

# Field observations on feeding behavior in an Aruba Island rattlesnake (*Crotalus durissus unicolor*): Strike-induced chemosensory searching and trail following

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A free-ranging specimen of *Crotalus durissus unicolor* on Aruba Island was observed after striking rodent prey (*Calomys hummelincki*) and after no-strike presentations. Strike-induced chemosensory searching and trail following were seen after strikes. When a chemical trail was not present following a strike, the snake searched extensively near its refuge, but never emerged from it.

Numerous laboratory studies have demonstrated that rate of tongue flicking increases in rattlesnakes following the delivery of envenomating strikes but not after presentations of prey held just out of striking range (see Chiszar, Radcliffe, Scudder, & Duvall, 1983, for a review). Since rattlesnakes typically release adult rodent prey following the strike, the snakes must then recover the carcass. The high rate of tongue flicking coupled with searching movements (collectively termed strike-induced chemosensory searching, or SICS) contributes to the trail-following task (Golan, Radcliffe, Miller, O'Connell, & Chiszar, 1982). Only two field workers have so far seen these behaviors (Diller, 1990; Duvall, King, Graves, &

Chiszar, 1986), and these were unplanned or chance observations made while the investigators were studying other phenomena. Consequently, the present opportunity to study SICS, trailing, and feeding in a free-ranging Aruba Island rattlesnake (*Crotalus durissus unicolor*) represents the first systematic field experiment on this behavior.

## METHOD

Aruba Island, which is in the Dutch Lesser Antilles, contains the only known wild population of *C. d. unicolor*, although reproducing groups of the taxon are presently held in several zoos. This subspecies is endangered, and the American Association of Zoological Parks and Aquariums has organized a Species Survival Plan (SSP) to preserve it. This SSP is coordinated by Andrew Odum, and field work conducted on Aruba was designed to estimate the size of the present population, its distribution on the island, and the daily as well as seasonal activity patterns of the animals. These data will be reported elsewhere. The data reported here were gathered between May 8 and May 17, 1989, while we were tracking a free-ranging, radio-tagged, adult specimen.

The snake had positioned itself under an exposed root in a thick stand of bushes (*Acacia tortuosa*). The snake's head was clearly visible to the investigators, and its willingness to take rodent prey was confirmed by pilot tests. Four trials were then conducted in random order (inter-trial interval = 2 days). In two of these, live-trapped mice (*Calomys hummelincki*) were suspended by forceps and held just out of the snake's striking range (about 15 cm) for 5 sec. The mice were then removed. In one of the trials, no chemical trail was deposited as the mouse was moved away. During the second observation, the mouse was removed by dragging it along the substrate, thereby creating a chemical trail about

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Figure 1. Top: Xeric habitat of *Crotalus durissus unicolor* on Aruba Island, Dutch Caribbean. Bottom: The specimen studied here, upon arriving at the rodent carcass in the strike-trail condition (see Table 1).

Table 1

**Rate of Tongue Flicking and Latency to Locate Carcasses on Each of Four Trials by a Free-Ranging Aruba Island Rattlesnake**

Presentation	Latency	Carcass Recovered	Mean Tongue Flicks	
			Min 1-3	Min 1-20
No Chemical Trail				
No Strike	20	no	0.3	0.1
Strike	20	no	51.3	24.8
Chemical Trail				
No Strike	20	no	6.0	1.9
Strike	3.0	yes	47.3	

150 cm long. In the latter case, a euthanized mouse was placed at the end of the trail, whereas in the former case, a euthanized mouse was placed at the same spot (but of course no trail led to it). Two additional trials were run. These were exactly like the ones just described, except that the snake was permitted to strike the initial stimulus mice after the 5-sec presentations. The following dependent variables were recorded: (1) rate of tongue flicking during the 5 min preceding each trial (baseline data); (2) rate of tongue flicking during the 20 min following presentation of stimulus mice or until the snake located the carcass and began to eat; and (3) latency to locate the carcass.

## RESULTS

The rate of tongue flicking prior to presentation of stimulus mice was 0.0 on all trials, indicating that the snake was quiescent. All remaining data are summarized in Table 1. No-strike presentations were followed by low rates of tongue flicking and failures to locate rodent carcasses within 20 min. In fact, the snake never moved from its initial position during these trials. Strike presentations, however, were followed by high rates of tongue flicking. When no chemical trail was present in the poststrike environment, the snake searched all about the trunk under which it was located, but the animal never moved its tail out of its retreat. Only the snake's head moved about. Eventually, the snake quit flicking its tongue and coiled its body back into the initial retreat. When a chemical trail was available, however, the snake found it 120 sec after the strike (this corresponded to tongue flick No. 90). During the next 60 sec, a total of 52 tongue flicks were emitted, 40 (76.9%) of which were directed to the chemical trail as the snake moved directly to its termination (Figure 1).

## DISCUSSION

These data agree with laboratory results on SICS and trail following in rattlesnakes, providing field validation for the earlier lab studies (see O'Connell, Greenlee, Bacon, & Chiszar, 1982). Perhaps the most interesting result came from the strike-no-trail condition, in which rate of tongue flicking increased sharply but the snake, finding no trail, refused to leave its station. This implies that an elevated rate of tongue flicking is an obligate consequence of striking prey, agreeing with previous arguments that SICS represents a modal action pattern (Golan et al., 1982; cf. Barlow, 1977). Another implication of this performance is that the snake was strongly committed to cover, being willing to leave it only when a payoff was reasonably assured by the presence of a prey trail. Prairie rattlesnakes (*Crotalus viridis*), by contrast, are typically willing to search away from cover under strike-no-trail conditions (Chiszar, Radcliffe, & Feiler, 1986; Golan et al., 1982). Hence, if the behavior of the present specimen of *C. d. unicolor* is representative of its population, these snakes differ in an interesting way from *C. viridis*.

Further speculation about the behavior of Aruba Island rattlesnakes is unwarranted at this time. Instead we encourage further efforts to protect this seriously endangered population and we urge investigators to incorporate studies of basic ethology into their assessments of population dynamics. In this way, we will learn not only about the reproductive potential of the population, but also about its necessary resources. This knowledge might lead to techniques for artificially enhancing the existing resource base or for creating suitable conditions in places where resources currently are inadequate.

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