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EVERGLADES ALLIGATOR NESTS: NESTING SITES FOR MARSH REPTILES.—Oviparous reptiles living in marshes may face a shortage of sites suitable for egg deposition. Although in the southern Florida Everglades many slightly elevated tree islands occur throughout the marsh, the ground under most of these is submerged during the typical summer-fall high water period. Only a relatively few scattered tree island hammocks provide natural above-water habitat for reptile nesting during high water. The natural limitation of nesting sites is suggested by the extensive use of artificial road berms and levees by several species of turtles.

Marsh-dwelling crocodilians overcome nest-site limitation by constructing nest mounds. The American alligator, *Alligator mississippiensis,* builds its nests of vegetation, mud and plant debris. Although some of the impact of alligators on the Everglades ecosystem is well documented (Kushlan, 1974), little information is available on the role played by alligator nest mounds. Alligator nests are potential above-water sites for use by other animals in nesting (Goodwin and Marion, 1977; D. C. Dietz, pers. comm.). The purpose of this paper is to describe one aspect of the role of alligator nests in the Everglades—their use by nesting reptiles.

Methods.—The study is based on data from 103 alligator nests studied in 1976, 1977 and 1978 in the southern Everglades of Everglades National Park, Florida. Five 10 km^2 study areas were distributed along the northeast-southeast axis of the southern Everglades; a sixth study area was along an 11 km road near the western edge of the Everglades. Alligator nests were located by aerial and ground searches in May–July each year. Nests were visited at least twice. Each nest was opened and the identity and, usually, the location and clutch size of other reptile eggs in the alligator nest were noted. The center portion of all nests was searched but the base was usually left intact to preserve the nest size and shape. Nests were revisited after alligator eggs should have hatched, and additional information on other reptile eggs was collected at that time. Because reptile eggs were often deposited between our visits, varying amounts of data were available for different nests.

Results.—We found eggs of three species of reptiles, other than alligators, in alligator nest mounds, the Carolina anole (*Anolis carolinensis*), the mud turtle (*Kinosternon baurii*) and the red-bellied slider (*Chrysemys nelsoni*). Anole eggs were found in two nests, and mud turtle eggs were found in one nest. The low use of nests by anoles may reflect an abundance of alternative egg deposition sites such as dirt-filled stumps and tree crotches. As anole and mud turtle eggs are small, we may have overlooked some of them, particularly in the nest base. Over three years, *C. nelsoni* eggs were found in 20 of 103 alligator nests examined (19.4%). This percentage was fairly constant in each of the three years (Table 1).

The extent of use of alligator mounds by turtles differed in different areas of the Everglades, possibly reflecting the relative availability of alternative nesting sites. In the four northernmost study areas, located in typical Everglades marsh, an average of 11.3% of 62 nests contained turtle eggs. In the most southerly study area located at the interface between the Everglades marsh and coastal mangrove swamps, significantly more nests (56.2% of 16), contained turtle eggs ($\chi^2 = 13.1$, $P < .05$, df = 1). This area has few hammock tree islands and may therefore have less wet season high ground habitat than the northern areas.

Generally we found one *C. nelsoni* clutch per nest. One nest had two clutches and one nest had eight clutches, which skewed the mean to 1.4 clutch per nest having turtle eggs (Table 1). In two nests in 1977, we found turtle eggs after both they and the alligator eggs had hatched, so we do not know how many clutches there were. The nest containing eight clutches is of particular interest. On 5 July 1978 this nest had a single turtle clutch, and by 1 August we found turtle hatchlings alive inside the nest. Between these dates, the alligator eggs had disappeared from the nest without hatching, although the nest mound remained intact or had been re-

TABLE 1. OCCURRENCE OF *C. nelsoni* EGGS IN ALLIGATOR NESTS IN THE EVERGLADES.

Year	Alligator nests	Nests with turtle eggs	% with turtle eggs	Mean clutches per nest[1] $\bar{x} \pm$ SD (N)	Mean clutch size $\bar{x} \pm$ SD (N)
1976	27	5	18.5	1.2 ± 1.4 (5)	11.5 ± 3.4 (6)
1977	22	4	18.2	1.0 ± 0.0 (2)[2]	14.0 ± 9.0 (2)[2]
1978	54	11	20.3	1.6 ± 2.0 (11)	12.9 ± 0.7 (11)
Total/mean	103	20	19.4	1.4 ± 1.6 (18)	12.6 ± 3.5 (19)

[1] Per nest having turtle eggs.
[2] In two nests, number of clutches and clutch siz could not be determined.

stored. The seven additional clutches were found around the edge of the nest, and it seems that they might have been deposited after the alligator eggs had disappeared. It is possible that other multiple clutches were missed because we did not excavate the nest base.

We have placement data for 21 *C. nelsoni* clutches. Six clutches were below or on the side of the alligator clutch, and one was intermingled with the alligator clutch. Five clutches were in the center of mounds that did not later receive alligator eggs. If seven of the eight clutches we found in a single nest were laid after the alligator clutch was removed, then 86% of our turtle clutches may have been deposited at times when the mounds did not have alligator eggs in them. Three clutches, however, were deposited on top of the alligator clutch. In one case the nesting turtle destroyed several alligator eggs.

The mean size of *C. nelsoni* clutches in alligator nests was 12.6 ± 3.5 $\bar{x} \pm$ SD, N = 19) (Table 1). This is considerably below the 23.6 ± 5.9 (N = 7) found by Goodwin and Marion (1977) in north Florida (t = 5.88, $P < .05$). More information is needed to compare these data however, as Iverson (1977) reported *C. nelsoni* clutches similar to ours (10 ± 2.8, N = 3) from the same area where Goodwin and Marion worked.

Alligator eggs in the Everglades usually hatch in August and September. We have found *C. nelsoni* eggs hatching as early as 31 July and have recovered hatchlings in the nest beneath developing alligator clutches. At hatching, adult alligators usually excavate their eggs with minimal disturbance to nearby turtle clutches.

Discussion.—Although many animal species exhibit plesiobiotic relationships, commensal nesting is rare between vertebrates. The relationship between *A. mississippiensis* and other aquatic reptiles is particularly intriguing because alligators are one of the few reptiles that build nesting structures. The association does not appear to be particularly harmful to the alligator in the Everglades, except in the apparently rare instances when some alligator eggs are damaged by nesting turtles.

Use of alligator nest mounds as egg deposition sites by turtles may increase hatching success over tree island or levee sites. Although comparative data are not available, it appears that many turtle clutches deposited on tree islands or levees are lost to predation. In Louisiana, Joanen (1969) found a higher predation rate on alligator nests located on levees than in marshes. The isolation of alligator nests in the marsh, away from the high ground usually inhabited by racoons, probably reduces the probability of predation in the Everglades. Unlike other areas (Dietz and Hines, 1980), alligator nests in the Everglades have a low level of predation. Many Everglades alligators attend their nests during incubation (Kushlan, 1973), and their activities appear to be effective against predators such as racoons (Kushlan and Kushlan, 1980). Any defense of the nest site against nest predators would also protect the turtle eggs.

Dietz and Hines (1980) have shown that disturbance increases nest predation and suggested that the presence of turtle eggs may lead to increased predation. This would probably be an important factor primarily where nests are not guarded by alligators. It is probable that under natural conditions most nests were defended (Kushlan and Kushlan, 1980), and turtle nesting probably caused little additional loss to predators.

The protection offered to a turtle clutch by an alligator nest mound and its defending alligator is achieved with an important trade-off. There is little reason why an alligator should accord a turtle safe passage to its nest mound. The possibility of predation suggests why most turtle clutches appear to be deposited before the alligator clutch is laid or after the mound has been abandoned by the alligator because of hatching or egg loss. A turtle may not use alligator mounds when a potential predator is present. One turtle we encountered digging in a nest moved off in response to our approach, and no turtle eggs were subsequently deposited in that nest. We have not observed sunning or other casual use of active alligator nests by turtles in the Everglades. Observations of such activity by Goodwin and Marion (1977) may reflect less frequent nest attendance by alligators in north Florida (Dietz and Hines, 1980) associated with differences in the history of human harassment (Kushlan and Kushlan, 1980). Under more natural conditions, such as in the Everglades, the potential risk of predation by the guarding alligator appears to be an important factor in the timing and extent of use of alligator nests by turtles.

The use of alligator nest mounds as egg deposition sites by other reptiles increases our understanding of the complex role played by alligators in their marsh ecosystem. The relatively limited occurrence in the Everglades of natural egg deposition sites during the summer-fall high water period suggests that alligator nests may be important for maintenance of *C. nelsoni* populations. In the Everglades, although not in more disturbed areas, nest defense by alligators may increase turtle nesting success over the few natural, or unnatural, levee nesting sites. Thus, the relationship between turtles and alligators may be of considerable importance in the marsh ecosystem.

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HISTOCHEMICAL DEMONSTRATION OF TWO TYPES OF ALBINISM IN SAN DIEGO GOPHER SNAKES (*PITUOPHIS MELANOLEUCUS ANNECTENS*) BY USE OF DOPA REACTION.—Albinism occurs in warm and cold-blooded animals. There are several types of diminished pigmentation described as albinism, but the albinism discussed here is the phenotypical expression of a heritable failure to synthesize melanin. Although individual occurrence of albinism is uncommon, it has been recorded in nearly every animal of which adequate numbers have been observed. Albino snakes are conspicuous, and reports and descriptions of individual specimens are frequent. Wright and Wright (1957) mention the occurrence of albinism in a dozen genera. Harris (1968) summarized the known occurrence of albinism in Maryland amphibians and reptiles, reporting three *Elaphe obsoleta obsoleta* known from that state. Hensley (1959) attempted to summarize the known records for albinism in North American reptiles and amphibians. He recorded more than 100 albino or albinistic snakes in 16 genera. There has been no subsequent comprehensive survey.

In his discussion of incidence, genetics and description of albinism, Klauber (1956) notes the interesting work of the late C. B. Perkins of the San Diego Zoo, who demonstrated in captive breedings that albinism in *Pituophis melanoleucus annectens* is inherited as an autosomal recessive. Captive breedings have confirmed the