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## Introduction of taxanometry to evaluate a new Dilepididae tapeworm *Amoebotaenia gallusae sp. nov.* from *Gallus gallus domesticus* (Linnaeus, 1758) from Aurangabad (M.S.), India

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### Abstract

The present communication deals with the description of a new species of genus *Amoebotaenia gallusae sp. nov.* From *Gallus gallus domesticus* (Linnaeus, 1758) from Aurangabad provided new data on their morphology. The present form differ from the known species of the genus in the shape and size of the scolex, shape and number of hooks number of testes, number of Mature Proglottids and shape of vitelline gland.

**Keywords:** *Amoebotaenia gallusae Sp. Nov.*, *Gallus gallus domesticus* (Linnaeus, 1758) ; Aurangabad (M.S), India

### Introduction

The genus *Amoebotaenia* was erected by *Cohn*, in 1900 with as a type species *A. sphenoides* from *Vanellus dongolanus*. Since then 19 species are added to this genus. The present communications deals with *Amoebotaenia gallusae Sp. Nov.* is collected from *Gallus g. domesticus* at Aurangabad (M.S.) India.

Subsequently following species are added to this genus *Amoebotaenia* Viz.

1. *A. sphenoides* Chon, 1899
2. *A. brevicollis*, Fuhrmann, 1907
3. *A. vanelli*, Fuhrmann, 1907
4. *A. fragida*, Meggit, 1927
5. *A. fuhrmanni*, Tseng, 1932
6. *A. pekiensis* Tseng, 1932
7. *A. oligorchis*, Yamaguti, 1935
8. *A. Indiana*, Shinde, 1972
9. *A. megascolecis*, Shinde, 1972
10. *A. maharashtrii*, Shinde, 1972
11. *A. cohni* Kalyankar and Palladwae, 1975
12. *A. kharatia*, Kalyankar and Palladwae, 1975
13. *A. domesticus*, Ghare, shinde and Suryawanshi 1979
14. *A. bhonslei*, Gaikwad, 1980
15. *A. mohekarae*, Jadhav 2004
16. *A. soyagaonensis*, Khadap 2005
17. *A. jadhavae* Thorat 2009
18. *A. bhujangi* Garad 2010
19. *A. minuta*, Nanware 2011

### Materials and Methods

The intestine of the host *Gallus gallus domesticus* were collected from different places of Aurangabad District during the period of June 2009 to May 2011. The worms were collected from the alimentary tract of *Gallus gallus domesticus*. Then flattened and preserved in 4% formalin. These cestodes stained by Harris haematoxyline or Borax carmine washed in distilled water, dehydrated in ascending grades of alcohol, cleared in xylene, mounted in D.P.X and drawing are made with the aid of camera lucida. Identification was carried out with

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the help of Systema Helminthium Vol. I Yamaguti (1957)

### Result

All the cestodes were considerably small, creamy white in color, having scolex, consisting of 14-20 proglottids having followed by short neck, immature, mature and gravid segments. The worm measures 0.15 mm in length and (0.1 to 0.4 mm) in its maximum width.

The scolex is small in size, globular in shape, narrow anteriorly and broad posteriorly, anterior end of the scolex protruded as Rostellum, with four prominent suckers, sharply constricted at posterior margin followed by neck, immature segments and measures 0.555(0.544-0.590) in length and 0.4884 (0.3996-5328) in breadth.

The rostellum is well developed, as oval anterior projection, oval in shape, which is small in size, retractile, situated at the apex of scolex. It is armed with crown single circle of hooks and measures 0.00799(0.0071-0.00844) in length and 0.0062 (0.0057-0.0044) in breadth.

The rostellar hooks are 14 in numbers, with crown single circle hooks which are long, sickle shaped and pointed at the apex and measures 0.0110 (0.0088-0.01332) in length and 0.008 (0.006-0.010) in breadth.

The rostellar sac is large, wide, extends back up to the anterior margin of the suckers and measures 0.01776(0.01765-0.01786) in length and 0.01288(0.01275-0.01295) in breadth.

The sucker are four in numbers, large in size, round or oval in shape, arranged in two pairs, overlapping and measures 0.0621(0.0599-0.0666) in diameter.

The neck short, broad and followed by immature, mature and gravid segments which measures 0.01776 (0.01762-1790) in length and 0.031(0.026-0.039) in breadth.

The mature proglottids are two times longer than broad, craspedote, with slightly concave-convex lateral margins having short blunt, round, conical projections at the posterior corners of the segments slightly unequal in length, single set of reproductive organ and measures 0.0821(0.0777-0.0843) in length and 0.148(137-0.155) in breadth.

The testes are 30 - 35 in number, medium in size, rounded in shape, posterior sides of ovary, evenly distributed, within the longitudinal excretory canals and measures 0.0155(0.0088-0.02664) in diameter.

The cirrus pouch is well developed, medium in size, globular in shape, placed at anterior side of the segment, anteriorly directed, and measures 0.0588 (0.0564-0.0606) in length and 0.743 (0.0766-0.1021) in width.

The cirrus is thin tube, protrusible, curved, within the cirrus pouch and measures 0.0444 (0.0446-0.0443) length and 0.0921 (0.0821-0.102) in width.

The vas deferens is short thick, slightly convoluted, and measures 0.0222 (0.022-0.0224) in length and 0.1766 (0.167-0.1790) in width. The vagina and cirrus pouch opens as a common pore known as genital pores which is comparatively small in size, oval in shape, situated marginally, alternate regularly and measures 0.0147 (0.0140-0.0169) in length 0.0043 (0.0040-0.0049) in width.

The ovary is bilobed, elongated, both lobed irregular in shape

aporal lobe is larger than poral lobe, it measures 0.0133(0.0044-0.022) in length and 0.0399 (0.0355-0.0488) in breadth.

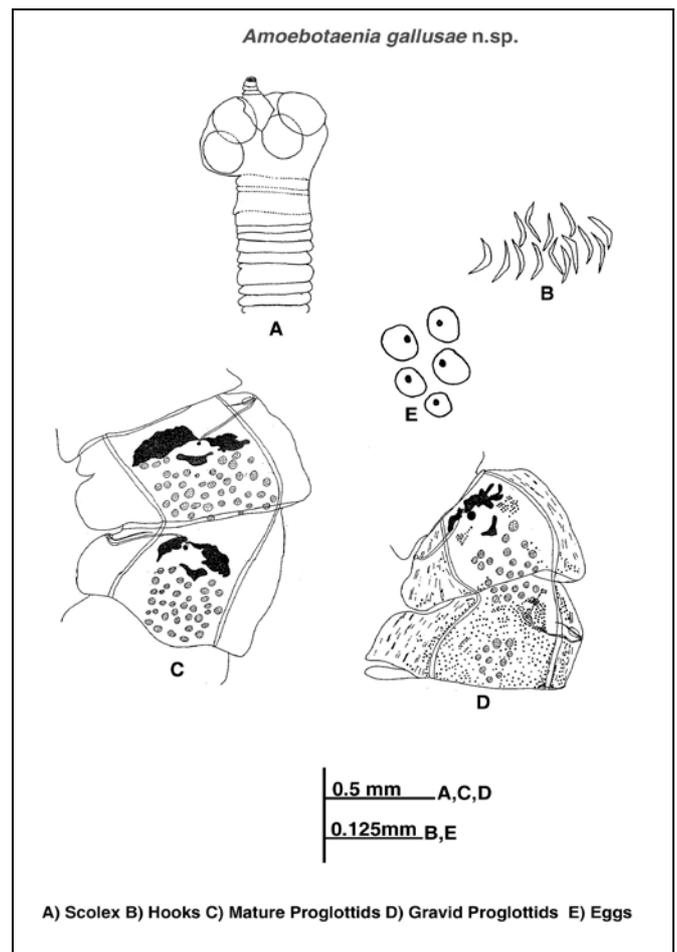
The vagina is thin tube, slightly curved, runs parallel to cirrus pouch and measures 0.04884 (0.0444-0.05328) in length and 0.3108 (0.3106-0.3110) in breadth.

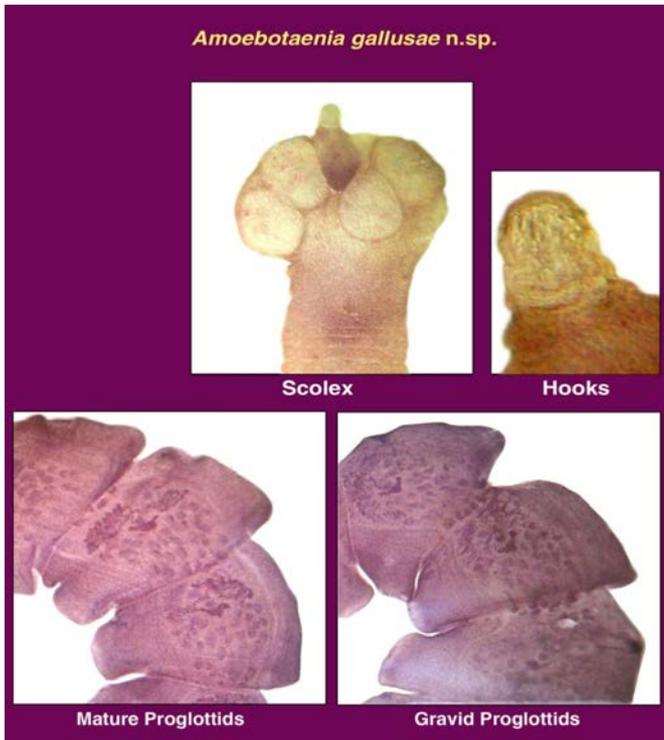
The ootype is small in size, oval to rounded in shape, antero-ventral and lateral to the ovary and measures 0.0066 (0.0034-0.0072) in length and 0.0888 (0.067-0.0893) in width.

The vitelline gland is large in size, compact, triangular and cup shaped, present posterior side of ovary and measures 0.0066(0.0222-0.0070) length and 0.01776 (0.01561-0.0187) in width.

The longitudinal excretory canals are long tube, paired, running across proglottids, longitudinally on both the side of proglottids and measures 0.0754(0.0744-0.0767) in length 0.0311(0.022-0.0325) in breadth.

The gravid segment is longer than broad, two times longer than broad; with slightly concave-convex lateral margins having short blunt, round, conical projections at the posterior corners of the segments and measures 0.0421 (0.0417-0.0430) in length and 0.0599(0.5104-0.05436) in breadth. Inner longitudinal muscles split up into individual fibers in posterior segments. It contain large number of loosely packed eggs which are small and rounded and measures 0.02 X 0.03 in diameter.





### Discussion

After going through the literature the present worm differs from *A. oligorchis* Yamaguti, 1935, *A. fuhrmanni* Tseng, 1932, *A. brevicollis*, Fuhrmann 1907, *A. sphenoides* Chon, 1899, *A. vanelli*, Fuhrmann 1907, *A. pekinensis*, Tseng, 1932, *A. kharatia*, Kalyankar and Palladwae 1975, *A. soyagaonensis*, Khadap 2005, *A. jadhavae* Thorat 2009, *A. minuta*, Nanware 2011 and *A. bhujangi* Garad 2010.

But it resembles with *A. indiana*, Shinde, *A. megascolesis*, Shinde, 1972, *A. fragida*, Meggit, 1927, *A. maharashtrii*, Shinde, 1972, *A. cohni* Kalyankar and Palladwae 1975, *A. bhonslei*, Gaikwad, 1980, *A. mohekarae*, Jadhav 2004, *A. domesticus* Ghare, Shinde & Suryawanshi 1979 in the number of hooks and number of Proglottids and differs from the same in few characters which are summarized below.

1. The present worm differs from *A. sphenoides*, (Chon, 1899) in having number of segment (10-15 Vs.16-23), and number of testes (30-35 vs. 12-14), opening of genital organ (4<sup>th</sup> segment regular alternate Vs. testes seen in 1<sup>st</sup> and 2<sup>nd</sup> segment), and host (*Gallus domesticus* as against *Vanellus dongolanus*)
2. The present tapeworm differs from *A. brevicollis*, (Fuhrmann, 1907) in having the number of segment (10-15Vs.24), number of testes (30-35 Vs.12-15), opening of genital organ (4<sup>th</sup> segment regular alternate vs. immediately behind the scolex), host (*Gallus domesticus* as against *Charadrius nubicus*), and locality (India Vs. Egypt).
3. The present worm differs from *A. vanelli*, (Fuhrmann, 1907) in having number of segments (10-15 vs.25) and number of testes (30-35 Vs.18-20), host (*Gallus domesticus* as against. *Vanellus dongolanus*), and locality (India Vs. Egypt).
4. The present worm differs from *A. fragida* (Meggit, 1927) in having number of hooks (14 in number, single circle, sickle shape Vs. 30, 0.051 long in two rows), mature proglottids (10-15 vs.12), and number of testes (30-35 vs. 11-15 in two rows).

5. The present worm differ from *A. pekinensis*, (Tseng, 1932) in having number of segments (10-15 Vs. 16-20), and number of testes (30-35 Vs.12- 20), length of scolex (0.555 vs. 0.27mm), host (*Gallus domesticus* as against. *Charadrius veredus*), and locality (India Vs. Peking).
6. The present worm differs from *A. fuhrmanni* (Tseng, 1932) in having number of proglottids (10-15 Vs.17-31), number of rostellar hooks (14, sickle shape Vs. 10,long) and number of testes (30-35 Vs. 12-16), opening of genital organ (4<sup>th</sup> segment regular alternate vs. immediately behind the scolex), host (*Gallus domesticus* as against. *Gallinago sp.*), and locality (India Vs. Nanking).
7. The present worm differs from *A. oligorchis* (Yamaguti, 1935) in having number of mature proglottids (10-15 Vs. 28), rostellar hooks (14, sickle shape Vs. 0.033, long), and number of testes (30-35,spread transversally in posterior lateral margin of segment Vs. 6 spread transversally in posterior lateral margin of segment), Locality (India Vs. Japan).
8. The present worm differs from *A. indiana*, (Shinde, 1972) in having number of segments (10-15 Vs.14-15), number of rostellar hooks (14,sickle shape Vs. 10, long) and number of testes (30-35 vs. 10-12), scolex shape (globular shape anteriorly broad narrow posteriorly Vs. small, oval), neck (present Vs. absent), vitaline gland (triangular, cup shape Vs. triangular and compact).
9. The present worm differs from *A. megascolesis*, (Shinde, 1972) in having number of segments (10-15 Vs. 14-16), number of testes (30-35 Vs. 14-17), scolex shape (globular shape anteriorly broad narrow posteriorly Vs. quadrangular), Neck (present Vs. absent), opening of genital organ (4<sup>th</sup> segment regular alternate Vs. genital pore regularly alternate) vitaline gland (triangular, cup shape Vs. compact), host (*Gallus domesticus* as against *Francolinus pondicerianus*),
10. The present worm differs from *A. maharashtrii*, (Shinde, 1972) in having number of segments (10-15 vs. 15) and number of testes (30-35 Vs. 11), scolex shape (globular shape anteriorly broad narrow posteriorly Vs. quadrangular), Neck (present Vs. absent), vitaline gland (triangular, cup shape Vs. bean shaped ).
11. The present worm differs from *A. cohni*, (Kalyankar and Palladwae, 1975) in having number of proglottids (10-15 vs. 15-18), number of rostellar hooks (14 vs.12) number of testes (30-35 Vs. 8-9).
12. The present worm differs from *A. kharatia*, (Kharati,Kalyankar and Palladwae, 1975)in having number of proglottids (10-15 Vs. 16), numbers of hooks (14 Vs. 18) and number of testes (30-35 Vs. 13-15), opening of genital organ (regular alternate vs. male genital system stars in 4<sup>th</sup> segment).
13. The present worm further differs from *A. bhonslei* Gaikwad, 1980 in having beginning of genital organ (4<sup>th</sup> segment regular alternate Vs. 8<sup>th</sup> segments), number of mature proglottids (10-15Vs. 12), and number of testes (30-35 spread transversally in posterior lateral margin of segment Vs. 27-28 serially arranged along posterior margin).
14. The present worm differs from *A. domesticus* (Ghare, Shinde, *et al.*, 1979) in having shape and size of scolex (Globular shape anteriorly broad narrow posteriorly Vs. Small, quadrangular), neck (Present Vs. absent), cirrus

well developed (thin tube, protrusible Vs. spiny), mature proglottids (10-15 Vs. 10-12), number of testes (30-35 spread transversally in posterior lateral margin of segment Vs. 10 arranged serially along the posterior margin of segments), vitelline gland (cup shape Vs. compact).

15. The present worm further differs from *A.mohekarae*, (Jadhav 2004) in having shape and size of scolex (globular shape anteriorly broad narrow posteriorly Vs. globular), size of rostellum (oval anterior projection, retractile Vs. medium) rostellar hooks (14 Vs. arranged in single circle, 24 in number), neck (Present Vs. absent), mature segments (10-15 in number and two times longer than broad with posteriorly blunt projection Vs. three times broader than long), number of testes (30-35 Vs. 34-35), size of vitelline gland (cup shape Vs. large).
16. The present worm differs from *A.soyagaonensis*, (Khadap 2005) in having the presence of number of rostellar hooks (14 Vs. 46), number of testes (30-35 Vs. 53-56), and number of segments (10-15 Vs.44).
17. The present worm further differs from *A. jadhavae* (Thorat 2009) in size and shape of scolex (globular shape anteriorly broad narrow posteriorly Vs. large & rectangular), shape of rostellum (oval anterior projection, retractile vs. large, oval), number of hooks (14 in number and sickle shape Vs. 46 in number and arranged in single circle in rostellum), beginning of genital organ (4<sup>th</sup> segment regular alternate Vs. anterior side of segment unilateral) neck (present Vs. absent), cirrus pouch (globular Vs. oval), and vitelline gland (cup shape Vs. oval).
18. The present worm differs from *A.bhujangi*, (Garad 2010) in having shape and size of scolex i.e. (globular shape anteriorly broad narrow posteriorly vs. squarish, 0.260 x 0.242-0.320mm), and arrangement of rostellar hooks. (14 Vs. single circle) shape and size of mature proglottid (10-15 in number, two times longer than broad with posteriorly blunt projection vs. squarish, 0.181 x 0.234mm) number of testes (30-35 vs. 28) and host (*Gallus domesticus* as against *Venellus malbaricus*)
19. The present worm further differs from *A.minuta* (Nanware 2011) in having arrangement of rostellar hooks. (single circle 14 Vs. double circle), number of testes (30-35Vs. 30-40) shape of ovary (bilobed, both lobed irregular in shape One lobe is larger than other Vs. 'V' or 'U' shaped ), vitaline gland ( cup shaped vs. oval) position of genital pore (regularly alternate vs. irregularly alternate), host (*Gallus domesticus* as against *Venellus malbaricus*), locality (Aurangabad Vs. Nanded).

#### A Key to the Species of the Genus *Amoebotaenia*

- Number of proglottids below 15 in number.....  
*A.cohni* Kalyankar and Palladwae, 1975
  - Number of proglottids above 15 in numbers.....<sup>[1]</sup>
  - Number of Proglottids above 30 in numbers .....<sup>[2]</sup>
  - Number of Proglottids below 30 in numbers .....<sup>[3]</sup>
  - Number of Proglottids in between 10-20 .....  
*A. gallusae* n.sp. 2013
1. Testes 10-12 in number.....<sup>[4]</sup>  
Testes 12-15 in number.....<sup>[5]</sup>  
Testes 12-20 in number.....*A.pekinensis* Tseng, 1932

- Testes 14-17 in number.....*A.megascolesis* Shinde, 1972
  - Testes 10-12 in number.....*A.vanelli* Fuhrmann, 1907
  - Testes 20-30 in numbers .....*A.bhujangi* Garad 2010
  - Testes in between 25-30 in numbers.....*A. bhonslei* Gaikwad, 1980.
  - Testes above 40 in numbers.....*A. soyageonensis* Khadap 2005
  - Testes in between 53-56.....*A. jadhavae* 2009
2. Number of Proglottids above 30.....<sup>[6]</sup>
  3. Number of Proglottids below 30.....<sup>[7]</sup>
  4. Rostellar hooks 10 in numbers.....*A.indiana* Shinde, 1972  
Rostellar hooks 14 in numbers.....*A.maharashtrii* Shinde, 1972  
Rostellar hooks single crown of hook 16 in numbers .....  
*A.domesticus* Ghare, Shinde and Suryawanshi 1979
  5. Rostellar hooks 10 in numbers .....*A.fuhrmanni* Tseng, 1932  
Rostellar hooks 14 in numbers .....*A.sphenoides* Chon, 1899  
Rostellar hooks 16 in numbers.....*A.brevicollis* Fuhrmann, 1907s  
Rostellar hooks 18 in numbers .....*A.kharati* Kalyankar and Palladwae, 1975  
Rostellar hooks 16-18 in numbers.....*A.minuta* Nanware 2011  
Rostellar hooks 24 in numbers .....  
*A.mohekarae* Jadhav 2004  
Rostellar hooks 30 in numbers.....*A.fragida* Meggit, 1927
  6. Testes in between 5-10 spread transversally in posterior lateral margin of segment.....*A.oligorchis* Yamaguti, 1935 Testes in between 30-35 spread transversally in posterior lateral margin of segment .....  
*A. gallusae*. n.sp

#### Taxonomic Summary

Genus : *Amoebotaenia*

Species : *Amoebotaenia gallusae* n.sp

Type host : *Gallus g. domesticus* (Linnaeus, 1758)

Habitat : Intestine

Type locality : Aurangabad, (M. S.) India.

Accession no. : HRL/2009-2011/6c/1a-15m

Holotype : Deposited in Helminthology Research Lab.

Paratype : Dept. of Zoology, Dr. B. A. M. University Aurangabad.

Period of collection : June 2009 to May 2011

Etymology : As the cestode species reported from host *Gallus g. domesticus*.

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