

Ticks from a Morelet's Crocodile in Belize

Authors: Rainwater, Thomas R., Platt, Steven G., Robbins, Richard G., and McMurry, Scott T.

Source: Journal of Wildlife Diseases, 37(4) : 836-839

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-37.4.836>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Ticks from a Morelet's Crocodile in Belize

Thomas R. Rainwater,¹ Steven G. Platt,² Richard G. Robbins,^{3,4} and Scott T. McMurry¹ ¹The Institute of Environmental and Human Health, Texas Tech University, Box 41163, Lubbock, Texas 79409-1163, USA; ²Wildlife Conservation Society, P.O. Box 1620, Phnom Penh, Cambodia; ³Armed Forces Pest Management Board, Walter Reed Army Medical Center, Washington, DC 20307-5001, USA; ⁴Corresponding author (email: robbingr@acq.osd.mil).

ABSTRACT: Parasitism of crocodilians by ticks has rarely been reported, and to our knowledge only seven published accounts exist. On 3 July 1999, we collected four ticks from a subadult Morelet's crocodile (*Crocodylus moreletii*) captured in northern Belize. These were identified as *Amblyomma dissimile* (one female), and *Amblyomma* sp. (two nymphs, one larva). The crocodile was captured on land approximately 100 m from water, and all four ticks were attached to loose skin on the lateral surface of the tail. Crocodilians are most susceptible to terrestrial ectoparasites, including ticks, during overland movements. However, most such movements occur in response to drought, when tick questing activity is suppressed, which likely accounts for the small numbers of tick specimens recorded from crocodilians and the absence of any noticeable impact of parasitism on host fitness.

Key words: Case report, *Amblyomma dissimile*, *Amblyomma* sp., ticks, *Crocodylus moreletii*, Morelet's crocodile, ectoparasitism, review.

Tick (Acari; Ixodida; Ixodidae) parasitism of crocodilians (alligators, caimans, crocodiles, gharials) is so infrequent that, in over a century of study, only seven publications have addressed the subject. In the first of these, Neumann (1899) reported an engorged female of the *nomen dubium* *Amblyomma grossum*, its "scutum cordiform, blackish, with copper patches anteriorly and posteriorly" (translation), from an unspecified crocodile in Suriname. Subsequently, Schwetz (1927a, b) twice described a collection of four males of *Aponomma exornatum* from a crocodile on Île de Mateba (5°54'S, 12°50'E), at the mouth of the Congo River, former Belgian Congo (now Democratic Republic of the Congo, previously Zaire), erroneously adding that these specimens were probably the first ever collected from any species of crocodile. Although *A. exornatum* has

since been recorded from the Nile crocodile (*Crocodylus niloticus*; Crocodylidae) in Mali (Villiers, 1955), Senegal (Saratsiotis, 1972, citing "Morel 1961," an apparently unpublished manuscript record), and Uganda (Matthysse and Colbo, 1987), it would be presumptuous to assume that Schwetz's specimens were also from this host, which shares the Congo Basin with the African slender-snouted crocodile (*C. cataphractus*) and the dwarf crocodile (*Osteolaemus tetraspis*) (King and Burke, 1989). The only other record we have found is that of Tucker (1995), who collected a single *Amblyomma* sp. nymph (possibly *A. limbatum* or *A. moreliae*) from the neck of a yearling freshwater crocodile (*C. johnsoni* = *C. johnstoni* of Australian workers; see King and Burke, 1989), in the Lynd River, northcentral Queensland (Australia, about 17°45'S, 144°20'E). No reports appear to exist of ticks parasitizing alligators and caimans (Alligatoridae) or true gharials (Gavialidae).

With records so scarce and scattered, it is perhaps not surprising that we have recently been able to augment this list. On 3 July 1999, one of us (TRR) collected four tick specimens, *A. dissimile* one female, and *Amblyomma* sp. two nymphs, one larva, from a subadult male Morelet's crocodile (*Crocodylus moreletii*; total length = 102.5 cm, snout-vent length = 50.0 cm, mass = 2.65 kg), which is a freshwater inhabitant of Atlantic and Caribbean drainages from central Tamaulipas, Mexico, south to Belize and Guatemala (Thorbjarnarson, 1992; Platt et al., 1999). The crocodile was captured within the Lamanai Archaeological Reserve (LAR; Orange Walk District, Belize; 17°47'N, 88°40'W), during ongoing ecological and toxicological

studies of this species (Rainwater et al., 1998). It was found in a small puddle along a marl road approximately 100 m from the New River Lagoon, which borders LAR to the east. All four ticks were attached to loose skin on the lateral surface of the tail immediately posterior to the right hind limb. Our tick collection (RML 122916) has been deposited in the U.S. National Tick Collection (Institute of Arthropodology and Parasitology, Georgia Southern University, Statesboro, Georgia, USA).

Amblyomma dissimile is a common and widespread parasite of reptiles and amphibians, occurring from Florida, Mexico, and the West Indies southward to Argentina (Jones et al., 1972). Though adults of this species have occasionally been recorded from domestic stock and other large mammals (Cooley and Kohls, 1944), the species is most often collected from reptiles, especially snakes. All stages are found on reptiles, nymphs exclusively so. The preimaginal stages of Neotropical amblyommines are generally "identified" by association with adults. However, our nymphs are perplexing because their hypostomal dentition is 2/2, whereas the normal dental formula for nymphal *A. dissimile* is 3/3 (Keirans and Durden, 1998). Even so, we suspect that our nymphs may also be *A. dissimile* because their pattern of scutal punctations exactly matches published descriptions for this species (Cooley and Kohls, 1944; Keirans and Durden, 1998). In this regard, it should be noted that 19 of the 53 Neotropical species of *Amblyomma* (36%) preferentially parasitize reptiles or amphibians; on a worldwide basis, 42 of 105 generally recognized species (40%) are known to do so (Hoogstraal and Aeschlimann, 1982; Keirans, 1992; Camicas et al., 1998).

Ectoparasitism of crocodylians by aquatic parasites, particularly leeches, has been well documented (Cott, 1961; Cherry and Ager, 1982; Webb and Manolis, 1983; Brantley and Platt, 1991). Conversely, accounts of parasitism of crocodylians by ter-

restrial ectoparasites are rare. Basking *C. niloticus* are commonly parasitized by the tsetse fly (*Glossina palpalis*) and these flies may actually prefer crocodile blood to that of mammals (Hoare, 1931; Cott, 1961). Crocodylians often move overland and can spend considerable periods of time out of water (McIlhenny, 1935; Cansdale, 1955; Poles, 1956; Cott, 1961; Webb and Manolis, 1989), where they may be opportunistically parasitized by tick species that otherwise infest snakes or lizards. Overland movements usually coincide with periods of drought. As smaller ponds evaporate, crocodylians may be forced to emigrate to new water sources (Platt, 1996). Such overland movements appear to be common in *C. moreletii*, which in northern Belize is frequently forced to emigrate during the dry season (Platt, 1996; S. G. Platt and T. R. Rainwater, unpubl. data). The crocodile examined in this study was captured at the extreme end of the dry season in northern Belize, which typically extends from January through June (Johnson, 1983). We have occasionally encountered other *C. moreletii* on land during the dry season, sometimes at considerable distances from water (e.g., 300 m) (Platt and Rainwater, unpublished data). Limited overland movements also occur during the wet season, when crocodiles return to ephemeral water bodies (Platt, 1996), though most wet season travel is probably facilitated by the flooding of ditches and dry creeks that provide avenues away from permanent water.

The tenuous relationship between crocodiles and ticks all but rules out a role for the latter in disease transmission. Moreover, by moving overland chiefly during the dry season, crocodiles are less likely to encounter ticks, whose questing for hosts is suppressed by desiccation (Sonenshine, 1993). This concurrence of activity on the part of potential hosts and inactivity on the part of ectoparasites likely accounts for the small numbers of ticks recorded from these large aquatic reptiles. By contrast, small terrestrial reptiles may acquire large

tick burdens that can significantly compromise their health (Dunlap and Mathies, 1993; Schall et al., 2000).

We are grateful to L. A. Durden and J. E. Keirans, for determining that no tick specimens from crocodilians have previously been deposited in the U.S. National Tick Collection, and for generously supplying many of the papers cited herein. In addition, we thank E. Garcia, D. Green and M. England for field assistance in Belize. Special appreciation goes to M. and M. Howells, for providing logistical support and accommodations throughout this project. The necessary research and collection permits were issued by E. Codd and N. Rosado, Forest Department, Conservation Division, Ministry of Natural Resources, Belmopan, Belize. Funding for this study was provided by the Lamanai Field Research Center and the U.S. Environmental Protection Agency (Grant No. R826310 to STM). Support for SGP was provided by the Wildlife Conservation Society.

LITERATURE CITED

- BRANTLEY, C. G., AND S. G. PLATT. 1991. Salinity correlations of the leech *Placobdella multilineata* on alligators. *Herpetological Review* 22: 4–5.
- CAMICAS, J.-L., J.-P. HERVY, F. ADAM, AND P.-C. MOREL. 1998. Les tiques du monde (Acarida, Ixodida): nomenclature, stades décrits, hôtes, répartition. Orstom, Paris, France, 233 pp.
- CANSDALE, G. 1955. Reptiles of West Africa. Penguin Books, London, UK, 104 pp.
- CHERRY, R. H., AND A. L. AGER, JR. 1982. Parasites of American alligators (*Alligator mississippiensis*) in South Florida. *The Journal of Parasitology* 68: 509–510.
- COOLEY, R. A., AND G. M. KOHLS. 1944. The genus *Amblyomma* (Ixodidae) in the United States. *The Journal of Parasitology* 30: 77–111.
- COTT, H. B. 1961. Scientific results of an inquiry into the ecology and economic status of the Nile crocodile (*Crocodilus niloticus*) in Uganda and northern Rhodesia. *Transactions of the Zoological Society of London* 29: 211–359.
- DUNLAP, K. D., AND T. MATHIES. 1993. The effects of nymphal ticks and their interaction with malaria on the physiology of male western fence lizards. *Copeia* 1993: 1041–1045.
- HOARE, C. A. 1931. Studies on *Trypanosoma grayi*. III. Life-cycle in the tsetse-fly and in the crocodile. *Parasitology* 23: 449–484.
- HOOGSTRAAL, H., AND A. AESCHLIMANN. 1982. Tick-host specificity. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft/Bulletin de la Société Entomologique Suisse* 55: 5–32.
- JOHNSON, W. C. 1983. The physical setting: Northern Belize and Pulltrowser Swamp. In *Pulltrowser Swamp: Ancient Maya habitat, agriculture, and settlement in northern Belize*. B. L. Turner and P. D. Harrison (eds.). University of Texas Press, Austin, Texas, pp. 8–20.
- JONES, E. K., C. M. CLIFFORD, J. E. KEIRANS, AND G. M. KOHLS. 1972. The ticks of Venezuela (Acarina: Ixodoidea) with a key to the species of *Amblyomma* in the Western Hemisphere. *Brigham Young University Science Bulletin, Biological Series* 17: 1–40.
- KEIRANS, J. E. 1992. Systematics of the Ixodida (Argasidae, Ixodidae, Nuttalliellidae): An overview and some problems. In *Tick vector biology: Medical and veterinary aspects*. B. Fivaz, T. Petney, and I. Horak (eds.). Springer-Verlag, Berlin, Germany, pp. 1–21.
- , AND L. A. DURDEN. 1998. Illustrated key to nymphs of the tick genus *Amblyomma* (Acari: Ixodidae) found in the United States. *Journal of Medical Entomology* 35: 489–495.
- KING, F. W., AND R. L. BURKE (EDITORS). 1989. Crocodilian, tuatara, and turtle species of the world: A taxonomic and geographic reference. Association of Systematics Collections, Washington, DC, 216 pp.
- MATTHYSSE, J. G., AND M. H. COLBO. 1987. The ixodid ticks of Uganda. *Entomological Society of America, College Park, Maryland*, 426 pp.
- MCILHENNY, E. A. 1935. The alligator's life history. Christopher Publishing House, Boston, Massachusetts, 117 pp.
- NEUMANN, L. G. 1899. Révision de la famille des ixodidés (3^e mémoire). *Mémoires de la Société Zoologique de France* 12: 107–294.
- PLATT, S. G. 1996. The ecology and status of Morelet's crocodile in Belize. Ph.D. Dissertation, Clemson University, Clemson, South Carolina, 187 pp.
- , J. B. THORBJARNARSON, AND T. R. RAINWATER. 1999. Distribution of Morelet's crocodile (*Crocodylus moreletii*) in southern Belize. *Southwestern Naturalist* 44: 395–398.
- POLES, W. E. 1956. Animal ways. *Oryx* 3: 246–254.
- RAINWATER, T. R., S. G. PLATT, AND S. T. MCMURRY. 1998. A population study of Morelet's crocodile (*Crocodylus moreletii*) in the New River watershed of northern Belize. In *Proceedings of the 14th Working Meeting of the Crocodile Specialist Group, International Union for the Conservation of Nature and Natural Resources (IUCN)—The World Conservation Union*,

- Gland, Switzerland and Cambridge, United Kingdom, pp. 206–220.
- SARATSIOTIS, A. 1972. Contribution à l'étude morphologique et biologique du genre *Aponomma* Neumann, 1899 (Acariens, Ixodidea). *Acarologia* 13: 476–495.
- SCHALL, J. J., H. R. PRENDEVILLE, AND K. A. HANLEY. 2000. Prevalence of the tick, *Ixodes pacificus*, on western fence lizards, *Sceloporus occidentalis*: Trends by gender, size, season, site, and mite infestation. *Journal of Herpetology* 34: 160–163.
- SCHWETZ, J. 1927a. Études et notes d'entomologie médicale sur le Katanga (élevage, tsé-tsé, tiques et moustiques). In Comité Spécial du Katanga, Office de Publicité, Brussels, Belgium pp. 117–124.
- . 1927b. Contribution à l'étude des Ixodidae (tiques) du Congo belge (d'après les collections du Musée Royal d'Histoire naturelle de Bruxelles) (deuxième note). *Revue Zoologique Africaine* 15: 73–80.
- SONENSHINE, D. E. 1993. *Biology of ticks*, Vol. 2. Oxford University Press, New York, New York 465 pp.
- THORBJARNARSON, J. B. 1992. Crocodiles: An action plan for their conservation. In International Union for the Conservation of Nature and Natural Resources (IUCN)/Species Survival Commission (SSC) Crocodile Specialist Group Publication, H. Messel, F. W. King, and J. P. Ross (eds.). Gland, Switzerland, 136 pp.
- TUCKER, A. D. 1995. First record of parasitism by a tick on an Australian freshwater crocodile. *Memoirs of the Queensland Museum* 38: 686.
- VILLIERS, A. 1955. Note sur quelques Ixodidae et Gamasidae parasites des vertébrés rencontrés en Afrique Occidentale Française. *Bulletin de l'Institut Française d'Afrique Noire, Série A* 17: 444–454.
- WEBB, G. J. W., AND C. S. MANOLIS. 1983. *Crocodylus johnstoni* in the McKinlay River area, N. T. V. Abnormalities and injuries. *Australian Wildlife Research* 10: 407–420.
- , AND ———. 1989. *Crocodiles of Australia*. Reed Books Pty. Limited, Frenchs Forest, New South Wales, Australia, 160 pp.

Received for publication 11 August 2000.