Oochoristica whitentoni Steelman, 1939 (Cestoda: Cyclophyllidea: Linstowiidae) and *Cruzia testudinis* (Nematoda: Ascaridida: Kathlaniidae) from a Three-toed Box Turtle, *Terrapene carolina triunguis* (Testudines: Emydidae) from Oklahoma: Second Report from Type Host Species and New State Record for C. *testudinis*

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The tapeworm genus *Oochoristica* Lühe is a large, unwieldy complex of parasitic worms that infect a variety of reptiles (primarily lizards) and mammals, and currently includes 93 species (Schuster 2012). One, *Oochoristica whitentoni* Steelman, was described from a three-toed box turtle, *Terrapene carolina triunguis* from Stillwater, Payne County, Oklahoma (Steelman 1939). It has since also been reported from the false iguana, *Ctenosaura pectinata* from Guerrero, Mexico (Flores-Barroeta 1955) and reticulate Gila monster, *Heloderma suspectum suspectum* from Arizona (Goldberg and Bursey 1991). The validity of the former record has been questioned; its possible inclusion in *O. acapulcoensis* Brooks, Pérez-Ponce de León and García-Prieto has been suggested (Brooks et al. 1999) and we concur. Therefore, only two valid hosts of *O. whitentoni* may occur. Here, we provide only the second report of *O. whitentoni* from the type host species since the original description over 75 yr ago. In addition, we document only the second report of a nematode, *Cruzia testudinis* Harwood in *T. c. triunguis* and, most importantly, the first report of this nematode from Oklahoma.

On 8 May 2015 a single adult *T. c. triunguis* was found dead on road off St. Hwy 82, Le Flore County (34.814878°N, 95.04472°W). It was placed on ice, taken to the laboratory and, since its shell was already cracked, the gastrointestinal tract was split longitudinally and the contents placed in a Petri dish containing 0.85% saline. A single live tapeworm was found in the small intestine, fixed in near boiling water, transferred to 70% ethanol, stained with acetocarmine, and mounted in Canada balsam. Numerous nematodes were found in the intestinal tract and fixed in near boiling water, transferred to 70% ethanol and examined as temporary mounts after placement on a glass slide in a drop of glycerol. A host voucher specimen was deposited in the Henderson State University Collection (HSU), Arkadelphia, Arkansas; parasite vouchers were deposited in the Harold W. Manter Laboratory

Table 1. Comparison of measurements between original and current specimens.

Character	Steelman 1939	Current specimen
Length	12.3 (1.5–27.5) cm	17.1 cm
Suckers	0.16 (0.15–0.18) mm	0.17 mm
Scolex	0.40 (0.36–0.44) mm	0.41 mm
Segmentation begins	3.3 (2.9–3.6) mm from anterior	2.3 mm from anterior
*Immature segments	0.26 (0.09–0.39) mm long ×	0.26–0.39 mm long ×
	0.57 (0.33–0.73) mm wide	0.58–1.08 mm wide
*Mature segments	0.95 (0.56–1.36) mm long ×	0.64–1.47 mm long ×
	1.04 (0.79–1.13) mm wide	1.34–2.51 mm wide
Gravid segments	absent	absent
Cirrus sac	0.19 (0.13–0.23) mm long ×	0.22–0.31 mm long ×
	0.09 (0.07–0.12) mm wide	0.05–0.08 mm wide
Ovary	0.29 (0.13–0.36) mm wide	0.47–0.51 mm wide
Testes	0.04 (0.02–0.06) mm diameter	0.02–0.05 mm diameter
Number	100–150	105–110

*Strobilus width is significantly larger in the current specimen.

of Parasitology (HWML), Lincoln, Nebraska.

Closer examination revealed the tapeworm (HWML 101644) fit the description of *O. whitentoni* provided by Steelman (1939): i.e., scolex rounded anteriorly, four unarmed suckers, narrowed neck; segmentation as light transverse lines separating bands of deeper-staining tissue; genital primordia first apparent as an ovoid mass of deeply staining tissue centrally placed in segment which eventually becomes medially elongate; genital pores marginal, irregularly alternate, located in anterior third of segment; ovary median comprising two lateral lobated wings connected by a transverse median portion. Vitellarium ovoid just posterior to ovary. Testes located behind and posterolateral to ovary, spheroid in shape, forming crescentic band with concavity directed forward. Steelman (1939) reported one strobila, measuring 9.5 cm in length to contain 134 immature and 77 mature proglottids; our specimen possessed 153 immature and 101 mature proglottids; in both specimens, gravid proglottids were absent. Morphological features between Steelman's specimen and the current specimen are given in Table 1. However, with the exception of strobilus width (our specimen is larger than original description), all of our measurements are within the ranges provided by Steelman (1939).

In the original description, Steelman (1939) mentioned the low prevalence of infection of *O. whitentoni* as he observed it from only one of 11 (9%) *T. c. triunguis*, while no *O. whitentoni* were found in 35 ornate box turtles, *Terrapene ornata* from Oklahoma. In an unpublished thesis, Mays (1960) examined 77 *T. c. triunguis* and 89 *T. ornata* from Oklahoma and did not report *O. whitentoni*. Indeed, we have also examined 45 *T. c. triunguis* for coccidian parasites from Arkansas and Oklahoma via fecal flotation technique (McAllister et al. 2015), and while coccidia and nematode ova were often observed, none of the box turtles were found to be passing linstowiid tapeworm ova. Therefore, prevalence of this tapeworm in box turtles is likely very low which may account for its absence in helminth surveys of *Terrapene* spp. (see Mays 1960; Ernst and Ernst 1977; Baker 1987; Dodd 2001) in the United States.

In addition to *O. whitentoni*, numerous nematodes (HWML 92074) found in the intestinal

tract fit the description of *Cruzia testudinis* that Harwood (1932) described previously from *T. c. triunguis* collected in Houston, Harris County, Texas. Since that time, we are unaware of additional reports of this nematode in three-toed box turtles or any other host.

In summary, we provide only the second report of *O. whitentoni* and *C. testudinis* from the type host species since the original description over 75 and 83 years ago, respectively. In addition, we document the first report of *C. testudinis* in Oklahoma. Further sampling of box turtles may eventually allow description of gravid segments of *O. whitentoni* and additional reports of *C. testudinis* in three-toed and other box turtles from other parts of their range.

Acknowledgments

The Oklahoma Department of Wildlife Conservation issued a Scientific Collecting Permit to CTM. We also thank Drs. S. L. Gardner (HWML) and R. Tumlison (HSU) for expert curatorial assistance.

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Submitted July 22, 2015 Accepted October 26, 2015