



Redescription and First Report of the Cestode *Paracaryophyllaeus Lepidocephali* Kundu, 1985 in *Lepidocephalichthys Guntea* (Hamilton-Buchanan)

KEYWORDS

Cestodes, Karbhala wetland, *Paracaryophyllaeus lepidoccephali*, Assam

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ABSTRACT Out of 148 (7.50 ± 4.183) fish specimens examined, 14 fish individuals was parasitized with a total of 62 (4.43 ± 3.546 , $P = 0.05$) parasites of the genus *Paracaryophyllaeus* from Karbhala wetland, Silchar in Assam, India. The overall prevalence and intensity of *Paracaryophyllaeus* infection was 9.46 % and 4.43 respectively and abundance was 0.42. The present study also deals with the first geographical report of the genus *Paracaryophyllaeus* in Assam and the taxonomical observation of *Paracaryophyllaeus lepidoccephali* was briefly re-described. The number of fish examined and parasites was statistically significant. The correlation between the fish examined and sex of the fish was significant ($r = 0.859 > 0.01$) but showed negative correlation between fish examined and parasites ($r = -0.342$); and parasites and sex of the fish host ($r = -0.531$).

INTRODUCTION

Cestodes are found in a wide variety of animals, including fish. Adult cestodes are typically found in the gastrointestinal (GI) tract, while larval stages may be found in a variety of organs. However, adults are generally more host specific than larval cestodes (Dick et al., 2006). In the present study, cestodes were collected from the fish host *Lepidocephalichthys guntea* from Karbhala wetland (area 0.2345 ha at FSL) lying between 24° 41' N and 92° 42' E and situated 5 km from the Assam University, Silchar in Assam (India) to study the prevalence percentage (incidence) and intensity and taxonomical observations.

Report on the genus *Paracaryophyllaeus* and its known species are few.

Kulakovskaya (1961) found a new genus *Paracaryophyllaeus* with the species *P. dubinae* as its type species from the intestine of *Misgurnus anguillicaudatus* from Ukraine. *P. dubinae* was then described from other cobitid fishes, *Cobitis taenia* and *C. caucasica* from USSR including the Amur River Basin, and from Hungary and Bulgaria (Ergens et al., 1975, Kakacheva-Avramova 1983, Protasova et al., 1990). Dubinina (1971) synonymised *P. dubinae* with *Caryophyllaeus gotoi*, the latter species being transferred to *Paracaryophyllaeus*, and thus becoming the type species as *P. gotoi* from a cobitid fish from Russia. However, Protasova et al. (1990) described this synonymy as incorrect because of its contradiction to the rules of the International Code of Zoological Nomenclature. This was accepted by Dubinina (1987) and Mackiewicz (1994) and thereafter Scholz et al. (2001) has followed the same.

P. lepidoccephali Kundu (1985) from *L. lepidoccephali*; *P. ostiobramanensis* Gupta and Sinha (1984) from *Ostiobrama cotio*.

MATERIALS AND METHODS

Fishes of different sizes were routinely collected from Karbhala wetland. Cestodes were collected from the duodenum and intestine of freshwater fish *Lepidocephalichthys guntea*. The collected cestodes were fixed in 5% formalin and preserved in 70% alcohol. The preserved cestodes were stained with alum carmine, passed through various alcoholic grades, cleared in methyl salicylate and mounted in Canada balsam. Photographs were taken using a digital camera. Drawing was done using mirror type Camera Lucida. The measurements were given in millimetres. Identification was done through standard literature and statistical analysis was done using

SPSS 17.0 software.

The data obtained were subjected to the standard formulae given below:

Incidence:

It is the frequency of infection of hosts by the parasite expressed in terms of percentage i.e.,

$$\text{Incidence} = \frac{\text{Infected host}}{\text{Total hosts examined}} \times 100$$

Intensity: It is the quotient from the number of parasites divided by the number of infected hosts i.e.,

$$\text{Intensity} = \frac{\text{Number of parasites obtained}}{\text{Number of infected hosts}}$$

Abundance: It is the concentration of the parasite in terms of parasite (single host) per unit space i.e.,

$$\text{Abundance} = \frac{\text{Total number of parasite recovered}}{\text{Total number of fish examined}}$$

RESULTS

A total of 148 (7.50 ± 4.183) fish specimens was examined for cestode parasites from the fish host *Lepidocephalichthys guntea* from Karbhala wetland, Silchar in Assam, India. Of these, 14 fish individuals were parasitized with a total of 62 (4.43 ± 3.546 , $P = 0.05$) *Paracaryophyllaeus lepidoccephali*. Out of 14 fish hosts infected, 8 (4.50 ± 2.449) female fish was parasitized with 48 (2.33 ± 1.862) and 6 (11.50 ± 1.871) male fish hosts was parasitized with only 14 (6 ± 3.780) cestode parasites. Female fish was highly infected as compared to male fish hosts. The prevalence percentage was recorded with 9.46 %, intensity with 4.43 and abundance was recorded to be 0.42. One way ANOVA of fish examined $F(1, 12) = 33.882$, $P = 0.00$ and parasites $F(1, 12) = 4.714$, $P = 0.05$. The number of fish examined and the parasites obtained was statistically significant. On the other hand, the number of fish examined and the sex of the fish host was significant at the

0.01 level ($r = 0.859$) and between fish examined and parasites ($r = -0.342$); and parasites and sex of the fish host ($r = -0.531$) were showed negative correlation.

There are two species of *Paracaryophyllaeus* from India: *Paracaryophyllaeus lepidocephali* (Kundu 1985) and *Paracaryophyllaeus ostiobramensis* (Gupta & Sinha 1984) (Table 1). Both the species were described from cypriniformes fishes. The present form was also recovered only from the fish host *Lepidocephalichthys guntea* which indicates that the species was host specific. Taxonomic re-description is given below:

Caryophyllidea Beneden in Carus, 1863
Caryophyllaeidae Leuckart, 1878
Paracaryophyllaeus Kulakovskaya, 1961
Paracaryophyllaeus lepidocephali Kundu, 1985 (Fig. 1 a, b)

Description

Body 1.68 - 1.90 long and 0.15 - 0.21 mm wide; width at gonopore 0.15 - 0.21 mm. Scolex simple, slightly rounded, smooth, slightly widened, 0.11 - 0.25 mm long and 0.15 - 0.22 mm wide; neck absent. Pre-vitellaria distance 0.21 - 0.48 mm. Distance between anterior extent of testis and vitellaria 0.22 - 0.67 mm. Pre-testes distance 0.43 - 1.1 mm. Testes 10 - 18 in number; testicular follicles 0.02 - 0.05 mm long and 0.02 - 0.05 mm wide. Ovary H-shaped, medullary 0.02 - 0.04 x 0.01 - 0.02 mm in measure, wings follicular, connected by a narrow strip of isthmus. Ovarian lobes 0.14 - 0.20 x 0.03 - 0.05 mm; ovary from posterior end 0.28 - 0.28 mm in length. Vitelline follicles smaller than testes, 0.03 - 0.05 mm long and 0.01 - 0.03 mm wide. Cirrus sac 0.04 - 0.07 x 0.04 - 0.07 mm in measure; cirrus sac from posterior end 0.35 mm in length. Male posterior gonopore 0.35 - 0.37 mm in length and female posterior gonopore 0.34 - 0.36 mm in length. Eggs 0.01 - 0.02 x 0.01 mm in measure. Post ovarian vitellaria present.

Host : *Lepidocephalichthys guntea*
 Habitat : Intestine
 Locality : Karbhala wetland, Cachar District, Silchar, Assam (first geographical record)
 Key to Indian species of *Paracaryophyllaeus* (Kulakovskaya, 1961) as proposed by Hafeezullah, 1993

Scolex slightly rounded and widened as compared to the rest of the body; testes 10-20 in number; post-ovarian region comparatively less extensive

.....*Paracaryophyllaeus lepidocephali* Kundu, 1985

Scolex truncated, not wider than rest of body; testes 16-41 in number; post-ovarian region comparatively much extensive
 *P. ostiobramensis* Gupta and Sinha, 1984

DISCUSSION

The prevalence percentage was recorded less than 10% (9.46) which indicates that *Paracaryophyllaeus lepidocephali* is an ecological satellite species. This may be due to feeding habits, water quality and temperature. More infection in the female fish hosts may be due to hormones during the breeding seasons.

Scolex slightly rounded and widened as compared to the rest of the body. Testes few in number. Post-ovarian region comparatively much extensive. Hence, based on the above mentioned similarities the present form is assigned to the genus *Paracaryophyllaeus* Kulakovskaya (1961) and the species as *Paracaryophyllaeus lepidocephali* (Kundu, 1985) both recovered from cypriniformes fishes. The latter species differs from the former in having more number of testes (16-41), truncated and not widened apex of scolex and comparatively longer post-ovarian region of body. The shape of cirrus sac was distinctly oval in the present form. The number of testes of the known species described by Kundu, 1985 ranges from 16-20 but in the present form the number of testes ranges from 10-18. The excretory pore was terminal in the present

while it is unknown in the form described by Kundu (1985).

Paracaryophyllaeus lepidocephali was first reported from *Lepidocephalichthys guntea* in West Bengal for the first time in India. Another species *P. ostiobramensis* was also reported for the first time from Lucknow. No significant findings of the genus *Paracaryophyllaeus* has been reported so far in India.

The difference in the relative size of some body organs of the present form with the already described *Paracaryophyllaeus lepidocephali* Kundu, 1985 is considered as intra-specific variations.

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Table 1. Comparative chart of the taxonomical characters of *Paracaryophyllaeus lepidocephali*.

	<i>Paracaryophyllaeus lepidocephali</i> Kundu, 1985	<i>Paracaryophyllaeus lepidocephali</i> (Present form)
Body	4.77 mm long, 0.72 mm wide.	1.68-1.90 mm long and 0.15-0.21 mm wide
Scolex	Simple, smooth, unspecialized, slightly widened.	Simple, smooth, unspecialized, slightly widened
Neck	Absent	Absent
Testes	Globular 16-20 in number 0.41-0.19 mm in diameter Anterior extent remaining restricted to a level much posterior to anterior level of vitellaria.	Globular 10-18 in number 0.02-0.05 mm long and 0.02-0.05 mm wide Anterior extent remaining restricted to a level much posterior to anterior level of vitellaria.
External seminal vesicle	Absent	Absent
Vas deferens	Loose coils in front of cirrus sac	Loose coils in front of cirrus sac
Cirrus sac	Globular or slightly oval	Oval 0.01-0.46 x 0.35-0.46
Ovary	H-shaped, wings follicular	H-shaped
Seminal receptacle	Absent	Not known
Vitelline follicles	Smaller than testes, Extending from a little behind scolex to anterior horns of ovarian wings.	Smaller than testes Extending from some distance behind scolex to cirrus sac and anterior horns of ovarian wings.



Fig. 1 (a) : *Paracaryophyllaeus lepidocephali* Kundu, 1985 (a) Whole mount (28X enlarged)

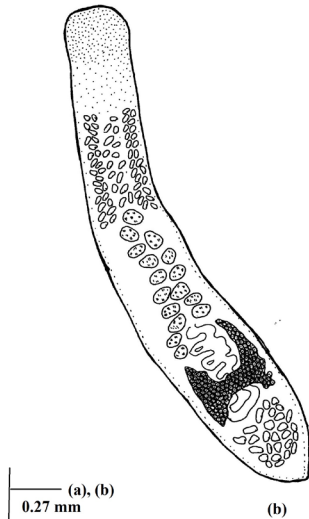


Fig. 1 (b): *Paracaryophyllaeus lepidoccephali* Kundu, 1985
(b) Whole mount (28X enlarged)

REFERENCE

- Carus, J. V. 1863. Raderthiere Wumer, Echinodermen, Coelenteraten and Protozoen, p. 422-600 (W.C. Peters J. V. Carus. and C. E. Gerstaecker). In "Handbook der Zoologie". Zweiter Band, Verlag von Wilhelm Engelmann, Leipzig. | Dick, T. A., Chambers, C. and Isinguzo. 2006. Cestoidea (Phylum Platyhelminthes) In: Fish diseases and disorders. Protozoan and metazoan infections, Vol. 1. (Ed: Woo, P. T. K). 390-416 pp. CAB International, Wallingford, UK. | Dubinina, M. N. 1971. [Fish tapeworms from the Amur basin] Parazitol. Sb. 25: 77-119. (In Russian) | Dubinina, M. N. 1987. [Class tapeworms- Cestoda Rudolphi, 1808] In O. N. Bauer (Ed.), Key to the Parasites of Freshwater Fishes of the USSR. Vol. 3. 5-76 pp. Nauka, Leningrad. (In Russian). | Ergens, R., Gussev, V. A., Izyumova, N. A. & Molnar, K. 1975. Parasite fauna of fishes the Tisa River basin. Rozprawy CSAV, Academia, Prague, 85, 2: 117. | Gupta, V. & Sinha, N. 1984. On three new species of caryophyllaeids from freshwater fishes of Lucknow. Indian Journal of Helminthology, 36, 1:73-80. | Hafeezulah, M. 1993. Caryophyllidean cestode fauna of India. Records of the Zoological Survey of India, Occasional paper no. 157: 101. | Kulakovskaya, O. P. 1961. [On the fauna of the caryophyllaeidae (Cestoda, Pseudophyllidea) of the USSR.] Parazitol. Sb. 20: 339-354. (In Russian) | Kundu, D. K. 1985. On a new species of the genus *Lytocestoides* Baylis, 1928 (Cestoidea: Caryophyllidea: Lytocestidae) from a cobitid fish, *Lepidocephalus guntea* (Ham.) from West Bengal. Bulletin of Zoological Survey of India. 7: 285-290. | Leuckart, R. 1878. *Archigetes sieboldi*, eine geschlechtsreife Cestodenart. Mit Bemerkungen über die Entwicklungsgeschichte der Bandwürmer. Zeitschrift für wissenschaftliche Zoologie 30: 595-606. | Protasova, E. N., Kuperman, B. I., Roitman, V. A. and Poddubnaya, L. G. 1990. [Caryophyllideans of the Fauna of the USSR] Nauka, Moscow, pp. 238. [In Russian] | Scholtz, T., Shimazu, T., Olson, P. D. and Nagasawa, K. 2001. Caryophyllidean tapeworms (Platyhelminthes: Eucestoda) from freshwater fishes in Japan. Folia Parasitologica. 48:275-288. |