INTRODUCTION
The genus Moniezia was established by Blanchard, 1891. Skrjabin and Schulz (1937) divided this genus in to three subgenera as follows:

1) Inter proglottidal glands grouped in rosettes---------------------- Moniezia.

2) Inter proglottidal glands arranged linearly---------------------- Blanchariezia.

3) Inter proglottidal glands absent-------------------------------- Baeriezia.

The present worm agrees in all characters with subgenus Blanchariezia. Skrjabin and Schulz (1937) having two species as M. (B) benedeni (Moniez, 1879). Skrjabin et al Schulz 1937 and M. (B) pallida, Monnig, 1926. Later on two more species were added by Shinde et al. (1985) from the host Ovis bharal as M. (B) aurangabadensis and M. (B) bharalae at Aurangabad, M.S. India. Later on Patil et al. added M. (B) warananagarensis from Capra hircus(L) in 1997. In 1999 Nanware et al. erected M. (B) kalawati from Capra hircus (L). Kalse et al. (1999) added M. (B) murhari from the same host, Pokale et al. (2004) added M. (B) caprai from Capra hircus (L). Pawar et al. (2004) added M. (B) shindei from Capra hircus (L). Tat and Jadhav B. V. (2004) added M. (B) hircusae, from Capra hircus (L). Borde et al. (2007) added Moniezia (B) rajalaensis from Capra hircus (L.), Padwal et al. (2008) added M (B) govindae from Capra hircus (L), M. (B) Caprae is added by Nanware S. S. (2010). Later on Humbe et al. added four more species i.e. M. (B) babai, 2011, M. (B) ovisae, 2011, M. (B) osmanabadensis, 2012 and M. (B) devraci, 2013. Lastly Barote et al. added two more species i.e. M. (B) shegaonesis and M. (B) shivajiraoae, 2014.

The phylogeny of the order Anaplocephalidea has been studied at generic and subfamilial level or as a part of studies on the phylogeny of the Eucestoda in general, mainly in comparative morphology and relationships among individual orders. In addition to morphological characters that are often variable, difficult to homologies, molecular data have been widely used in phylogenetic studies of Cestodes generally and these Cestodes particularly using many genes and developed techniques as attempts in solving many taxonomic problem. Aim of these study was to evaluate the phylogenetic position of the Cestode Moniezia Sp. parasite of the Goat i.e. Capra hircus (L) from Aurangabad district (M.S), India on the basis of morphological and molecular and molecular data (using molecular markers) among Anaplocephalideans.

The present communication, deals with the description of a new species, Moniezia (B) jadhavii Sp. Nov. Collected from the Capra hircus (L) at Aurangabad City (M.S.) India, in the month of Feb. 2015.

MATERIAL AND PARADISES
Cestode parasites were collected from the intestine of Capra hircus at. Aurangabad district (M.S) India. These Cestodes preserved in hot 4% formalin and stained with Aceto-carmine or Harris haematoxylin, passed through various alcoholic grades, cleared in xylene, mounted in D.P.X. and drawings are made with the aid of camera lucida. All measurements are given in millimeters, otherwise mentioned. The identification is made with the help of Systema Helminthum.

Cestodes intended for molecular analysis were fixed with 95% ethyl alcohol. DNA Extraction was carried out using GenElute Mammalian Genomic DNA extraction kit (Sigma, G11N0-1KT). 25mg of tissue was minced and transferred to 1.5ml microcentrifuge tube. 180µl of Lysis solution T and 20 µl of proteinase K were added. The samples were mixed and incubated at 55°C to digest the tissue completely. 20 µl of RNase A solution was added and incubated at room temperature for 2min. Then 200µl of lysis solution C was added and incubated at 70°C for 10 min. The column was prepared for binding by adding 500µl of Column preparation solution to each pre-assembled GenElute Miniprep Binding Column and centrifuge at 12,000 rpm
for 1 min. 200µl of ethanol was added to the lysate and mixed by vortexing. The entire lysate was transferred into the treated binding column and centrifuge at 10,000rpm for 1 min. The binding column was then placed in fresh 2ml collection tube. 500µl of Wash solution was added to the binding column and centrifuge at 10,000 rpm for 3min. This step was repeated twice. The column was again transferred to a new tube. 200µl of elution buffer was added directly into the centre of the binding column and centrifuge at 10,000rpm for 1min. Concentration of DNA was determined using UV-1800 spectrophotometer (Schimadzu Corporation A11454806498). The DNA was stored at -20°C for further use.

The DNA isolated was subjected to polymerase chain reaction (PCR) amplification using Biometra thermal cycler (T- Personal 48). The PCR reaction mix contained 2.5µl of 10X buffer, 1µl of each primer (Table 6), 2.5µl of 2.5mM of each dNTP, 2.5 Units of Taq DNA polymerase and 1µl Template DNA and 8.5µl nuclease free water. The PCR amplification cycle consist of, a cycle of 5 min at 94°C; 35 cycles of 1min at 94°C, 1 min at 56°C, 2 min at 72°C; and additionally 1 cycle of 7 min at 72°C. The reagents used are procured from GeNei. Gel electrophoresis was performed using 1.0% agarose (Seakem, 50004L) to analyze the size of amplified PCR product. The band size obtained for amplification of Partial 18S rRNA region is ~1095bp.

The PCR product was purified using AxyPrep PCR Clean up kit (Axygen, AP-PCR-50). 100µl of PCR-A buffer was added to the 25µl of reaction. The sample was mixed and transferred to column placed in 2ml collection tube and centrifuge at 10,000 rpm for 1min. The filtrate was discarded. 700µl of W2 buffer was added to the column and centrifuge at 10,000rpm for 2min. This step was repeated twice. The column was transferred to a new tube. 25µl of Eluent was added into the column and incubated at room temperature for 2min. Then centrifuge at 10,000rpm for 5min. It was further sequenced using Applied Biosystems 3730xl DNA Analyzer USA and chromatogram was obtained. For sequencing of 18S rRNA PCR product 18S SF-5' (CTGGTTGATYCTGCGCATG 3') sequencing primer was used and for sequencing 28S rRNA PCR product LSU5F 5' (TAGTGGACCCGGCTGAAYTTAAGCA) sequencing primer was used.

The DNA sequences were analyzed using online BLASTn (nucleotide Basic Local Alignment Search Tool) facility of National Centre for Biotechnology Information (NCBI). The BLAST results were used to find out evolutionary relationship of Worms. Altogether twenty sequences, including sample were used to generate phylogenetic tree (Figure 1-4). The tree was constructed by using MEGA 5 software (Saitou N. and Nei M., 1987; Felsenstein J.1985 and Tamura K. et al 2011).

RESULTS

Morphological description: - Twelve specimens of the Cestode parasites were collected from the intestine of Capra hircus (L.) from Aurangabad District (M.S.), India, during the period of Feb.-2015. These Cestodes were preserved in 4% formalin and stained and then mounted, slide were observed for identification.

The Cestodes are long consisting scolex, neck and proglottids. Proglottids are immature, mature and gravid. The scolex is large in size, almost squarish in shape and measures 2.475 (2.178-2.772) in length and 1.898 (132-2.475) in width. The Suckers are large, oval to round in shape, four in numbers, arranged in two pairs and measures 0.636 (0.627-0.644) in diameter. The neck is long and measures 14.8 in length and 1.056 (0.858-1.254) in width. Mature proglottids are broader than long, nearly five time broader than long. Craspedote in shape, each proglottids with a double set of reproductive organs and measures 2.673 (2.211-3.135) in length and 10.23 (9.90-10.56) in width. The testes are small, round to oval in shape, 210-220 in numbers, scattered all over the segment in between longitudinal excretory canal and measures 0.083 (0.033-0.132) in diameter. The Cirrus pouch is small, oval in shape, situated in middle margin of the segments and measures 0.578 (0.495-0.660) in length and 0.182 (0.099-0.264) in width. The Cirrus is thin, large, inside the cirrus pouch, slightly curved and measures 0.513 in length and 0.05 in width. The vas-deference is long, thin tube, measures 0.989 in length and 0.066 in width. The Ovary large, compact, horse-shoe shaped, two in numbers, on each lateral side of the segments with big acini, and measures 0.875 (0.759-0.990) in length and 0.809 (0.495-1.122) in width. The Vagina posterior to cirrus pouch, long tube reaches to the Ootype and measures 0.991 in length and 0.05 in width. The Ootype is small, oval to rounded, anterior to the ovary and measures 0.149 (0.132-0.165) in length and 0.132 (0.132-0.132) in width. The Genital pores large, oval, marginal, bilateral, protruded outside, middle in position and measures 0.231 in length and 0.05 in width. The Vitelline gland large, rounded, post-ovarian, near the con-cavity of the ovary and measures0.248 in diameter. The Interproglottal glands present in between two proglottids, they are large, oval to round, arranged linearly in one or two rows in between longitudinal excretory canals, 46-52 in numbers and measures 0.182 in diameter. The longitudinal excretory canals are thin, present on both the sides of segments along the body lengths and measures 0.215 (0.132-0.297) in width.

Molecular data: - A comparison of the partial sequences of the 18S rRNA gene of the present Cestodes with those of other Cestodes, in a phylogenetic context, provided further support for placing this species as a new one within Moniezia jadhavii Sp. Nov. thus confirming taxonomic conclusion based on morphological data.

In the phylogenetic trees (Fig. 2 ) obtained by maximum parsimony analysis of the 18S rRNA sequence data set, a close to the species Moniezia expansa is clear with a maximum identity 97% (Table no.1). After partial 18S rRNA gene Sequence of Moniezia sample DNA sequences length is 1040bp (Fig. 3)
Table 1: Phylogenetic neighbors of Moniezia Sp. based on partial 18s rRNA gene sequence

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<tr>
<th>Description</th>
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<th>Query cover</th>
<th>E value</th>
<th>Ident</th>
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DISCUSSION

The genus Moniezia was erected by Blanchard in 1891. The worm under discussion is having the scolex almost squarish, mature proglottids nearly five times broader than long, Craspedote in shape, testes small in size, round to oval, 210-220 in numbers, cirrus pouch oval, ovary horse-shoe shaped, vitelline gland posterior to ovarian.

1. The present worm differs from Moniezia (B) benedeni,
Moniez, 1879, Skrabin and Schulz, 1937, which is having numerous proglottids broader than long, posterior proglottids fleshy, testes 500 in numbers, arranged in two groups, cirrus pouch short and wide, vas deferens with 2-3 coils, ovary compact, in the center of the segments, eggs well developed, inter proglottidial glands liner and close to the posterior margin of the segments, arranged transversely and reported from the Calves and Lambs.

2. The present cestode differs from Moniezia (B) pallid, Monnig, 1926, which is having the uterus external, dorsal and ventrally over excretory canals, the interproglottidial glands varying in size and reported from the host horse in South Africa.

3. The present parasite from Moniezia (B) aurang-abadensis, Jadhav B. V. et al. 1985, which is having the scolex quadrangular, testes small, 1100-1200 in numbers, vas deferens coiled, cirrus pouch cylindrical, oval with some rounded acini, gravid proglottids broader than long, uterus reticulate, inter proglottidial glands 12-15 in numbers and reported from Ovis bharal (L.).

4. The present tapeworm differs from Moniezia (B) bharalae Jadhav B.V. et al. 1985 which is having testes rounded, 190-200 in numbers, vas deferens short, elongated, fusiform, genital pores bilateral, sub marginal, ovary compact, inter proglottidial glands arranged in two rows, small in size, 38-44 in number and reported from Ovis bharal (L.).

5. The present form differs from Moniezia (B) warnanagarensis, Patil et al. 1997, which is having scolex large, testes 300-320 in number, distributed throughout the proglottids, in single field, ovary indistinctly lobed with 13-15 short, blunt acini, transversely elongated, inter proglottidial glands, 56 in numbers, oval, medium in size, cirrus pouch medium, oval, transversely elongated, slightly obliquely placed and extend beyond longitudinal excretory canal.

6. The present cestode differs from Moniezia (B) kalawati, Nanware et al. 1999. Which is having squarish scolex, oval shaped cirrus pouch, testes small, oval distributed throughout the segment, 172 in number, ovary medium, short, blunt acini, and 54 inter proglottidial glands in the inter segmental region, medium, oval either single or paired, irregularly arranged in the central width of the segments and leaving space on each lateral side.

7. The present tapeworm differs from Moniezia (B) murharikalseet.al, 1999, in having the scolex squarish, testes 405-415 in number, cirrus pouch elongated in the anterior region of the segments, ovary inverted horse shoe shaped, indistinctly lobed each with numerous short, blunt, round, acini and inter proglottidial glands 63 in numbers.

8. The present parasites from Moniezia (B) caprai, Pokale, et al, 2004, which is having the scolex is medium, squarish, with large four suckers, without rostellum, testes oval in shape, 255-260 in numbers, cirrus pouch is medium in size and ovary medium in size, kidney shaped.

9. The present worm differs from Moniezia (B) shindei, Paware et al., 2004 in having scolex large, mature segments craspedote, testes 190-200 (195) in number, scattered all over segment and ovary a single mass, large, oval, cirrus pouch oval, elongated, in centre of the segment and vitelline gland large, oval, internal to ovary.

10. The present cestode differs from Moniezia (B) hircusae Tat and Jadhav B. V., 2004 which is having scolex large, mature segments big, craspedote, testes 168 in number, medium, small, scattered in a single field, ovary large, oval, a single mass, in anterior half of the segment, inter proglottidial glands 14-15 in number, large, oval and cirrus pouch in anterior 1/3rd region of the segment.

11. The present cestode differs from earlier described Moniezia (B) rajaIanesis, Borde et al. 2007 in having scolex large, globular, mature proglottids Squarish, Broadener than long, testes 250-260 in numbers, medium, scattered throughout proglottids, ovary large, horse shoe shaped, inter proglottidial glands 31-32 in number, large, oval and cirrus pouch oval.

12. The present cestode differs from earlier described Moniezia (B) caprae, Nanware S.S., 2010 in having scolex large, mature segment big, almost three and a half times border than long, testes 170 in numbers, medium in size, oval in shape, ovary large, bilobed, inter proglottidial glands 40 in number, oval, rounded and cirrus pouch on each side.

13. The present cestode differs from earlier described Moniezia (B) govnindae, Padwal et. al., 2011 in having scolex large, globular, mature proglottids big, craspedote, testes 100-140 in numbers, medium, scattered throughout proglottids, ovary large, compact, nut shaped, inter proglottidial glands 40-42 in number, large, oval and cirrus pouch elongated.

14. The present cestode differs from earlier described Moniezia (B) babai, Humbe et al., 2011 in having scolex globular, mature segment four times border than long, testes 190-220 in numbers, small in size, rounded in shape, ovary large, rounded, inter proglottidial glands 18-20 in number, oval, rounded and cirrus pouch on each side.

15. The present cestode differs from earlier described Moniezia (B) ovisae, Humbe et al., 2011 in having scolex broad anteriorly and narrow towards neck, mature segment two times border than long, testes 155-165 in numbers, small in size, rounded in shape, ovary large, bilobed, inter proglottidial glands 32-35 in number, oval, rounded and cirrus pouch on each side.

16. The present cestode differs from earlier described Moniezia (B) osmanabadensis, Humbe et al., 2012 in having scolex globular, mature segment five times border than long, craspedote, testes 170-200 in numbers, small in size, rounded in shape, ovary large, bilobed, inter proglottidial glands 38-40 in number, oval, rounded and cirrus pouch on each side.

17. The present cestode differs from earlier described Moniezia (B) devraoi, Humbe et al., 2013 in having scolex quadrangular, mature segment four times border than long, testes 160-180 in numbers, small in size, rounded in shape, ovary large, bilobed, inter proglottidial glands 40-45 in number, oval, rounded and cirrus pouch on each side.

18. The present cestode differs from earlier described Moniezia (B) shegaonensis, Barote et. al., 2013 in having scoloxglobular, mature segment four to five times border than long, testes 190-220 in numbers, small in size, rounded in shape, ovary compact, inter proglottidial glands 20-25 in number, oval, rounded and cirrus pouch on each side.

19. The present cestode differs from earlier described Moniezia (B) shivajiraovae, Barote et al., 2014 in having scoloxsquarish, large in size, mature segment six to eighttimes border than long, testes 84-95 in numbers, small in size, rounded in shape, ovary horse-shoe shaped, inter proglottidial glands 40-42 in number, oval, rounded and cirrus pouch on each side.

We conclude that the morphological observation as well as
the sequence of its 18S rRNA gene obtained in this study, clearly
demonstrate that this species should be considered
to be a member of genus Moniezia (Cestoda: Anaplocephal-
idea) but species name is differ in both the observation. Sev-
eral characteristics are differs from other Moniezia Sp.

In molecular analysis the phylogenetic neighbors of Monie-
zia Sp. based on partial 18S rRNA gene are shown in table
no. 1. On the basis of position of sequence of the given
Moniezia sample in the phylogenetic tree, the sample showed closest similarity with the Moniezia expansa.

After above discussion in both morphological and molecu-
lar observations the Cestode is same at generic level but the
species are different and these differentiating charac-
ters are valid enough to erect a new species for the Ces-
tode and hence the name Moniezia (B) jadhavii, Sp. Nov. is
proposed after Late Professor Dr. Baba Jadhav, well known
scientist in Helminthology and Ex-head and professor, De-
partment of Zoology, Dr. Babasaheb Ambedkar University,
Aurangabad-431004.

Key to the Species of the genus Moniezia Blanchard, 1891.

1) Testes below 100 in numbers-M. (B.) Caparai, Nanwa-
reetal.,2010
Testes in between 100-150 in number-M. (B.) govindae,
Padwal et al.2011
Testes in between 200-150 in numbers- 3
Testes in between 200-300 in numbers- 4
Testes in between 300-400 in numbers-M. (B.) murhari-
Kalseet.al.,1999
Testes in between 400-450 in numbers-M. (B.) ovisae,
Pande et. al., 1995
Testes in between 500 -450 in numbers-M. (B.) ovisae,
Pande et. al., 1995
Testes in between 1100-1200 in numbers-M. (B.) aurang-
abadensis, Shindeet.al.,1985
2) Inter proglottidal glands between10-15 in number- M. (B.) hircuse,Tat and Jadhav, 2004
Inter proglottidal glands between 16-20 in number- M. (B.) babai, humbe et al., 2011
Inter proglottidal glands between 20-25 in number- M. (B.) shegaonesis,Barote et al., 2013
Inter proglottidal glands between 30-35 in number- 5
Inter proglottidal glands between 36-40 in number- M. (B.) osmabadensis humbe et al., 2012
Inter proglottidal glands between 46-52 in numbers- M. (B.) jadhavii Sp. Nov.
Inter proglottidal glands 76in number- M. (B.) shindei, Pa-
waret.al. 2004
3) Scolex globular-M. (B.) bharalae, Shindeet.al., 1985
Scolexsquarish-M. (B.)kalawati, Nanwareet.al., 1999
Scolex quadrangular-
6
4) Scolexsquarish-M. (B.) caparai,Pokale et al., 2004
Scolexglobular-M. (B.) rajalaensis, Bordeet.al., 2007
5) Testes in between 50-100 in numbers - M. shivajiroave,Barote et al., 2014
Testes in between 150- 200 in numbers- M. (B.) ovisae,
humbe et al., 2011
6) Ovary oval in shape - M. (B.) devraoe, humbe et al., 2013

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