

Reports on Wildlife and Laboratory Animals

Myiasis in two box turtles

Willard J. Gould, DVM, and Marion E. Georgi, DVM

Two recently captured eastern box turtles (*Terrapene carolina carolina*) were referred with a 6-week history of swellings on the cervical region. Both tortoises had been captured in Virginia 2 months prior to referral and had been housed indoors since capture. The tortoises were in good condition and were eating and ambulating normally. However, both had swellings at the base of the neck on the right side. At the top of each swelling, a small (1 mm) opening was identified through which live larvae could occasionally be seen. A smaller swelling was also noticed in the subcutaneous tissue of the lateral aspect of the distal portion of the right humerus of 1 tortoise.

The tortoises were anesthetized with ketamine (50 mg/kg of body weight, IM) in the left forelimb. Following standard surgical preparation, the air holes at the top of the swellings were enlarged with a No. 11 scalpel blade. Thirteen live larvae were removed from 1 tortoise, and 5 were removed from the other (Fig 1). The swelling over the distal portion of the humerus contained 1 degenerate larva. The larvae ranged in length from 12 to 15 mm and in width from 3 to 4.5 mm. The wounds were swabbed with a povidone iodine solution^a and healed by granulation in 3 weeks.

The larvae were placed on a medium of sand and fresh horse meat and kept at 23 C. The horse meat was replaced daily. Pupation occurred in 1 week after which the meat was removed and the container was covered with cheesecloth. Adults emerged in 28 days. Dissection of the genitalia of the adult males revealed these to be *Sarcophaga cistudinis*.¹

Incomplete descriptions of *S cistudinis* as a cause of myiasis in chelonians have appeared in the veterinary literature.²⁻⁵ The first report in the entomologic literature was in 1882.^b Since the first case study, there have been numerous reports; however, the information has not been readily accessible to the veterinary practitioner.⁶⁻⁹

From the Department of Clinical Sciences (Gould), and The New York State Diagnostic Laboratory (Georgi), New York State College of Veterinary Medicine, Cornell University, Ithaca, NY 14853.

^aBetadine solution, Purdue Frederick Co, Norwalk, Conn.

^bPackard AS. Bot fly maggots in a turtles neck (abstr). *Am Nat* 1882;16:598.



Figure 1—Lesion containing 13 *Sarcophaga cistudinis* larvae on the neck of an eastern box turtle.

The adult sarcophagid gravid females deposit first instar larvae on areas of broken skin whereupon they burrow into the wound. Larvae deposited on areas of unbroken skin may fail to penetrate into the subcutaneous layers. Preexisting wounds or even tick bite scars caused by *Amblyomma tuberculatum* may allow more successful infestation.⁶ Sites of predilection are the subcutaneous tissue of the neck, limbs, axilla, and inguinal regions. One report described infestation of a traumatic wound of the plastron.^c The larvae have only been found on chelonians. Attempts to establish infestations on sheep, goats, fish, and an alligator failed.⁶

The number of larvae that may inhabit a single lesion varies from 1 to 18. Ten to 20 larvae are deposited by the gravid female at one time.⁷ Up to 5 lesions have been described on one tortoise.⁷ Some of these animals have been unable to walk, and others died during captivity. It is possible that the cause of death is related to toxins released by the larvae, or to the rupture of one or more larvae with the subsequent release of antigenic material. Anaphylactic reactions in cats have been reported following the death of *Cuterebra* larvae.¹⁰

The second and third instar larvae may feed on exudate that enters the walled-off cyst in which

^cJackson CG, Jackson MM, Davis JD. Cutaneous myiasis in the three-toed box turtle, *Terrapene carolina triunquus* (abstr). *Bull Wild Dis Assoc* 1969;5:114.

they live.⁷ It is not uncommon to see the larvae moving about in the lesions. A foul odor along with a dark discharge has been described to emanate from these air holes.⁶ Odor or discharge were not noticed in these tortoises.

The developmental period for the first 3 instar larval forms at 26 C is 7 to 11 days for the first-instar larvae, 7 to 9 days for the second-instar larvae, and 28 to 35 days for the third-instar larvae, for a total larval developmental period of 42 to 55 days. Pupation occurs after the larva drops from the host and takes from 17 to 18 days.⁶ Crowding of larvae in a single lesion may result in substantially longer development times.⁶ The aforementioned times may represent growth under ideal environmental conditions.

Myiasis by *S. cistudinis* has been reported from Massachusetts to Florida and as far west as Kansas. Multiple species of tortoises have been described to be parasitized by *S. cistudinis* (Appendix).

The treatment of myiasis by *S. cistudinis* is straightforward. The breathing holes are surgically enlarged, and the maggots are carefully removed. The wound is then thoroughly flushed with an antiseptic and left to granulate closed. Systemic administration of antibiotics have been advocated to reduce the risk of secondary bacterial infection, especially in cases with diffuse involvement.³

Appendix

Species affected by *Sarcophaga cistudinis*
 Gopher tortoise (*Gopherus polyphemus*)

Texas tortoise	(<i>Gopherus berlandieri</i>)
Galapagos tortoise	(<i>Geochelone elephantopus</i>)
Florida box turtle	(<i>Terrapene carolina bauri</i>)
Ornate box turtle	(<i>Terrapene ornata</i>)
Eastern box turtle	(<i>Terrapene carolina carolina</i>)
Three-toed box turtle	(<i>Terrapene carolina triunguis</i>)
Painted turtle	(<i>Chrysemys picta</i>)

1. Aldrich JM. *Sarcophaga and allies in North America*. Lafayette, Ind: Thomas Say Foundation, 1916;12-15, 278-280.
2. Frye FL. *Biomedical and surgical aspects of captive reptile husbandry*. Edwardsville, Kan: Veterinary Medicine Publishing Co, 1981;223-224.
3. Jacobson ER. Parasitic diseases of reptiles. In: Fowler ME, ed. *Zoo and wild animal medicine*. Philadelphia: WB Saunders Co, 1986;180.
4. Marcus LC. Parasitic diseases of captive reptiles. In: Kirk RW, ed. *Current veterinary therapy VI*. Philadelphia: WB Saunders Co, 1977;801-806.
5. Jacobson ER. Parasitic diseases of reptiles. In: Kirk RW, ed. *Current veterinary therapy VIII*. Philadelphia: WB Saunders Co, 1983;599-605.
6. Knipling EF. The biology of *Sarcophaga cistudinis* Aldrich (Diptera), a species of Sarcophagidae parasitic on turtles and tortoises, in *Proceedings. Ent Soc Wash* 1937;39:91-101.
7. McMullen DB. Cutaneous myiasis in a box turtle, in *Proceedings. Okla Acad Sci* 1940;20:23-25.
8. Rodeck HG. Notes on box turtles in Colorado. *Copeia* 1949;1:32-34.
9. Peters JA. The box turtle as a host for dipterous parasites. *Am Midland Naturalist* 1948;40:472-474.
10. Williams JF. Parasitic diseases of the respiratory tract. In: Kirk RW, ed. *Current veterinary therapy VI*. Philadelphia: WB Saunders Co, 1977;270-277.