Head, Shoulders, Knees and Toes:
A Morphological Study of the Schizopterid (Heteroptera: Dipsocoromorpha) Head and Thorax
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Introduction
Dipsocoromorpha, or litter bugs, are possibly the least known infraorder of true bugs. Schizopteridae is the largest family in Dipsocoromorpha and comprises ~48 genera and ~230 species. It showcases stunning morphological diversity and varying degrees of abdominal and genitalic asymmetry. Schizopteridae exhibit a wide range of simple and complex wing venation patterns and some females even possess true elytra. The group is currently divided into three subfamilies: Schizopterinae, Ogeriinae and Hypselosomatinae.

Objectives
1. Document wing venation and competing venation hypotheses for Schizopteridae
2. Document thoracic structures including:
   - Pretarsal structures
   - Adhesive pad
   - Subgeneric characters of Schizoptera

Materials and Methods:
- 12 Specimens were selected from field collected material from Cameroon, Colombia, Peru, Argentina and Thailand
- Habitus images of specimens were taken on a GT Vision Imaging System
- Wings from 10 specimens, representing 10 genera, were slide mounted and imaged using a Zeiss Axioskop 2 compound microscope
- SEM images were generated at the UCR CFAMM (Central Facility for Advanced Microscopy and Microanalysis) using the XL30 FEG Scanning Electron Microscope

Background on wing venation hypotheses in the clavus of basal Heteroptera
The homology of the two claval veins of Heteroptera is inconsistent in the literature. Some authors label them as postcubitus (pcu) and first anal vein (1AN), others as the first and second anal veins (1AN and 2AN). Wootton (1986) rejected the existence of a postcubitus in Heteroptera.

Because of these competing hypotheses that impact interpretation of the more anterior wing veins, wing venation homologies are poorly understood in Dipsocoromorpha.

We here review wing vein hypotheses of basal heteropteran groups and previously studied schizopterid and synthesize this information to generate venation hypotheses that are consistent across these groups.

Results and Discussion

Wing Venation

- Groundplan hypothesis for the forewing of Heteroptera (Wootton & Betts 1986)
- Fore wing venation of Enicospilus enoplia (Wygodzinsky & Schmidt 1992)
- Generalized germoplanc forewing
- Forming of Hypselosomatinae


Our preferred hypothesis above:
- We follow Redei (2008) and disregard the venation hypothesis presented by Emsley (1969) (we only see one anal vein in the wing membrane, as in most Heteroptera). The position of Cu is along the claval fold, as noted by all authors, but the continuation of Cu through the remigium still remains ambiguous.

Coxal Adhesive Pads and Metasternal Spine

Unique to Schizopteridae are rugose pads, also called adhesive pads, on the inner surface of the metasternal coxae. These structures have been described, but not imaged before. The literature suggests that in conjunction with the metasternal spine, these pads are used as a jumping device in some genera (Schizopter & Corixidae). Upon closer observation it remains unclear how they aid in jumping.

Thorax: diagnostic features

The genus Schizoptera showcases high levels of morphological variability in structures of the thorax. This genus is divided into six subgenera, of which three were examined using SEM.

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References: