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TAXONOMIC STUDIES OF MAMMALIAN TAPEWORM *MONIEZIA* (*B.*) *NAIDUI* N. SP. FROM *CAPRA HIRCUS* (L.)

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ABSTRACT: - The present paper deals with the description of a new species of genus Moniezia, Blanchard, 1891 subgenus Blanchariezia, Skrjabin and Schulz, 1937, viz. Moniezia (B.) naidui n. sp. The present tapeworm differs from all other species of genus Moniezia (B.) in having scolex medium, globular in shape, with four suckers; neck medium; mature segment rectangular, with double set of reproductive organs; testes 147in number; cirrus pouch oval in shape, cirrus thin; vas deferens thick, wavy; ovary large, inverted cup shaped; vagina thick tube, posterior to the cirrus pouch; receptaculum seminis large, spindle shaped; ootype medium, round; genital pores bilateral, medium, oval; longitudinal excretory canals wide; interproglottid glands oval, 30-35 in number; vitelline gland large, amoeboid in shape and gravid proglottids were not stained properly.

KEYWORDS: *Capra hircus, new species, Moniezia (B.) naidui n. sp., Shindkheda.*

INTRODUCTION

The genus *Moniezia* was established by Blanchard, in 1891 as a type species *Moniezia expansa* from *Ovis aries*. Skrjabin and Schulz, 1937 divided this genus, into three sub-genera as follows:

1. Interproglottidal glands grouped in rosettes……*Moniezia*
2. Interproglottidal glands arranged lineally (sometimes absent……..*Blanchariezia*
3. Interproglottidal glands absent……*Baeriezia*

The present worm agrees in all characters with subgenus *Blanchariezia* in which the following species are added, till to date, by different workers, in the world.

1. *M. (B.) benedeni* (Moniez, 1879) Skrj. et. Schulz, 1937.
2. *M. (B.) pallida* Monnig, 1926.
3. *M. (B.) aurangabadensis* Shinde, Jadhav & Kadam, 1985
4. *M. (B.) bharalae* Shinde, Jadhav & Kadam, 1985
5. *M.* (*B.*) *murhari* Kalse & Shinde, 1999
6. *M.* (*B.*) *jadhavae* Hiware, 1999
7. *M.* (*B.*) *kalawati* Nanware, Jadhav & Babare, 1999
8. *M.* (*B.*) *jalnaensis* Borde & Shinde, 1999
9. *M.* (*B.*) *warananagarensis* Patil & Shinde, 2000
10. *M.* (*B.*) *shindei* Deshmukh & Shinde, 2001
11. *M.* (*B.*) *hircusae* Tat & Jadhav, 2004
12. *M.* (*B.*) *aishvaryae* Shelke & Shinde, 2004
13. *M.* (*B.*) *caprai* Pokale, Shinde & Wagh, 2004
14. *M.* (*B.*) *rajalensis* Borde, Patil & Naphade, 2007
15. *M.* (*B.*) *punensis* Suryawanshi, Kalse & Chaudhari, 2008
16. *M.* (*B.*) *caprae* Nanware, 2010
17. *M.* (*B.*) *madhukarae* Kasar, Bhure, Nanware & Sonune, 2010
18. *M.* (*B.*) *maharashtrae* Nanware, 2010
19. *M.* (*B.*) *warudensis* Chaudhary 2010
20. *M.* (*B.*) *babai* Humbe, Jadhav & Borde, 2011
21. *M.* (*B.*) *govindae* Padwal & Kadam, 2011
22. *M. (B.) ovisae* Humbe, Jadhav & Borde, 2011
23. *M. (B.) mansurae* Shaikh, Chaudhary, Waghmare & Bhure 2011
24. *M. (B.) orientalis* Shinde, Nanware, Bhure and Deshmukh, 2013
25. *M. (B.) parbhaniensis* Makne, 2013
26. *M. (B.) nagaonensis* Suryawanshi & Kalse, 2015
27. *M. (B.) bhalchandrai* Kalse & Suryawanshi, 2016

The present communication, deals with the description, of a new species, as *Moniezia* (*Blanchariezia) naidui* n. sp. collected from the intestine of a goat, *Capra hircus* at Shindkheda, Tq. Shindkheda & Dist. Dhule, M.S., India.

MATERIALS AND METHODS

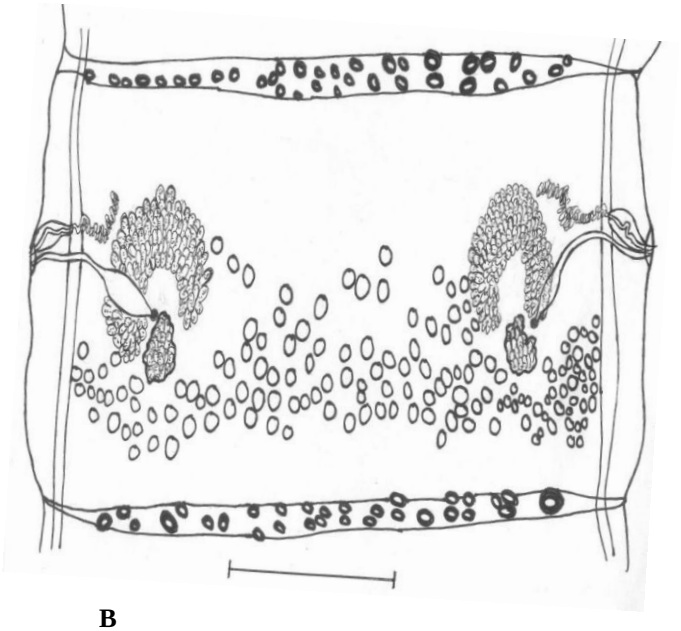
The survey of *Capra hircus* were made at Shindkheda for Cestode infection in the month of February, 2009. Four Cestodes were collected from the intestine of *Capra hircus*. All the worms are flattened preserved in 4% formalin, stained with Harris Haematoxyline, passed through various alcoholic grades, cleared in Xylol, mounted in DPX and whole mount slide were prepared for anatomical studies, drawing were made with the help of camera lucida and microphotographs were taken by digital camera.

RESULT AND DISCUSSION

Description (**Based on four specimens**): **(Figs. 1. A, B)**

The worms were large in size, muscular and consist of scolex, numerous immature, mature and gravid proglottids. The **scolex** is medium in size, globular in shape, broad anteriorly and narrows posteriorly, with four medium suckers, without rostellum, distinctly marked off from the strobila and measures 0.266 to 0.273 in length and 0.200 to 0.236 in breadth. The suckers are medium in size, round in shape, arranged in two pairs, one pair in each half of it, slightly overlapping each other and measure 0.066 and 0.073 in diameter. The **neck** is of medium size, uniform anteriorly and posteriorly, with straight lateral margins and measures 0.243 to 0.250 in length and 0.160 to 0.163 in breadth.

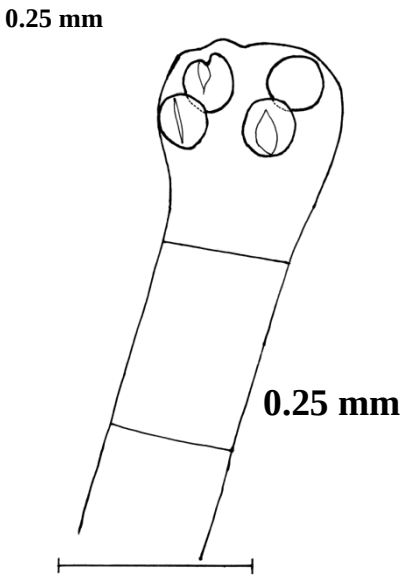
The **mature proglottids** are large in size, rectangular in shape, broader than long, almost two times broader than long, each with a double set of reproductive organs, one set on each side of the segment, acraspedote, with irregular concave or convex lateral margins and measure 0.883 to 0.940 in length and 0.426 to 0.466 in breadth. The **testes** are medium in size, oval in shape, 147 in number, evenly distributed, in a single field, in the posterior part of the segment, bounded laterally by the longitudinal excretory canals, majority of them in between the ovary of each side, few on the poral side of the ovary and measure 0.020 to 0.024 in length and 0.014 to 0.017 in breadth. The **cirrus pouch** on each side is medium in size, oval in shape, elongated, situated just anterior to the middle of the segments, reaching to the longitudinal excretory canals, slightly obliquely placed, directed anteriorly, medially and measures 0.066 to 0.070 in length and 0.024 to 0.027 in breadth. The **cirrus** on each side is a thin tube, curved, contained within the cirrus pouch and measures 0.066 to 0.080 in length and 0.003 to 0.004 in breadth. The **vas deferens** on each side is thick, wavy, runs obliquely and measures 0.233 to 0.266 in 1ength and 0.003 to 0.004 in breadth.



B

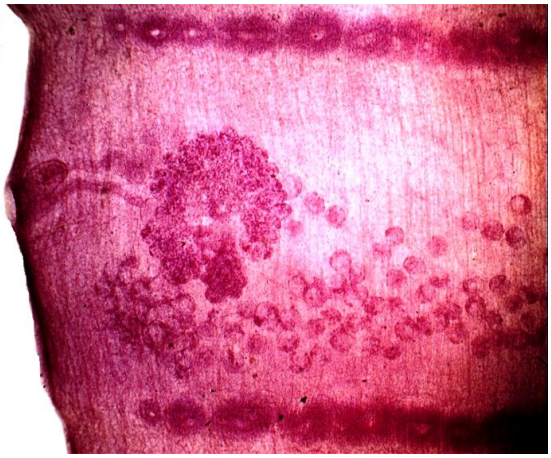
Fig: 1 - *Moniezia (B.) naidui* n. sp.

A – Scolex; B – Mature segment



A

A



B

C

Fig: 1 - *Moniezia (B.) naidui* n. sp.
A – Scolex; B & C– Enlarged Mature half segment

The **ovary** on each side is large in size, inverted cup shaped in appearance, with irregular margin, each with numerous prominent, blunt, round acini, lobes directed posteriorly, placed in the middle of the segment and measures 0.250 to 0.283 in length and 0.070 to 0.090 in breadth. The **vagina** on each side is a thick tube, situated posterior to the cirrus pouch, starts from the genital pore, extends anteriorly and then medially for a long distance, takes a turn posteriorly, enlarge and forms the receptaculum seminis, reaches and opens into the ootype and measures 0.123 to 0.166 in length and 0.010 to 0.014 in breadth. The **receptaculum seminis** is large, elongated, spindle shaped, in between the ovarian lobes, obliquely placed and measures 0.066 to 0.073 in length and 0.020 to 0.024 in breadth. The **ootype** is medium in size, round in shape, situated posteriorly in between the poral lobe of the ovary and measures 0.004 to 0.006 diameters. The **genital pores** are bilateral, medium in size, oval in shape, placed anterior to middle of the segments and measure 0.024 in length and 0.036 in breadth.

The **longitudinal excretory canals** are wide and measure 0.017 to 0.027 in breadth. The **interproglottidal glands** are present in the inter-segmental regions of the anterior and posterior margins of the segments, medium in size, 30-35 in number, oval in shape, highly muscular, either single or paired irregularly and lineally arranged and measure 0.014 to 0.036 in length and 0.010 to 0.027 in breadth . The **vitelline gland** on each side is large in size, amoeboid in shape, obliquely placed, post ovarian, having short, and blunt, round acini and measures 0.034 to 0.066 in length and 0.043 to 0.046 in breadths. The **gravid segments** were not stained properly.

DISCUSSION

The genus *Moniezia* was established by Blanchard, 1891 and Skrjabin and Schulz, 1937 divided this genus, into three sub-genera as *Moniezia, Blanchariezia and Baeriezia*. The present worm agrees with subgenus *Blanchariezia*, in which the following 25 species are added till to date, by different workers, in the world

1) The worm under discussion differs from *M.* (*B.) benedeni* in the number of testes (147 vs. 500), ovary (inverted cup shaped vs, compact), cirrus pouch (large, oval vs. short), interproglottidal glands (30-35 vs. 10-12), vitelline gland (amoeboid vs. absent) and host (*Capra hircus* vs. *Ovies aries)*.
2) The parasite under discussion, differs from *M. (B.) pallida* which is having mature segments (rectangular vs. squarish), interproglottid glands (30-35 vs. varying in size) and host (*Capra hircus* vs. *Equus caballus*).
3) The present cestode, differs from *M. (B.) aurangabadensis*, which is having scolex (globular vs. simple), in the number of testes (147 vs. 1100-1200), in the number of interproglottid gland (30-35 vs. 12-15) and in host (*Capra hircus* vs. *Ovis bharal*).
4) The present worm, differs from *M. (B.) bharalae*, in the ovary (inverted cup shaped vs. bilobed, compact), in the number of interproglottid gland (30-35 vs. 38-44), receptaculum seminis (spindle vs. fusiform), vitelline gland (amoeboid vs. absent) and in host (*Capra hircus* vs. *Ovis bharal*).
5) The worm under discussion, differs from *M. (B.) murhari* in the shape of scolex (globular vs. squarish), in the number of testes (147 vs. 405-415), ovary (inverted cup shaped vs. bilobed),

interproglottid glands (30-35 vs. 63) and vitelline gland (amoeboid vs. rounded).

6) The present cestode, differs from *M. (B.) jadhavae*, in the shape of scolex (globular vs. dome), in the number of testes (147 vs. 30-50), ovary (inverted cup shaped vs. bilobed) in the number of interproglottid gland (30-35 vs. 10-12), vagina (posterior to cirrus pouch vs. anterior to cirrus pouch) and in host (*Capra hircus* vs. *Ovis bharal*).
7) The worm under discussion, differs from *M. (B.) kalawati*, in the shape of scolex (globular vs. squarish), in the number of testes (147 vs. 172), in the shape of ovary (inverted cup shaped vs. oval, single mass), interproglottid glands (30-35 vs. 54) and vitelline gland (amoeboid vs. rounded).
8) The worm under discussion, differs from *M. (B.) jalnaensis*, in the shape of scolex (globular vs. squarish), in the shape of ovary (inverted cup vs. horse shoe shaped), in the number of interproglottid gland (30-35 vs. 19) and in host (*Capra hircus* vs. *Ovis bharal*).
9) The present cestode, differs from *M. (B.) warananagarensis*, in the number of testes (147 vs. 300-320), ovary (inverted cup shaped vs. bilobed), in the number of interproglottid gland (30-35 vs. 56), vitelline gland (amoeboid vs. elongated), and in host (*Capra hircus* vs. *Ovis bharal*).
10) The present tapeworm, differs from *M. (B.) shindei*, in the shape of scolex (globular vs. dome shaped), in the number of testes (147 vs. 30-40), in the shape of ovary (inverted cup shaped vs. distinctly bilobed), in the number of interproglottid gland (30-35 vs. 12-14), vitelline gland (amoeboid vs. globular) and in host (*Capra hircus* vs. *Ovis bharal*).
11) The worm under discussion, differs from *M. (B.) hircusae*, in the number of testes (147 vs. 168) and in the shape of ovary (inverted cup shaped vs. oval), in the number of interproglottid gland (30-35 vs. 14-15) and vitelline gland (amoeboid vs. globular).
12) The worm under discussion, differs from *M. (B.) aishvaryae*, in the number of testes (147 vs. 255-265), in the shape of ovary (inverted cup shaped vs. single mass), interproglottid gland (30-35 vs. 43-46), vitelline gland (amoeboid vs. quadrangular) and in host (*Capra hircus* vs. *Bos indicus*).
13) The present parasite, differs from *M. (B.) caprai*, in the shape of scolex (globular vs. squarish), in the number of testes (147 vs. 255-260), in the shape of ovary (inverted cup shaped vs. inverted horse shoe), in the number of interproglottid gland (30-35 vs. 30-34) and vitelline gland (amoeboid vs. oval).
14) The present parasite, differs from *M. (B.) rajalensis*, in the number of testes (147 vs. 250-260), in the shape of ovary (inverted cup vs. horse shoe shaped) and vitelline gland (amoeboid vs. squarish).
15) The present worm, differs from *M. (B.) punensis*, in the shape of scolex (globular vs. quadrangular), in the number of testes (147 vs. 110-120), in the number of interproglottid gland (30-35 vs. 18-22) and vitelline gland (amoeboid vs. oval).
16) The present parasite differs, from *M. (B.) caprae*, in the shape of scolex (globular vs. oval), in the number of testes (147 vs. 170), in the shape of ovary (inverted cup vs. bilobed shaped), in the number of interproglottidal gland (30-35 vs. 40) and in size and shape of cirrus pouch (large, oval vs. medium, pyriform).
17) The worm under discussion, differs from *M. (B.) madhukarae*, in the shape of scolex (globular vs. elongated), in the number of testes (147 vs. 210-240), in the shape of ovary (inverted cup vs. butterfly shaped), in the number of interproglottid gland (30-35 vs. 18-20) and vitelline gland (amoeboid vs. oval).
18) The present worm, differs from *M. (B.) maharashtrae*, in the shape of scolex (globular vs. oval), in the number of testes (147 vs. 116) in the shape of ovary (inverted cup vs. butterfly shaped) and vitelline gland (amoeboid vs. compact).
19) The present parasite, differs from *M.* (*B.*) *warudensis*, in the shape of scolex (globular vs. quadrangular), in the shape of ovary (inverted cup vs compact) and vitelline gland (amoeboid vs. oval).
20) The present worm, differs from *M. (B.) babai*, in the number of testes (147 vs.190-220), in the shape of ovary (inverted cup shaped vs. rounded) and in the number of interproglottid gland (30-35 vs. 18-20) and vitelline gland (amoeboid vs. oval).
21) The worm under discussion differs from *M. (B.) govindae*, in the number of testes (147 vs. 100-140), in the shape of ovary (inverted cup vs. nut shaped) and in the number of interproglottid gland (30-35 vs. 42) and vitelline gland (amoeboid vs. oval).
22) The present tape worm differs from *M. (B.) ovisae*, in the number of testes (147 vs. 155-165), in the shape of ovary (inverted cup vs. bilobed shaped), vitelline gland (amoeboid vs. oval) and reported from host (*Capra hircus* vs. *Ovis bharal).*
23) The worm under discussion, differs from *M. (B.) mansurae*, in the number of testes (242 vs. 160-170), in the shape of ovary (inverted cup vs. compact), in the number of interproglottid gland (30-35 vs. 18) and vitelline gland (amoeboid vs. oval).
24) The present parasite, differs from *M. (B.) orientalis*, which is having scolex (globular vs. oval), testes (147 vs. 35-40), in the shape of ovary (inverted cup vs. bean shaped), vagina (posterior to cirrus pouch

vs. anterior to cirrus pouch), and vitelline gland (amoeboid vs. oval) and reported from host (*Capra hircus* vs. *Ovis bharal).*

25) The worm under discussion, differs from *M. (B.) parbhaniensis*, in the shape of scolex (globular vs. squarish), in the number of testes (147 vs. 240-246), in the shape of ovary (inverted cup vs. bilobed) and in the number of interproglottid gland (30-35 vs. 27-30).
26) The present tape worm differs from *M. (B.) nagaonensis*, in the shape of scolex (globular vs. squarish), in the number of testes (147 vs. 185), in the shape of ovary (inverted cup vs. horse shoe shaped) and vitelline gland (amoeboid vs. oval).
27) The present worm, differs from *M. (B.) bhalchandrai*, in the shape of scolex (globular vs. quadrangular), the number of testes (147 vs.196-200), and in the number of interproglottid gland (30-35 vs. 13-14) and vitelline gland (amoeboid vs. oval).

These characters are valid enough, to erect a new species, for these worms and hence the name *M. (B.) naidui* n. sp. is proposed, in the honor of Dr. T.S.V. Naidu, Ex- Principal, Mohta Science College, Nagpur, who has remarkably contributed to the knowledge of exploring Helminthology.

TAXONOMIC SUMMARY

Type species	: *Moniezia (B.) naidui* n.sp.
Host	: *Capra hircus* (Linnaeus, 1758)
Habitat	: Small intestine.
Locality	: Shindkheda, Dist. Dhule, M.S., India.
Holotype and Paratype	: Deposited in the Helminthology Research Lab. Department of Zoology, Nanasaheb Y. N. Chavan College, Chalisgaon, Dist. Jalgaon (M.S.) India
Date of collection	: February, 2009.
Ethmology	: Named in the honor of Dr. T.S.V. Naidu.

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