# INVERTEBRATE INFESTATION IN LOGGERHEAD TURTLE (*CARETTA CARETTA*) NESTS, IN DALYAN, TURKEY

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ABSTRACT: Some invertebrates' infestation in loggerhead turtle nests, *Caretta caretta*, was investigated during the summer of 2008 on Dalyan İztuzu beach, Turkey. The specimens, identified to order, family or genus levels, from representing 5 orders were recorded as infesting nests of loggerhead turtles. These invertebrate groups are *Pimelia* sp (Tenebrionidae: Coleoptera), Muscidae (Diptera), *Rhodacarellus* sp. (Mesostigmata: Acari), Cryptostigmata (Acari) and Oligochaeta. We give the infestation level and effects of these invertebrate. In this study invertebrate infestation was recorded for the first time in loggerhead sea turtle nests in Dalyan İztuzu Beach. We estimate that these invertebrate groups infest the sea turtle nests in the other beaches of Turkey.

KEY WORDS: *Caretta caretta*, nest, invertebrate infestation, *Pimelia*, Dalyan beach, Turkey.

The presence of larvae from two dipteran families (Phoridae and Sarcophagidae) in marine turtle nests have been reported (Lopes, 1982; Andrade et al., 1992; Broderick & Hancock, 1997; McGowan et al., 2001a, b). Larvae of the dipteran family Phoridae have been determined in nests of green (Fowler, 1979) and hawksbill turtles (Bjorndal et al., 1985) in Costa Rica. However *Eumacronychia sternalis* (Sarcophagidae, Diptera) was recorded to infest green turtle eggs on the Pacific coast of Mexico (Lopes 1982). Sarcophagids of the genera *Phorosinella* and *Eusenotainia* were reported in nests of leatherback turtles (*Dermochelys coriacea*) and olive ridley turtles (*Lepidochelys olivacea*) in Mexico (Andrade et al., 1992). Türkozan & Baran (1996) first reported coleopteran infestation in the eastern Mediterranean. Broderick & Hancock (1997) mentioned various insect groups infesting marine turtle eggs in northern Cyprus. Türkozan (2000) also found these types of infestations on another beach (Kızılot beach, central Mediterranean coast of Turkey). Eleven dipterans species were recorded in turtle nests in northern Cyprus. On Fethiye beach Tenebrionid larvae caused the most damage by penetrating the eggs and hatchlings of loggerhead turtles, destroying 8.1% of the eggs in infested nests and 0.6% of hatchlings (Baran et al., 2001). Recently some invertebrate infestation was also reported on Dalaman beach. *Pimelia* sp. (Tenebrionidae) and Muscidae larvae were found 36% and 39% respectively of loggerhead turtle nests (Katilmis et al., 2006). The most significant factor was depth of the egg chamber for Diptera infestation on sea turtle nests (McGowan et al., 2001b; Katılmış & Urhan, 2007a). Muscidae and Tenebrionidae larvae found in Nile Soft-shelled Turtle *Trionyx triunguis* nests in Kükürtlü Lake (Dalaman, Turkey) (Katılmış & Urhan, 2007b).

In this study our aim was to determine the impact and level of infestation of invertebrates, infesting loggerhead turtle nest on Dalyan beach.

## MATERIAL AND METHODS

This study was carried out during the hatching seasons (July-September) 2008 on Dalyan İz tuzu Beach, which is one of the main nesting sites for loggerhead turtles. Only intact nests were examined in this work, while nests that were partly predated by foxes and dogs were excluded. One week after the first emergence, nests were excavated to examine their contents. For each nest, the number of infested eggs and hatchlings, of empty eggshells, of dead hatchlings and embryos and the number of surviving hatchlings were counted. The locations of larvae and other invertebrates within the nests were recorded and the specimens were preserved in 70% alcohol. Invertebrates were identified to the family or order level according to standard literature sources (Krantz, 1978; Anon., 1987; Booth et al., 1990; Karg, 1993; Elzinga, 2000). The distance of each nest to the landward vegetation and to the low waterline as well as the depth and width of the egg chambers were measured.

## RESULTS

A total of 60 intact loggerhead turtle nests were investigated in terms of the invertebrate faunal composition of the eggs and hatchlings at Dalyan İztuzu beach from July to September 2008. The diversity of invertebrates found in loggerhead turtle nests and their percentage are given in Tab. 1. *Pimelia* sp. (Tenebrionidae) larvae were found 8 (13.3%) out of 60 loggerhead turtle nests. Larval damage in the form of egg penetration was recorded in 53 eggs in 8 nests, but this represents only 11.01 % of the total eggs laid in 8 nests (Fig. 1a). It was determined that *Pimelia* larvae damage the embryos in penetration eggs. These larvae were generally observed in the eggs of the top of the nest chamber.

Larvae of Muscidae (Diptera) were observed in empty eggshells, in eggs perforated by *Pimelia* larvae, in nest sands and in the soft tissues of dead hatchlings. Muscidae larvae were found 11 (18.3%) out of 60 loggerhead turtle nests.

Enchytridae specimens (Oligochaeta) were observed on empty eggshells, in perforated eggs punctured by *Pimelia* larvae, and in the sand columns of nests. These specimens were found in 17 (28.3%) nests from nests. Oligochaeta speciemens were counted about average 90-100 individuals in one egg.

Another group observed in the nests was acarines (Acari) species (Fig. 1b). *Rhodacarellus* sp. (Rhodacaridae: Acari) speciemens in 3 nests and Cryptostigmata (Acari) speciemens in only 1 nest were found from examined totally 60 nests. This group was just observed in eggs. These acarines were very small and very abundant, they could not all be counted in each nest examined. A total of 111 acarines was counted in a single egg.

## DISCUSSION

Insect larvae were found in 9 % of the green turtle nests and 23 % of loggerhead turtle nests at Alagadi in northern Cyprus (Broderick & Hancock, 1997). On Fethiye Beach Loggerhead sea turtle nests were infested %50 by Tenebrionidae larvae and %41.5 by Muscidae larvae (Baran et al., 2001). These levels on Dalaman Beach for loggerhead sea turtle nests was found (*Pimelia* 36%, Muscidae 39%) in 2002 and (*Pimelia* sp. 33.9%, Muscidae 33.9%) in 2003 (Katılmış et al., 2006; Katılmış & Urhan, 2007a). These percentages were (Tenebrionidae 50%, Muscidae 80% in 2002) and (Tenebrionidae 29%, Muscidae 45.9% in 2003) calculated for Nile soft-shelled turtle nests in Dalaman (Katılmış & Urhan, 2007b). Loggerhead sea turtle nests were infested 18.3% by Muscidae larvae and 13.3% by *Pimelia* larvae on Dalyan Beach.

Tenebrionidae, Muscidae, Acari and Oligochaete individuals were recorded on Kızılot, Fethiye and Dalaman Beach from Turkey (Türkozan, 2000; Baran et al., 2001; Katılmış et al., 2006; Katılmış & Urhan, 2007a). In this study invertebrate infestaion was recorded for the first time in loggerhead sea turtle nests in Dalyan İztuzu Beach. We estimate that these invertebrate groups infest the sea turtle nests in the other beaches of Turkey.

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Table 1. The diversity of invertebrates found in the loggerhead turtle nests on Dalyan beach.

| Invertebrates | No. of Nest observed | Percent Nest (%) | No. of individuals observed |
|---|---|---|---|
| *Pimelia sp.* | 8 | 13,3 | 5 |
| *Muscidae* | 11 | 18,3 | 37 |
| Oligochaete | 17 | 28,3 | Average 90-100 in 1 egg |
| *Rhodacarellus* sp. | 3 | 5 | 87 |
| Cryptostigmata | 1 | 1,6 | 111 individuals in 1 egg |

a

b

Figure 1. a. Perforated egg by *Pimelia* sp., b. Acari specimens in egg.