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Description of a new Neotropical species of *Mathevotaenia* (Cestoda: Anoplocephalidae), a parasite of the Virginia opossum *Didelphis virginiana*

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Abstract: The cestodes of the genus *Mathevotaenia* Akhumyan, 1946, are parasites of mammals, although some species also occur in reptiles. The genus comprises 61 species distributed worldwide, 25 of which occur in the American continent. During a collection of mammals in Yucatán, Mexico, six specimens of a cestode belonging to *Mathevotaenia* were found in the Virginia opossum *Didelphis virginiana* Kerr. The aim of this study is to morphologically describe these specimens, which represent a new species, and to evaluate their phylogenetic position within the Anoplocephalidae, based on *cox*1, 28S rDNA and ITS sequences. The new species is distinguished from its congeners by the combination of the following characters: a high number of ovarian lobes, comparable only with *Mathevotaenia wallacei* (Chandler, 1952), and a body proper size similar to that of *M. diminuta* Navone, 1988, *M. oklahomensis* (Peery, 1939) and *M. brasiliensis* Kugi et Sawada, 1970.

Keywords: Mexico, Linstowiinae, tapeworms, marsupials, phylogeny

The Virginia opossum, *Didelphis virginiana* Kerr, is a marsupial ranging from northern Costa Rica to southern Canada. Primarily insectivorous, this species also supplements its diet with fruits and carrion (Cruz-Salazar et al. 2014). Despite its broad distribution across Mexico, records of cestode species infecting *D. virginiana* remain limited. Records included species such as the cyclophyllidean *Mathevotaenia* sp. found in Chiapas (García-Prieto et al. 2012), Colima (Monet-Mendoza et al. 2005, Acosta-Virgen et al. 2015) and Yucatán (Panti-May et al. 2024) as well as the onchoproteocephalidean *Thaumasioscolex didelphidis* Cañeda-Guzmán, de Chambrier et Scholz, 2001 in Veracruz (Cañeda-Guzmán et al. 2001). In the Nearctic region, *Mesocestoides didelphus* Campbell, Gardner et Navone, 2003 is the only cestode found in this marsupial (Campbell et al. 2003).

The genus *Mathevotaenia* Akhumyan, 1946 has been frequently synonymised with the genus *Oochoristica* Lühe, 1898. Nevertheless, the genus was considered as valid by Beveridge (1994). The main distinction between these two genera is the presence of craspedote proglottids in *Mathevotaenia* and acraspedote proglottids in *Oochoristica* (Beveridge 1994). Furthermore, *Mathevotaenia* has been regarded as a genus associated with mammals, although the existence of a species with craspedote proglottids parasitising reptiles has included these among its hosts (Bursey et al. 2010).

Currently, *Mathevotaenia* comprises 61 species, 25 of which are found on the American continent. There is a greater richness of this genus in Latin America, with Argentina and Brazil having the highest number of recorded species, followed by the United States in North America. Despite the global distribution of the genus, there are no descriptions of species of *Mathevotaenia* from Mexico, only identifications at genus level (Monet-Mendoza et al. 2005, Acosta-Virgen et al. 2015, Panti-May et al. 2024).

During a collection of mammals in Yucatán, Mexico, some anoplocephalid cestodes that belong to *Mathevotaenia* were found. They are characterised by the presence of an unarmed scolex, four suckers, small strobila and irregularly alternating genital pores in craspedote proglottids (Beveridge 1994). The objectives of this study are two folds: 1) to describe a new species of *Mathevotaenia* retrieved from the small intestine of *D. virginiana* from Yucatán, Mexico and 2) to establish the phylogenetic position of the new species within the family Anoplocephalidae, based on molecular data of *cox*1, 28S rDNA and ITS.

MATERIALS AND METHODS

Specimen collection

As a part of a preliminary study on helminths of opossums in the Yucatán Peninsula (Panti-May et al. 2024), six specimens of *Didel-*

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Table 1. Metadata associated with molecular data used in the phylogenetic inference. New sequences are denoted with an asterisk.

Taxon names	Locality	*cox*1	ITS	28S rDNA	References
Anoplocephalinae Blanchard, 1891					
Andrya rhopalocephala	Hódmezövásárhely, Hungary	AY189958	AY752647	AY569724	Haukisalmi et al. 2004, Wickström et al. 2005
Anoplocephala perfoliata	Hokkaido, Japan; Hannover, Germany	LC796749	AJ578153	LC795781	Drogemuller et al. 2004, Sasaki et al. 2024
Anoplocephaloides bulmeri	Helsinki, Finland			KJ950148	Haukisalmi et al. 2014
Arctocestus serratus specimen 1	Cape Bathurst, Canada	KJ778907			Haukisalmi et al. 2014
Arctocestus serratus specimen 2	Nunavut, Canada	AY568219	AF314414	AY569768	Haukisalmi et al. 2001, Wickström et al. 2005
Beringitaenia nanushukensis	Alaska, USA	KJ778923			Haukisalmi et al. 2014
Bertiella studeri	Shanghai, China; Kerala, India; Central Providence, Sri Lanka	OQ726388	OP477441	MN982722	Song, unpublished; Sebasteena et al., unpublished; Amarasinghe and Wickramasinghe 2020
Cookiella ondatrae	Nevada, USA	KJ778908			Haukisalmi et al. 2014
Ctenotaenia marmotae	France	AY568187		HM138529	Wickström et al. 2005; Haukisalmi et al., unpublished
Diandrya composita	Alaska, USA	AY181551	AY752649	AY569741	Wickström et al. 2005, Haukisalmi et al. 2016
Douthittia nordenskioeldi	Byron Bay, Nunavut, Canada	AY568204		AY569759	Wickström et al. 2005
Equinia mamillana	Madrid, Spain; Germany		KJ934712	AY569770	Wickström et al. 2005, Bohórquez et al. 2015;
Gulyaevia longivaginata	Siberia, Russia	AY568202	AY752657	AY569756	Wickström et al. 2005
Lemminia fellmani	Finse, Norway	AY586612	AY752655	AY569748	Wickström et al. 2005
Microcephaloides krebsi	Wrangel Island, Russia	AY568201		AY569755	Wickström et al. 2005
Micrococticola blanchardi	Heinävesi, Finland	AY189955	AY752653	AY569746	Haukisalmi et al. 2004, Wickström et al. 2005
Moniezia benedeni	Hokkaido, Japan	AB821396			Diop et al. 2015
Moniezia sp.	Alaska, USA			AY569772	Wickström et al. 2005
Monoecocestus americanus	Alaska, USA	AY568184	AY752652		Wickström et al. 2005
Mosgovoyia pectinata	North Yorkshire, England	AY568211	AY752648	HM045012	Wickström et al. 2005; Haukisalmi et al., unpublished
Neoctenotaenia ctenoides	Uncertain			HM045016	Haukisalmi et al., unpublished
Parandrya oeconomi	Barbacs, Hungary	AY568217		AY569760	Wickström et al. 2005
Progamotaenia fellicola	Townsville, Qld, Australia			JN683675	Hardman et al. 2012
Rauschoides alternata	Cape Krusenstern, USA	AY181426	AY299562	AY569742	Wickström et al. 2003, 2005
Rodentocestus freemani	Michigan, USA	PP903715			Grover 2024
Schizorchis caballeroi	Uncertain			HM045014	Haukisalmi et al., unpublished
Tenoraia janickii	Izsák, Hungary	KJ778925			Haukisalmi et al. 2014
Triplotaenia undosa	Kangaroo Island, Australia			JN683696	Hardman et al. 2012
Linstowiinae Fuhrmann, 1907					
Atriotaenia incisa	Stuttgart, Germany	OR039311			Reinhardt et al. 2023
Mathevotaenia symmetrica	Kurdistan Region, Iraq			MW410226	Al-Bajalan, unpublished
***Mathevotaenia mayae* sp. n.**	**Yucatan, Mexico**	**PQ870061***	**PV196925***	**PP662454**	Panti-May et al. 2024; **this study**
Oochoristica hemidactyli	Uttar Pradesh, India		MK937578		Verma et al. 2020
Inermicapsiferinae Lopez-Neyra, 1943					
Thysanotaenia congolensis	not known			KP171521	Świderski et al. 2016
Thysanosomatinae Fuhrmann, 1907					
Avitellina centripunctata	Duhok, Iraq	ON421930			Alberfkani et al. 2022
Thysaniezia ovilla	Hódmezövásárhely, Hungary	AY189958		AY569724	Haukisalmi et al. 2004, Wickström et al. 2005
Outgroup					
Mesocestoides sp.	Mexico City, Mexico	OQ281681		OQ343502	Camacho-Giles et al. 2024

phis virginiana were examined for helminths under a permit from the Mexican Ministry of Environment (SGPA/DGVS/02974/22). In one of the opossums examined six cestodes were found in the small intestine.

Morphological study

Cestodes were relaxed alive using hot distilled water. Specimens destined for morphological analysis were fixed with 10% formalin and preserved in 70% ethanol, while specimens for molecular analysis were fixed directly in 100% ethanol. For morphological observations, helminths were stained with Mayer's paracarmine, dehydrated through a graded ethanol series, cleared in methyl salicylate, and permanently mounted in Canada balsam. Specimens were examined and illustrated using a light microscope equipped with a drawing tube. The type series was deposited in the Colección Nacional de Helmintos (CNHE), Instituto de Biología (IB), Universidad Nacional Autónoma de México, Mexico City.

For better visualisation of eggs, five terminal proglottids were artificially digested on a glass slide by adding digestion buffer and proteinase K, provided in Animal and Fungi Genomic DNA preparation Kit of Jena. The slide was placed in a Thermo Scientific Precision incubator at 5° C, monitoring every 10 to 15 min. To prevent sample desiccation, a 100 µl drop of digestion buffer was added as many times as necessary. Once the tissue was digested it was covered with a coverslip and observed directly microscopically with a Leica DM750 microscope with a 5MP Leica Camera ICC 50E attached.

An individual was processed to scanning electron microscopy (SEM); it was dehydrated using a graded ethanol series and critical-point dried with carbon dioxide. The dehydrated specimen was then mounted on a metal stub, coated with a gold-palladium mixture, and examined using a SEM (Hitachi SU1510) at 10 kV at Laboratorio de la Biodiversidad (LANABIO), IBUNAM, Mexico City. All measurements are reported in micrometres unless stated otherwise.

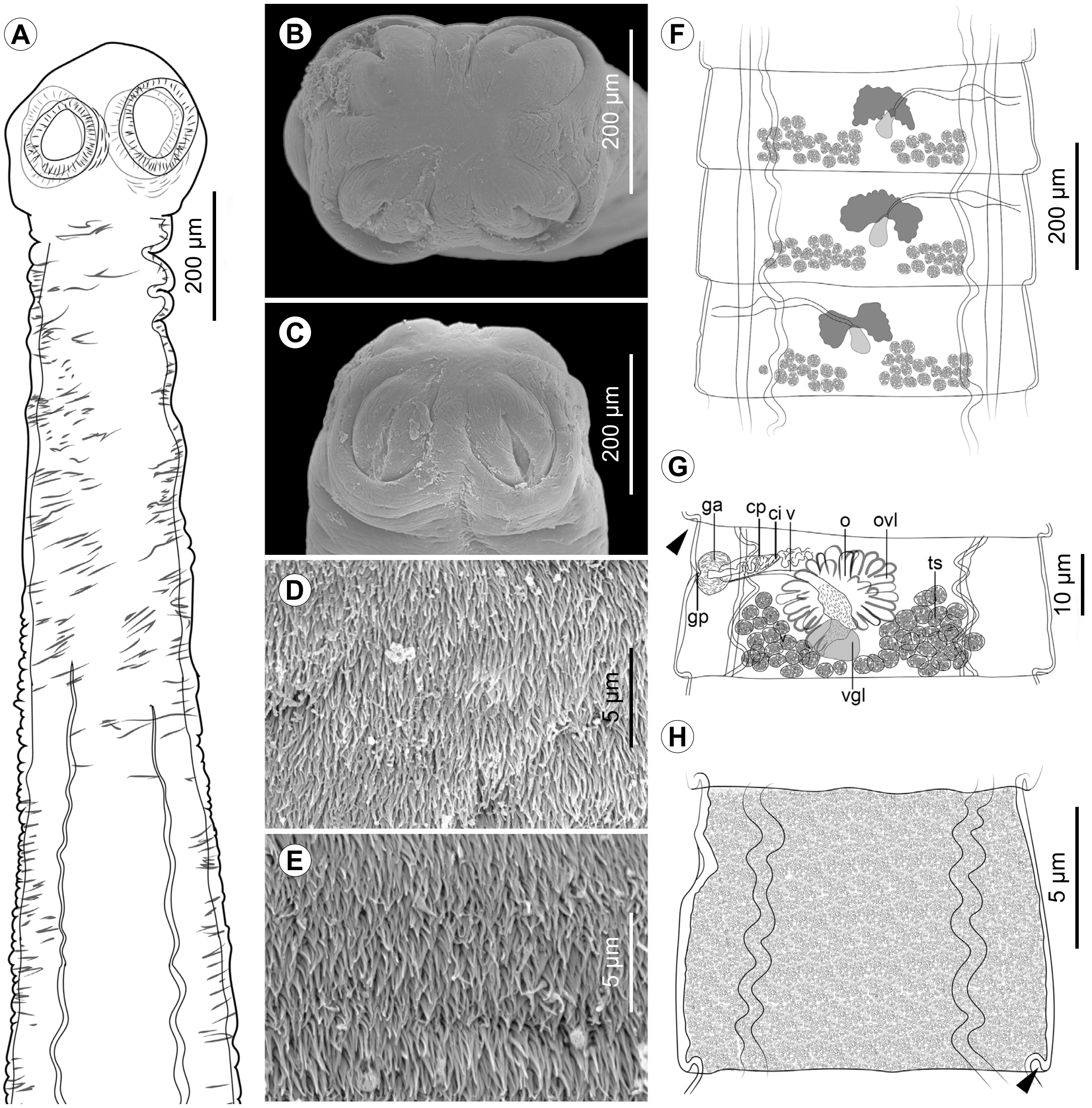

Fig. 1. SEM microphotographs and composite drawing of *Mathevotaenia mayae* sp. n. from *Didelphis virginiana* Kerr, Mexico, based on holotype and paratypes. **A** – line drawing of anterior region of body; **B**, **C** – apical and lateral view of scolex; **D**, **E** – microphotographs of acicular spinitriches at level of the scolex and at anterior level of strobila; **F** – immature proglottids; **G** – mature proglottid; **H** – gravid proglottid. Arrow indicates the craspedote arrangement of strobila. *Abbreviations*: ci – cirrus; cp – cirrus pouch; ga – genital atrium; gp – genital pore; o – ovary; ovl – ovarian lobule; ts – testis; v – vagina; vgl – vitelline gland.

Molecular analyses

For molecular diagnosis, DNA was extracted from 5 to 10 gravid proglottids using a Bio Basic Molecular Biology Kit, following the methodology described by the manufacturer. Domains D1–D2 of large ribosomal subunit (28S) rDNA were amplified through Polymerase Chain Reaction (PCR) with primers 391 (5’-AGCGGAGGAAAAGAAACTA-3’) (Smythe and Nadler 2006) 536 (5’-CAGCTATCCTGAGGGAAAC-3’) (García-Varela and Nadler 2005), following the thermal profile: 94 °C for 5 min, 35 cycles of 94 °C for 45 s, 52 °C 45 sec and 72° C 1 min, with final extension of 7 min. Cytochrome oxidase subunit 1 was amplified with primers JB3 (5′-TTTTTTGGGCATCCTGAGGTTTAT-3′) (Bowles et al. 1993) and CO1-R (5′-CAACAAATCATGATGCAAAAGG-3′) (Miura et al. 2005) under the same thermal profile.

Internal transcribed spacer was amplified with primers ITS4 (5′-TCCTCCGCTTATTGATATGC-3’), ITS5 (5′-GGAAGTAAAAGTCGTAACAAGG-3’) (White et al. 1990), 5.8MussF (5′-CGCAGCCAGCTGCGTGAATTAATGT-3’), 8MussR (5′-GATGTCGATGTTCAATGTGTCCTGC-3’) (Källersjö et al. 2005) and ITS BD1 (5′-GTCGTAACAAGGTTTCCGTA-3’) and ITS BD2 (5′-TATGCTTAAATTCAGCGGGT-3’) (Bowles et al. 1993), with internal PD450F (5′-CGATGAAGAGTGCAGCAAAC-3’) and PD450R (5′-GTTTGCTGCACTCTTCATCG-3’) (Hayward et al. 2001) using the same profile as for 28S rDNA.

Fig. 2. Microphotograph of eggs of *Mathevotaenia mayae* sp. n. from *Didelphis virginiana* Kerr, Mexico after digestion of three terminal proglottids.

Successful PCRs were corroborated by electrophoresis in an agarose gel 1.6%. Successful amplifications were purified using CentriSep 96 filter plates with Sephadex G-50. Sequencing reactions included 0.4 µl BigDye Terminator v. 3.1, 2 µl Buffer 5x, 4 µl ddH_2O, 1 µl of primer at 10 µm, and 3 µl purified PCR product (total volume 10 µl). Samples were purified using Sephadex G-50, then 25 µl de EDTA 0.5 mM was added to each sample and finally sequenced in an ABI-PRISM 3100 sequencer at the LANABIO-IBUNAM.

Complementary sequences were assembled and visualised using Geneious version 5.1.7. The correct amplification of target sequences was revised with a blast search (NCBI). In the special case of ITS, amplification resulted in two contigs, one apparently chimeric sequence due to the BLAST query resulted in 11% coverture and 98% similarity with the sequence of *Taenia martis* (Zeder, 1803). Second contig with the BLAST query derived in 64% coverture and 83% similarity with the sequence of *Oochoristica hemidactyli* Johri, 1955. The last was used in the phylogenetic analysis.

Phylogenetic analyses

Sequences generated here were aligned with those available in GenBank using Mafft online version (Katoh et al. 2018). Selection of terminals was based on a search in GenBank of each genus of the Anoplocephalidae according to Caira and Jensen (2017) (for more details see Table 1). The cyclophyllidean genus *Mesocestoides* sp. was used as outgroup. A concatenated DNA data set was built using Mesquite (Maddison and Maddison 2023) and consisted of 36 terminals and 3,357 base pairs.

Phylogenetic reconstruction was inferred under two criteria: Maximum likelihood (ML) and Bayesian Inference (BI) using IQtree (Nguyen et al. 2015) and MrBayes version 3.2 (Ronquist et al. 2012), respectively. In the case of ML the integrated ModelFinder module (Kalyaanamoorthy et al. 2017) was used to estimate the best fit substitution model, and rapidBootstrap algorithm (Hoang et al. 2017) for calculating support values establishing 1,000 replicates. For BI search, 10 million replicates were established, discarding 25% as burning. In both cases each partition was informed.

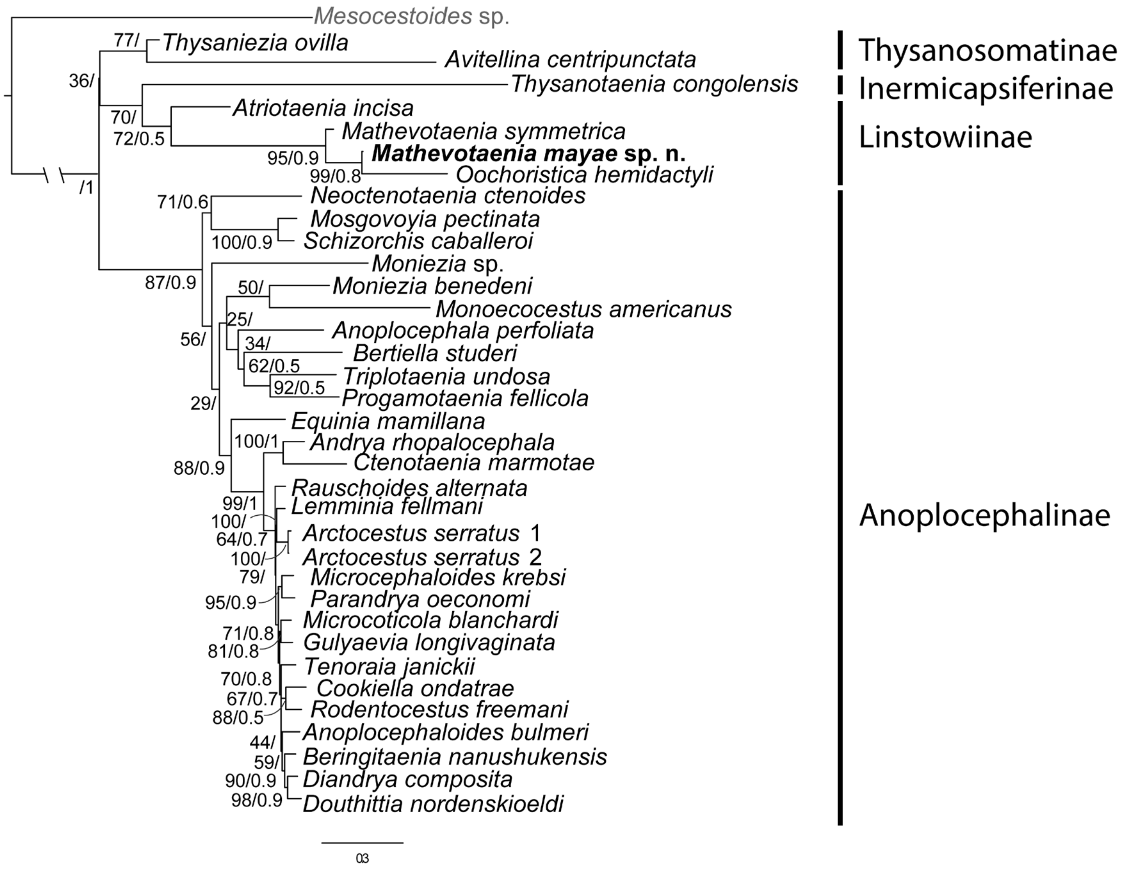

Fig. 3. Phylogenetic position of *Mathevotaenia mayae* sp. n. from *Didelphis virginiana*, Mexico within the inferred phylogeny of Anoplocephalidae, with ML criteria and based on a concatenated data set of *cox*1, 28S rRNA and ITS sequences. Bootstrap percentages and posterior probabilities support values besides the nodes.

RESULTS

Mathevotaenia mayae sp. n. Figs. 1, 2

ZooBank number for species:
urn:lsid:zoobank.org:act:607137EC-0B17-458D-9C81-7DB9EE5077B9

Description (based on four specimens). Cyclophyllidea, Anoplocephalidae. With characteristics of *Mathevotaenia.* Robust body, 94 mm long (n = 1) and 1.39 mm wide (n = 1) wide, consisting of 153–210 (n = 2) craspedote proglottids. Scolex unarmed, 252–270 (n = 2) long and 315–430 (n = 4) wide (Fig. 1A–C), poorly demarcated from strobila. Rostellum absent. Four oval suckers, 135–155 long (n = 4) and 117–126 wide (n = 4) (Fig. 1A–C). Scolex and anterior-most strobila covered with dense acicular filitriches (see Chervy 2009 for terminology of microtriches). Proximal part of filitriches about 140 nm wide; length of filitriches about 2.

Strobila with about 62–98 immature, protandric proglottids, 126–162 long and 558–630 wide (n = 4); 39–44 mature proglottids wider than long, 171–306 long and 684–774 (n = 4), respectively. Gravid proglottids 52–68 in number; wider than long, 1,178–1,392 long and 749–1,028 wide (Fig. 1F–H). Genital pores alternate irregularly, situated near anterior margin of proglottids. Genital atrium 749 deep and 90 wide. Genital ducts pass between osmoregulatory canals.

Testes 44–48 in number, 26–33 long and 19–24 wide (n = 4), arranged in single cluster in mature proglottids and in two lateral groups in immature proglottids, posterior to vitelline gland, reaching mid region of ovary. Cirrus pouch with well-defined cirrus and highly convoluted vas deferens; 82 long and 51 (n = 4), extends transversely beyond osmoregulatory canals, directed towards anterior margin of mature proglottids.

Two-winged ovary in central portion of proglottid; isthmus visible in first mature proglottids; ovarian lobules 30 in number. Vitelline gland posterior to ovary, slightly overlapping it in ventral view, 99 long and 171 wide. Seminal receptacle absent. Vagina opening posterior to cirrus pouch in genital atrium. Eggs oval, in capsules, 40–44 long and 28–35 wide (n = 4). Oncospheres, 27–31 long and 23–25 wide (n = 4); embryonic hooks 13 long (n = 4) (Fig. 2).

Remarks

Of 25 species of *Mathevotaenia* distributed on the American continent, the new species is comparable in whole-body size with only three species: *Mathevotaenia oklahomensis* (Peery, 1939) ex *Spilogale putorius* (Linnaeus) from North America (Beveridge 1994), *Mathevotaenia diminuta* Navone, 1988 ex *Chaetophractus vellerosus* (Gray), from Argentina (Navone 1988) and *Mathevotaenia brasiliensis* Kugi et Sawada, 1970 ex *Saimiri sciureus*

(Linnaeus) probably from Central or South America (Brazil) (Kugi and Sawada 1970).

Mathevotaenia mayae sp. n. can be distinguished from these species by the size of the scolex (252–270 µm long and 315–430 µm wide), smaller than those of *M. diminuta* (680–720 µm in diameter) and *M. oklahomensis* (508–705 µm in diameter) and larger than that of *M. brasiliensis* (350–490 µm long and 249–263 µm wide). The new species has smaller suckers than those of *M. oklahomensis* (135–155 µm long and 117–126 µm wide vs. 222–226 µm long and 195–225 µm wide, respectively).

The new species also differs in the shape of the genital atrium, which is transversely elongated and narrower than those of *M. diminuta* (44 µm wide and 95 µm deep vs. 96–166 µm in diameter). The genital atrium of the new species is larger than that of *M. oklahomensis* (33–47 µm vs 21–30 µm). The Mexican species has an ovary wider than long (198–216 µm long and 306–342 µm wide) than *M. diminuta*, whose ovary is longer than wide (240–272 µm long and 144–192 µm wide).

Mathevotaenia brasiliensis can be separated from the new species by having a larger ovary (387–429 µm wide). In addition, the number of testes in the new species is smaller (44–48) than that of *M. diminuta* (130–150) and *M. brasiliensis* (130–150). The size of the testes is another feature that distinguishes *M. diminuta* (60–64 µm in diameter), *M. brasiliensis* (42–55 µm) and *M. oklahomensis* (70–96 µm) from *M. mayae* sp. n., whose testes are smaller (26–33 µm long and 19–24 µm wide). Finally, the reported measurements for the oncosphere of *M. oklahomensis* (40–45 µm in diameter) are almost twice the size of those of *M. mayae* sp. n. (23–25 µm).

There are ten species whose descriptions do not mention body size and also are distributed on the American continent. *Mathevotaenia antrozoi* (Voge, 1954); *Mathevotaenia boliviana* Sawada et Harada, 1986; *Mathevotaenia deserti* (Milleman, 1955); *Mathevotaenia dipodomi* (Bienek et Grundmann, 1973); *Mathevotaenia megastoma* (Diesing, 1950); *Mathevotaenia mephitis* (Skinker, 1935); *Mathevotaenia paraguayae* Schmidt et Martin, 1978; *Mathevotaenia pedunculata* (Chandler, 1952); *Mathevotaenia pennsylvanica* (Chandler et Melvin, 1951); and *Mathevotaenia wallacei* (Chandler, 1952).

The new species differs from *M. antrozoi* by having a remarkably smaller cirrus pouch (82 µm by 51 µm vs. 160–234 µm by 76–144 µm, respectively) (Voge 1954). It also differs from *M. boliviana*, *M. dipodomi*, *M. megastoma* and *M. paraguayae* by the number of testes: 44–48 vs. 16–20 (Sawada and Harada 1986); 27–30 (Milleman 1955); 160–200 (Spasskii 1951) and 16–25.

Mathevotaenia mayae sp. n. can be easily distinguished from *M. deserti* in the size of egg capsule and shell (40–44 µm by 28–35 µm vs 142–216 µm by 102–165 µm and 27–31 µm by 23–25 µm vs. 39–58 µm by 34–46 µm). Finally, the species described here differs from *M. mephitis*, *M. pedunculata*, *M. pennsylvanica* and *M. wallacei* by the scolex size (252–270 µm by 315–430 µm vs. 429–689 µm in diameter, 775 µm by 900 µm, 636 µm by 946 µm and 775–900 µm in diameter, respectively).

Phylogeny

Both methods recover the same groups, with some differences in early divergent clades (Fig. 3). The phylogenetic tree recovers *M. mayae* sp. n. as sister of *Oochoristica hemidactyli* and these as sisters to *Mathevotaenia symmetrica* (Baylis, 1927) (Fig. 3). This group is sister to *Atriotaenia incisa* (Railliet, 1899) and all are members of Linstowiinae. The remaining subfamilies of Anoplocephalidae represented (i.e., Anoplocephalinae, Inermicapsiferinae and Thysanosomatinae were recovered as monophyletic) (see Table 1, Fig. 3).

Taxonomic summary

Type and only host: *Didelphis virginiana* Kerr (Didelphimorphia: Didelphidae).

Site of infection: small intestine.

Type and only locality: Mérida (20.936933 N, -89.606583 W), Yucatán, Mexico.

Infection rate: 6 specimens found in 1 of 6 hosts (prevalence 17%).

Type specimens: Holotype: CNHE 13045; paratypes CNHE: 13046. Voucher specimen CNHE 12896 (see Panti-May et al. 2024)

Representative sequences: 28S rDNA: PP662454; *cox*1: PQ870061; ITS: PV196925.

Etymology: The species epithet honours the Maya culture indigenous to the region where this new species was discovered.

DISCUSSION

In this work, the 26th species of *Mathevotaenia* in the Americas is described. Likewise, the characterisation of microtriches for a species of the genus is presented. These structures have been described in other members of Anoplocephalidae such as *Moniezia expansa* (Rudolphi, 1810) and *Monoecocestus threlkeldi* (Parra, 1952), members of Anoplocephalinae (Ndom et al. 2016, Martins et al. 2023), as well as *Avitellina centripunctata* (Rivolta, 1874), *Stilesia globipunctata* (Rivolta, 1874) and *Thysaniezia ovilla* (Rivolta, 1878) of the Thysanosomatinae (Ndom et al. 2016), and also for *Oochoristica* sp. of the Linstowiinae (Ashour et al. 1994). The filitriches of the new species are similar with those of the last in the shape and size (143 nm at base by 1.93 µm long vs. 140 nm by 2 µm long).

Historically, the taxonomy of *Mathevotaenia* and *Oochoristica* has been complicated, due to ambiguous criteria employed to define the species belonging to each genus. Their classification primarily relies on two criteria: (1) the craspedote or acraspedote arrangement of proglottids and (2) host affinity. Traditionally, tapeworms parasitising reptiles have been assigned to *Oochoristica*, while those of mammals to *Mathevotaenia* (Yamaguti 1959, Schmidt 1986, Beveridge 1994, Caira and Jensen 2017). However, *Oochoristica eremophila* Beveridge, 1977 (acraspedote proglottids) was found in a marsupial species and *Mathevotaenia chaquensis* Lunaschi, Lamas et Drago, 2012 and *Mathevotaenia panamensis* Bursey, Goldberg et Telford, 2010 (craspedote proglottids) were found in two species of reptiles, respectively (Beveridge 1977, Bursey et al. 2010, Lunaschi et al. 2012).

Although *Oochoristica hemidactyli* was recovered nested within *Mathevotaenia* spp. clade, this placement may be artifactual. While the phylogenies were based on concatenated dataset, only the ITS sequence was available for *O. hemidactyli*. Of the two *Mathevotaenia* species included, only *Mathevotaenia mayae* sp. n. has this locus. Thus, comparison between both *Mathevotaenia* species based only on this molecular marker is not possible and due to the absence of other *Oochoristica* spp. represented, *O. hemidactyli* may appear more closely related to the new species than to other members of Anoplocephalidae.

With the phylogeny of Anoplocephalidae presented here, it is still not feasible to see a light in the resolution to the *Mathevotaenia/Oochoristica* issue. A solution that has been suggested previously to solving this taxonomic problem is to generate more molecular data with a broader representation of species, to confirm or reject the validity of the separation of these genera. The lack of available sequences is still limiting comprehension of the historic relationships within the family.

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