



Review: *Trichinella zimbabwensis* – the first known species of the genus *Trichinella* infecting cold-blooded animals



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Trichinellosis is a meat-borne zoonotic disease caused by nematodes belonging to the genus *Trichinella* (Fig. 1). These nematodes are among the least host-specific helminths (Kapel, 2000). Currently, 10 *Trichinella* species have been described (Sharma et al., 2020), including seven encapsulating species - *Trichinella spiralis*, *Trichinella nativa*, *Trichinella britovi*, *Trichinella nelsoni*, *Trichinella murrelli*, *Trichinella patagoniensis*, *Trichinella chanchalensis* and three genotypes whose taxonomic status remains unstipulated - *Trichinella T6*, *T8* and *T9* exclusive to mammals, and three non-encapsulating species *Trichinella papuae*, *Trichinella pseudospiralis* - infecting mammals and birds, and *Trichinella zimbabwensis* – infecting both mammals and reptiles (Kapel, 2000), (Pozio et al., 2002).

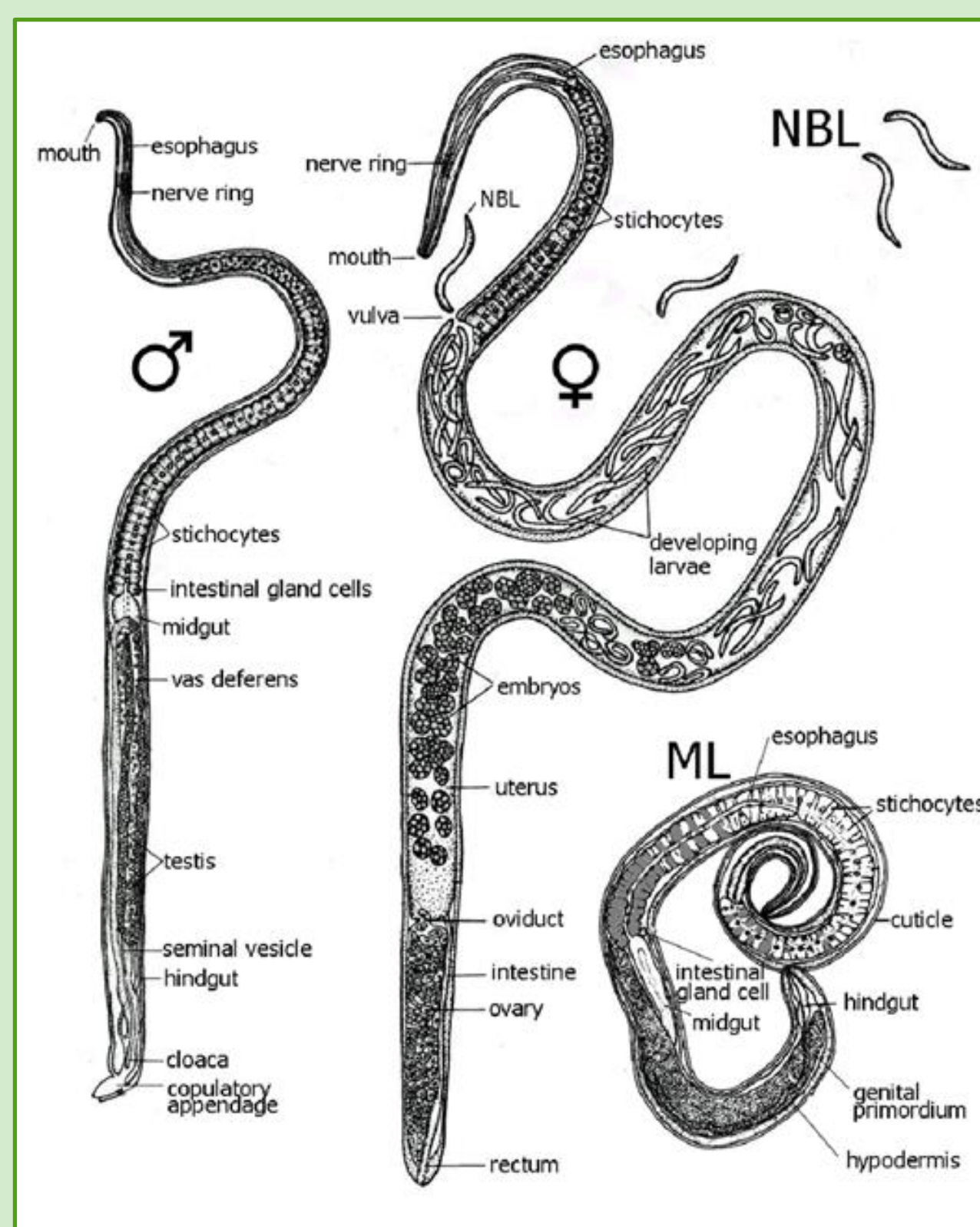


Fig. 1. Morphology of *Trichinella* male, female, muscle larvae (ML) and newborn larvae (NBL) (Näreaho, A., 2006)

The geographic area with the highest level of possibility for *T. zimbabwensis* spread only over the southeastern areas of Africa (Mozambique, South Africa and Zimbabwe). Lower distribution is also found over the central South America, followed by focal point in the western South America (Peru), southwestern Africa (Namibia), the south part of Madagascar, and the northeastern part of Australia (Fig. 3).

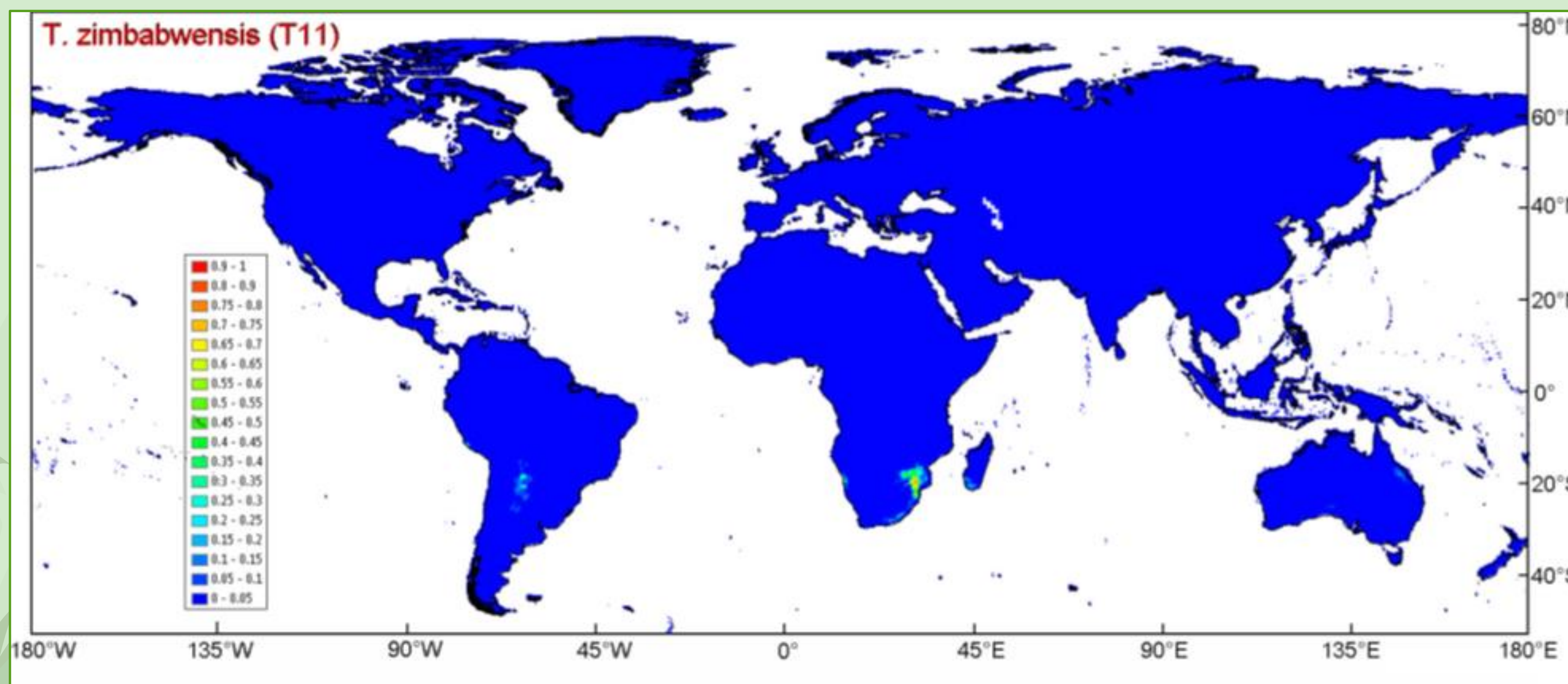


Fig.3. Predicted geographic distribution ranges for *T. zimbabwensis* (Feidas et al., 2014).

Many surveys have been conducted to determine the predilection muscles of *T. zimbabwensis*. Louis J. La Grange and Samson Mukaratirwa have used 15 crocodiles randomly divided into three cohorts of five animals each, representing high infection (642 larvae/kg of bodyweight average), medium infection (414 larvae/kg of bodyweight average) and low infection (134 larvae/kg of bodyweight average) cohorts. In the first group the highest percentages of larvae have been observed in the triceps muscles and hind limb muscles. In the second group larvae have been found in the triceps muscles, sternomastoid and hind limb muscles. In the last group with low infection larvae have been mainly found in the intercostal muscles. In another study an interesting observation was that the dorsal tail musculature appeared to harbour a higher mean number of larvae than ventral muscles. Similarly, the superficial musculature of the dorsal tail on average harboured more larvae than the deeper muscles (La Grange et al., 2013), (La Grange and Mukaratirwa, 2014).

Experimental infections have shown that this nematode can infect other reptile species, as well as mammals (i.e., mice, rats, pigs, foxes, and primates) (La Grange et al., 2009). Despite the ability of *T. zimbabwensis* to infect mammalian hosts there has only been a single report of a naturally infected mammal to date - *Panthera Leo* of the Kruger National Park (KNP) of South Africa (La Grange et al., 2010).

Analysis of the sequence data available in GenBank for the other remaining taxa, *T. zimbabwensis* (Fig. 2), *T. papuae*, *T. patagoniensis* and *Trichinella T8* and *T9*, the ITS-1 primers also detected the marker fragments of these taxa for their differentiation by the NGS method (Lobanov et al., 2023). If the amplification band is 264 bp, the larva is known to belong to *T. zimbabwensis* (Pozio and Zarlenga, 2019).

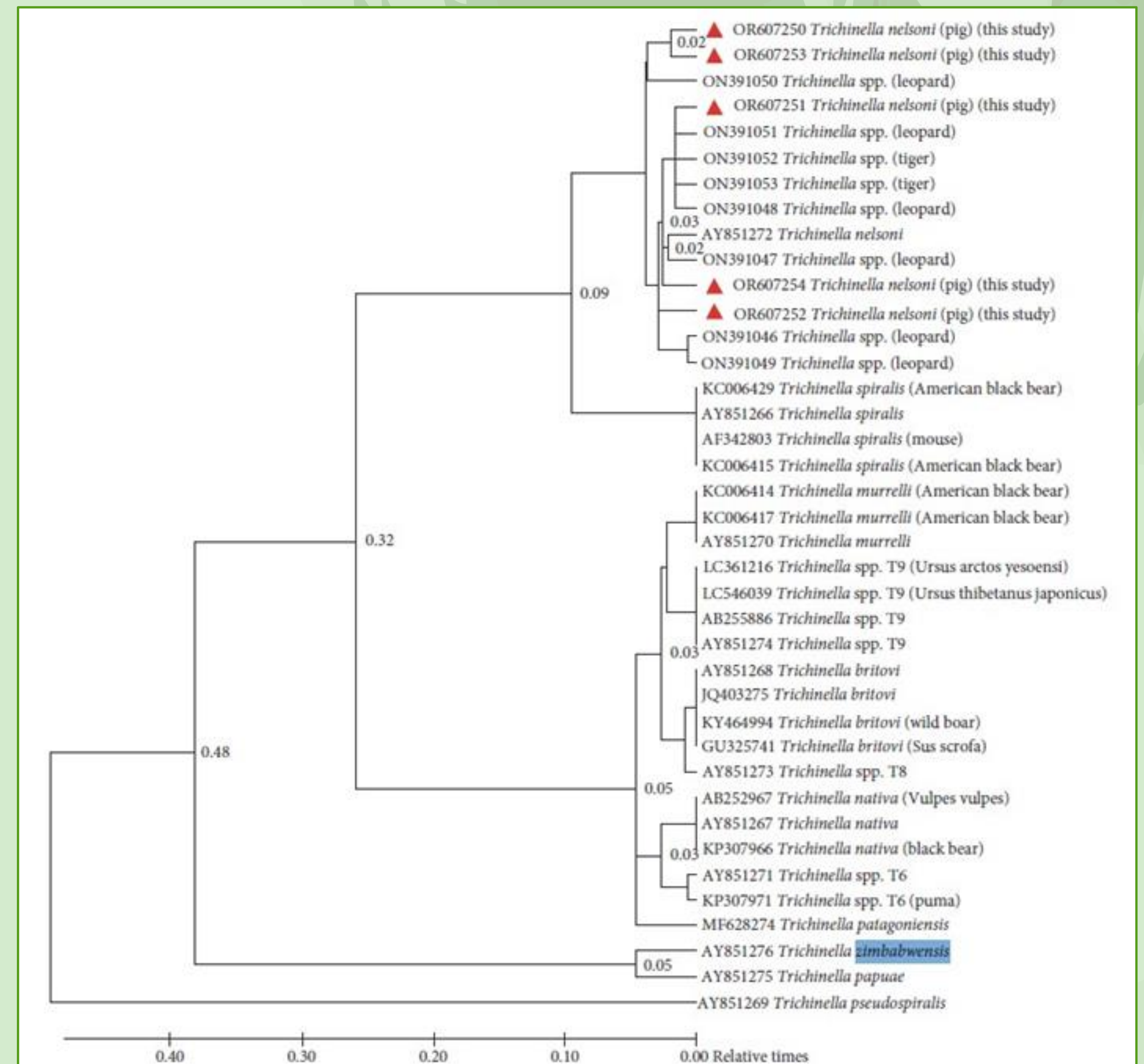


Fig.2. Phylogram of *Trichinella* species on nucleotide sequences of ITS-2 region. The phylogenetic tree was based on comparison of the isolated larvae (Δ) with the known up to now *Trichinella* species available in the Genebank database. Relativity time is shown on branches (Kilabhe et al., 2024).

CONCLUSION:

To summarize, results of passive monitoring indicate that *T. zimbabwensis* has the highest prevalence in crocodiles and carnivores from the three species known to roam South Africa. *T. zimbabwensis* is not only the most prevalent, but also infects the widest host range of all *Trichinella* species. Due to the consumption of alligator meat in some countries, this disease represents a potential zoonosis

The presence of different species which infect reptiles, mammals or birds in the genus *Trichinella* strongly suggests the possibility of this nematode group being ancient and it have evolved with the evolution of reptiles into mammals and birds (i.e. from poikilothermic to homoiothermic vertebrates).

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