22[ND] SYMPOSIUM PROCEEDINGS ADDENDUM

JUVENILE GREEN TURTLES OF THE SABELLARIID WORM REEF

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Phragmatopoma lapidosa (Sabellariid worms) build unique reef types called worm reef or worm rock along the East Coat of Florida from Cape Canaveral to Key Biscayne. These reef formations are particularly extensive in high energy surf zones. The greatest expanse of worm reef formation occurs between Brevard and Martin County. In Florida, there have been few studies that characterize the use of nearshore habitat by juvenile green turtles. At the St. Lucie Power Plant green turtles become entrained in the cooling water intake pipe that is located 365 meters offshore, adjacent to extensive worm reef formations. Since 1976, green turtles have been captured, measured, tagged and released from the power plant's intake canal system. The green turtle aggregation over the worm reef in Indian River County has been studied since 1989. Green turtles are net-captured, measured, tagged and released. We compiled information from these two areas that documents the importance of nearshore reef environments as critical developmental habitat.

THE TROPICAL FIRE ANT, *SOLENOPSIS GEMINATA*, ON AN IMPORTANT SEA TURTLE NESTING BEACH IN TORTUGUERO NATIONAL PARK, COSTA RICA

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Introduction

Several species of predatory ants are known to attack the hatchlings of ground-nesting birds & reptiles (e.g., Emlen 1938; Travis 1941; Hughes 1975; Landers et al. 1980; Montgomery 1996; Wetterer 1997; Allen et al. 1994, 1997, 2001; Mueller 1999; Chan & Liew 1999; Reagan et al. 2000). Hatching sea turtles are particularly vulnerable to attack by ants because hatchlings typically take from several hours to several days after pipping before they emerge from their nests. During this time, ants may invade the nests & attack trapped hatchlings (Fowler 1979; Krahe et al., 2003). Ants also sting hatchlings as they exit the nest (Krahe et al., 2003). Hatchlings may die as a direct result of the ant stings, or as an indirect result, due to impairment caused by stings, particularly stings to their eyes (Krahe et al., 2003).

Fire ants (*Solenopsis* spp.), in particular, pose an important threat to sea turtles (Foote et al. 2000; Allen et al. 2001; Wetterer & Wood 2002; Krahe et al., 2003). On Sanibel Island, Florida, LeBuff (1990 in Moulis 1997) concluded that "fire ants were the most dangerous predators upon hatchlings." In Wassaw National Wildlife Refuge, Georgia, Moulis (1997) found a significant decrease in emergence success in loggerhead sea turtle, *Caretta caretta*, nests infested with fire ants compared with uninfested nests (40.6% vs. 54.0%). In Key West Wildlife Refuge, Florida, Wilmers et al. (1996) found that the proportion of sea turtle nests infested with the red imported fire ant, *Solenopsis invicta*, increased greatly between 1990 & 1994. In Palm Beach Co., Florida, Wetterer & Wood (2002) found that 328 of 912 (36.0%) marked sea turtle nests had *S. invicta* present & two nests (<0.1%) had the tropical fire ant, *Solenopsis geminata*, present.

I conducted a preliminary survey of ants on an important sea turtle nesting beach in Tortuguero, Costa Rica. Tortuguero has the largest Atlantic nesting population of green sea turtles, *Chelonia mydas* (Bjorndal et al. 1999). Earlier researchers documented ants preying on sea turtle eggs & hatchlings at Tortuguero, but did not identify the ants (Fowler 1979; Mangel et al. 2001). In my survey, I wished to determine what species of ants are present on the Tortuguero beach that may attack sea turtle eggs & hatchlings.

Methods

I surveyed ants along an 8.3 km stretch of beach at Tortuguero (10° 33' N; 83° 32' W) at long-term markers set up by Archie Carr in the 1950's (Carr et al. 1978) near the edge of the beach vegetation, & spaced at ~0.2 km (1/8 mile) intervals along the beach. Markers begin at -3/8 at the northernmost end of the beach (mouth of the Rio Tortuguero, 3/8 miles north of the 0 marker). On 9-10 June 2001, with the help of student assistants, I performed a visual survey to examine overall ant diversity on the beach from marker -1/8 to marker 5, collecting ants on the beach & in the vegetation within ~5 m of the marker pole closest to the ocean at each site (n = 42). I also conducted a bait survey to examine dominance (typically only one ant species dominates a bait) from marker 1 3/8 to marker 5. I placed tuna on index cards at each marker (n = 30), collected the cards two hours later, & placed them in separate plastic bags. I later counted the ants at each bait. Stefan Cover, at Harvard University, identified ants to species when possible.

Results

Combining results of the two survey methods, I found a total of 14 ant species on the Tortuguero beach (# of markers where I found each species in parentheses): *Solenopsis geminate* (32), *Pheidole* sp. (26), *Camponotus* sp. (15), *Dorymyrmex* sp. (10), *Brachymyrmex* sp. (10), *Tapinoma melanocephalum* (3), *Cardiocondyla* sp. (2), *Crematogaster* sp. (2), *Ectatomma tuberculatum* (1), *Monomorium ebeninum* (1), *Pachycondyla harpax* (1), *Pheidole laticornis* (1), *Neivamyrmex* sp. (1), and *Tapinoma* sp. (1). Only one of these species is a likely to pose a significant threat to hatching sea turtles: the tropical fire ant, *Solenopsis geminata*.

Solenopsis geminata was more common in visual surveys from marker 2 to marker 5 (at 24 of 25 markers), than along the northernmost part of the beach, from marker -1/8 to marker 1 7/8 (at 7 of 17 markers). *Solenopsis geminata* was the most common ant species in the bait survey; 14 baits had only *S. geminata* present, usually in high numbers (range: 28-764; mean = 359 ±247). Of the remaining baits, nine had other ants present, two had no ants, & five were lost, apparently taken by dogs & crabs. At the one marker between markers 2 & 5 where I did not find *S. geminata* in the visual survey, I did find this species in the bait survey.

Discussion

In 1977, Fowler (1979) studied green turtles nesting at Tortuguero along a 4-km stretch of beach (marker 2 4/8 to 5). She found that ants invaded 35 of 237 (14.8%) nests, where they "fed on the remaining hatchlings. They also were found feeding on undeveloped & unhatched eggs." However, Fowler (1979) "could not tell whether the ants killed developing eggs & hatchlings, or fed only on dead & weak individuals." Fowler (1979) noted that the ants "chew into eggs, particularly those in vegetated areas." In Florida beaches, ants are more common on nests near the vegetation. Wetterer & Wood (2002) found ants present at baits on 93.1% of sea turtle nests within 2 m of the dune vegetation, declining to 50.0% for nests 10-12 m from the vegetation, & 14.8% for nests further than 18 m from the vegetation.

In 2000, Mangel et al. (2001) studied green turtles nesting at Tortuguero along an 8.7-km stretch (marker -3/8 to 5) & noted ants "depredating or killing eggs, pipped hatchlings, hatchlings in the nest & hatchlings in the vicinity of the nest." Mangel et al. (2001), however, recorded infestation by ants at only one of 194 (0.5%) nests. Emergence success for this nest was 60.8 % as compared to 71.0 % hatching success overall for the 194 monitored nests.

From the present study, it seems likely that the tropical fire ant, *Solenopsis geminata*, is the most common ant attacking sea turtles at Tortuguero. *Solenopsis geminata*, though not as virulent as its congener *S. invicta*, is also known to attack the hatchlings of birds & reptiles (e.g., Stoddard 1931; Travis 1938, 1941; Kroll et al. 1973; Mrazek 1974). Because of the very high numbers of *S. geminata* that I observed (and was stung by) on Tortuguero beach, I suspect the impact of these ants on hatchling sea turtles may be more substantial than suggested by Mangel et al. 's (2001) study. The impact on hatchlings stung as they exit their nests may be particularly important.

Solenopsis geminata is native to the Neotropics (including Costa Rica), where in disturbed areas, it can reach very high densities & dominate the invertebrate community (Risch & Carroll 1982). It is also an invasive pest in many other parts of the world (Wetterer 1997), including many tropical & subtropical areas where sea turtles nest, such as Australia, islands of the Pacific & Indian Oceans, the Arabian Peninsula, India, South Africa, Greece, & Cyprus.

Native ants can certainly be important predator of sea turtle hatchlings. Chan & Liew (1999) found that "red ants" infested 53% of hawksbill turtle (*Eretmochelys imbricata*) nests and preyed on both eggs and hatchlings. Chan sent me ant samples and S. Cover identified them as three native Malaysian species: *Dorylus orientalis*, *Lophomyrmex* sp., and *Pheidole* sp.

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R. Some movements were registered at aggregations in which individuals were observed as residents and transients. The haplotypes by site were obtained through blood samples.

The evident destruction of olive ridley sea turtle eggs (*Lepidochelys olivacea*) by the beetle *Omorgus suberosus* (Fabricius, 1775) at Escobilla Beach, Oaxaca: A proposal of a biological control

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The olive ridley sea turtle (*Lepidochelys olivacea*) population is increasing, causing a sense of satisfaction for the people who are working to protect them. However, there remains a large problem that is necessary to evaluate, control and exterminate: the beetle *Omorgus suberosus* (Fabricius, 1775).

This arthropod eats the eggs, embryos and hatchlings, regardless of stage of the eggs or the beetles' phase. We did two studies; in both the nests were placed in plastic pots and incubated with sand, avoiding beetle contamination including larvae. A known quantity of beetles was introduced into each pot and there were three trials for each treatment. After the hatch period, the nests were reviewed to calculate the percentage of eggs destroyed by beetles. The destruction percentage was proportional to the number of beetles. In this poster, we show the results and how the study was done. With this problem, it is necessary to use a non-chemical alternative for control of the beetles. This avoids risks to human health, turtles, and to the environment, as they would be seriously affected by the use of chemicals. It has been demonstrated in the field of agriculture that the use of seeds of superior plants to combat insects represents an economic savings and does not undermine the environment.

Protection and conservation actions for marine turtles in Guatemala 1999-2002

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This is a brief description of the last three nesting seasons of sea turtles in Guatemala. During this period 22 turtle hatcheries were active. However the number of active hatcheries was different each season and only 11 were active all three seasons. Eggs from five species were collected (*Lepidochelys olivacea*, *Dermochelys coriacea*, *Chelonia mydas*, *C. mydas agassizii*, *Eretmochelys imbricata*) with between 92 and 97% of collected eggs belonging to *L. olivacea*.

Evaluation of olive ridley sea turtle (*Lepidochelys olivacea*) size with fecundity and hatch success percentage from their eggs transferred to a protection corral on Escobilla Beach, Oaxaca

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In the olive ridley sea turtle, the most common size range of nesting females is from 60 to 70 cm long. Few studies have taken note of females outside of this range. The present study seeks to compare the incubation results among individuals with sizes smaller than 60 cm and bigger than 70. In this study, we compare the number of eggs, hatch success and incubation results in the three different phases of embryonic development that are managed for this species, unhatched apparent success and other embryonic development.

This comparison was carried out by incubating 50 olive ridley nests of large-size females and 50 of small-size femalesafter transferring them to a protected place. Nests hatch between the 44th and 59th day of incubation. There were a total of 4,771 eggs from small-size females (95.4 eggs for nest average), which produced a total of 3,706 fry, which calculates to a 74% hatching success. The large-size females hatching success was smaller: 66% out of a total of 5,234 eggs for an average of 104.7. In the large-size, a total of 924 eggs were obtained with an embryonic mortality of 18%, with 15% occurring in the last phase of development (phase III). In females smaller than 60 cm, the percentage is 9%. The largest percentage of eggs without apparent embryonic development was presented in females of large-size with a total of 762 (15%), compared to 5% of the eggs from smaller females.

Ten years of the study and control of the beetle *Omorgus suberosus* (Fabricio, 1775) that destroys the eggs of the olive ridley turtle (*Lepidochelys olivacea*) during incubation at La Escobilla Beach, Oaxaca

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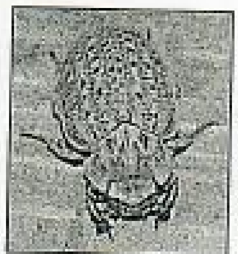
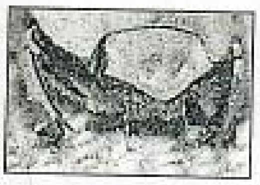
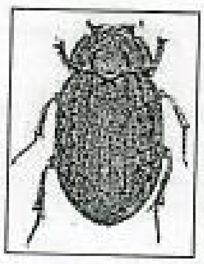
This summary presents the work carried out during 10 years, from August 1993 to December 2003, at "La Escobilla" beach, Oaxaca, Mexico. One of the objectives was to capture beetles using traps baited with sugar, chicken feces, dead fish and squid. To understand the depth and width of their distribution, we sieved a cubic meter of sand every 500m. In order to understand how the beetles make their way to the beach, we used pots as traps at the surface, placing them every 300m over 15km along the riverside of the Cozoaltepec River between the beach and mountains. Using this strategy, our theory was confirmed that the beetles arrived in the dry, dead trees. The eggs of the beetles were incubated in plastic flasks to understand their life cycle and determine how the beetles destroy sea turtle eggs. Approximately 10,000,000 coleoptera have been captured.

During these ten years, we have learned that the most affected areas are from stations 8 to 39 parallel to the coast. These coleoptera lay six small eggs each cycle, with an incubation period between 30 to 90 days. The reproductive season is ten months, from June to February, coinciding with the reproductive season of the sea turtle and with the rainy season.

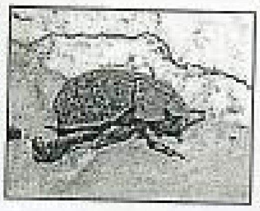
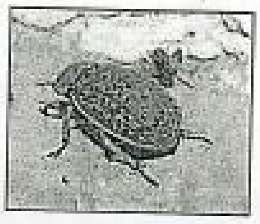
BugGuide

Identification, Images, & Information
For Insects, Spiders & Their Kin
For the United States & Canada

Species *Omorgus suberosus*



Classification

Kingdom Animalia (Animals)
Phylum Arthropoda (Arthropods)
Class Insecta (Insects)
Order Coleoptera (Beetles)
Suborder Polyphaga (Water, Rove, Scarab, Longhorn, Leaf and Snout Beetles)
Superfamily Scarabaeoidea (Scarab, Stag and Bess Beetles)
Family Trogidae (Hide Beetles)
Genus *Omorgus* (Hastate Hide Beetles)
Species *suberosus* (Omorgus suberosus)

Other Common Names

Common Cork Hide Beetle

Synonyms and other taxonomic changes

Orig. Comb: *Trox suberosus* Fabricius 1775

Explanation of Names

suber - Latin for the cork oak (1)

Numbers

16 spp. n. of Mex. (2)

Size

Length 2.0 – 4.0 mm
Width 5.9 – 7.5 mm

Identification

Variation - TAMUIC Unit Tray

Range

Omorgus suberosus has the broadest distribution of any trogid in the western hemisphere. (McPeak & Oberbauer 2008)

It ranges from Canada to southern South America and on some Pacific islands as well as W. Indies (Scholtz 1982).

It occurs throughout the US except New England, the Pacific Northwest, and Alaska (Vaurie 1955; Baker 1968)

Habitat

Vaurie (1955) reported *Omorgus suberosus* taken under goat carrion, chicken feathers, and cow dung, at malt, and at lights.

Season

March-Sept in southern CA (McPeak & Oberbauer 2008)

Food

Necrophagous

Life Cycle

Adults in North Dakota overwinter and emerge the following spring to feed and mate (Lago et al. 1979).

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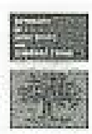

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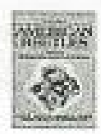

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