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Caspian Terns respond to rattlesnake predation in a colony.—Colonial living potentially enhances predator detection and defense by increased response to intruders. Responses may vary according to the vulnerability of the prey (Leger and Nelson, *Wilson Bull.* 94:322–328, 1982) and the species of predator (Seyfarth, Cheney, and Marler, *Science* 210:801–803, 1980). Black Skimmers (*Rynchops niger*) and Caspian Terns (*Sterna caspia*) nesting on dredged material islands in Lavaca Bay, Calhoun Co., Texas (March–July, 1982 and 1983) were subject to predation by western diamondback rattlesnakes (*Crotalus atrox*). Here, I report evidence for predation on Black Skimmers by rattlesnakes, and observations of the responses of adult Caspian Terns to a rattlesnake.

On 14 June 1983, I captured a western diamondback rattlesnake (about 1.25 m long) adjacent to an about 15-d old dead Black Skimmer chick. A necropsy revealed a hematoma on the back of the chick associated with two holes, 1 mm in diameter and 1–1.5 cm apart, in the musculature at the base of the neck. These were virtually identical to fang marks produced by an induced bite on the breast of the chick by the same snake. Also within 5 m of the snake was a dead adult male Black Skimmer. It had an extensive hematoma between the wrist and the elbow of the right wing; however, fang marks were not apparent, possibly because of an extensive hemorrhage and a tear in the skin.

The likelihood that snakebite caused the death of the skimmer adult suggests the potential danger of western diamondbacks to adult waterbirds. King (*Southwest. Nat.* 20:416–417, 1975) observed a western diamondback attempting to swallow an adult Laughing Gull (*Larus atricilla*).

Effective defense of offspring against venomous predators may be difficult and costly to adults. On 5 May 1982 I began observations of a fenced colony of 61 nesting pairs of Caspian Terns at 13:30. The behavior of the terns became unusually agitated at 19:47 when an alarm call was given. The call given was a nonspecific one that increased the alertness of all adults in the colony. The first call was followed by many others as adults within a radius of about 5 m of the location of a rattlesnake flew up and hovered approximately 2 m over their nests, without diving at the snake. Adults between about 5 and 7 m from the snake remained standing on the ground in an alert posture, while those farther away simply looked in the direction of the disturbance and then resumed incubating or brooding. Parents may protect offspring that are especially vulnerable and have received substantial parental investment (Trivers, pp. 136–179 in *Sexual Selection and the Descent of Man, 1871–1971*, B. Campbell, ed., Aldine, Chicago, Illinois, 1972), if costs to the parents' own survival are small. Proximity to the initial alarm calling or to the snake, and presumably the specific attributes of this predator such as mobility or maneuverability, influenced the response of colony members.

Four min after I heard the initial alarm call, the snake moved from behind some vegetation into my sight, at which time I left the blind and killed the snake. It was refrigerated overnight, then frozen and later measured (snout–vent length = 0.94 m). Five Caspian Terns, aged 3 d or less, were found in its stomach. Chicks in the area of the intruding rattlesnake did not run, but crouched in the nest cup and remained still. This is the typical response of young Caspian Tern chicks to alarm calls (pers. obs.). Such behavior is more appropriate for defense from visually oriented predators and is apparently ineffective against rattlesnakes orienting to odors or heat (Klauber, *Rattlesnakes: Their Habits, Life Histories, and Influence on Mankind*, Univ. California Press, Berkeley, California, 1972).

Western diamondbacks (1.25 m snout–vent length) take about 7–10 min to ingest a 35 g lab mouse (*Mus musculus*; S. Secor, pers. comm.). Newly hatched Caspian Tern chicks weigh about 70 g (Quinn, unpubl.). The advanced state of digestion of the first ingested chick (through the skin to the muscle layer) combined with the timing of the snake's activity in

the colony (3–4 min) may be evidence that the snake had eaten one or more chicks earlier in the day and had remained inactive, under cover, until observed.

I did not see adult birds attack the rattlesnake. Avoidance of venomous snakes by adult birds has been documented (Smith, *Science* 187:759–760, 1975; Caldwell and Rubinoff, *Auk* 100:195–198, 1983). Other intruders elicit flushing and are often relentlessly attacked by Caspian Terns (e.g., Herring Gulls [*L. argentatus*], Turkey Vultures [*Cathartes aura*], Great Blue Herons [*Ardea herodias*], and researchers [pers. obs.]). Mobbing of nonvenomous snakes has been reported in some species. Blem (Wilson Bull. 91:135–137, 1979) observed nesting Bank Swallows (*Riparia riparia*) mobbing black rat snakes (*Elaphe obsoleta*), but did not mention contact with the snake by the birds. Francesca Cuthbert (pers. comm.) noted Common Terns (*S. hirundo*) contact-mobbing common garter snakes (*Thamnophis sirtalis*), and in one case a snake was killed. In contrast, Fetterolf (Can. Field-Nat. 93:317–318, 1979) reported that adult Ring-billed Gulls (*L. delawarensis*) stood near their nests and displayed no anti-predator behavior while a common garter snake (*T. sirtalis*) ingested two gull chicks.

Responses to western diamondback rattlesnakes by adult Caspian Terns probably increased detectability of the snake for all colony members. Active defense of offspring, however, was not increased, nor was the response of offspring effective. Parents responded to the rattlesnake according to risks to themselves despite the vulnerability of their young. Hovering without attack may be a common response of colonial nesting birds reacting to potentially lethal terrestrial predators.

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Acorn Woodpecker mutilates nestling Red-breasted Sapsuckers.—On 22 June 1980 I observed an interaction between Acorn Woodpeckers (*Melanerpes formicivorus*) and nesting Red-breasted Sapsuckers (*Sphyrapicus ruber daggetti*) along Bear Valley Creek at the Bear Valley Headquarters of the Point Reyes National Seashore, Marin County, California. The Red-breasted Sapsuckers were nesting approximately 8 m up in a madrono (*Arbutus menziesii*) snag in a coast live oak (*Quercus agrifolia*), tanbark oak (*Lithocarpus densiflorus*), and California bay laurel (*Umbellularia californica*) woodland just upslope from a red alder (*Alnus rubra*) thicket bordering Bear Valley Creek. The nest tree was used to a limited degree as an acorn storage site by Acorn Woodpeckers. The nest at this location was unusual as the breeding range of Red-breasted Sapsucker has previously been reported in the northern Coast Range of California south only to the middle of Mendocino County (Grinnell and Miller, *Pacific Coast Avifauna* No. 27, 1944). More recent evidence indicates that it breeds regularly south to northern Sonoma County (Shuford, unpubl.), making the nesting at Bear Valley an isolated occurrence even farther south.