Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
Impact Factor (RJIF): 5.83
www.entomoljournal.com
JEZS 2025; 13(6): 01-04

Received: 02-08-2025
Accepted: 05-09-2025

Avinash B Gholap
Department of Zoology,
Padmashri Vikhe Patil College,
Pravaranagar, Ahilyanagar,
Maharashtra, India

Corresponding Author:
Avinash B Gholap
Department of Zoology,
Padmashri Vikhe Patil College,
Pravaranagar, Ahilyanagar,
Maharashtra, India

Taxonomical and biochemical studies of cestode parasite (*Raillietina* (R) *tetragona,* Molin: 1858) redescribed from *Gallus gallus domesticus*. (Linn) at Ahilyanagar district (M.S.) India

Avinash B Gholap

DOI: https://www.doi.org/10.22271/j.ento.2025.v13.i6a.9619

Abstract
Given investigation, concerns with study of taxonomy and biochemistry to identify novel species, about 44 helminth parasites was isolated from the intestine of *Gallus gallus domesticus* from various town of Ahilyanagar district for study. Fuhrmann erected Raillietina genus. The literature survey conform that identified as Raillietina (R) tetragona, (Molin, 1858) present worm resembles most of the characters in size and shape of scolex, ovary, number of hooks, proglottids, testes, etc. As well as biochemical parameters like protein, lipid and glycogen. These resembling characters are enough to erected as Redescribed species *Raillietina (R) tetragona,* (Molin, 1858).

Keywords: Taxonomy, helminth parasite, *Raillietina tetragona*

Introduction
Taxonomical and biochemical studies have a vital role in the field of parasitology and they provide work in biological diversity is recognise for species characterisation. Uses of taxonomical technique still dominate and considered as tool in description, naming and identification of the organism. (Dar G. H. *et al.,* 2003) [5] (Kapoor, 1998) [12]. Helminth infection in poultry birds causes effect to economy, mortality and egg production. (Yamaguti S, 1940) [24]. In poultry birds, parasite infection causes infectious disease, which result in increases in mortality in the birds if not proper treatment. (Wankhed H J, *et al.,* 2016) [22]. Current classifications of cestodes parasites base on morphological characters in adult parasite phenotype (Gholap A. B., *et al.,* 2022) [10]. Fuhrmann (1920) [9] established the genus *Raillietina* with type species *R. tetragona (syn. Taenia bothrioplistis),* which harbours *Gallus, Numida, Lagopus, and Colinus* as their hosts. The order Cyclophyllidea (Braun, 1900) [3] and family Davaineidae (Fuhrmann, 1907) [8] of genus *Raillietina* With numerous proglottids and a rostellum having a double circle of hammer-shaped hooks. Sucker margins with several circles of minute hooks. Testes usually numerous; cirrus pouch small, usually not reaching excretory stems, rarely crossing them; genital pores unilateral or irregularly alternating; ovary bi-lobed or not; median or somewhat poral vitelline gland compact. (Yamaguti S, 1940) [24].
Biomolecules like carbohydrates, proteins and lipids having structural and functional role in cell. Digestive system is dwelling site of numbers of parasitic pathogen. (Von Brand, 1979) [21]. Parasites absorb protein by transmission and diffusion mechanism. Parasites utilised protein for produces energy. Literature state that the parasite is adapted them to the parasitic mode of life due to the protein. The fraction in carbohydrate influences the digestive process of glucose and other nutrients in various parts of the digestive tract (Bach Knudsen *et al.,* 1991) and the mucosal architecture (Brunsgaard, 1998) [4]. The lipid tends to be more abundant in the posterior proglottids (Feirbairn *et al.,* 1961) [7]. In older proglottids the lipid content of has led to represent metabolism of waste products (Brand T. Von, 1952) [2]. The present study deals with a (*Raillietina (R) tetragona*, Molin: 1858) [16] Redescribed from *Gallus gallus domesticus* (Linn) collected from the intestine.

Materials and Methods
Gastrointestinal tract of Domestic foul were collected from slaughterhouse of various village

of Ahilyanagar district. Total 290 intestine 127 are infect with cestode parasite. GI tract of hen was expose and parasites were separated from the infected intestine and it fix in 4% formaldehyde and counting of parasite and by staining and mounting process slides were made. For Scanning Electron Microscopy parasites were preserved in 4% neutral phosphate-buffered formaldehyde at 4ºC for 24 hr. (Dey *et.al.* 1989; Roy and Tandon, 1991) [6, 19]. Drawing with Camera Lucida was made having measurement is in millimetres. Parasite diagnosis were done by standard methods, identification of the cestode parasites as per key (Soulsby 1982) [20] and "Systema Helminthium" Volume- II. "Cestode of Vertebrates" (Yamaguti S, 1959) [23]. For biochemical studies the host intestine and parasite are estimated. The protein containt of cestodes parasites estimated by (Lowry's *et.al*. 1951) [15] Glycogen contain by (Kemp *et al.,* 1954) [13] and lipid Contain by (Barnes and Bradstock, 1973) [1].

Results and Discussion

a) Taxonomical Studies

About thirty-eight specimens of the cestode parasites is collect from the intestine of *Gallus gallus domesticus* Out of these eight specimens were processed for taxonomical studies. parasites was long and narrow, scolex, immature and mature segments, which on closer observation, show to be the species of *Raillietina* (*R) tetragona* (Molin, 1858) [16] genus.

The cestode considerably long with numerous proglottids, scolex, immature and mature segments having colour is ccreamy white with measures about 40-95 mm length in size

The scolex is small, oval to rounded, anteriorly narrow and broad posteriorly, distinct mark off from the strobilla with size 0.3907 (0.3883- 0.3932) in length and 0.4587 (0. 4563- 0.4611) in width. scolex Rostellum is large, retractile, oval to rounded, rostellum hooks situated at the tip of scolex measure 0.0266 (0.0242-0.0291) length and 0.0558 (0.0533-0.0582) width. rostellum hooks are arranged in two circles, transversely elongated, having 65-70 in number, they are small, simple, pin like, single pronged measure 0.0272 (0.0245-0.0256) length and 0.0026 (0.0021- 0.0032) width. Scolex having four suckers which is medium and oval, arranged in two pairs, overlapping on each other, separate pairs obliquely placed, near the lateral margin measure 0.1189 (0.1165- 0.1213) width. The sucker margins are covered with numerous minute spines, having 3-4 transverse rows.

Worm neck is of medium, longer than broad with smooth, nearly equal to width of head measure 0.1431 (0.1407- 0.1456) length and 0.4295 (0.4271- 0.4320) width.

The mature segments are medium, craspedote, broader than long almost three time broader than long, with posterior corners projecting outside measure 0.2670 (0.2613- 0.2727) length and 1.2600 (1.2500- 1.2700) width. Testes are 15-20 in numbers, medium and oval situated in anterior lateral sides segment and measure 0.0170 (0.0113-0.0227) diameter. Cirrus pouch is small, oval, narrow anteriorly, broad posteriorly, obliquely placed, situated at lateral region of the segments measure 0.02840 (0.0227-0.0340) length and 0.0511 (0.0454-0.0568) width. Cirrus is thin, slightly coiled, within the cirrus pouch measure 0.0170 (0.0113-0.0227) length and 0.0738 (0.0681-0.0795) width. Vas deferens is medium, extends medially, runs parallel to vagina, coiled measure 0.0852 (0.0795-0.0909) length and 0.0397 (0.0340-0.0454) width.Vagina and cirrus pouch opens as a genital pores which are medium, oval, marginal, unilateral, situated at middle of the segment and post-ovarian and measure 0.02272 in diameter.

Ovary is medium, bilobed, V or kidney Shape obliquely placed just anterior of the segment, blunt acini, poral lobe smaller than aporal lobe measure 0.1533 (0.1477-0.1590) length and 0.2151 (0.1022- 0.1136) width. Vagina is fine tube at the posteriorly to the cirrus pouch which is from the genital pore, runs anteriorly to poralovarian lobe and opens into the ootype measure 0.1406 (0.1363-0.1477) length and 0.0170 (0.0113- 0.0227) width. Ootype is small, oval, located on the isthmus and measure 0.0113 diameter. Excretory canals are long tube, paired, running across proglottids, longitudinally on both the side of proglottids measure 0.2556 (0.2500- 0.2613) length and 0.0397 (0.0340-0.0454) width.

The gravid segments are broader than long contains 80 to 90 eggs capsules and each egg capsule contain 6 to 7 eggs measure 1.6761 (1.1136-1.1250) length and 0.4374 (0.4318- 0.4431) width. Eggs are rounded and measure 0.0069 (0.0064-0.0074) diameters.

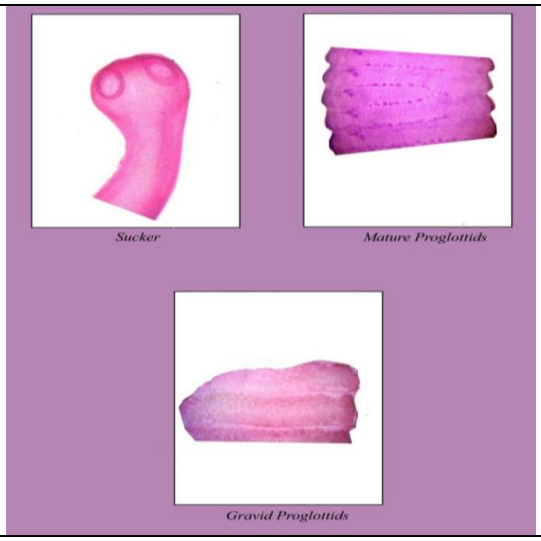


Fig 1: Photos shows that scolex, mature and gravid segment of cestode

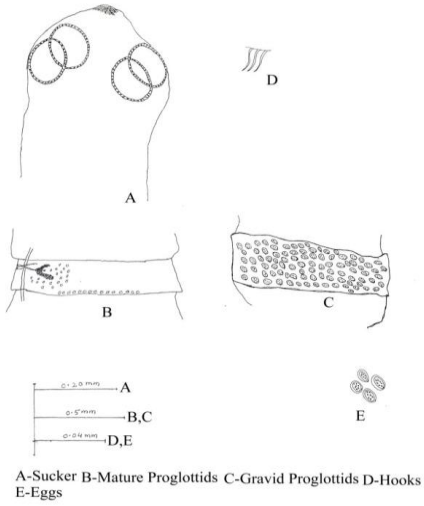
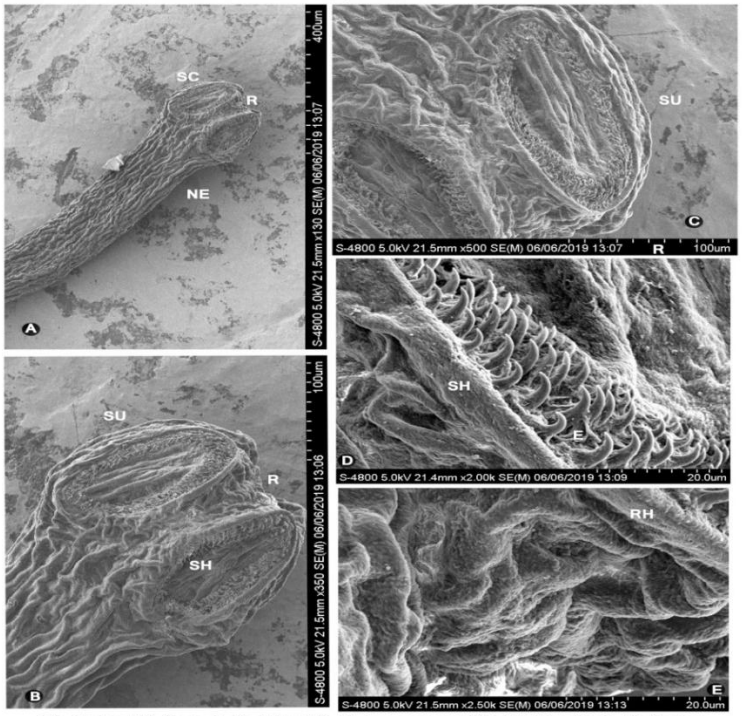


Fig 2: Camera Lucida shows that scolex, mature and gravid segment of cestode



SU- Sucker, NE- Neck, R- Rostellar, MS- Mature segment, RH- Rostellar Hook, SC- Sucker,

Fig 3: Scanning electron microscopy showing scolex and Hooks of parasites

b) Biochemical Parameters

Table 1: Showing Biochemical Parameters of parasites and host tissue

Parameter	Parasitic tissue (mg/gm)	Intestine tissue of infected host (mg/gm)	Intestine tissue of non-infected host (mg/gm)
Protein	10.71±0.86	12.34 ±0.88	17.06 ±0.64
Glycogen	8.26 ±0.61	12.62 ±0.46	20.15 ±0.59
Lipid	13.86 ± 0.55	13.26 ±0.32	9.50 ±0.34

Mean (±SD) values of protein, glycogen and lipid content in tissue (mg/gm) of cestode parasite, infected and non- infected tissue of host intestine. Protein content is less in infected tissue (12.34±0.88 mg/gm) than non-infected tissue (17.06±0.64 mg/gm) the level of protein in cestode parasite (10.71±0.86 mg/gm) due to parasitic infection Above observations show that cestode parasites should maintain a balance of protein level in the host Glycogen contain level is low in cestode parasite (8.26 ±0.61 mg/gm) than intestinal tissue (12.62 ±0.46, 20.15±0.59 mg/gm). It show that cestode parasites should maintain a balance of glycogen level carbohydrates is good energy source for parasites. Lipid contain is higher in parasite (13.86±0.55 mg/gm), than intestinal tissue of host is (13.26±0.32, 9.50±0.34 mg/gm). Show that parasites absorb nutrients from the host,

Conclusion

After literature study, biochemical Parameter investigation the present worm resembles in most of the characters with *Raillietina (R) tetragona* (Molin, 1858) [16] Which as the, number of testes, Ovary and vitelline gland shape but differs from the same in few known as additional characters, which are as like:

1. Number of rows of spines on the sucker margins 3-4 as against 8-10.
2. Number of egg capsules 80-90 as against 50 -100. Each egg capsule contains 6 -77 eggs
3. Number of rostellum hooks 65-70 as against 100.

As the characters are minor, hence it is redescribed here, as *Raillietina (R) tetragona* (Molin, 1858) [16] who reported the worm from *Gallus gallus domesticus* (Linnaeus, 1758) whereas the present worm also reported from *Gallus gallus domesticus* (Linnaeus,1758) At- Loni, Taluka- Rahata, Dist.- Ahilyanagar, (MS)

Acknowledgment

Authors are thankful to Principal and Head, Department of Zoology, P.V.P. College of Arts, Science and Commerce, Pravaranagar, for supporting lab. facility and uplift at a time of research work.

References

1. Barnes H, Bradstock ZJ. Estimations of lipid in marine animal and tissue. J Exp Mar Biol Ecol. 1973;12:103-18.
2. Brand T von. Chemical physiology of endoparasitic animals. New York: Academic Press; 1952.
3. Braun M. In: Bronn HG, editor. Klassen und Ordnungen des Thierreichs. Band IV, Vermes; Abtheilung I.B., Cestodes. Leipzig; 1900. p. 927-1731.
4. Brunsgaard G. Effects of cereal type and feed particle size on morphological characteristics, epithelial cell proliferation and pectin binding patterns in the large intestine of pigs. J Anim Sci. 1998;76:2787-98.
5. Dar GH, Khuroo AA, Reddy CS. The relationship between taxonomy and conservation biology in the century of extinctions. C R Biol. 2003;326(Suppl 1):9-21.
6. Dey S, Basu Baul TS, Roy B, Dey D. A new rapid method of air drying for scanning electron microscopy using tetramethylsilane. J Microsc. 1989;156(13):259-61.

7. Fairbairn D, Wertheim G, Harpur RP, Scholler EL. Biochemistry of normal and irradiated strains of *Hymenolepis diminuta*. Exp Parasitol. 1961;11:248-63.
8. Fuhrmann O. Die Systematik der Ordnung der Cyclophyllidea. Zool Anz. 1907;32:289-97.
9. Fuhrmann O. Considerations générales sur les Davainea. Centralbl Bakteriol Parasitenkd. 1920;44:116.
10. Gholap AB, Wankhede HJ, Pulate VM. A new species of genus *Amoebotaenia alokni* sp. nov. from *Gallus gallus domesticus* from Ahmednagar District, India. J Sci Res BHU. 2022;66(3):117-20.
11. Barrett J. Biochemistry of parasitic helminths. 1982.
12. Kapoor VC. Theory and practice of animal taxonomy. 4th ed. New Delhi: Oxford & IBH Publishing Co. Pvt. Ltd.; 1998. p. 247.
13. Kemp A, Kits Van Heijningen AJM. A colorimetric micro method for determination of glycogen in tissue. Biochem J. 1954;56(4):646-8.
14. Linnaeus C. Systema naturae per regna tria naturae secundum classes, ordines, genera, species cum characteribus, differentiis, synonymis, locis. 10th ed. Vol 1. 1758. p. 823.
15. Lowry OH, Rosebrough NJ, Farr AL, Randall RJ. The original method. J Biol Chem. 1951;193:265.
16. Molin R. Prospectus helminthum, quae in prodromo fauna helminthologicae Venetiae continentur. SB Akad Wiss Wien Math Nat. 1858;30(14):127-58.
17. Railliet A, Henry A. Les cestodes des oiseaux par O. Fuhrmann. Rec Med Vet. 1909;86:337-8.
18. Railliet A, Henry A. Nematodes vasculicoles des bovins annamites. Rec Med Vet. 1912;15:115.
19. Roy B, Tandon V. Usefulness of tetramethylsilane in the preparation of helminth parasites for scanning electron microscopy. Riv Parassitol. 1991;8:207-15.
20. Soulsby EJL. Helminths, arthropods and protozoa of domesticated animals. 7th ed. London: Bailliere Tindall; 1982.
21. von Brand T. Biochemistry and physiology of endoparasites. Amsterdam: North-Holland/Elsevier; 1979.
22. Wankhede HJ, Gholap AB. Effect of cestode parasites on haematological parameters in *Gallus gallus domesticus* in Ahmednagar District. Int J Life Sci. 2016;5-11.
23. Yamaguti S. Systema helminthum. Vol II. Cestodes of vertebrates. New York: Interscience Publishers; 1959. p. 1-860.
24. Yamaguti S. Studies on helminth fauna of Japan. Part 30. Cestodes of birds II. Jpn J Zool. 1940;4-5(1):175-211.