



E-ISSN: 2320-7078

P-ISSN: 2349-6800

JEZS 2017; 5(5): 1827-1830

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Received: 21-07-2017

Accepted: 22-08-2017

Hafeeza Gul Lund

Department of Zoology,
Shah Abdul Latif University,
Khairpur, Pakistan

Nadir Ali Birmani

Department of Zoology,
Shah Abdul Latif University,
Khairpur, Pakistan

Abdul Manan Shaikh

Department of Zoology,
Shah Abdul Latif University,
Khairpur, Pakistan

Saeeda Anjum Buriro

Department of Zoology,
Shah Abdul Latif University,
Khairpur, Pakistan

Correspondence

Hafeeza Gul Lund

Department of Zoology,
Shah Abdul Latif University,
Khairpur, Pakistan

A new species of genus *Cotugnia* Diamare (Cestoda: Davaineidae, Fuhrmann 1907) from domestic fowl (*Gallus domesticus*) of district Khairpur, Sindh, Pakistan

Hafeeza Gul Lund, Nadir Ali Birmani, Abdul Manan Shaikh and Saeeda Anjum Buriro

Abstract

During the current investigation of cestodes parasites of domestic fowl *Gallus domesticus* of district Khairpur, Sindh, Pakistan, six undescribed specimens of genus *Cotugnia* Diamare 1893 were recovered from the intestine of single host birds. Present specimen come closer to all the known species of genus *Cotugnia* but differ in having scolex cup-shaped, four muscular cup-shaped spined sucker, rostellum oval with numerous pin shaped hooks, mature segments trapezium in shape, ovaries flower shape, lies in the middle of segment, cirrus sac globular to oval in shape, cirrus protruded out word in all the segments, testes 15-20 in number genital aperture round in shape armed with tiny spines situated at the middle of segments, gravid proglottids tetra angular in shape containing numerous egg capsule with 2-3 egg in each capsule and other varying characters. The name of new species *C. asiysis* refers the name of the late sister of the first author.

Keywords: Domestic fowl, *Gallus domesticus*, Cestode, *Cotugnia asiysis* sp. Sindh, Pakistan

Introduction

The family Davaineidae is huge and gloats the biggest genus of Cestodes: Up to now 54 types of the genus *Cotugnia* (Diamare, 1893) and 300 types of the variety Raillietina Fuhrmann, 1920 have been recognized in Birds and Mammals everywhere throughout the world [1, 23, 25]. Variety *Cotugnia* has a place with family Davaineidae. Fuhrmann, 1907 with analytic characters. Rostellum with a little mallet moulded snares. Suckers unarmed, each proglottid with two arrangements of regenerative organs. Combine of ovaries. Testicles at the focal position. Vitelline organ posts ovarian. Vagina back to cirrus sac. Genital pore reciprocal, dorsal to the osmoregulatory water way. Gravid segments having many egg capsule, at least one egg in each egg capsule [6].

Genus *Cotugnia* was erected by Diamare in 1893 with the type species *Cotugnia digonopora* (Pasquale, 1890) collected from *Gallus domesticus* from Africa, Burma, India and Philippines. *C. polycantha* added by Fuhrman in 1909. Other species including. *C. margareta* Beppard, 1916 collected from the intestine of Fowl, *C. cuneata* Meggitt, 1924 recovered from the intestine of pigeon from Lahore, *C. celebensis* Yamaguti, 1956 collected from intestine of *Columba livia* of Karachi, *C. streptopeli* Khan & Habibullah, 1967 recovered from *Streptopelia decaocto* from Lahore, *C. fleari* Meggit, 1927 collected from the intestine of *Columba livia* from Karachi Pakistan. Bilqees, 1985 [22] *C. orientalis* Nanware, Dhondge and Bhure. 2011 [13] collected from the intestine of domestic chicken from Loha, Nanded, India. *C. tetragona* sp. nov Nanware, Dhondge and Bhure, 2011 [14] collected from *Columba livia* from Hadgaon, District Nanded (M.S) India. *C. Mohekarri* sp. Nov Shukla et al. 2012 [23] collected from intestine of *Gallus Gallus domesticus* of Ahmed nagar district (M.S) India *C. singhisp* Sanap and Siddiqui, 2011 [18] collected from intestine of *Columba Livia* from Jinsture dist Parbhani (M.S) India

Materials and method

Live Fifty domestic fowl (*Gallus domesticus*) were collected from various localities of the district Khairpur of Sindh, Pakistan and examined for helminthes.

During an inspection of visceral organs and gut content, a total of 6 cestodes belonging to genus *Cotugnia* were obtained from the intestine of the single host. The cestodes were secure in 70% ethanol, stained with borax carmine, dehydrated in graded alcohol series, cleared in clove oil and xylol. Specimens were permanently mounted in Canada balsam. The

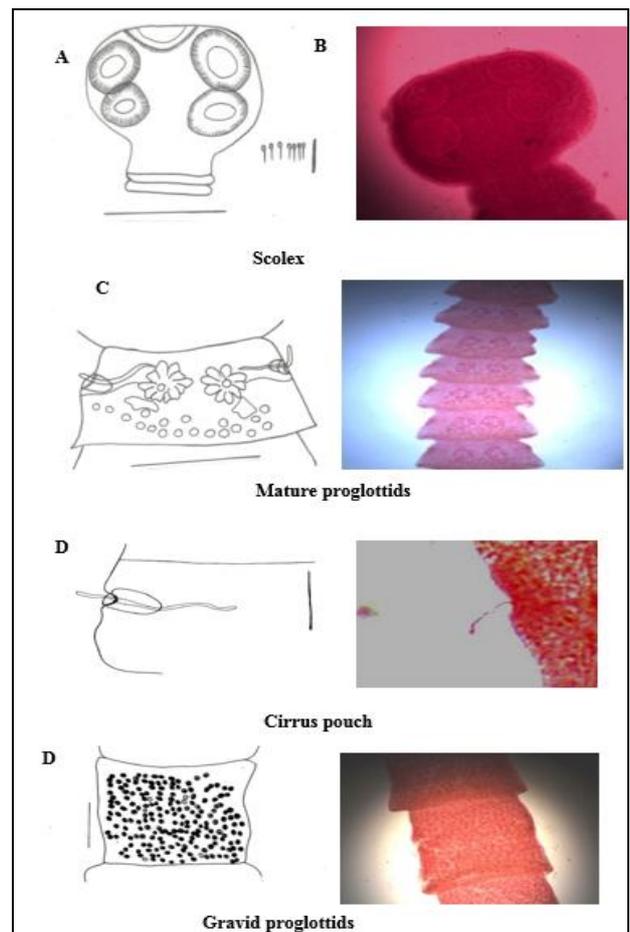
drawing lines were made with camera Lucida and photographs taken with Sony digital camera. The measurements were taken in micrometers (μm). The identification of specimens was made accordance to keys given by Yamaguti [23] and relevant literature.

Table 1: Comparative characteristics of various species of genus *Cotugnia* Diamare, 1893 collected from avian hosts

Species	Present species	<i>C. digonopora</i> (Pasquale, 1890)	<i>C. celebensis</i> Yamaguti, 1956	<i>C. margarita</i> Beddard, 1916	<i>C. cuneata</i> Meggit, 1924	<i>C. streptopelia</i> Khan & Habibullah
Strobila	62,93-630,690	71-78	-	78-102	40.0-47.1	30.35
Scolex	492-500 X 678	1.47 X 2.14	1.12-14 X 0.38-0.41	0.99 X 1.2	0.26-0.40	0.13-0.15
Rostellum	86-94 X 215-258	0.17 X 0.35	0.18 X 0.21	0.13 X 0.05	0.31-0.35	Larger 0.22
Suckers	232-250 X 230-232	0.45 X 0.49	0.15 X 0.23	0.25 X 0.24	0.10-0.15	-
Neck	120-129 X 301-318	-	0.37-0.39	-	-	-
Mature segments	379-396 X 913-931	0.52-0.77 X 3.01-3.85	0.43-0.45 X 2.3-2.5	0.061-071 X 0.84-1.83	0.55-0.65 X 0.93-0.63	0.25-0.35 X 0.74-1.41
Gravid segments	1,080-1,100 X 1,234-1,360	1.01-1.82 X 4.20-5.11	-	-	0.55-0.65	-
Ovary	189-206 X 172-215	0.29 X 0.235	0.30-0.38	0.153 X 0.179	0.10-0.13 X 0.20-0.25	-
Cirrus sac	54-93 X 45-70	0.41 X 0.05	0.23-0.27 X 0.20-0.21	0.043-0.051	0.12-0.22 X 0.027-0.50	0.18-0.23 X 0.03-0.04
Vagina	181-250	0.117	0.452	0.307	-	0.22-0.33 X 0.03-0.06
Testes	34-43 X 34-43	0.117 X 0.117	0.022 X 0.02	0.05 X 0.05	0.03-0.05	0.05
Genital pore	60-86 X 60-77	-	-	-	-	-
Host	<i>Gallus domesticus</i>	<i>Gallus domesticus</i>	<i>Columba livia</i>	<i>Gallus domesticus</i>	<i>Columba livia</i>	<i>Streptopelia decaocto</i>
Location	Intestine	Intestine	Intestine	Intestine	Intestine	Intestine
Locality	Khairpur, Pakistan	Karachi, Pakistan	Karachi, Pakistan	Karachi, Pakistan	Lahore, Pakistan	Lahore, Pakistan

Results

The worms were taken from *Gallus domesticus* have 62-930 X 630-690 in size. The worm contains cup-shaped scolex measuring 492-500 X 678 having four cup-shaped suckers with tiny spines measuring 232-250 X 230-232. Rostellum oval and line up with numerous hooks, measuring, 86-94 X 215-258; Neck small measuring, 120-129 X 301-318 in size, followed 112 segments all the segments wider than long. Immature segments 57 in number. Mature segments trapezium in shape, 38 in number, measuring 379-396 X 913-931 in size. Mature segments having male and female reproductive organs, a couple of multilobed flower shaped ovaries at the middle of segments measuring 189-206 X 172-215 in size. Vitelline gland uneven, compact in shaped situated behind the ovaries, measuring 51-94 X 77-127 in size. Cirrus sac globular to oval, expanded to narrow convoluted vasadifferansa, reach to word ovaries, measuring 54-93 X 45-70 in size. Cirrus run out word in almost all the proglottids, measuring 126-168 X 6-9 in size. Vagina lies behind the cirrus sac, measuring 181-250 X 9-16 in size. Testes round, 15-20 in number dispersed in segments measuring 34-43 X 34-43 in size. Genital pore marginal, ring shapes containing tiny spines measuring 60-86 X 60-75 in size. Gravid proglottids 17 in number measuring 1080-1100 X 1234-1360 almost tetra angular in shape, contain many egg capsule with 2-3 eggs in each.



A. Scolex; **B.** Hooks; **C.** Mature proglottids; **D.** Cirrus pouch; **E.** Gravid proglottids; Entire specimen scale bar 500 μm scolex 500 μm ; mature proglottids: 500 μm ; gravid proglottids: 500 μm Cirrus sac 200 μm ; hooks 50 μm

Taxonomic status of <i>Cotugnia</i> sp Family	Davaineidae Fuhrmann, 1907
Genus species	<i>Cotugnia</i> Diammare, 1893 <i>Cotugnia asiayasis</i>
Host	<i>Gallus domesticus</i>
No. of specimens recovered	06
No. of hosts found positive	1 out of 50
Site of infection	Intestine
Locality	Khairpur, Sindh, Pakistan

Discussion

Diamare erect genus *Cotugnia* in 1893 with the type species *C. digonopora* (Pasquale, 1890) collected from *Gallus domesticus* (Dasi fowl) of Africa, Burma, India and Philippines. Few species of Genus *cotugnia* also reported from Pakistan including *C. margareta* Beddard, 1916, *C. digonopora* (pasquale, 1890), from *Gallus domesticus*, *C. celebensis* Yamaguti, 1956, *Columba livia*, *C. cuneata* Meggitt, 1924, *C. streptopeli* Khan & Habibullah, 1967, from Eurasian collard dove, *C. fleari* Meggit, 1927 from *Columba livia*, and *C. karachenisis* *C. margareta* Beddard, 1916 (Bilqees, 1985) [6] recovered from intestine of Fowl from Karachi differs from present specimens possessing bigger strobila; scolex lager in size; rostellum bigger and narrower; mature segments slighter in size; ovaries lobed, smaller size; vitelline gland dense, smaller in size; cirrus pouch bigger, cylindrical in shape; excretory vessels present; testes are larger in number, slightly bigger in size;; vagina larger in size; genital duct slightly smaller.

C. digonopora Pasquale, 1890 (Bilqees, 1985) [6] collected from intestine of fowl from Karachi differs in larger strobila; having small number of segments; scolex bigger; rostellum bigger in size; suckers bigger; mature proglottids larger; female reproductive organ smaller; cirrus sac tubular, slightly smaller; vagina larger; testes larger in number and size; vitelline gland larger in size; gravid proglottids smaller.

C. celebensis Yamaguti, 1956 (Bilqees, 1985) [6] collected from intestine of *Columba livia* of Karachi varying by present species in possessing bigger strobila, rostellum un armed, bigger; suckers smaller; neck larger; mature segments larger; testes larger in size; cirrus pouch undersized; ovaries and vagina bigger.

C. cuneata Meggitt, 1924 (Bilqees, 1985) [6] collected from the intestine of *Columba livia* of Lahore Pakistan varying from present species by possessing smaller srobila; scolex bigger; rostellum circular, bigger with countable hooks; suckers smaller; neck absent; mature segments greater in number, smaller; ovaries crescent-shaped, smaller; vitellaria bigger; testes slightly bigger; cirrus sac larger in size; gravid segments smaller.

C. streptopeli Khan & Habibullah, 1967 (Bilqees, 1985) [6] collected from intestine of *Streptopelia decaocto* from Lahore Pakistan differs from present specimens in possessing shorter srobila; scolex elongated; rostellum un armed and smaller; suckers unarmed, larger; neck absent; ovaries crescent-shaped, smaller; vitellaria smaller; seminal receptacle present; vagina and cirrus sac larger, cirrus sac cylindrical in shape; testes larger; gravid proglottids smaller in size;

C. fleari Meggit, 1927 (Bilqees 1985) [6] collected from intestine of *Columba livia* of Karachi Pakistan differs in scolex flatted, smaller; suckers smaller; rostellum larger; neck absent; all the segments are larger; ovaries, vitellaria, vagina and cirrus sac larger; testes almost equal in size.

C. lohanesis Jadhav and Ghore, 2004 [7] collected from the intestine of pigeon of Loha, India varying from present species by bigger strobila, scolex oval in shape; rostellum

smaller contains 190-210 hooks; testes 28-30; cirrus sac smaller; ovary with two lobes.

C. hafeezi Sp. nov Nanware, Dhondge and Bhure, 2010 [12] collected from the intestine of domestic chicken of India varying by present species possessing quadrangular scolex of larger; rostellum larger having 55-60 hooks; testes 150-160 in number.

C. indiana sp. nov Kasar *et al.* 2010 [10] collected from intestine of pigeon of Dharni Dist Amravati, M.S. India differ from present communication in possessing square shaped scolex, sucker egg-shaped; 100-120 rostellar spines; testes 115- 120 in contrast of 15- 20, cirrus sac elliptical; ootypes present; ovary having two lobes vitelline gland oval instead of compact.

C. orientalisn. Sp Nanware, Dhondge and Bhure, 2011 [13] recovered from intestine of domestic fowl of Loha, Nanded, India varying by present species possessing smaller strobila; Scolex small egg-shaped, suckers under sized; rostellum with single crown of countable hooks; larger neck; mature proglottids bigger and wider; testes greater in number and larger size; cirrus pouch and vagina bigger; ootypes present; ovary "W" like with two lobes, larger; vitelline gland larger, circular in shape; gravid proglottids smaller and wider.

C. tetragona sp. nov Nanware, Dhondge and Bhure, 2011 [14] collected from intestine of *Columba livia* from Hadgaon, District Nanded (M.S) India varying by present species in possessing shoter strobila; scolex larger, tetragonal in shape; suckers smaller; rostellum with countable hooks and rostellum ring; neck absent; mature proglottids larger; testes, cirrus sac, vagina are larger in size; ovary slightly smaller; vitelline gland ring shaped, smaller; excretory canal and seminusreceptaculum, ootypes present.

C. murhari sp. nov Sanp, Patil and Siddique, 2011 [18] collected from pigeon from Wasmat District Parbhai (M.S) India varying in having scolex quadrangular, smaller; rostellum smaller with countable hooks; suckers smaller, egg-shaped; neck bigger; mature segments smaller craspedote in shape; testes greater in number, smaller in size, oval in shape; ovary lager, cylindrical in shape; vagina, cirrus sac, genital pore are smaller; vitelline gland smaller in size; excretory tube present.

C. jadhavii Shukla and Bhavare, 2012 [22] recovered from intestine of domestic chicken from Ahmednagar District (M.S) India varying in having scolex larger in size, quadrangular in shape; rostellum larger; suckers lesser in size; neck missing; mature segments larger in size; testes greater in number, larger in diameter; cirrus sac larger, wider at center and narrower near vas deference; ovaries "V" like, bigger in size; vagina bigger in size; ootypes present; genital opening bigger in size; gravid proglottids unseem.

C. Mohekarri sp. Nov Shukla *et al.* 2012 [23] obtain from intestine of domestic fowl of Ahmed Nagar district (M.S) India varying by present species in possessing scolex larger in size; quadrangular; rostellum bigger; suckers larger in size; neck absent; mature segments bigger; testes greater number and larger; cylindrical straight cirrus pouch wider at middle and narrow around vasa deference, larger by size; genital aperture elliptical and slightly smaller in size; ovary oval, bigger; vagina larger; otypes present; vitellaria smaller in size; *C. domestica*, Shinde. *et al.* 2012 [21] collected from the intestine of domestic fowl varying fas of present specimens by scolex and suckers oval shaped; rostellum having rostellum ring and 18-20 hooks; testes 40-50; cirrus pouch tubular; ovaries dense bean shaped.

C. diamare Sp. Nov. Nanware and Bhure 2013 [15] collected

from the intestine of domestic fowl of Nanded M.S India varying in having scolex quadrangular in shape; rostellum with 53- 55 v like spines having the rostellar ring; testes 62 in number, oval in shape; ovary with two lobes.

Cotugnia rajvji, Jadhav. *et al.* 1994 (Pathan, Bhure and Mule 2014) ^[17] recovered from the intestine of pigeon from Hyderabad A. P India differs from present species in having scolex oval, larger; testes larger in number; ovaries bilobed; cirrus pouch tubular, larger.

C. osmanabadensis Sp. Nov. Pathan, Bhure and Mule 2014 ^[17] collected from intestine of domestic chicken of Osmanabad (M.S) India varying by present species in possessing scolex smaller in size; suckers smaller; rostellum oval, rectangular; neck larger; mature proglottids bigger; testes greater in number, bigger in diameter; cirrus pouch and vagina bigger in size; seminusreceptaculum and ootypes present; ovaries circular, smaller; vitelline gland ring-shaped; excretory tube present.

From the above discussion, it has indicated that the specimen belonging to genus *Cotugnia* identified as new species based on differentiating characters from known species of genus *Cotugnia* a new species *C. asiysis* is purposed. The name of new species *C. asiysis* refers the name of late sister of the first author

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