Males biting males: does testosterone shape both sides of the snakebite equation?

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Introduction
We examine the hypothesis that male rattlesnakes are responsible for significantly more snakebites than female rattlesnakes by correlating snakebite epidemiology recorded at a major southern California trauma center with examinations of the biting snakes and data regarding sexual differences in behavior of rattlesnakes in local populations.

Results

Wild rattlesnake behavior (continued)
A recent four-year radiotelemetry study (Cardwell unpub. data) of wild Mohave rattlesnakes (Crotalus scutulatus) disclosed a bimodal mating pattern with courtship activity occurring in March/April/May and August/September/October. The estimated mean home range for males (20.4 hectares, SE = 2.59) was nearly 10 times greater than for females (2.2 hectares, SE = 0.45) (independent t-test, P = 0.001).

While limited by small sample sizes in some aspects, our study suggests that:

• Male rattlesnakes are more likely than females to bite humans, at least in part because sexually mature male rattlesnakes are much more motile than females during their mating seasons and, therefore, are more likely to encounter humans (e.g., in yards and on trails and roadways).

• Male humans are more likely than females to be bitten by rattlesnakes, probably because they more often choose to interact with the snakes (consistent with previous investigators).

• The severity of a snakebite season may be predictable as the factors that stimulate sexual activity in rattlesnakes are better understood.

• Further investigation will likely identify other significant variables, particularly involving human behavior. For example, the relatively high incidence of bites in May and June may, at least in part, reflect an abrupt increase in outdoor recreational activities in spring and early summer.

Epidemiology
Seventy-eight rattlesnake bites presented to the study institution during 2003 and 2004.

• 83% (n = 65) were male patients (binomial P = 0.001)

• 81% (n = 63) of all bites were to the hands and/or forearms

• More males suffered hand and/or forearm bites than females but the difference was not significant (independent t-test, P = 0.342).

Most rattlesnake bites occurred in May (n = 17), June (n = 13), August (n = 11) and September (n = 11).

Materials and methods
Supplemental case history data were recorded and analyzed for all snakebite patients presenting to the study institution during 2003 and 2004.

• Biting snakes were identified to species and sex when possible.

This was accomplished by recovery of the animal (usually its carcass), examination of skins preserved by patients, or from photographs. Subadult scale counts were also utilized, particularly where the only remains were a removed skin, and when the count fell within the sexually dimorphic range for the species as reported by Gloyd (1940) and Klauber (1956). Sex of one specimen was determined from a suitable photograph by tail morphology and a traumatically everted hemipenis.

• The seasonality of snakebites was compared to the behavior of wild populations of the rattlesnake species responsible for the bites (Crotalus scutulatus - Cardwell, unpub. data; C. helleri & C. ruber – Dugan, unpub. data; C. cerastes - Secor 1992).

Acknowledgments
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Conclusions
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