

Poster Abstract

Differential Analysis of Individual *Centruroides vittatus* Venom

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Scorpions are well known, venomous arthropods (Class: Arachnida, Order: Scorpiones). Their venom is composed of neurotoxins, proteases and cytotoxic peptides which plays 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* (bark 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°57' N, 99°43' W), held in captivity for 4 months and fed a consistent diet of *Acheta domesticus*, prior to milking. The venom signatures from individual size class IV scorpions and the pooled samples from size class IV and I-III 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 LUC 1, LUC 2, and LUC 5, respectively. This suggest, on average, LUC 2 and LUC 5 expressed a 0.50 fold lower expression compared to LUC 1. Meanwhile, selected protein band (7) returned normalized intensity values of 16250.12, 20311.69, and 29904.62 for LUC 1, LUC 2, and LUC 5, respectively. This suggest, on average, LUC 2 and LUC 5 expressed a 1.55 fold higher expression compared to LUC 1. 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.

Key Words: Scorpion, *Centruroides vittatus*, venom, Differential

Results

The venom signatures from individual size class IV scorpions and the pooled samples from size class IV and I-III scorpions were investigated to determine if there were differences in the venom signatures. Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), LiCor scanning, and ImageJ techniques that were employed showed differences in bands that appeared and in intensities for the individuals and pooled samples. Selected protein bands (7 and 9) were found in all three scorpions and suggested that, on average, LUC 2 and LUC 5 expressed a 0.50 fold lower and a 1.55 fold higher expression, respectively, compared to LUC 1. Examination of pooled size class I-III and size class IV venom suggests size class IV venom displays a 1.43, 1.13, and 1.06 fold higher expression higher for bands 3, 4 and 7, respectively, compared to size class I-III scorpions.

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Conclusion

Our data suggests there is a difference between individual *C. vittatus* venom signatures as well as a difference between separate size class venom signatures.

Current and past *Centruroides vittatus* scorpions were collected from La Union Ranch at San Ygnacio, Texas and then, measured and weighed (Table 1, Figure 1). Based on the measurements between the anterior of their prosoma and the posterior of their mesosoma, the scorpions were assigned a class size (Figure 2). The scorpions were fed monthly and water weekly. They were also used for venom extraction that occurred weekly by gripping the tail of each in an arena and guiding its stinger into a parafilm covered centrifuge tube that was used to collect the droplets (Figure 3).

Introduction

Scorpions are well known venomous arthropods (Class: Arachnida, Order: Scorpiones). Their venom is composed of neurotoxins, proteases and cytotoxic peptides which plays 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* (bark 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°57' N, 99°43' W), held in captivity for 4 months and fed a consistent diet of *Acheta domesticus*, prior to milking.

Previous reports have demonstrated venom is diverse among scorpion classes 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 buthidae scorpions separately (*Androctonus bicolor*, *Androctonus crassicauda*, and *Leirus quinquestriatus*) [2]. As for diversity within the same species, but different geographic locations, Abdel et al. investigated the Egyptian scorpion *scorpio maurus palmatus* in Southern Sinai and in Western Mediterranean Coastal Desert (WMCD [2]. The report suggested differences in venom peptides and proteins. Particular, the report found that individual pooled samples from each location showed different protein bands and the venom had different potencies based on location. [2].

We hypothesize that individual size class IV scorpions express identical venom signatures and that pooled size class I-III samples will display different venom signatures from pooled size class IV, which may represent ontogenetic diversity.

References

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