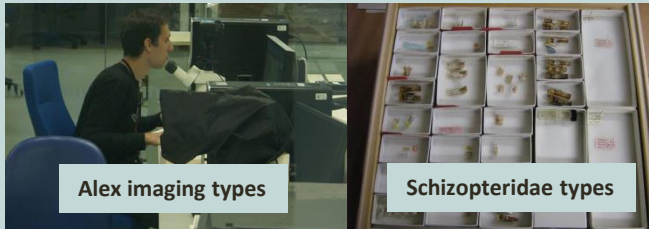
Stephanie sorting fogging samples *Hypselosoma boops* McAtee & Malloch 1925





ARTS: Litter Bugs: revisionary and phylogenetic research on the least studied true bug infraorder (Insecta: Hemiptera: Dipsocoromorpha)

Museum Visits



Alex imaging types

Schizopteridae types

In September, Alex visited the **British Museum of Natural History**, London, to image type specimens and sort unidentified dry material. The most interesting types he studied were those of *Ommatides insignis* and *Oncerodes robusta*. Both species had been poorly described and are important to ongoing projects on Hypselosomatinae and the *Corixidea*-group, respectively. Alex took 103 pictures of type specimens that belong to 28 species. The dry collection of Dipsocoromorpha (5 drawers) mostly contained Ceratocombidae (~3 drawers). Alex also sorted out ~1 drawer of Schizopteridae, of which he took ~100 specimens (*Schizoptera*, *Corixidea*-group, *Chinannus*, *Nannocoris* and New World Hypselosomatinae) on loan.

Ommatides insignis Uhler 1894

Nannocoris capitata Uhler 1894



Thank you! Residue sorting at the FMNH and FSCA is over and we would like to thank Robin Delapena and Walter Winn for their efforts. Robin sorted >1,400 samples and recovered 7,510 specimens, about 50% of the overall targeted number for this project. Walter sorted 288 samples and a total of 831 specimens. Christiane will sort specimens at the IZIKO museum in 2015.

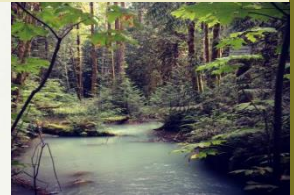
Vancouver 2014

Stephanie and Christiane went on a “fishing expedition” to the temperate rainforests north of Vancouver (August 24-27, 2014) in an effort to collect additional specimens of a mysterious *Chinannus* Wygodzinsky (Scudder, 2010) of which only one specimen was collected. They spent 2 days sifting leaf litter in the Squamish area and caught up with Geoff Scudder and Karen Needham at the University of British Columbia. Other than about 40 specimens of *Ceratocombus*, no additional Dipsocoromorpha were collected during this trip. The original collecting site in Pacific Spirit Park has been developed, but even at the time of collection was the location of a wood processing factory.

Upon our return, genitalic features of the single known specimen were examined and are identical to an undescribed species of *Chinannus* from Venezuela (2 localities, 17 specimens) that are about to be described. This is taken as evidence that the “Canadian mystery bug” was likely an introduction, potentially connected with wood imported by the processing factory.



“Canadian mystery bug”



Paradise Valley, Squamish

Costa Rica 2014

Originally destined to explore the schizopterid fauna of western Africa, Christiane, Stephanie and Alex travelled instead to Costa Rica in late September for two weeks to do field work. The team met with Jim Lewis at INBio and did field work at **Las Cruces** Biological Station (Puntarenas) and **Monteverde** Research Station (Guanacaste). Over 130 schizopterids were collected using active methods (i.e. beating and sweeping), with numbers from passive methods pending. The commonly encountered genera *Nannocoris*, *Corixidea*, and *Schizoptera* are key for Christiane, Alex, and Stephanie’s revisionary projects. Yellow pan traps, Malaise traps, litter sifting and sorting, Berlese funnels, and light traps were set up at both stations, resulting in ~30 samples. The team also meet insect photographer Kenji Nashida, who took some of the first live schizopterid digital images in Monteverde.



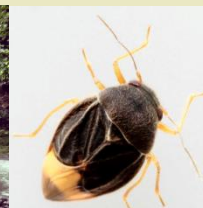
Christiane & Stephanie in Las Cruces

Alex setting tying the malaise trap

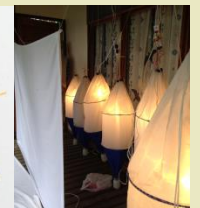
Christiane covering the malaise trap



River at Monteverde research station



Schizoptera sp. Image by Kenji Nashida



Berlese funnel set-up