

TWO KNOWN SPECIES OF GENUS *NYCTOTHERUS* IN THE DIGESTIVE SYSTEM OF *PERIPLANETA AMERICANA* IN AURANGABAD REGION (M.S.) INDIA.

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ABSTRACT

Two ciliates species isolated from the midgut and hindgut of cockroach (*Periplaneta americana*), identified as *Nyctotherus ovalis* and *Nyctotherus periplanetae* collected in vicinity of Aurangabad region (M.S). The present study deals with morphological characteristics, similarities and their minor differences.

KEY WORDS: Morphology, *Nyctotherus*, *Periplaneta americana*.

INTRODUCTION

Cockroach is a household insect that acts as a mechanical carrier as well as a vector to a large number of pathogens. They harbour a variety of protozoans in their digestive system where in most of them live as endocommensals. The major groups of protozoan parasites reported in the gut of the cockroaches are ciliates, flagellates and apicomplexans (Kudo, 1926a, 1926b, 1926c; Kudo and Mecglitsch, 1938 and Hoyte, 1961). Researchers have examined various aspects of parasites including morphological, cytological and ecological details. In the recent past, the contributions of aerobic protozoans and methanogens to hindgut metabolic activities of American cockroaches been studied in details. (Gijzen and Barughare, 1992). On the basis of reports of references most Nyctotherans are parasites or endosymbiotic in the intestine of various invertebrates such as roaches, termites, earthworms, millipedes and snails, while a few live in fishes, reptiles and amphibians. Leidy (1849) first discovered *Nyctotherus velox* found in millipede. The genus *Nyctotherus* is member of class Spirotricha order Clevelandellida (De Puytorac and Grain, 1976). According to the reports of Earl (1970, 1972) there are 2 families Plagiotomidae, Clevelandellidae and 15 genera of *Nyctotherus* known.

MATERIALS AND METHODS

The cockroaches (*Periplaneta americana*) were collected from different locality of Aurangabad city. Host were dissected after anesthizing and digestive system was removed, midgut, hindgut (ileum, colon and rectum) were taken out separately and kept in different watch glasses containing saline (0.6% NaCl in distilled water) solution. The gut smears were first examined under a light microscope and then permanent preparation were made. Fixation was done by schudinn's, fixative and the smears were stained with haematoxyline.

RESULTS AND DISCUSSION

During the present study 180 cockroaches were scarified out of them 123 were positive. In which 65 positive for *N. ovalis* were found in midgut and remaining 58 positive for *N. periplanetae* were found in hindgut.

Classification

Phylum : Ciliophora
Class : Spirotricha
Order : Clevelandellida
Genus : *Nyctotherus*
Species : *ovalis*
periplanetae

Morphology

1) *Nyctotherus ovalis*

The body of the ciliate is elongated to ovoidal in shape. It is wide at posterior end and slightly narrow at the anterior end. It is enveloped by a thick and stiff cuticle, which bears the numerous cilia. The lengths of these ciliates are varied from 102.15 to 129.29 μm and width from 56.75 to 98.07 μm . The peristome situated at the anterior end, turns slightly to the right and ends in to cytostome. It is about 13.62 – 18.16 μm in wide. The cytostome located midway between the ends. The cytopharynx runs horizontal and posteriorly below the macronucleus, which is wide and somewhat rounded at the tip. It is 45.4 to 61.29 μm in length and 6.81 to 9.8 μm is width.

The macronucleus is elongated to ovoid. It is about 18.16 to 29.51 μm in length and width is 34.05 to 37.34 μm and is placed in the anterior half of the body. The macronucleus is surrounded by a membrane that some denominate suspensorium, which adheres to the dorsal cuticle at a upper level than to the ventral one. So the nucleus and its suspensorium separate the ciliates in two well defined zones. An anterior and smaller one filled with darker particles

and a posterior one fill with lots of clear granules. On the left side of posterior end a large contractile vacuole is seen its diameter is 12 to 15 μm . The cytophyge is triangular and located at the posterior end.

2) *Nyctotherus periplanetae*

The shape of the body is oval and slightly narrow at the anterior end. The posterior end is broad than the anterior one. It is covered by a thick and stiff cuticle that bears the numerous fine cilia. It measures 93.07 to 111.35 μm in length and 47.67 to 81.72 μm is width. The peristomal groove starts from the anterior region of the body and situated in the middle of the ventral surface and open in to straight cytopharynx. The peristome is about 11.35 to 18.16 μm . The cytopharynx is straight, situated at the dorsal side, somewhat posterior part of the body, just behind the macronucleus. The tip of the cytopharynx is comma shaped. The cytopharynx is about 47.67 μm to 60.35 μm in length and 6.81 to 11.35 μm is width. The dorsal cilia in peristomal groove and cytopharynx are stouter and longer than the body cilia.

The macronucleus is granular and irregular in shape. It is mostly biconcave but variable forms are seen. They are bowl shape, somewhat triangular, and semi ovoid. It is about 13.78 to 22.27 μm in length and 22.7 to 31.78 μm is width. Anterior part is surrounded by a membrane that some denominate suspensorium, which adheres to the dorsal cuticle at an upper level than to the ventral one. So the nucleus and its suspensorium separate the ciliate in two well defined zones. An anterior and smaller one filled with darker particles and the bigger posterior one full with lots of clear granules. The micronucleus is situated on the antero-ventral side of the macronucleus. A large contractile vacuole about 10 to 15 μm in diameter usually appears near the cytophyge. The cytophyge is slit like and always located at the posterior end of the organism. The present species closer to *N. ovalis*, (Leidy, 1849) and *N. periplanetae*. However they differ from all above species in some morphological characteristics and their body dimensions. The details comparative characters and body dimensions are given in table no. (1, 2).

Table 1. Comparison of the present species of the genus *Nyctotherus* (*N. ovalis*)

Comparative characters	<i>N. ovalis</i> Leidy (1849), Gosh and Gayn (2006)	<i>N. ovalis</i> Present author
Body shape and dimensions	Elongated ovoid L - 57- 123.5 μm , W- 47- 95 μm	Elongated ovoid L - 102.15 - 129.2 μm , W- 56.75 - 93.07 μm
Peristome	Middle of the cytostome	Middle of the cytostome
Cytoparynx	-----	Run horizontally and posterior below the macronucleus, rounded at tip.
Macronucleus	Oval to spherical	Elongated ovoid
Micronucleus	-----	-----
Contractile vacuole	Single large	Single large
Cytopyge	Oval or spherical	Somewhat triangular
Host	<i>Periplaneta americana</i>	<i>Periplaneta americana</i>
Locality	Calcutta	Aurangabad District (M.S.)

Table 2. Comparison of the present species of the genus *Nyctotherus* (*N. periplanetae*)

Particulars	<i>N. periplanetae</i> Lalpotu (1976)	<i>N. periplanetae</i> T.T. Sheikh (2006)	<i>N. periplanetae</i> Present author
Body shape and dimensions	Ovidal, ant. end slightly narrow and post. end broad L - 78.8 - 122.9 μm W- 50.4 - 91.4 μm	Oval shape somewhat laterally compressed L - 61.00 - 110 μm W- 45 - 65 μm	Oval slightly narrow at the anterior end L - 93.07 - 111.35 μm W- 47.67 - 81.72 μm
Peristomal groove	Behind anterior end.	Behind anterior end.	Start at anterior end
peristome	Middle of the ventral surface		Middle of the ventral surface
Cytoparynx	Straight-beak like and bent at the tip	Straight slightly bent at the tip	Straight and comma shaped at the anterior tip
Macronucleus	Variable shape mostly bowl-like or biconcave	Irregular shape fusiform bowl and granular or biconvex	Variable shapes, bowl shape, somewhat triangular and semi-ovoid.
Micronucleus	Antero-ventral side of the macronucleus	Antero-ventral side of the macronucleus	Antero- ventral side of the macronucleus
C. vacuole	Single large	Single large	Single large
Cytopyge	Oval shape	Oval shape	Slit like shape
Host	<i>Periplaneta americana</i>	<i>Periplaneta americana</i>	<i>Periplaneta americana</i>
Locality	Parbhani district (M.S)	Aurangabad district (M.S)	Aurangabad district (M.S)

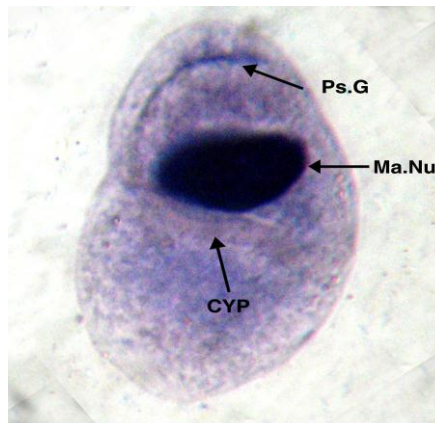


Figure 1. *Nyctotherus ovalis* (Ps. G : Pristomal Groove; Ma. Nu: Macronucleus; Cyp. : Cytopharynx)

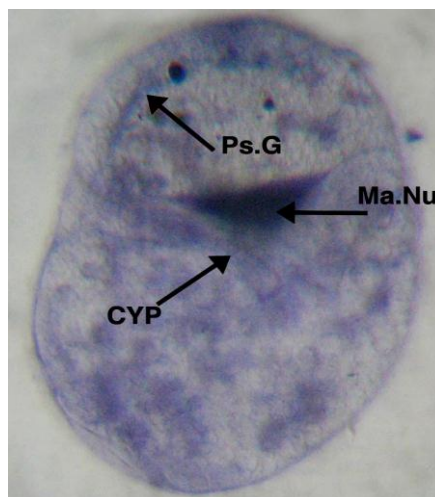


Figure 2. *Nyctotherus periplanetae* (P.S. G : Preistomal Groove; Ma. Nu : Macronucleus Cyp. : Cytopharynx)

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