Studies on avian cestode genus *Cotugnia* Diamare, 1893 (Cestoda: Davaineidae, Fuhrmann, 1907) from *Gallus Gallus domesticus*

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The present investigation deals with a new species of the genus *Cotugnia*, Diamare 1893 from the intestine of *Gallus gallus domesticus*, from Nanded (M.S.) of India. The new species *Cotugnia diamarei* Sp.Nov. comes closer to all known species of the genus *Cotugnia* in general topography of organ but differs due to scolex large, quadrangular, suckers four, oval to rounded, arranged in four corners, rostellum oval, large, placed in anterior region of scolex and having rostellar ring, rostellar hooks 53-55 in numbers, ’V’ shaped, arranged in a single circle, neck short, mature proglottids three times broader than long, testes 62 in numbers, oval to rounded, postovarian, cirrus pouch cylindrical, cirrus short, curved tube contained within cirrus pouch, vas deferens thin, curved, vagina posterior to cirrus pouch and ovary bilobed.

**Key words**: Cestoda, *Cotugnia diamarei* Sp.Nov., Davaineidae, *Gallus gallus domesticus*.


**INTRODUCTION**

Birds are important components of ecosystem. They are important from the ecological and economical point of view. Man uses many birds as delicious and nutritious food. Similarly birds also produce some important products like meat, eggs and beautiful feathers. The infections of cestode parasites are found in birds. There are no estimates of population suffering from cestode infection but infections are very common in people who are eating poorly cooked or uncooked meat, unhygienic habitats and poor sanitation. Infection leads to anemia. Parasitic diseases are the major public health problem of tropical countries including India. They infect man and also invade domestic birds and wildlife. Although the morbidities and mortality due to such infection is not alarming they adversely affect the general health, physical and mental health, growth of children and productivity of an adult.

Genus *Cotugnia* was erected by Diamare, 1893 with type species *C.digonopora* (Pasqule, 1890) collected from domestic fowl. So far the following species of the avian cestode Genus *Cotugina* are reported.

- *C. digonopora* (Pasqule, 1890), Diamare, 1893.
- *C. cunearea tenuis*, Meggitt, 1924.
- *C. joyeuxi*, Baer, 1925.
- *C. parva*, Baer, 1925.
- *C. fleari*, Meggitt, 1927.
- *C. bahli*, Johri, 1934.
- *C. intermedia*, Johri, 1934.
- *C. noctua*, Johri, 1934.
- *C. magna*, Burt, 1940.
- *C. sildodensis*, Jadhav et al., 2003.
- *C. singhi*, Pawar et al., 2004.
- *C. lohaensis*, Jadhav et al., 2004.
RESEARCH METHODOLOGY

During survey of cestode parasites of birds from Nanded district, (M.S.) India, Eleven cestode parasites were recovered from the intestine of *Gallus gallus domesticus* during March, 2012-May, 2012. These worms were preserved in hot 4 per cent formalin. The parasites were washed thoroughly for several times under running tap water, stained with borax carmine, dehydrated in ascending grades of alcohol, cleared in xylene, mounted in Canada Balsm. Camera lucida drawings were prepared by research microscope. All the measurements are recorded in millimeter.

RESEARCH FINDINGS AND ANALYSIS

The findings of the study have been discussed in detail as under:

(Description based on eleven alike specimens) *(Cotugnia Diamarei Sp. Nov. Fig. 1)*

All cestode were about 23 millimeter long, creamy whitish in colour having scolex, neck, immature and mature proglottids. The Scolex is large, quadrangular and measures 0.59 -0.72 x 0.68-1.04 mm in length and breadth. Rostellum medium, oval in shape and measures 0.21-0.25 x 0.39-0.46 mm in length and breadth. Rostellum armed with a single circle rostellar hook, 53-55 in numbers and measures 0.033-0.038 x 0.003-0.007 mm in length and breadth. Scolex bears four suckers, which is large, oval to rounded in shape, muscular, lie at four corners and measures 0.165-0.192mm in diameter. The scolex is followed by neck, which is short and measures 0.47-0.83 x 0.82-0.91 mm in length and breadth.

Mature proglottids three times broader than long, with a double set of reproductive organs and measures 0.82-0.98 x 2.12 -2.71 mm in length and breadth. Testes oval to rounded in shape, arranged in single field, 62 in numbers and measures 0.055-0.061 mm in diameter. Cirrus pouch long, elongated, cylindrical, curved and measures 0.283-0.289 x 0.03-0.09 mm in length and breadth. Cirrus thin, curved and measures 0.21-0.25 x 0.008-0.012 mm in length and breadth, and forms vas deferens, which is thin, long, curved and measures 0.523 x 0.007 mm in length and breadth. Cirrus and vagina opens from common genital pores, which is small, oval to rounded, bilateral, marginally placed and measures 0.062-0.065 x 0.024-0.027 mm in length and breadth.

Vagina thin tube, opens from genital pores, posterior to cirrus pouch and measures 0.057-0.059 x 0.01-0.03 mm in length and breadth, and forms receptaculum seminis which is thin, sac like, fusiform and reaches to ootype and measures 0.14-0.16 x 0.052-0.054 mm in length and breadth. The ootype is small, oval to round in shape, post ovarian and measures 0.134-0.138 x 0.05-0.07 mm in length and breadth. The ovary bilobed and measures 0.371-0.374 x 0.09-0.14 mm in length and breadth. Vitelline gland is compact, oval in shape, post-ovarian. Longitudinal excretory canals present on either side of the segment, long, tubular.

The genus *Cotugnia* was established by Diamare (1893), with its type species *C. diagnopora* (Pasquale,1890), subsequently following thirty seven species are known so far viz., *C. diagnopora* (Pasquale, 1890) Diamare, 1893; *C.polyacantha* Fuhrmann, 1909; *C.cuneatae tenuis* Meggitt, 1924; *C.joyeuxi* Baer, 1925; *C.parva* Baer, 1925; *C.fleari* Meggitt, 1927; *C.bahli* Johri, 1934; *C.intermedia* Johri, 1934; *C. noctua* Johri, 1934; *C.taivanensis*, Yamaguti, 1935; *C.rimandoi* Tubangui et al. Masilungam, 1937; *C magna* Burt, 1940; *C.aurangabadensis* Shinde, 1969; *C.columbae*, Shinde 1969; *C.srivastavi* Malviya and Datta, 1970; *C.magdoubii* Magzoubi and Kasim, 1980; *C.satpulensis* Malhotra and Kapoor, 1983; *C. yamagutii* Shinde, 1985; *C. vishakhapattnamensis* Kolluri, 1988; *C.rajivji* Jadhav et al., 1994; *C. kamatensis* Kharade and Shinde, 1995; *C.chengmiae* C. Wongsawad and Jadhav, 1988; *C.manishae* Shinde, 1999; *C. ganguiae* Shinde, 1999, *C.mehdii* Mahajan et al., 1999, *C.alii* Shinde et al., 2002; *C. silledonis* Jadhav et al., 2004; *C.sinhgh Pawar* et al., 2004; *C. lohaensis* Jadhav et al., 2004; *C.shankari* Tat and Jadhav 2005; *C. liviae* Patil et al., 2005; *C.streptopellii* G.P. Jadhav et al., 2009. *C. hafezzi* Nanware et al., 2010 ; *C.indiana minor* Garad et al., 2010, *C. tetragona* Nanware et al., 2011, *C.orientalis* Nanware et al. (2011).

The *Cotugnia diamarei* Sp. Nov. under discussion is...
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<td>C. reyi, JadHAV et al. 1984</td>
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<td>C. kanamensis, Klarade et al. 1995</td>
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<td>C. chengnai, C. Vongsawad et al. 1999</td>
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<td>C. singhi, Patw et al. 2004</td>
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<td>C. lehrensis, JadHAV et al. 2004</td>
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<td>C. albinera, JadHAV et al. 2005</td>
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<td>C. irvico, Pati et al. 2005</td>
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<td>C. chaetet, Nanvar et al. 2010</td>
<td>Oval</td>
<td>1.25-1.506</td>
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<td>C. indica, Kasar et al. 2010</td>
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<td>C. indica, miror, Gard et al. 2010</td>
<td>Squarish</td>
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<td>C. tetragona, Nanvar et al. 2011</td>
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<td>0.927-0.733</td>
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<td>Oval</td>
<td>1.56-0.92</td>
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characterized by having to scolex large, oval, suckers four, oval to rounded, arranged in four corners, rostellum oval, large, placed in anterior region of scolex and having rostellar ring, rostellar hooks 53-55 in numbers, ‘V’ shaped, arranged in a single circle, neck short, mature proglottids three times broader than long, testes 62 in numbers, oval to rounded, postovarian, cirrus pouch cylindrical, cirrus short, curved tube contained within cirrus pouch, vas deferens thin, curved, vagina posterior to cirrus pouch, and ovary bilobed.

The present form comes closer to all reported above species in general topography of organs, but differs from C. digonopora Pasquale, 1890, Diamare, 1893 in the size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs 1.5), size of rostellum 0.21 - 0.25 x 0.39 - 0.46 mm Vs 1.5, rostellar hooks (53 - 55 Vs numerous), number of testes (62 in number Vs 100 - 150) and size of cirrus pouch (0.283 - 0.289 x 0.03 - 0.09 mm Vs 0.300).

The Cotugnia diamarei Sp. Nov. differs from C. polyacantha Fuhrmann, 1909, in having size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.45), size of rostellum 0.21 - 0.25 x 0.39 - 0.46 mm Vs 0.22), number of rostellar hooks (53 - 55 Vs 420), number of testes 62 Vs 100), size of cirrus pouch (0.283 - 0.289 x 0.03 - 0.09 mm Vs 0.180) and reported from intestine of Gallus gallus domesticus Vs Columba livia.

The present specimen differs from C. cuneata tenuis Meggitt, 1924 due to shape and size of scolex (oval, 0.59 - 0.72 x 0.68 - 1.04 mm Vs rounded, 0.26), rostellum (0.21 - 0.25 x 0.39 - 0.46 mm Vs rostellum rounded, 0.12) and reported from Gallus gallus domesticus Vs Columba livia.

The Cotugnia diamarei Sp. Nov. differs from C. joyeuxi Baer, 1925; by having Size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.67); size of rostellum (0.21 - 0.25 x 0.39 - 0.46 mm Vs 0.19); number of rostellar hooks (53 - 55 in number Vs 250); number of testes (62 Vs 30 - 50); size of cirrus pouch (0.283 - 0.289 x 0.03 - 0.09 Vs 0.075).

It differs from C. parva Baer, 1925, due to size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs. 0.49 - 0.68x 0.69 - 0.85 mm). Size of rostellum 0.21 - 0.25 x 0.39 - 0.46 mm where as 0.15); rostellar hooks (53 - 55 where as 378 - 396), Testes (62 in number where as 32 - 41 in numbers), size of cirrus pouch (0.283 - 0.289 x 0.03 - 0.09 Vs 0.196 - 0.200) and reported from Gallus gallus domesticus Vs Columba livia.

The present form differs from C. fleari Meggitt, 1927, in having size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.45 - 0.58), testes (62 Vs 28 - 44), size of cirrus pouch 0.283 - 0.289 x 0.03 - 0.09mm Vs 0.29 - 0.31 mm and reported from Gallus gallus domesticus Vs Columba livia.

The present form differs from C. fleari Meggitt, 1927, in having size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.45 - 0.58), testes (62 Vs 28 - 44), size of cirrus pouch 0.283 - 0.289 x 0.03 - 0.09mm Vs 0.29 - 0.31 mm and reported from Gallus gallus domesticus Vs Columba livia.

The present specimen differs from C. bhali Johri, 1934 due to size of scolex 0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.50, size of rostellum 0.21 - 0.25 x 0.39 - 0.46 mm Vs 0.34, number of rostellar hooks 53 - 55 Vs 332; Testes 62 Vs 69 - 74 in number; size of cirrus pouch 0.283 - 0.289 x 0.03 - 0.09 mm Vs 0.215 - 0.223.

It differs from C. intermedia Johri, 1934 in having size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.44 - 0.525 mm), number of testes (62 Vs 69 - 74); size of cirrus pouch (0.283 - 0.289 x 0.03 - 0.09mm Vs 0.215 - 0.225).

The present form differs from C. noctica Johri, 1934 by having size of scolex 0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.51, size of rostellum 0.21 - 0.25 x 0.39 - 0.46 mm Vs 0.225, number of testes 62 Vs 170 - 182, size of cirrus pouch 0.283 - 0.289 x 0.03 - 0.09mm Vs 0.176 - 0.200.

The present form differs from C. taiwanensis Yamaguti, 1935 due to size of scolex 0.59 - 0.72 x 0.68 - 1.04 mm Vs 0.54 - 0.74 mm, The size of rostellum 0.21 - 0.25 x 0.39 - 0.46 mm Vs 0.44, number of rostellar hooks (53 - 55 Vs 200), number of testes (62 Vs 12 - 13) and reported from Gallus gallus domesticus Vs Columba livia.

The Cotugnia diamarei Sp. Nov. differs from C. rimandoi Tubangui et Masilungam, 1937 in number of rostellar hooks (53 - 55 against 300), number of testes (62 against 100 - 136) and described from Gallus gallus domesticus Vs Columba livia.

The new form differs from C. magna Burt, 1940, in having size of scolex (0.59 - 0.72 x 0.68 - 1.04 mm against 0.58 - 0.62); size of rostellum (0.21 - 0.25 x 0.39 - 0.46 mm against 0.285 - 0.315), number of rostellar hooks (53 - 55 against 480 - 500); number of testes (62 against 150); size of cirrus pouch (0.283 - 0.289 x 0.03 - 0.09 mm against 0.238 - 0.270) and reported from Gallus gallus domesticus Vs Columba livia.

The present tapeworms differs from C. aurangabaensis Shinde 1969, in having shape and size of scolex (Oval, 0.59 - 0.72 x 0.68 - 1.04 mm Vs Broad, 0.483 mm) rostellum large, oval, placed in centre of scolex, 0.21 - 0.25 x 0.39 - 0.46 mm against flat, 0.300 mm, number of rostellar hooks (53 - 55 against 500), testes oval to rounded, 62 against small rounded, 80 - 90, cirrus pouch elongated, 0.283 - 0.289 x 0.03 - 0.09 against slender, 1.30 x 1.040 mm in length and breadth, ovary bilobed against compact and reported from Gallus gallus domesticus Vs Columba livia.

The Cotugnia diamarei Sp. Nov. differs from C. columbae Shinde, 1969, due to shape and size of scolex (oval, 0.59 - 0.72 x 0.68 - 1.04 mm Vs wide, 0.54 - 0.74 mm), size of rostellum (0.21 - 0.25 x 0.39 - 0.46 mm Vs 0.447), number of rostellar hooks (53 - 55 Vs 1200), number of testes (62 Vs 12 - 14), shape and size of cirrus pouch (elongated, 0.283 - 0.289 x 0.03 - 0.09 Vs narrow, short, 0.3), vitelline gland (compact, large Vs absent) and reported from Gallus gallus domesticus Vs Columba livia.

The present specimen differs from C. srivastavi Malviya and Dutta, 1970, in having size of scolex (0.59 - 0.72 x
The present worm differs from C. magdoubii, Magzoubi and Kasim, 1980, in having size of scolex (0.59 -0.72 x 0.68-1.04 mm Vs 0.446), number of testes (62 Vs 80-85) and reported from Gallus gallus domesticus Vs Columba livia.

It differs from C. magdoubii, Magzoubi and Kasim, 1980, in having size of scolex (0.59 -0.72 x 0.68-1.04 mm Vs 0.446), number of testes (62 Vs 80-85) and reported from Gallus gallus domesticus Vs Columba livia.

The present form differs from C. satulensis Malhotra and Capoor, 1983, in having size of scolex (0.59 -0.72 x 0.68-1.04 mm Vs 0.535), size of rostellum (0.21-0.25 x 0.39-0.46 mm Vs 0.230), number of rostellar hooks (53-55 Vs 337), number of testes (62 Vs 43-52), size of cirrus pouch (0.283-0.289 x 0.03-0.09 mm Vs 0.190-0.283 mm) and reported from Gallus gallus domesticus Vs Columba livia.

The present worm differs from C. yamagutii Shinde et al., 1985 in having shape and size of scolex oval, (0.59 -0.72 x 0.68-1.04 mm Vs 0.51-0.60 mm), rostellum large, oval, 0.21-0.25 x 0.39-0.46 mm Vs rounded, 0.26-0.27, number of rostellar hooks (53-55 Vs 500), number of testes (62 Vs 190-200), size of cirrus pouch (0.283-0.289 x 0.03-0.09 mm as against 0.005-0.132 x 0.044-0.0197 mm in length and breadth) and reported from Gallus gallus domesticus Vs Columba livia.

The present form differs from C. splendens Mahajan, 1994, in having shape and size of scolex oval, (0.59 -0.72 x 0.68-1.04 mm Vs 0.283-0.289 x 0.030-0.038), vitelline gland compact, large Vs oval to squarish, 0.84-1.00x 0.917-1.099), shape and size of rostellum large, 0.21-0.25 x 0.39-0.46 mm Vs small, 0.018x 0.152 mm, number of rostellar hooks (53-55 Vs 350-400), number of testes (62 Vs 60-65), size of cirrus pouch (0.283-0.289 x 0.03-0.09 mm Vs 0.280-0.282).

The present worm differs from C. vishakhapatnamensis Kolluri 1988, by having size of scolex oval, 0.59 -0.72 x 0.68-1.04 mm Vs 28-35 x 0.336-1.056.

The present cestode differs from C. rajivji Jadhav et al., 1994, in having shape and size of scolex (oval, 0.59 -0.72 x 0.68-1.04 mm Vs oval, 0.62-1.006), size of rostellum (0.21-0.25 x 0.39-0.46 mm) Vs (0.37-0.44 mm), number of rostellar hooks (53-55 Vs 350-400), number of testes (62 Vs 60-65), size of cirrus pouch (0.283-0.289 x 0.03-0.09 mm Vs 0.280-0.282).

The present worm differs from C. sillodensis Jadhav et al., 2003, in having size of scolex (0.59 -0.72 x 0.68-1.04 mm Vs 0.51-0.60 mm), rostellum large, oval, 0.21-0.25 x 0.39-0.46 mm Vs rounded, 0.26-0.27, number of rostellar hooks (53-55 Vs 350-400), number of testes (62 Vs 60-65), size of cirrus pouch (0.283-0.289 x 0.03-0.09 mm Vs 0.280-0.282).

The present worm differs from C. singhi Pawar S.B. et al., 2004, by having size of scolex (0.59 -0.72 x 0.68-1.04 mm Vs 0.363 x 0.436-0.417), size of rostellum 0.21-0.25 x 0.39-0.46 mm Vs 0.154 x 0.255-0.215 mm, number of rostellar hooks (53-55 Vs 200-210), number of testes (62 Vs 152), size of cirrus pouch 0.283-0.289 x 0.03-0.09 Vs 0.229-0.159 x 0.033-0.024.

The present worm differs from C. lohaensis, Jadhav et al. 2004, by having size of scolex (0.59 -0.72 x 0.68-1.04 mm Vs 0.590-0.660 x 0.471-0.757), size of rostellum 0.21-0.25 x 0.39-0.46 mm Vs 0.227 x 0.242 mm, number of hooks (53-55 Vs 190-210), number of testes (62 Vs 28-30), size of cirrus pouch (0.283-0.289 x 0.03-0.09 Vs 0.086-0.097 x 0.030-0.043).
Asian J. Bio Sci.,
Cotugnia tetragona
Columba livia
Nanware 2010 in having size of scolex 0.59 -0.72 x 0.68-1.04 mm
G .P . Jadhav
Sp.Nov
ODA: DA
in respect to taxonomic
VIAN CEST
New avian cestodes of family Davaineidae from Ceylon. Cotugnia
Gallus gallus domesticus,
Cotugnia
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22
/1-02/ March,
2010 in having size of
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Contributional fauna Helminthologiansub africanae Note Preliminaire.
Vs
Gallus gallus domesticus
PGDZ/YMN
et al.
Cotugnia
Columba livia
Gallus gallus domesticus.
2009, by
The
et al.,
8
Eleven specimens collected
viz.,
diamarei
Cotugnia indiana
Research and P .G . Department
The présent cestode differs from
The species is named in
diamarei
ODE GENUS
et al.,
Cotugnia
The present cestode differs from
vs
diamarei
C. streptopelli
G.P. Jadhav et al.,
2009, by
having size of scolex 0.59-0.72 x 0.68-1.04 mm as against
8.04-5.36 x 9.82-5.36), number of testes (62 as against 27-30), size of ovary (0.12 x 0.37 Vs 5.36-4.46 x 5.34-4.46).
The present cestode differs from Cotugnia indiana Kasar
2010 in having size of scolex 0.59-0.72 x 0.68-1.04 mm Vs squarish, 0.58 x 0.54, number of rostellar hooks (53-55 Vs 100-120), number of testes (62 Vs 115-120), size of cirrus pouch (0.283-0.289 x 0.03-0.09 Vs 0.225 x 0.11).
The present form differs from Cotugnia diamarei Sp. Nov.
2010 in having size of scolex 0.59-0.72 x 0.68-1.04 mm Vs quadrangular 1.245 x 1.086, number of rostellar hooks (53-55 Vs 55-60), number of testes (62 Vs 150-160), size of cirrus pouch (0.283-0.289 x 0.03-0.09 Vs 0.23 x 0.11).
The present form differs from Cotugnia hafezzi Nanware et al.,
2010 in having size of scolex 0.59-0.72 x 0.68-1.04 mm Vs quadrangular 1.245 x 1.086, number of rostellar hooks (53-55 Vs 55-60), number of testes (62 Vs 150-160), size of cirrus pouch (0.283-0.289 x 0.03-0.09 Vs 0.23 x 0.11).
C. Shankari and Jadhav, 2005, by having size of scolex 0.59-0.72 x 0.68-1.04 mm Vs squarish, large 0.927 x 0.773, number of Rostellar hooks (53-55 Vs 120-130), number of testes (62 Vs 60-70), size of cirrus pouch (0.283-0.289 x 0.03-0.09 Vs 0.185 x 0.090) and reported from Gallus gallus domesticus Vs Columba livia.

THE OTONOMIC SUMMARY:

Type species : Cotugnia diamarei Sp.Nov.
Host : Gallus gallus domesticus, Linnaeus, 1758
Habitat : Intestine
Locality : Nanded (M.S.) India
Prevalence : Eleven specimens collected from five infected host out of Eight examined.
No. of Specimen : 11
Accession number : PGDZ/YMN/1-02/ March, 1202-May,2012
Deposition : Research and P.G. Department of Zoology, Yeshwant Mahavidyalaya, Nanded.
Etymology : The species is named in honour of Diamare for his valuable contributions made in this field.

CONCLUSION:
From the above discussion it is clear that, the species under discussion is new to science and differs from known valid species of the genus Cotugnia in respect to taxonomic characteristics. On the basis of presence of above mentioned differences and variations the authors are convinced to place the present form in new species viz., Cotugnia diamarei Sp.Nov. in honour of Diamare for his valuable contributions made in this field.

ACKNOWLEDGMENT:
The authors are indebted to Swami Ramanand Teerth Marathwada University, Nanded for sanctioning the Research Project No. APDS/UniMRP-III/2011-12/3039 Dated March 09/11, 2012 for financial assistance and Dr. N.V. Kalyankar, Principal, Yeshwant Mahavidyalaya, Nanded for their help, inspiration and providing necessary laboratory facilities.

LITERATURE CITED


STUDIES ON AVIAN CESTODE GENUS Cotugnia DIAMARE, 1893 (CESTODA: DAVAINIIDAE, FUHRMANN, 1907) FROM Gallus Gallus domesticus


