

STUDIES ON A NEW CESTODE OF THE GENUS *COTUGNIA* DIAMARE, 1893 FROM DOMESTIC FOWL *GALLUS GALLUS DOMESTICUS*

Mahesh Uttamrao Barshe, Dhanraj Balbhim Bhure* and Sanjay Shamrao Nanware

Post Graduate Department of Zoology, Yeshwant Mahavidyalaya, Nanded 431 602 (M. S.)

*Author for Correspondence: drajbhure82@gmail.com

ABSTRACT

Present investigation deals with a new species of the genus *Cotugnia*, Diamare 1893 from the intestine of *Gallus gallus domesticus*, from Latur (M.S.) of India. The new species *Cotugnia rectangulata* Sp.Nov. comes closer to all known species of the genus *Cotugnia* in general topography of organ but differs due to quadrangular, distinctly marked off from body, Suckers four in numbers, oval to rounded in shape, muscular, situated at four corners, Rostellum placed centrally in hold fast organ, medium, having rostellar rings with rostellar 22-24 hooks, neck absent, mature proglottids five times wider than long, oval to round in shape, placed at central medulla of segment, in between ovary, 60-70 in numbers, Cirrus pouch pyriform, Cirrus protrusible, lies within the cirrus sac, vas deferens thin, tubular, vagina posterior to cirrus pouch and ovary bilobed.

Keywords- Cestoda, *Cotugnia pyriformis* Sp.Nov., Davaineidae, *Gallus gallus domesticus*.

INTRODUCTION

Diamare (1893) erected the genus *Cotugnia* with type species *C. digonopora* (Pasquale, 1890) collected from the *Gallus gallus domesticus*. Then *C. Polyacantha*, is added by Fuhrmann, in 1909. Meggitt in 1924 described *C. cuneate tenuis*. Later on Baer, in 1925 added two species to this genus viz. *C. joyeuxi* and *C. parva*. Then *C. fleari* is described by Meggitt, 1927. Later on Johri added in 1934 three species to this genus i.e. *C. bahli*, *C. intermedia* and *C. noctua*. Then *C. taiwanensis* is added by Yamaguti, 1935. Tubangui et. Masilungan, 1937 described *C. rimandoi*. *C. magna* is added by Burt, 1940. Shinde, 1969 added two species i.e. *C. aurangabadensis* and *C. columbae*. Later on *C. srivastavi* is added by Malviya and Datta, 1970. Then *C. magdoubii* is described by Magzoubi and Kasim, 1980. Malhotra and Capoor, 1983 described *C. satpulensis*. *C. yamaguti* is added by Shinde, 1985. Kolluri in 1988 described *C. vishakhapatnamensis*. In 1994 *C. rajivji* is added by Jadhav et. al. Then *C. kamatiensis* is described by Kharade and Shinde, 1995. C. Wongsawad and Jadhav in 1998 added *C. chengmai*. In 1999 *C. manishae* and *C. ganguae* are described by Shinde, while *C. mehdii* is added by Mahajan et al., 1999, *C. alii*, is described by Shinde et al., in 2002. Later on Jadhav et al., in 2004 added two new species to this genus i.e. *C. sillodensis* and *C. lohaensis*. While Pawar et al., 2004 added *C. singhi*. In 2005 *C. shankari* is added by Tat and Jadhav while *C. liviae* is described by Patil et al., Later on *C. streptopelii* is added by G.P. Jadhav et al., in 2009. Nanware et al., 2010 added *C. hafezzi*. The *C. indiana* is added by Kasar et al., 2010. Garad et al., 2010 added *C. indiana minor*. Later on in 2011 Nanware et.al added *C. tetragona* and *C. orientalis*. Sanap et al., 2011 added *C. murharii* from *Columba livia*. Shinde et al., 2012 described *Cotugnia domestica* from *Gallus g. domesticus*. Shukla et.al., 2012 reported *C. mohekarii*. Nanware and Bhure, 2013 added *Cotugnia diamarei* from *Gallus g. domesticus*. Pathan et.al., 2014 described *Cotugnia osmanabadensis* from *Gallus g. domesticus*. Recently Barshe et.al., 2019 reported *C. rectangulata* from *Gallus g. domesticus*.

MATERIALS AND METHODS

During the survey of cestode parasites of Birds from Chakur, Shirur Dist. Latur, (M.S.) India, Two Hundred Thirty One cestodes were recovered from the One Hundred Forty Nine infected intestine out of Two Hundred Forty examined intestine of *Gallus gallus domesticus* during the period of February, 2012 to January, 2014. Collection of parasites, preservation, staining, mounting and Identification was done by standard methods (Gerald D. Schmidt, 1934; Yamaguti, S., 1959; Wardle, R.A., Mcleod, J.A. and Radinovsky, 1974; Khalil, Jones and Bray, 1994).

RESULTS (Based On Eighteen Specimens)

Tapeworms are 20-25 millimeter long, having scolex, neck and proglottids. The scolex is quadrangular, distinctly marked off from body, measures $2.992(2.850-3.135) \times 2.707 (2.137-3.277)$ mm in length and width. Suckers four in numbers, oval to rounded in shape, muscular, situated at four corners, measures $0.783 (0.570-0.997) \times 0.741 (0.513-0.939)$ mm in length and width. Rostellum placed centrally in hold fast organ, medium, having rostellar rings with rostellar hooks, and measures $0.641 (0.427-0.855) \times 0.855 (0.570-1.140)$ mm in length and width. Rostellar hooks are 22-24 in numbers arranged in single circle, 'V' shaped and measures $0.242(0.228-0.256) \times 0.057 (0.028-0.085)$ mm in length and width. Neck is absent. Mature proglottids five times broader than long, medium, with convex margin, paired reproductive organs in every segment, measures $1.353 (1.282-1.425) \times 5.272 (5.130-5.415)$ mm in length and breadth. Testes oval to round in shape, placed at central medulla of segment, in between ovary, 60-70 in numbers and measures $0.156 (0.142-0.171) \times 0.099(0.085-0.114)$ in length and breadth. Cirrus pouch pyriform, measures $0.669(0.627-0.712) \times 0.242 (0.171-0.313)$ mm in length and width. Cirrus protrusible, thin, tubular and measures $0.826 (0.798-0.855) \times 0.042 (0.028-0.057)$ mm in length and width, and forms vas deferens, which is short, tubular, and measures $0.541 (0.513-0.570) \times 0.071 (0.057-0.085)$ mm in length and width. Cirrus and vagina opens from common atrium called genital atrium, which is small in size, oval to rounded in shape, marginally situated, and measures $0.256(0.228-0.285) \times 0.085 (0.057-0.114)$ mm in length and width.

Vagina is thin, tubular, arise from genital atrium, runs transversely, posterior to the cirrus pouch and measures $0.969 (0.912-1.026) \times 0.042(0.028-0.057)$ mm in length and width, and forms seminal receptacle which is thin, short, tubular and reaches to ootype and measures $0.285 (0.228-0.342) \times 0.071(0.057-0.085)$ mm in length and breadth. The ootype is compact, medium, situated in between two lobes of the ovary and measures 0.114 mm in diameter. The ovary is Bilobed, small, having numerous blunt acini and measures $0.541 (0.513-0.570) \times 0.199 (0.171-0.228)$ mm in length and width. Vitelline gland is compact, oval in shape, post-ovarian in position and measures 0.053 mm in diameter. Longitudinal excretory canals present on either side of the segment, which is long, tubular, paired and measures $1.496 (1.425-1.567) \times 0.085 (0.057-0.114)$ in length and width.

DISCUSSION

Diamare (1893) erected the genus *Cotugnia* with type species *C. digonopora* (Pasquale, 1890) collected from the *Gallus gallus domesticus*.

The present Parasite under discussion comes closer due to some morphological characters to their genus, but varied from following species.

1) The present form *Cotugnia rectangulata* Sp.Nov. differs from *C.digonopora* Pasquale 1890, Diamare, 1893 due to scolex 1.5mm in size, rostellum oval, 1.5 mm, Hooks numerous, testes, oval to rounded, 100-150 in numbers and cirrus sac 0.300 mm.

2) The Present form *C. rectangulata* Sp.Nov. differs from *C.polyacontha* Fuhrmann, 1909, in having scolex 0.45 mm, rostellum 0.22 mm, Rostellar hooks 420 in numbers, testes 100 in numbers, cirrus pouch 0.180 mm and reported from intestine of *Columba livia*.

- 3) The present specimen differs from *C.cuneata tenuis* Meggitt, 1924 due to scolex rounded, 0.26 mm, Rostellum rounded, 0.12 mm and reported from *Columba livia*
- 4) The present Tapeworm differs from *C.joyeuxi* Baer, 1925; due to scolex 0.67 mm; rostellum 0.19 mm; rostellar hooks 250 in numbers; testes 30-50 in numbers; cirrus pouch 0.075 mm .
- 5) The *C. rectangulata* Sp.Nov. differs from *C. parva* Baer, 1925, by possessing scolex 0.49-0.68x 0.69-0.85 mm in size; rostellum 0.15 mm; Hooks 378-396 in numbers; Testes 32-41 in numbers; cirrus pouch 0.196-0.106 mm and reported from *Columba livia*.
- 6) The present form differs from *C.fleari* Meggitt, 1927, in having Scolex 0.45-0.58 mm; Testes 28-44 in numbers; cirrus pouch 0.29-0.31mm and reported from *Columba livia*
- 7) The present form differs from *C.bhali* Johri, 1934 due to scolex 0.50 mm; rostellum 0.34 mm; rostellar hooks 332 in numbers; Testes 69-74 in numbers and cirrus pouch 0.215-0.223 mm.
- 8) The *C. rectangulata* Sp.Nov. differs from *C.intermedia* Johri, 1934 in having Scolex 0.44-0.525 mm; testes 69-74 in numbers; cirrus pouch 0.215-0.225 mm.
- 9) The present form differs from *C.noctua* Johri, 1934 by having hold fast organ 0.51 mm; rostellum 0.225 mm; testes 170-182 in numbers and cirrus pouch 0.176-0.200 mm.
- 10) The present form differs from *C.taiwanensis* Yamaguti, 1935 due to scolex 0.54-0.74 mm; rostellum 0.44mm; rostellar hooks 200 in numbers; testes 12-13 in numbers and reported from intestine of *Columba livia*
- 11) The *C. rectangulata* Sp.Nov. differs from *C.rimandoi* Tubangui et Masilungam, 1937 in having Rostellar hooks 300 in numbers; testes 100-136 in numbers and recovered from *Columba livia*.
- 12) The new form differs from *C.magna* Burt, 1940, in having scolex 0.58-0.62 mm; rostellum 0.285-0.315 mm; Rostellar hooks 480-500 in numbers; testes 150 in numbers; cirrus pouch 0.238-0.270mm and reported from *Columba livia*.
- 13) The present Tapeworms differs from *C.aurangabaensis* Shinde 1969, in possessing broad Scolex, 0.483 mm; flattened rostellum 0.300 mm in size; rostellar hooks 500 in numbers; testes small in size, rounded in shape, 80-90 in numbers; Cirrus sac slender, 1.30 × 1.040 mm; Genital atrium slightly anterior to middle of the proglottid; Ovary compact and reported from *Columba livia*.
- 14) The present cestode differs from *C.columbae* Shinde, 1969, due to scolex wide, 0.54-0.74 mm; rostellum 0.447mm; rostellar hooks 1200 in numbers; testes 12-14 in numbers; cirrus pouch narrow, short, 0.3 mm; Vitelline gland absent and reported from *Columba livia*.
- 15) The present specimen differs from *C.srivastavi* Malviya and Dutta, 1970, in having scolex 0.726 mm; rostellum 0.446 mm; testes 80-85 in numbers and reported from *Columba livia*.
- 16) The *C. rectangulata* Sp.Nov. differs from *C.magdoubii*, Magzoubi and Kasim, 1980, in having scolex 0.44-0.55 mm; rostellum 0.25-0.44 mm; cirrus pouch 0.15-0.18 mm and reported from the intestine of *Columba livia*.
- 17) *C. rectangulata* Sp.Nov. differs from *C.satpulensis* Malhotra and Capoor, 1983, in having scolex 0.535 mm in size; rostellum 0.230 mm; hooks 337 in numbers; testes oval in shape, 43-52 in numbers; cirrus pouch 0.190-0.283 mm and reported from *Columba livia*.
- 18) The present worm differs from *C.yamagutii* Shinde et al., 1985 in having scolex 0.51-0.60 mm in size; Rostellum rounded in shape, 0.26-0.27 mm; encircled with 500 hooks; testes oval to rounded, 190-200 in numbers; cirrus pouch 0.005-0.132 × 0.044-0.0197 mm in length and breadth and reported from *Columba livia*.
- 19) The present worm differs from *Cotugnia vishakhapatnamensis* Kolluri 1988, by having scolex 28-35 x 0.336-1.056 mm.
- 20) The present cestode differs from *Cotugnia rajivji* Jadhav et al., 1994, in having scolex oval, 0.62-1.006 mm; rostellum 0.37-0.44 mm; rostellar hooks 350-400 in numbers; testes 60-65 in numbers; cirrus pouch 0.280-0.282 mm and vitelline gland small, rounded.

- 21) The present worm differs from *Cotugnia kamatensis* Kharade and Shinde, 1995, by having scolex squarish in shape, $0.84-1.00 \times 0.917-1.099$ mm; rostellum small, 0.018×0.152 mm; rostellar hooks 200-210 in numbers; testes 95-105 in numbers; cirrus sac oval in shape, cylindrical, $0.005-0.60$ mm and Vagina runs anterior to cirrus pouch.
- 22) The present tapeworm differs from *Cotugnia chengmai* C.Wangsawad et al., 1998, by having scolex 0.58×0.738 mm; rostellum 0.194×0.249 mm; testes 30-35 in numbers, oval, cirrus sac 0.32×0.043 mm.
- 23) The present worm differs from *C.manishae* Shinde et al., 1999, in having scolex 0.485 mm; rostellum 0.22×0.227 mm; hooks 110-120 in numbers; testes 85-90 in numbers; cirrus pouch $0.083-0.121 \times 0.030-0.038$ mm; Ovary oval; Vitelline gland oval to triangular and collected from *Columba livia*.
- 24) The present cestode differs from *Cotugnia ganguae* Shinde et al., 1999, in having scolex 0.529×0.636 mm; rostellum 0.189×0.216 mm; rostellar hooks 275-300 in numbers; testes 155-160 in numbers; cirrus pouch 0.260 mm in length and reported from *Corvus splendens*.
- 25) The present new form *Cotugnia rectangulata* Sp.Nov. differs from *Cotugnia mehdii* Mahajan et al., 1999, in having scolex 0.985×1.516 mm; rostellum 0.129×0.182 mm; 110 rostellar hooks; testes 140-150 in numbers and cirrus sac elongated, 0.530 mm.
- 26) The present worm differs from *Cotugnia alii*, Shinde et al., 2002, in having scolex $0.450-0.436 \times 0.639-0.657$ mm; rostellum $0.279 \times 0.436-0.315$ mm; rostellar hooks 100-110 in numbers; 80-85 testes; cirrus pouch $0.241-0.191 \times 0.029-0.024$ mm; vas deferens $0.097-0.072 \times 0.004$ mm; ovary $0.265-0.241 \times 0.051-0.067$ mm and reported from *Columba livia*.
- 27) The present form differs from *Cotugnia sillodensis* Jadhav et al., 2003, in having scolex $0.851-1.192 \times 1.192-1.395$ mm; rostellum 0.170×0.281 mm; 220-250 rostellar hooks; cirrus pouch $0.067-0.092 \times 0.035$ mm; ovary irregular, medium and Vitelline gland small.
- 28) The *C. rectangulata* Sp.Nov. differs from *Cotugnia singhi* Pawar S.B. et al., 2004, due to scolex $0.363 \times 0.436-0.417$ mm in size; rostellum $0.154 \times 0.255-0.215$ mm; encircled with 200-210 rostellar hooks; testes oval, 65-70 in numbers; cirrus sac $0.229-0.159 \times 0.033-0.024$ mm and Ovary 'H' shaped.
- 29) The present form differs from *Cotugnia lohaensis*, Jadhav et al., 2004 by having scolex $0.590-0.660 \times 0.471-0.757$ mm; rostellum 0.227×0.242 mm; 190-210 rostellar hooks; testes 28-30 in numbers; cirrus pouch $0.086-0.097 \times 0.004-0.009$ mm and reported from *Columba livia*.
- 30) The present worm differs from *C.shankari* Tat and Jadhav, 2005, by having scolex $0.947-1.000 \times 0.955-1.175$ mm; rostellum $0.049-0.092 \times 0.182-0.213$ mm, hooks 105-205 in numbers; 27-40 testes; cirrus pouch $0.098-0.030$ mm and reported from *Columba livia*.
- 31) The present cestode differs from *C.liviae* Patil et al., 2005, in having scolex $0.369 \times 0.359-0.437$ mm; rostellum $0.175-0.0189 \times 0.097-0.131$ mm; 250-270 rostellar hooks; testes 120-125 (123) in numbers; cirrus pouch 0.225×0.068 mm and reported from intestine of *Columba livia*.
- 32) The *C. rectangulata* Sp.Nov. differs from *C. streptopelli* G.P. Jadhav et al., 2009, by having scolex $8.04-5.36 \times 9.82-5.36$ mm; testes 27-30 in numbers and ovary $5.36-4.46 \times 5.34-4.46$ mm.
- 33) The present form differs from the *Cotugnia hafezzi* Nanware et. al., 2010 in having scolex quadrangular 1.245×1.086 mm; Rostellar hooks 55-60 in numbers; 150-160 testes; cirrus pouch 0.23×0.11 mm and ovary butterfly shaped with irregular margin, 0.30×0.107 mm.
- 34) The present form *Cotugnia rectangulata* Sp.Nov. differs from the *Cotugnia indiana* Kasar et al., 2010 due to squarish hold fast organ, 0.58×0.54 mm; rostellar hooks 100-120 in numbers; testes rounded, 115-120 in numbers; cirrus pouch elongated, 0.189×0.079 mm; ovary 0.184×0.174 mm and recovered from *Columba livia*.
- 35) The new form differs from *Cotugnia indiana minor* Garad et al., 2010 in possessing scolex squarish shaped, hooks 400-415 in numbers, neck present, medium, mature proglottid wider and testes 70-75 in numbers.

36) The present form *C. rectangulata* Sp.Nov. differs from the *Cotugnia tetragona* Nanware et. al.,2011 due to tetragonal and large hold fast organ, 0.927×0.773 mm; rostellum encircled with 120-130 rostellar hooks; 60-70 testes oval in shape; cirrus pouch fusiform, 0.185×0.090 mm; ovary 0.190×0.068 mm and reported from *Columba livia*.

37) The present form differs from the *Cotugnia orientalis* Nanware et. al.,2011 in having scolex $1.266 (1.102-1.431) \times 0.927 (0.901-0.954)$ mm; 110-120 Rostellar hooks; testes 45-50 in numbers; cirrus pouch 0.168×0.128 mm; ovary 'W' shaped, $0.291 (0.159-0.424) \times 0.265 (0.212-0.318)$ mm and reported from *Streptopelia decacto*.

38) The present form *Cotugnia rectangulata* Sp.Nov differs from *Cotugnia murhari* Sanap et. al.,2011 in having scolex large, quadrangular; rostellum large, oval, with two circles of 320-330 hooks; neck medium; mature segment medium, squarish, broader than long, craspedote; testes oval, small, 70 to 75(73) in number; cirrus pouch small, oval, obliquely placed; cirrus medium; ovary cylindrical, bilobed; genital pore medium, oval, bilateral in position; vitelline gland medium, oval; longitudinal excretory canals are narrow and reported from *Columba livia*.

39) The new form differs from *Cotugnia mohekarii* Shukla et.al.,2012 in having scolex quadrangular; absence of rostellar hooks; testes 63 in number; ovary oval; ootype small, rounded and postovarian.

40) The present cestode differs from *Cotugnia diamarei* Nanware and Bhure 2013 due to oval hold fast organ; Rostellum lies at anterior part of scolex, rounded in shape and encircled rostellar ring with 53-55 hooks, hooks 'V' shaped, located in a one circle; short neck; Mature segment wide; Testes sixty two in numbers, oval to rounded in shape, postovarian in position; Cirrus sac elongated and Cirrus short, curved tube contained within cirrus pouch.

41) It differs from *Cotugnia osmanabadensis* Pathan et al., 2014 in having scolex globular; four rounded suckers; rostellum large and oval, rectangular with hooks; mature segments broader than long; testes 110-120 in numbers, oval to rounded and Post-ovarian; cirrus pouch large oval and elongated; cirrus short, thin and slightly curved; vas deferens tubular, curved directed anteriorly; genital pores large oval and marginal and ovary compact, oval in shape.

42) The *Cotugnia pyriformis* Sp.Nov. differs from earlier described *C. rectangulata* Barshe et al., 2019 due to rectangular hold fast organ, muscular suckers four in numbers, oval to rounded in shape, located in two groups, rostellum small in size, oval in shape, lies in anterior region of hold fast organ, having rostellar ring with 18-20 Rostellar hooks, mature proglottids wider, testes 75-85 in numbers, oval to rounded in shape, Cirrus sac cylindrical, Cirrus short tubular, lies within the cirrus sac, vas deferens thin, tubular and ovarian lobe bean shaped.

Therefore, Considering all significant differentiating features of newer worms, authors are inclined to raise a new species viz. *Cotugnia pyriformis* Sp.Nov. The species is named due to remarkable Pyriform Cirrus pouch.

TAXONOMIC SUMMARY

Type species : *Cotugnia pyriformis* Sp.Nov.

Host : *Gallus gallus domesticus*, Linnaeus, 1758.

Habitat: Intestine

Type Locality: Chakur, Shirur, District Latur (M.S.), India.

Prevalence : Two Hundred Thirty one specimens collected from one hundred forty nine infected host intestine out of two hundred forty examined.

Period of collection : February, 2012 to January, 2014.

Number of Specimen : 231(Two Hundred Thirty One)

Accession number : PGDZ/YMN/1-18/ February, 2012 to January, 2014

Deposition : Department of Zoology (UG & PG), Yeshwant Mahavidyalya, Nanded.

Etymology : The species is named after Shape of cirrus pouch.

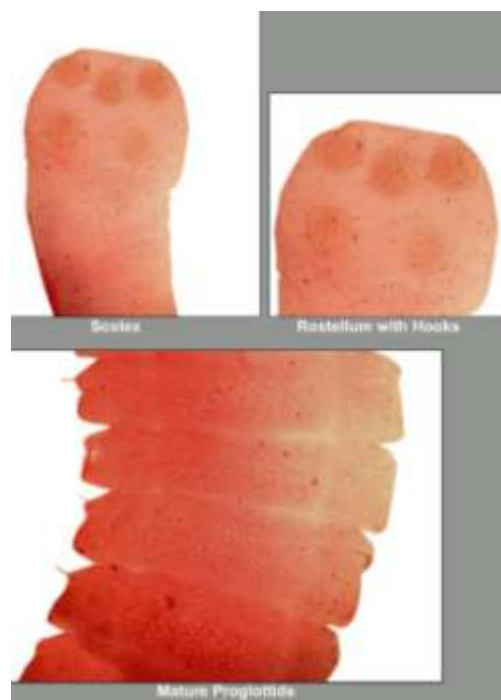


Figure 1: Macrophotoplate of *Cotugnia pyriformis* Sp.Nov.

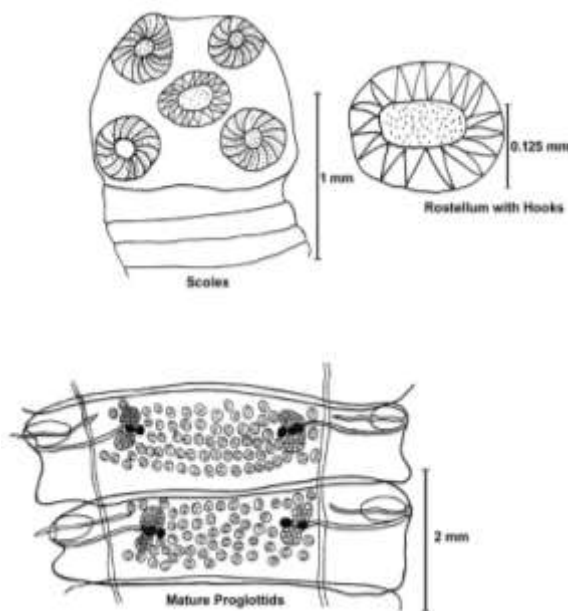


Figure 2: Camera Lucida sketch of *Cotugnia pyriformis* Sp.Nov.

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