Differential Analysis of Individual Centruroides vittatus Venom

Isabella Batallas1, C. Neal McReynolds2, Kelci Knight1, Whitney Smith1, Thomas McElroy1 and Eric A. Albrecht1

1 Kennesaw State University, Kennesaw GA 30144. 2 Texas A&M International University, Laredo TX, 78041

Abstract
Scorpions are well-known, venomous arthropods (Class: Arachnida, Order: Scorpiones). Their venom is composed of neurotoxins, proteases and cytotoxic peptides which play a major role in toxic components such as inflammatory, antimicrobial and hemolytic activity. Venom is key for the survival of scorpions as it is involved in defense against prey and in feeding on predators. *Centruroides vittatus* (harbark scorpion) is commonly found in North America, with habitat ranges from Nebraska to southern Texas. For this study, scorpions were harvested from Laredo, Texas (27°37’ N, 99°43’ W), held in captivity for 4 months and fed a consistent diet of *Decena domestica*, prior to milking. The venom signatures from individual size class IV scorpions and the pooled samples from size class IV and I-II scorpions were investigated. Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and LiCor scanning techniques were employed to resolve differences in venom signatures. Selected protein band (9) returned normalized intensity values of 112571.12, 56472.49, and 57149.72 for Luc1, Luc2, and Luc3, respectively. This suggest, on average, Luc2 and Luc3 expressed a 0.50 fold lower expression compared to Luc1. Meanwhile, selected protein band (7) returned normalized intensity values of 16250.12, 20311.69, and 29904.62 for Luc1, Luc2, and Luc3, respectively. This suggest, on average, Luc2 and Luc3 expressed a 1.55 fold higher expression compared to Luc1. Examination of pooled size class I-III and size class IV venom suggests size class IV venom displays higher intensities for bands 3, 4 and 7 compared to size class I-III scorpions. Our data suggests there is a difference between individual *C. vittatus* venom signatures.

Introduction
Scorpions are well-known venomous arthropods (Class: Arachnida, Order: Scorpiones). Their venom is composed of neurotoxins, proteases and cytotoxic peptides which play a major role in toxic components such as inflammatory, antimicrobial and hemolytic activity. Previous reports have demonstrated venom is diverse among scorpion species and geographic locations [1, 2]. Diversity in the concentration of elements that make up venom among different scorpion classes was investigated by pooling three classes of bathide scorpions separately (*Androctonus bicolor*, *Androctonus crassicauda*, and *Loxosceles quiroti*). We hypothesize that individual size class IV scorpions express a venom signature that is different from size class I-III scorpions and that pooled size class I-III scorpions were analyzed by SDS-PAGE and LiCor scanning techniques to determine differences in venom signature. The venom signatures from individual size class IV scorpions and the pooled samples from size class IV and I-II scorpions were investigated. Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) and LiCor scanning techniques were employed to resolve differences in venom signatures. Selected protein band (9) returned normalized intensity values of 112571.12, 56472.49, and 57149.72 for Luc1, Luc2, and Luc3, respectively. This suggest, on average, Luc2 and Luc3 expressed a 0.50 fold lower expression compared to Luc1. Meanwhile, selected protein band (7) returned normalized intensity values of 16250.12, 20311.69, and 29904.62 for Luc1, Luc2, and Luc3, respectively. This suggest, on average, Luc2 and Luc3 expressed a 1.55 fold higher expression compared to Luc1. Examination of pooled size class I-III and size class IV venom suggests size class IV venom displays higher intensities for bands 3, 4 and 7 compared to size class I-III scorpions. Our data suggests there is a difference between individual *C. vittatus* venom signatures.

Results
The venom signatures from individual size class IV scorpions and pooled samples from size class IV and I-II scorpions were investigated. Total protein band intensities (Figure 4) were used to normalize scorpion samples. The BSA band intensities from figure 4 were plotted and used to determine total protein concentration of the venom samples: Luc1, Luc2, and Luc5 (Figure 5). The total protein normalization factor was applied to subsequently analyzed venom samples (Table 2). Figures 6 shows a coomassie stained gel containing the venom signatures of three individual scorpions. Luc1 appears to have fewer bands compared to Luc 2 and Luc5. The protein bands from figure 6 were scanned and analyzed to generate normalized protein band intensities (Table 2). Measured protein band intensities (band 7 and 9) for Luc2 and Luc5 indicate the bands are 55 fold greater in intensity compared to Luc1 (Table 2).}

Conclusions

References