ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 11 | November - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

TAXONOMIC DESCRIPTION OF COTUGNIA GALLUSAE, SP. NOV. (CESTODA: DAVAINEIDAE) FROM DOMESTIC FOWL (GALLUS GALLUS DOMESTICUS) IN BULDHANA DISTRICT, MAHARASHTRA, INDIA

Zoology

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ABSTRACT

The present study describes the morphological characteristics of Cotugnia gallusae, sp. nov. (Cestoda: Davaineidae), recovered from the intestine of domestic fowl, Gallus gallus domesticus, collected at Khamgaon, Buldhana District, Maharashtra, India, in January 2023. The specimens exhibited a large strobila comprising numerous proglottids and a distinct, globular scolex bearing four well-developed, approximately circular suckers. The neck region was reduced, and the mature proglottids were broader than long, containing two sets of reproductive organs. The testes were small, round to oval, and numerous, with approximately 40-50 testes per segment. The reproductive system was characterized by elongated cirrus pouches, slender cirri, elongated vas deferens, and small, oval genital pores. The ovary was medium sized, multi-lobed, and flower-like, while the vagina was slender and tubular, extending towards the ootype. The ootype and vitelline gland were small, and the excretory canals extended longitudinally along both sides of the proglottids. These morphological observations provide a basis for the taxonomic characterization of the specimens and their differentiation from closely related species of Cotugnia. The establishment of Cotugnia gallusae, sp. nov. should be supported by a detailed comparison with previously described closely related species and their diagnostic characters..

KEYWORDS

Cotugnia Gallusae, Cestoda, Davaineidae, Domestic Fowl, Morphological Characterization, Taxonomy, Maharashtra.

INTRODUCTION

The genus *Cotugnia* was erected by Diamare in 1893, with type species *C. diagonopora* (Pasquale, 1890) collected from the domestic fowl. In 1909 Fuhrman added *C. Polyacantha*. In 1924, Meggit added *C. cuneata*. *C. joyeuxi* and *C. parva* was added by bare in 1925. *C. fleari* was added by Meggit, 1927. *C. bhali* and *C. intermedia* and *C. noctua* was added by johri, 1934. *C. taiwanensis*, added by Yamaguti, 1935. *C. rimondoi*, by Tubangui et. al., Masilungun, 1937. *C. magna* by Burt, 1940. In 1961 Siddiqui studied the morphology of *Cotugnia digonopora*. C. *columbae* and *C. aurangabadensis* by Shinde, 1969. *C. shrivastavi* by Malviya and dutta, 1970 from the domestic Pigeon. In 1983 Malhotra and Capoor *C. satpulensis,* in 1985 shinde et. al., *C. yamagutii*. In 1988 kolluri, R. laxmi and Rao added C. *vishakapatnamensis.* In 1994 Jadhav et. al., added *C. rajivji*. In 1995 kharade and shinde added *C. kamatiensis*. In 1998 wongsawad and jadhav added C. *chengmaii*. In 1999, Mahajan added *C. mehdi* from *Gallus domesticus* in Aurangabad. In 1999 Shinde G.B. added *C. manishae* from *Columba livia* at Amravati and *C.ganguae* from *Carvus splendens.* In 2002 Shinde et.al., added *C.alii*. In 2003 Jadhav et.al., added *C.sillodensis*. In 2004 Pawar et.al.,added *C.singhi*. In 2004 Jadhav et.al., added *C.lohanensis*. In 2005, Tat and Jadhav added *C.shankari*. In 2005 Patil et.al., added

C. liviae . In 2009 G.P. Jadhav et.al., added *C. streptopelia*. In 2010, S.S Nanaware reported *C.hafeezii* in *Gallus gallus domesticus* from Nanded district and *C.indiana* was reported by C.R Kasar et.al., In 2011 S. S. Nanware et.al., added new species *C.tetragona*. In 2012 Shinde et.al., added *C. domestica* ; Shukla and Bhavare, in 2012 reported *C.jadhavii*. *C. diamaraei* added by Nanaware and Bhure in 2013. *C.osmanabadensis* reported by Pathan et.al., 2014. H.G Lund et.al., 2017 reported *C. asiyasis*.

The present study deals with the morphological examination of cestode specimens recovered from the intestine of domestic fowl, *Gallus gallus domesticus*, collected at Khamgaon, Buldhana District, Maharashtra, India, in January 2023. The study focuses on the morphological characteristics and morphometric measurements of the scolex, suckers, mature proglottids, and reproductive organs, with the objective of evaluating their taxonomic identity through comparison with previously described species of the genus *Cotugnia*.

MATERIALS AND METHODS

Cestode specimens were collected from the intestine of domestic fowl, *Gallus gallus domesticus*, obtained at Khamgaon, Buldhana District, Maharashtra, India. The recovered parasites were washed thoroughly in normal saline solution to remove adhering intestinal contents and mucus. The specimens were then killed and fixed in hot 4% formalin for preservation.

For morphological studies, the cestodes were stained with Acetocarmine and Harris haematoxylin, dehydrated through ascending grades of alcohol, cleared in xylene, and permanently mounted in DPX. Detailed morphological observations and measurements were made under a compound microscope. Illustrations were prepared with the aid of a Camera Lucida. All measurements are expressed in millimetres unless otherwise stated.

The identification and taxonomic characterization of the specimens were carried out based on their morphological and morphometric features using standard taxonomic keys and available literature on cestode parasites, including Systema Helminthum and relevant published records.

RESULTS

Description: - A total of seven cestode specimens were recovered from the intestine of domestic fowl, *Gallus gallus domesticus*, collected at Khamgaon, District Buldhana, Maharashtra, India, during January 2023.

The recovered specimens were flattened and fixed in 4% formalin. Staining was carried out using either Harris haematoxylin or acetocarmine. The specimens were subsequently dehydrated through ascending grades of alcohol, cleared in xylene, and permanently mounted in DPX. Camera lucida drawings were prepared to illustrate the morphological features. Unless otherwise specified, all measurements are expressed in millimetres.

The cestode specimens are large and possess a strobila composed of numerous proglottids, differentiated into immature and mature segments, along with a distinct scolex. The scolex is globular, relatively small, and clearly separated from the strobila. Its length is 3.383 (range: 3.135-3.630 mm), while its width is 2.558 mm (range: 1.980-3.135). The rostellum is small and rounded; its measurements were not available in the supplied description. Four well-developed, approximately circular suckers are present on the scolex. They are centrally positioned in two pairs. The suckers measure 0.776 (0.726-0.825) in length and 0.743 (0.660-0.825) in width.

The neck region is reduced. The mature proglottids are approximately five to six times wider than their length and contain two sets of reproductive organs. Each mature segment measures 0.743 (0.660-0.825) in length and 4.092 (3.960-4.224) in width.

The testes are small and exhibit round to oval shapes. They number approximately 40-50 per segment and are distributed throughout the proglottid. Each testis measures 0.050 in diameter, with a reported range of 0.033-0.066. The cirrus pouch is elongated and cylindrical on either side of the segment. It is broad in its middle portion and becomes

narrower towards the vas deferens. The pouch is located in the anterior region of the proglottid and measures 0.363 mm (0.330-0.396) in length and 0.132 (0.099-0.165) in width. The cirrus is slender and straight, measuring 0.132 (0.099-0.165) in length and 0.083 (0.066-0.099) in width. The genital pore is small and oval, situated centrally in the segment. It measures 0.109 (0.104-0.113) in length and 0.066 (0.033-0.099) in width. The vas deferens is elongated, slender, and slightly curved, extending close to the anterior margin of the segment. It measures 1.023 (0.990-1.056) in length and 0.050 (0.033-0.066) in width.

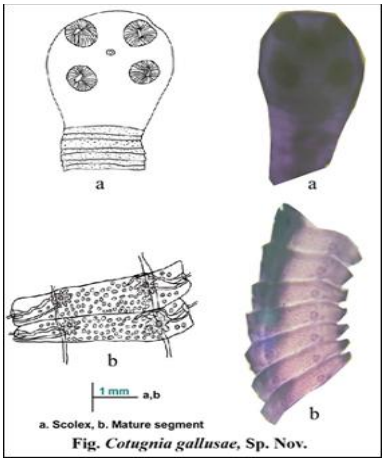

Fig. *Cotugnia gallusae*, Sp. Nov.

The ovary is medium-sized, rounded, and flower-like in appearance, with multiple lobes. An ovarian structure is present on each side of the segment, medial to the longitudinal excretory canal. It measures 0.347 (0.330-0.363) in length and 0.363 (0.330-0.396) in width. The vagina is a slender tubular structure situated posterior to the cirrus pouch. It runs horizontally, crosses the excretory canal, and extends towards the ootype, where it opens. It measures 1.353 (1.320-1.386) in length and 0.050 (0.033-0.066) in width. The ootype is small, rounded, and located posterior to the ovary. Its length is 0.116 (0.099-0.132), and its width is 0.099 (0.066-0.132). The vitelline gland is small and oval, measuring 0.043 (0.034-0.051) in length and 0.051 (0.034-0.068) in width. The excretory canals are slender and extend longitudinally along both sides of the segment. Their reported width is 0.043 (0.034-0.051).

DISCUSSION:-

Diamare established the genus *Cotugnia* in 1893, and *Cotugnia diagonopora* (Pasquale, 1890), obtained from domestic fowl, was designated as its type species. The parasite investigated in the present study shares similarities with other members of the genus in the general organization of its internal organs. Nevertheless, differences in morphometric measurements, rostellar armature, scolex morphology, number of testes, and reproductive structures distinguish the reported species from one another.

1. The present parasite can be distinguished from *C. satpulensis* (Shinde et al., 1983) by the reported presence of 337 rostellar hooks, a rostellum diameter of 0.230 mm, and 43-92 testes, with an average of 62.

2. The present parasite differs from *C. yamaguti* (Shinde et al., 1985) in the reported rostellum diameter of 0.26-0.27 mm.

3. The distinguishing characteristics of *C. rajivji* (Jadhav et al., 1994) include a scolex diameter of 0.62-1.006 mm, a rostellum diameter of 0.37-0.44 mm, 350-400 rostellar hooks, and 60-65 testes.

4. The distinguishing characteristics of *C. kamatiensis* (Kharade et al., 1995) is characterized by a squarish scolex, a rostellum measuring 0.068 × 0.152 mm, 200–210 hooks, 95-105 testes, and a bilobed ovary.

5. The reported features of *C. chiangmaii* (Wongsawad et al., 1998) comprise a scolex measuring 0.58 × 0.738 mm, a rostellum measuring 0.194 × 0.249 mm, numerous hooks, 30-35 testes, and a bilobed ovary.

6. The reported features *C. manishae* (Shinde et al., 1999) has a scolex measuring 0.462 × 0.485 mm and a rostellum measuring 0.223 × 0.227 mm. It possesses 110-120 hooks and 85-90 testes, with 90 reported, and was recorded from *Columba livia*.

7. The present parasite differs from *C. ganguae* (Shinde et al., 1999) is distinguished by its squarish scolex, measuring 0.529 × 0.636 mm, and rostellum, measuring 0.189 × 0.216 mm. The species possesses 275-300 hooks, 155-160 testes, and a bilobed ovary. Its reported host is *Corvus splendens*.

8. In *C. mehdii* (Mahajan et al., 1999), the scolex measures 0.985 × 1.516 mm, while the rostellum measures 0.129 × 0.182 mm. The species possesses 110 hooks and 140-150 testes.

9. The present parasite differs from *C. alii* (Shinde et al., 2002) exhibits a scolex measuring 0.450-0.456 × 0.636-0.657 mm, 100-110 hooks, and 80-85 testes.

10. The reported features of *C. sillodensis* (Jadhav et al., 2003) is reported to possess a scolex measuring 0.51-1.192 × 1.192-1.395 mm and a rostellum measuring 0.170 × 0.281 mm. The hook number ranges from 220 to 250, while the testes number 165-175.

11. The morphological measurements reported for *C. singhi* (Pawar et al., 2004) include a scolex measuring 0.363 × 0.436 mm and a rostellum measuring 0.154 × 0.255 mm. The species possesses 200-210 hooks and 65-70 testes and was recovered from *Columba livia*.

12. The reported features of *C. lohaensis* (Jadhav et al., 2004) is characterized by a scolex measuring 0.590-0.660 × 0.741-0.757 mm, a rostellum measuring 0.227 × 0.242 mm, 190-210 hooks, and 28-30 testes.

13. The reported measurements of *C. liviae* (Patil et al., 2005) include a scolex measuring 0.369 × 0.359-0.437 mm and a rostellum measuring 0.175-0.189 × 0.097-0.131 mm. The species possesses 250-270 hooks and 120-125 testes, with an average of 123.

14. The reported features of *C. streptopelii* (G. P. Jadhav, 2009) is reported to have scolex dimensions of 8.04-5.36 × 9.82-5.36 mm and rostellum dimensions of 2.58-2.14 × 1.96-1.25 mm. Numerous hooks and 27-30 testes are described. The reported host is *Streptopelia decaocto*.

15. The reported features of *C. shankari* (Tat and Jadhav, 2009) possesses a scolex measuring 0.947-1.000 × 0.955-1.175 mm and a rostellum measuring 0.049-0.092 × 0.182-0.213 mm. The species is reported to have 105–205 hooks and 27-40 testes.

16. In *C. hafeezi* (S. S. Nannaware et al., 2010), the reported scolex dimensions are 1.2245 × 1.08 × 0.996-1.176 mm, and the rostellum measures 6.395 × 0.317 mm. The species possesses 55-60 hooks and 150-160 testes.

17. The reported features of *C. indiana* (C. R. Kasar et al., 2010) is reported to possess 110-120 hooks and 115-120 testes.

18. The reported features of *C. indiana* minor (Garad et al., 2010) is described as having a squarish scolex, 400–415 hooks, and a moderately developed neck. Its mature proglottids are broader, and the testes number 70-75.

19. The reported characteristics of *C. tetragona* (S. S. Nannaware et al., 2011) include a scolex measuring 0.927 (0.688-1.66) × 0.773 (0.667-0.879) mm and a rostellum measuring 0.2809 × 0.4505 mm. The species possesses 120-130 hooks and 60-70 testes.

20. The reported features of *C. orientalis* (Nannaware et al., 2011) has a scolex measuring 1.266 (1.102-1.431) × 0.927 (0.901-0.954) mm. It possesses 110-120 rostellar hooks and 45-50 testes. The cirrus pouch measures 0.168 × 0.128 mm, and the ovary is W-shaped, measuring 0.291 (0.159-0.424) × 0.265 (0.212-0.318) mm. The species was reported from *Streptopelia decaocto*.

21. The reported features of *C. murhari* (Sanap et al., 2011) is described as having a large quadrangular scolex and a large oval rostellum bearing two circles of 320-330 hooks. The neck is moderately developed, and the mature segments are squarish, craspedote, and broader than long. The small oval testes number 70-75, with an average of 73. The cirrus pouch is small, oval, and obliquely positioned, while the cirrus is medium-sized. Other reported features include a cylindrical bilobed ovary, medium-sized oval genital pores in

a bilateral position, a medium-sized oval vitelline gland, and narrow longitudinal excretory canals. The host is reported as *Columba livia*.

22. The reported features of C. mohekarii (Shukla, 2011) is reported to possess 60-65 testes, with an average of 63, and a cirrus pouch measuring 0.534 (0.533-0.535) mm in length.

23. The reported features of *C. jadhavii* (Shukla et al., 2011) is characterized by a scolex measuring 3.757 × 4.867 mm, a rostellum measuring 0.95 × 0.590 mm, and 85 testes.

24. The reported features of *C. domestica* (Shinde et al., 2012) is reported to possess 18-20 hooks and 40-50 testes.

25. The reported features of *C. diamarai* (Nannaware et al., 2013) has a reported scolex diameter of 0.58-0.62 mm and a rostellum diameter of 1.329-1.613 mm. The species possesses 480-500 testes and 74-80 hooks.

26. The reported features of *C. singhii* (Sanap et al., 2013) exhibits a scolex measuring 0.316-0.461 × 0.291-0.752 mm and a rostellum measuring 0.175-0.325 × 0.175–0.301 mm. The species possesses 285-305 testes and 65-70 hooks.

27. The reported features of *C. osmanabadensis* (Pathan et al., 2014) is reported to have scolex dimensions of 0.3349-0.3058 mm and a rostellum measuring 0.1067-0.1092 mm. The number of hooks ranges from 60 to 80, and the testes number 110-120.

28. The reported features of *C. asiyasis* (H. G. Lund et al., 2017) is described as having scolex dimensions of 492-500 × 678 and rostellum dimensions of 86-94 × 215-258. Numerous hooks and 15-20 testes are reported.

29. The reported features of C. rectangulata (Barshe et al., 2019) is characterized by a rectangular holdfast organ bearing four muscular, oval-to-rounded suckers arranged in two groups. Its small oval rostellum is situated anteriorly on the holdfast organ and bears a ring of 18-20 hooks. The mature proglottids are broad, and the oval-to-rounded testes number 75-85. The cirrus sac is cylindrical, the cirrus is short and tubular, and the vas deferens is thin and tubular. The ovarian lobe is bean-shaped.

30. The reported features of *C. pyriformis* (Barshe et al., 2021) possesses a quadrangular scolex that is distinctly separated from the body. Four muscular, oval-to-rounded suckers are positioned at the corners. The medium-sized rostellum is centrally located on the holdfast organ and bears 22-24 hooks arranged in a rostellar ring. The neck is absent, and the mature proglottids are approximately five times broader than long. The description reports 60-70 testes and an ovary situated in the central medullary region of the segment. The cirrus pouch is pyriform, the cirrus is protrusible and lies within the cirrus sac, the vas deferens is thin and tubular, the vagina lies posterior to the cirrus pouch, and the ovary is bilobed.

31. The present cestode differs from *Cotugnia sushilii* Sp. Nov. in possessing a small, quadrangular scolex, mature proglottids that are five to six times broader than long, 135–145 proglottids in number, and a rounded ovary.

The above noted characters are valid enough to erect a new species hence the name *Cotugnia gallusae,* Sp. Nov. is proposed after the host genus name i.e. *Gallus gallus domesticus*.

CONCLUSION

The present study describes the morphological characteristics of cestode specimens recovered from the intestine of domestic fowl, *Gallus gallus domesticus*, collected at Khamgaon, Buldhana District, Maharashtra, India. The specimens exhibited a distinct combination of morphological features, including a globular scolex with four well developed suckers, a reduced neck, mature proglottids five to six times broader than long, approximately 40-50 testes per segment, an elongated cylindrical cirrus pouch, and a multi-lobed, flower-like ovary. These morphological characteristics were compared with those of previously described species of the genus *Cotugnia*. The above-mentioned characters were considered sufficient to propose a new species, designated *Cotugnia gallusae*, sp. nov., with the specific epithet derived from the host genus name, *Gallus*, of *Gallus gallus domesticus*. The proposed species requires confirmation through detailed comparison with previously described species and verification of the availability of the proposed name before formal taxonomic establishment.

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