

Biosystematic studies on *Raillietina (R.) domestica* (Davaineidae, Fuhrmann, 1908) from *Gallus gallus domesticus*

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The present investigation deals with taxonomic observation of avian tapeworm of genus *Raillietina (R.) rostellata* sp. Nov. collected from *Gallus gallus domesticus* at Ahmedpur, Dist. Latur. It comes closer to all the known species of the genus *Raillietina (R.)* in general topography of organ but differs due to scolex triangular, well marked from strobilae, rostellum lies at anterior region of scolex with 55-58 hooks, which is arranged in double rows, neck long, testes 30-35 in numbers, scattered throughout the segment, cirrus pouch small, oval, genital pore small, marginal, unilateral, Vagina posterior to cirrus pouch, Ovary bilobed, vitelline gland postovarian and gravid proglottid contains 44-48 egg capsules.

Key words : Biosystematic study, *Gallus gallus domesticus*, *Raillietina (R.) domestica* Sp.Nov., Taxonomic study

How to cite this paper : Bhure, Dhanraj Balbhim and Nanware, Sanjay Shamrao (2013). Biosystematic studies on *Raillietina (R.) domestica* (Davaineidae, Fuhrmann, 1908) from *Gallus gallus domesticus*. *Asian J. Bio. Sci.*, 8 (1) : 86-90.

INTRODUCTION

Livestock animals like domestic fowl, *Gallus gallus domesticus* have a great socio-economic importance than other animals domesticated by humans. It is an important item of human food as well as the source of income due to the production of meat, fibre and other substances. Farmers of Marathwada Region used fertilizer which is formed from domestic fowl in their fields to increase soil fertility. But these domestic fowl are infected with helminth infection which is responsible for mortality and economic losses in a number of instances. causes many diseases to human beings. The cestode parasites are found in birds throughout world.

The genus *Raillietina* was erected by Fuhrmann (1920) with its type species (*R. tetragona* (Molin, 1858, Syn. *Taenia bothrioplitis*) which harbours *Gallus*, *Numida*, *Francolinus*, *Pavo*, *Lagopus*, *Colinus* as their hosts. Later on Linstow (1877) added *Raillietina (R.) friedbergeri* from *Pycnonotus cafer*. Then Fuhrmann (1908) added three species in this genus i.e. *R.(R.) micracantha*, *R.(R.) paucitesticulata* and *R.(R.) cryptacantha* collected from *Columba delegoguei*. Kotlan (1921) described *R.(R.) polychali*. Then *R.(R.) weissii* added by Joyeux, 1923. Later on Meggitt (1931) reported *R.(R.) fragilis* collected from *Columba Punica*. Then *R.(R.) sequens* added by Tunabngui and Masilungan (1937). Reid and Denis Nugara, (1965) described *R.(R.) georgiensis* collected from *Meleagris*

gallopavo silvestris, *Meleagris gallopavo domesticus* Later on *R. (R.) waltirensis* added by Kolari *et al.* (1985) from *Streptopelia chinensis suratensis*. Recently, Nanware *et al.* (2010) added *R.(R.) microscolecina* (Fuhrmann, 1908) collected from *Gallus gallus domesticus*.

RESEARCH METHODOLOGY

Seven specimens of the cestode parasites were collected from the intestines of *Gallus gallus domesticus* at Nanded (M.S.) India. These cestode parasites were preserved in 4 per cent formalin, dehydrated in ascending grades of alcohols stained with borax carmine and Harri's Haematoxyline, cleared in xylene, mounted in D.P.X. and drawing were made with the aid of camera lucida. All measurements were recorded in millimeters.

RESEARCH FINDINGS AND ANALYSIS

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

Description (Based on 07 specimens) *Raillietina (R.) domestica* Sp. Nov. (Fig. 1 and 2):

All the tapeworms are medium in size, long, creamy white in colour with scolex, numerous immature, mature and gravid

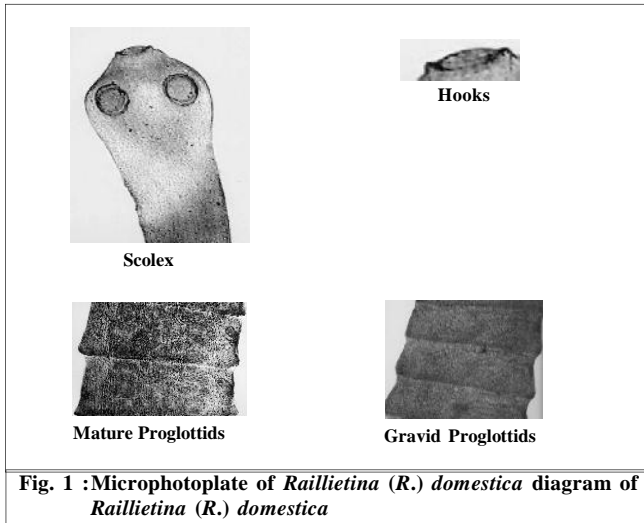


Fig. 1 : Microphotoplate of *Raillietina (R.) domestica* diagram of *Raillietina (R.) domestica*

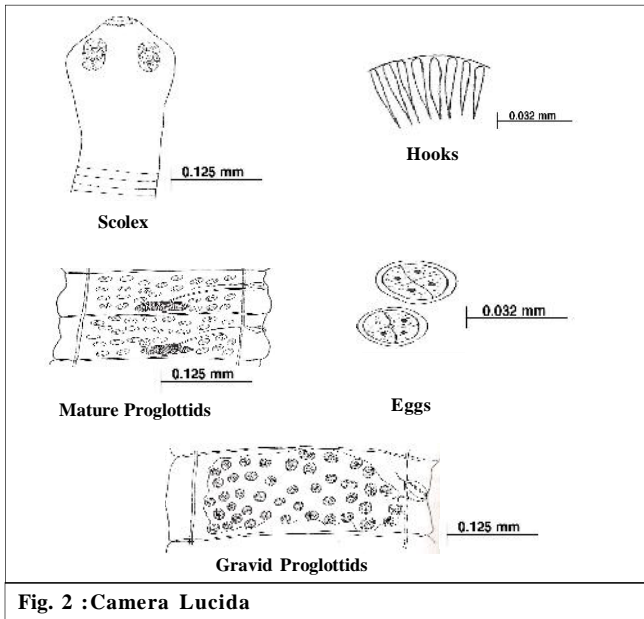


Fig. 2 : Camera Lucida

segments. The scolex is small, triangular tapering at both the ends and measures 0.513 (0.452-0.590) in length and 0.435 (0.389-0.476) in width. The scolex bears rostellum, which is oval and measures 0.107 (0.101-0.131) in length and 0.068 (0.034-0.106) in width, rostellum having hooks which are 55-58 in numbers arranged in two circles, which measures 0.036 (0.035-0.037) in length and 0.0028 (0.0025-0.0030) in width. Suckers are four, oval to rounded, overlapping each other and measures 0.151 (0.085-0.166) in diameter. Scolex is followed by neck, which is long and measures 0.440 (0.385-0.495) in length and 0.342 (0.323-0.360) in width.

The mature proglottids are four to five times broader than long, slightly concave and measures 0.328 (0.306-0.330) in length and 0.970 (0.958-0.982) in width, testes oval to rounded, pre-ovarian, scattered through out the segment, 30

to 35 in numbers and measures 0.0305 (0.024-0.0370) in length and 0.068 (0.058-0.078) in width. Cirrus pouch is small, oval, transversally placed and measures 0.07 (0.06-0.08) in length and 0.03 (0.02-0.04) in width. The cirrus is thin, straight, within the cirrus pouch and measures 0.05 (0.04-0.06) in length and 0.005 in width. Vas deferens is thick, long and measures 0.558 (0.528-0.588) in length and 0.009 (0.004-0.014) in width. The genital pores are small, oval, marginally placed, unilateral and measures 0.038 (0.035-0.041) in length and 0.013 (0.011-0.014) in width. The vagina is a thin tube, starts from genital pore, posterior to cirrus pouch, takes a turn, form receptaculum seminis and measures 0.112 (0.099-0.125) in length and 0.009 in width, receptaculum seminis small tube, runs transversely, take posterior turn reach to ootype and measures 0.422 (0.398-0.444) in length and 0.03 (0.02-0.04) in width. Ootype is distinct, medium in size, bean shaped. The ovary is distinctly bilobed, placed in the middle region of the segment and measures 0.255 (0.243-0.267) in length and 0.05 (0.04-0.06) in width. Vitelline gland is post-ovarian. The excretory canals runs obliquely on either side of the segment and measures 0.365 (0.345-0.385) in length and 0.017 (0.014-0.019) in width.

The gravid segments are broader than long and measures 0.619 (0.598-0.640) in length and 1.612 (1.590-1.633) in width. It contains 44-48 egg capsules, which measures 0.06 (0.05-0.07) in length and 0.08 (0.07-0.09) in width. Each egg capsule contains 4 to 5 eggs.

Fuhrmann (1920) established the genus *Raillietina* with type species *R. tetragona* (Syn. *Taenia bothrioplitis*) which harbours *Gallus*, *Numida*, *Francolinus*, *Pavo*, *Lagopus*, *Colinus* as their hosts. Later on many species were reported to this genus by various authors.

The present species under discussion in having scolex triangular, well marked from strobilae, rostellum lies at anterior region of scolex with 55-58 hooks, which is arranged in double rows, neck long, testes 30-35 in numbers, scattered throughout the segment, cirrus pouch small, oval, genital pore small, marginal, unilateral, Vagina posterior to cirrus pouch, ovary bilobed, vitelline gland postovarian and gravid proglottid contains 44-48 egg capsules.

The present species comes closer to all the known species of the genus *Raillietina (R.)* in general topography of organs but differs due to some characters from following species.

- The present cestode differs parasite differs from *Raillietina (R.) tetragona* (Molin, 1858) Fuhrmann, 1920 in having scolex quadrangular, testes 40-50 in numbers, cirrus pouch elongated, ovary lobulate, egg capsule 50-100 in numbers and egg 6-12 in each egg capsule.
- The present cestode differs from *Raillietina (R.) friedbergi*, Linstow, 1877 in having rosetellar hooks 90-95 in numbers, neck long, testes 33-35 in numbers, ovary bilobed and reported from *Pycnonotus cafer*.

Table 1: Comparative morphometric data of avian tapeworm species of the genus *Raillietina* known so far from the world including the present species viz., *Raillietina (R.) domestica* sp. Nov.

Tapeworm <i>Raillietina</i> species from avian host	Morphometric characteristics of avian tapeworm <i>Raillietina</i> species known so far from the world										Host species
	Scclcx			Rostellum			Other organs				
	Size of scolex (in mm)	Size of suckers (in mm)	Shape and Size (in mm)	No. of hooks	Size of hooks (in mm)	No. of testes	Ovary	Cirrus pouch			
<i>Raillietina (R.) domestica</i> Present Form	Triangular, 0.513 x 0.435	0.151	Oval, 0.107 x 0.068	55-58	0.036 x 0.028	30-35	Bilobed	0.07 x 0.03		<i>Gallus gallus domesticus</i>	
<i>Raillietina (R.) tetragona</i> (Molin, 1858) Fuhrmann, 1920	Quadrangular	--	--	--	--	40-50	lobulate	Elongate		<i>Gallus, Numida, Francolinus, Pavo, Lagopus, Colinus</i>	
<i>Raillietina (R.) friedbergerei</i> , Linstow, 1877			Oval	--	--	33-35	Bilobed	--		<i>Pycnonotus cafer</i>	
<i>R. (R.) micracantha</i> Fuhrmann, 1908	0.18-0.20	0.06	0.117-0.135	--	0.013-0.014	12-16	--	0.1-0.14 x 0.04		--	
<i>R. (R.) paucitesticulata</i> Fuhrmann, 1908	0.13-0.18	0.04-0.057	0.054-0.06	--	0.008	6-8	--	0.07-0.1 x 0.035-0.05		--	
<i>R. (R.) cryptacantha</i> Fuhrmann, 1908	0.08-0.14	0.035-0.04	0.04-0.06	--		3-12	--	0.09-0.165 x 0.058-0.080		<i>Columba delegouei</i>	
<i>R. (R.) polychaetix</i> Kotlan, 1921	0.13	0.26		--	0.011-0.014	8-9	--	0.125-0.130		--	
<i>R. (R.) weissii</i> Joyeux, 1923	0.15-0.17	0.04-0.06	0.1	--	0.019	12	--	0.025-0.04		--	
<i>R. (R.) fragilis</i> Meggitt, 1931	0.15		0.073	--	0.006-0.009	6-7	--	0.12		<i>Columba punica</i>	
<i>R. (R.) sequens</i> Tunabngui <i>et al.</i> , Masilungan, 1937	0.1	0.04	0.06	--	0.007-0.008	5-6	--	0.1-0.12 x 0.04-0.06		--	
<i>R. (R.) georgiensis</i> W. Malciom Reid and Denis Nugars, 1965	--	110-179 x 80-151 microns	17-23 x 12-16 microns	220-268	8-12 microns	23-29	--	96-143 x 55-95 microns		<i>Meleagriss gallopavo silvestris, Meleagriss gallopavo domestica</i>	
<i>R. (R.) waltirensis</i> S. RKolari, C. Vijaya Lakshmi and K. Hanumanth Rao, 1985	0.1-0.7	0.031-0.039	Disc shaped, 0.114	About 60	0.004	8-9	Bilobed	0.176-0.208 x 0.064-0.080		<i>Streptopelia chinensis suratensis</i>	
<i>R. (R.) microselecina</i> (Fuhrmann, 1908) Namwar <i>et al.</i> , 2010	Oval, 0.161 x 0.089	0.023 x 0.011	Oval, 0.036 x 0.024	Arrow shaped, 50-60	0.010 x 0.0009	50-60	Leaf shaped	0.030 x 0.010		<i>Gallus gallus domesticus</i>	

- The present cestode differs from *R.(R.) micracantha* Fuhrmann, 1908 in having scolex 0.18-0.20 mm in length, suckers 0.06 mm in diameter, rostellum 0.117-0.135 mm in length, rostellar hooks 0.013-0.014 mm in length, testes 12-16 in numbers and cirrus pouch 0.1-0.14 x 0.04 mm in diameter.
 - The present parasites differs from *R.(R.) paucitesticulata* Fuhrmann, 1908 in having scolex 0.13-0.18 mm in length, suckers 0.04-0.057 mm in diameter, rostellum 0.054-0.06 mm in length, rostellar hooks 0.008 mm in length, testes 6-8 in numbers and cirrus pouch 0.07-0.1 x 0.035-0.05 mm in diameter.
 - The present tapeworm differs from *R.(R.) cryptacantha* Fuhrmann, 1908 in having scolex 0.08-0.14 mm in length, suckers 0.035-0.04 mm in diameter, rostellum 0.04-0.06 mm in length, testes 8-12 in numbers, cirrus pouch 0.09-0.165 x 0.058-0.080 mm in diameter and reported from *Columba delegouei*.
 - The present cestode differs from *R.(R.) polychalix* Kotlan, 1921 in having scolex 0.13 mm in length, suckers 0.26 mm in diameter, rostellar hooks 0.011-0.014 mm in length, testes 8-9 in numbers and cirrus pouch 0.125-0.130 mm in length.
 - The present form differs from *R.(R.) weissii* Joyeux, 1923 in having scolex 0.15-0.17 mm in length, suckers 0.04-0.06 mm in diameter, rostellum 0.1 mm in length, rostellar hooks 0.019 mm in length, testes 12 in numbers and cirrus pouch 0.025-0.04 mm in length.
 - The present cestode differs from *R.(R.) fragilis* Meggitt, 1931 in having scolex 0.15 mm in length, rostellum 0.073 mm in length, rostellar hooks 0.006-0.009 mm in length, testes 6-7 in numbers, cirrus pouch 0.12 mm in length and reported from *Columba punica*.
 - The present tapeworm differs from *R.(R.) sequens* Tunabngui and Masilungan, 1937 in having scolex 0.1 mm in length, suckers 0.04 mm in diameter, rostellum 0.06 mm in length, rostellar hooks 0.007-0.008 mm in length, testes 5-6 in numbers and cirrus pouch 0.1-0.12 x 0.04-0.06 mm in length.
 - The present parasite differs from *R.(R.) georgiensis* Reid and Denis Nugara, 1965 in having suckers 110-179 x 80-151 microns in diameter, rostellum 17-23 x 12-16 microns in diameter, hooks 220-268 in numbers, 8-12 microns in length, testes 22-29 in numbers, cirrus pouch 96-143 x 55-96 microns in diameter and reported from *Meleagris gallopavo silvestris*, *Meleagris gallopavo domesticus*.
 - The present form differs from *R.(R.) waltirensis* Kolari *et al.*, 1985 in having scolex 0.117 mm in length, suckers 0.031-0.039 mm in diameter, rostellum Disc shaped, 0.114 mm in diameter, hooks 60 in numbers, 0.004 mm in length, testes 8-9 in numbers, ovary bilobed, cirrus pouch 0.176-0.208 x 0.064-0.080 mm in diameter and reported from *Streptopelia chinensis suratensis*.
 - The present tapeworm differs from *R.(R.) microscolecina* (Fuhrmann, 1908) Nanware *et al.* (2010) in having scolex oval, 0.161 x 0.089 mm in diameter, suckers 0.023 x 0.011 mm in diameter, rostellum Oval, 0.036 x 0.024 mm in diameter, hooks Arrow shaped, 50-60 in numbers, 0.010 x 0.0009 mm in diameter, testes 50-60 in numbers, ovary Leaf shaped and cirrus pouch 0.030 x 0.010 mm in diameter.
- 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 *Raillietina* 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.*, *Raillietina (R.) domestica* sp. Nov. The species is named due to name of host.

Taxonomic summary:

Type species	: <i>Raillietina (R.) domestica</i> Sp. Nov.
Host	: <i>Gallus gallus domesticus</i> .
Habitat	: Intestine.
(Site of collection)	
Locality	: Nanded, (M.S.) India.
Date of collection	: 07 May, 2012.
No. of Specimens	: 07.
Accession number	: PGDZ/YMN/1-7/ May, 2012.
Deposition	: Holotype and Paratypes are deposited in Research and PG Department of Zoology, Yeshwant Mahavidyalaya, Nanded (M.S.) India
Etymology	: The species is named due to host name

Acknowledgement:

The authors are indebted to S.R.T.M. University, Nanded for sanctioning the Research Project No. APDS/UniMRP-III/2011-12/3039 Dated March 09/11, 2012 for financial assistance.

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