



A Comparative Analysis of Dentition of Four Snakes from the Big Thicket National Preserve; *Elaphe obsoleta lindheimeri*, *Crotalus horridus atricaudatus*, *Nerodia erythrogaster flavigaster*,

Agleiostrodon piscivorus leucostoma

Aracely Vazquez, Jeff Hughes* and Paul Crump *

*Eastfield College, DCCCD, Mesquite, TX * Herpetologist, Houston Zoo



Thamnophis sirtalis sirtalis Photograph by Merry Blake

Abstract

There are many different species of snakes in the world. A snake's diet, size, and even colors can sometimes be used to identify which area they inhabit. This research was conducted with the intent to record the different species found at the Big Thicket National Preserve and to compare the dentition of *Elaphe obsoleta lindheimeri*, a non-venomous terrestrial constrictor, *Crotalus horridus atricaudatus* a venomous terrestrial, *Nerodia erythrogaster flavigaster* a non-venomous aquatic, and *Agleiostrodon piscivorus leucostoma*, a venomous aquatic. The teeth of the terrestrial snakes were expected to have more curvature than those of the aquatic snakes because of the difference in the diets of each species. Comparative analysis of dentition with a scanning electron microscope indicated the curvature of teeth of the terrestrial snakes versus the teeth of the aquatic snakes were not significantly different.

Introduction

Snakes are categorized as terrestrial or aquatic depending on their habitat and diet (1). For this study, a comparison of dentition was performed between four species of snakes inhabiting the Big Thicket National Preserve, *Elaphe obsoleta lindheimeri*, a non-venomous terrestrial constrictor, *Crotalus horridus atricaudatus* a venomous terrestrial, *Nerodia erythrogaster flavigaster* a non-venomous aquatic, and *Agleiostrodon piscivorus leucostoma*, a venomous aquatic. A Hitachi S-3400N scanning electron microscope (SEM) was used to determine if a correlation exists between dentition and diet. Because the diets of terrestrial and aquatic snakes differ, a noticeable difference in the curvature of the teeth is expected.



Agleiostrodon concolor concolor
Photograph by Jeff Hughes Edited by Michael Black

Methods

Nonliving road-killed snake specimens were collected from the roads of Saratoga, TX from 8 pm to 2 am June 6-16, 2009. The specimens were placed in plastic bags and stored in an ice chest until returning to the Big Thicket Field Research Station. The time of collection and length of each specimen was recorded. Each specimen was measured in centimeters using a vinyl tape measure. The specimens were rinsed with tap water and preserved in a half pint, quart or gallon jar, depending on the size of the snake. The specimens were preserved in 80% water and 20% formaldehyde solution for two weeks to preserve the tissues. Once returning to the Eastfield Microscopy Lab the specimens were transferred to distilled water for one week, and stored in a solution of 60% distilled water and 40% isopropyl alcohol. Of the specimens collected, *Elaphe obsoleta lindheimeri*, *Crotalus horridus atricaudatus*, *Nerodia erythrogaster flavigaster*, and *Agleiostrodon piscivorus leucostoma* were chosen for comparison of dentition. Each specimen's lower right mandible was removed with a scalpel, forceps, and small straight pins. Each mandible was placed in a vial of 9.5 ml of typical store brand bleach (6.0% sodium hypochlorite). After 24 hours, each mandible was placed in tap water for an hour and placed on a SEM stub with double-sided carbon sticky tape. Micrographs of the specimen's teeth were taken with a Hitachi S-3400N SEM. Also, photographs of the snakes were taken using a Canon A580 digital camera for documentation.



Agleiostrodon piscivorus leucostoma Photograph by Aracely Vazquez Edited by Michael Black

Results

A total of 29 snakes and 9 species were collected from the roads of Big Thicket National Preserve, 17 non-venomous and 12 venomous. Chart 1 shows the scientific name and the percentage of snakes collected. Figure 1 shows a micrograph of *Elaphe obsoleta lindheimeri*, Figure 2 shows a micrograph of *Crotalus horridus atricaudatus*, Figure 3 shows a micrograph of *Nerodia erythrogaster flavigaster*, and Figure 4 shows a micrograph of *Agleiostrodon piscivorus leucostoma*. The SEM micrographs were used to determine that there was no significant difference between the dentition of aquatic snakes versus terrestrial snakes.

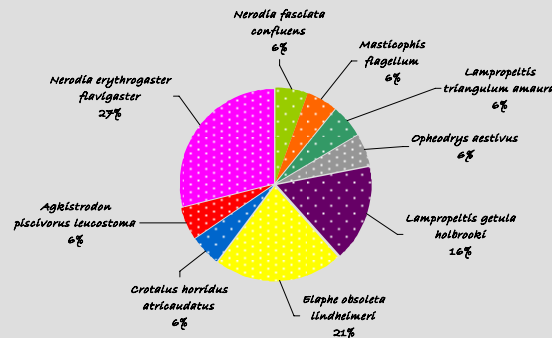


Chart 1: Species Collected

Discussion

It was expected that the teeth of *Elaphe obsoleta lindheimeri* and *Crotalus horridus atricaudatus* teeth would have a distinct curvature. This was believed because of their diets which consists primarily of small mammals. This diet would require many curved teeth to penetrate layers of fur and flesh. After observing the teeth with the SEM, it was established that the teeth of both *Elaphe obsoleta lindheimeri* and *Crotalus horridus atricaudatus* were distinctly curved. As for the other two species, *Nerodia erythrogaster flavigaster* and *Agleiostrodon piscivorus leucostoma*, it was expected that because of their diet, which consists primarily of amphibians and fish, they would have teeth with less curvature than the other two terrestrial species in this study. It was believed that this diet would not require much curvature of the teeth because an amphibian's skin can easily be broken. After observing the teeth with the SEM it was determined that there is no obvious difference in dentition in the aquatic snakes when compared to the terrestrial snakes. Further research including expanding the sample size to include more species is suggested in order to determine whether a significant difference exists in the dentition of terrestrial and aquatic snakes.

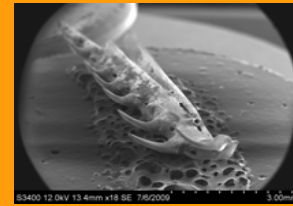


Figure 1: Micrograph of lower right mandible (18X)
Elaphe obsoleta lindheimeri

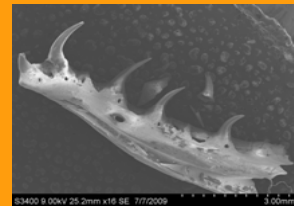


Figure 2: Micrograph of lower right mandible (60X)
Crotalus horridus atricaudatus



Figure 3: Micro graph of lower right mandible (60X)
Nerodia erythrogaster flavigaster

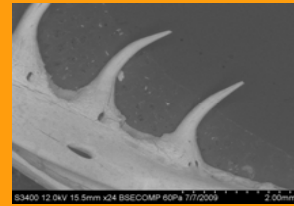


Figure 4: Micrograph of lower right mandible (24X)
Agleiostrodon piscivorus leucostoma

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Literature Cited

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