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Research Article

STUDY OF GREGARINE PARASITE, XIPHOCEPHALUS AFRICANUS AND GREGARINA HAVANURI OF BEETLES, RHYTINOTA ESCHSCHOLTZ FROM AURANGABAD DISTRICT

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ABSTRACT

In present work a study has been carried out on insect intestinal gregarine species from Aurangabad District. It was found that, Gregarinahavanuri and Xiphocephalus africanus are new species found in Aurnagabad District from Rhytinota species having site of infestation in mid intestine. The morphological characteristic of both the species were compared with other species from same genus from other cities.

Key Words:

Species , vertebrates, Gregarine, insect.

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INTRODUCTION

A review of the literature on gregarines reveals that mostly these parasites infect a large number of non chordates hosts. Although a few species are reported from the protochordate viz. The ascidians (Hymen1940). They do not see to infect they craniate's vertebrates. In the invertebrates group they have been reported from the following phyla. Coelenterate, Platyhelminthes, Annelida, Arthropod, Mollusc & Echinodermata (Kamm, 1922) among these the animals that most commonly harbour the gregarines are the arthropod host. According to Watson (1916), gregarines were probably first seen by Redi in 1708, through there artiest recorded description is that of Dufour in 1818, Kolliker (1848) published an 'elaborate Meroir on the group was perhaps the first to see the organism in syzygy. It is this characteristic which caused Dufour in coin the term. Gregarines' for them 20 years earlier, syzygy may in fact be a sexual response.

Host invariably invertebrates & the parasites are best known from arthropods. Which often show extremely heavy infection? The only invertebrate phyla not known to harbour gregarine are the rotifer trochelminthes, porifera & protozoa (Watson 1916). It is hard to explain such a particular host distribution. The complexity of both gregarine morphology & life history makes

it all but certain that they are a very ancient group having had. Ample time to adapt to life in the higher vertebrates somehow and opportunity was missed. Although many reports are made on gregarines parasitizing various arthropod an host from various region of India, North-West region of Kanataka by Devdhar (1962) & Amoji (1975) especially kalyani in west Bengal & Vishakhapattanum in Andhra Pradesh, author is doing this research work from the Maharashtra state.

The present research in gregarines is started from 2008 in protozoology lab BAMU Aurangabad for the analysis of the prevalence & systematise of the various eugregarine parasites from arthropod hosts.

Life cycle of gregarines: Intestinal gregarine parasites of beetles

The apical complex is characteristic of the organisms in the phylum Apicomplexa, 80 Gregarine parasites gregarines, they are often expelled with the faeces, as in the mealworm, marine polychaetes, and white spheres and can be quite large, so it is visible under the dissecting microscope and sometimes to the naked eye. We call them "pearls among poop" within this cyst, the two Gamont divide tefrommmny gametes. The gamete from the two Gamontfertiliewihin the cyst to form diploid zygotes, called oocyst or sporocysts, which undergo to form haploid

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sporozoites, the infective stage. Thus for most of the life cycle, gregarines are haploid. Only when the two gametes fuse to form a zygote, do we have a diploid stage. Meiosis occurs soon to again form haploid cells.

MATERIALS & METHODS

Different host specimens Collected from the field in & around Aurangabad city in region of Maharashtra, were brought to the laboratory & were maintained alive in insect, beetles & cockroaches were found there well for a week's time in these conditions as far as possible host specimens were examined for their protozoan parasite on the day of collection in order to reduce the chances of defecation due to starvation a total number of insect host 100, Beetles host 145 & Cockroaches host 95 in four months, i.e. July 2014- October 2014.

Preparation of Permanent Slides

Staining of gregarines (using tangstophoric acid hematoxylin). Mixed faecal content in saline water make a thick smear on a clean slide & immerse it. While still wet in schaudinn's fixative for 20 min pass the through the following solution.

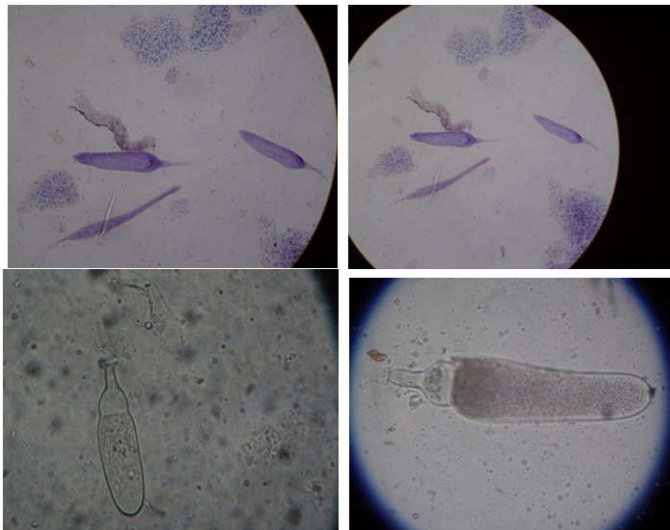


Fig No1 Images of Xiphoccephalus africanus

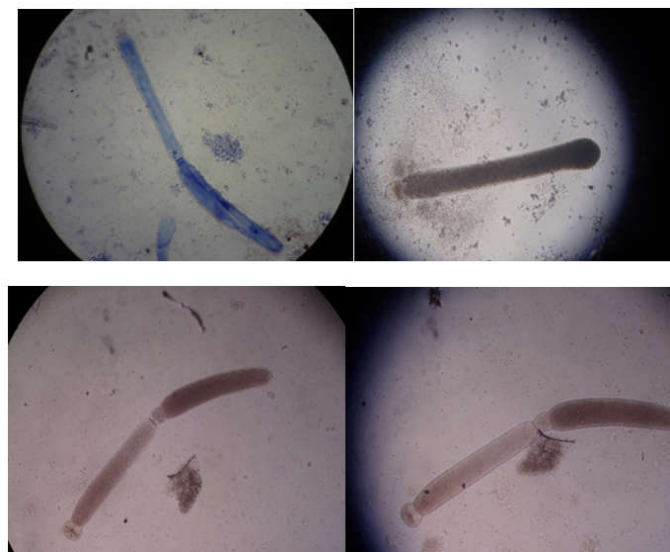


Fig No. 2 Images of Gregarina havanuri

DISCUSSION

Xiphoccephalus africanus She of Infection Mid-intestine Locality Aurangabad city The host Rhytinotasp, only one species is described in Africa Cephalont: In the smears of the gut young cephalins are observed they are oval in shape measuring about 25 µm in length and 5 µm in width. The epimerite in this form is cone shaped and measures 12 µm in length it is situated on a very short neck which is clearly distinguishable in early stage of cephalont. The protomerite of cephalont is hemispherical in shape measuring 16 µm in length and 4 µm in breadth deutomerite is oval and measures 11 µm in length, the nucleus of this cephalont in ovoidal and measures 3 µm x 2 µm as the growth proceeds. The collar of the epimerite, protomerite and deutomerite increase in size. In the advanced cephalonts the epimerite is longer the endoplasm is almost absent in the epimerite except at the base of the collar. The protomerite is dome shaped structure. The endoplasm in the protomerite is granulated and uniformly distributed. The deutomerite is elongated and cylindrical in shape the nucleus is ellipsoidal in shape. Sporonts: it is solitary it measures about 630 µm in length and 40 µm in breadth Gametocysts are spherical in shape the size of these cysts vary from 180 µm to 250 µm in diameter this variation is probably due to formation of cysts by sporadins at their different developmental dimensions. The cyst wall is adorned with papillae cyst mature at 4 to 6 days the spores are released. The sporocysts are hat shaped, these measure about 10 µm in length and 8 µm in width Beetles Rhytinota Sp. Genus -*Xiphoccephalus*: Epimerite in the form of lance shaped point and is carried by a long and slender neck. Corbel (1971) during the revision of the family stylocephalidae Ellis has raised the subgenera *xiphoccephalus*. Theodorides (1963) to generic rank and stated the following characters

1. Collarfiliform
2. Epimerite very long and terminated in a sharply pointed or blunt end.

According to the generic characters stated by Corbel four species are retained under this genus. After the Corbel three new species are retained under this genus. Elongated epimerite Gametocysts with papillated wall dehiscing by simple rupture with pseudocyst formation and releasing hat shaped sporocysts in chains of deir long ais revealed its inclusion in the family stylocephalidae Ellis. ndeayon am apadsaulad ag jo samayjelopoylaou L The lance-shaped structure of the epimerite carried by a long globular neck assign this species to the genus *xiphoccephalus* (Theodore's) Corbel. The cephalonts of presently described gregarine share common features with these of *X. gladintor* (Blanchard) Corbel *Xphaleria* (Tuzet et al) Corbel, *X. africanus* (Theodorides et al) Corbel, *X. karnatakensis* (Devdhar and Amoji) in having lance shaped epimerite and *x. gonocoe phalli* (Amoji) having lance shaped epimerite Comments:- This species was described for the first time by Theodorides et al, (1965) from *Grodus granipenlis*, *pimeliagrandsis*, *P. platynota* and *Thripteracirita*. Comparative study with *X. gladiator* Balachard (1905) *Xphaleria* Tuzet et al (1955) Corbel, *X. africanus* Theodorides et al (1965) Corbel and *X. karnatakensis* Devdhar et al (1977) shows that all the morphological characters of the species described here are very near to the *X. africanus* described by Theodorides et al (1965) Corbel so the species is Sporonts,

Gametocysts and sporocysts are similar in shape and size when compared to the *X. africanus* only the host is different our host is beetle - *Rhytinotasp*. The comparative account of the present species with other *xiphoccephalus* species is given in Table 1:

Table No.1 *X.africanus* is morphometric compararision of the species of Genus *Xephoccephalus* (Present author) with *X.gladicator*, *X.phaleria*,*x. karnalukaensis*, *X.gonocephalus*. All measurements are in microns. Mu

Comparative Charactes	<i>X.gladicator</i> (Blanchard, 1905) corberl	<i>x.phaleriae</i> (Tuzet <i>et. al.</i> .1955)	<i>x.africanus</i> (theodorides <i>et.al.</i> ...1965) corbel	<i>x.karnalukaensis</i> (Devdhar <i>et.al.</i> 1977)	<i>x.gonocephalin.sp</i> (Amoji)	<i>x.africanus</i> (described by present author)
Sporonts	700 µm	-	600u µm	Elongated.cylindrical 332 µm	Serpent shaped 2800 µm	Solitary630µm
Epimerite	Lance-shaped	Lance-shaped	Lance-shaped "bonnet de µm"	Lance -shaped	Elongated Lance-shaped	Lance-shaped
Gametocyst	Spherical 280µm diameter	-	Spherical 200 µm diameter	Spherical 310-408 µm diameter	Spherical 250-850 µm diameter	Spherical 180-250 µm
Host	<i>Helenophoruscollari</i> s L.	<i>Phaleriacadaverier</i> a F.	<i>Erodiusgranipennis</i> Fairm, <i>pim elia</i> <i>grandisklug</i> , <i>P.platynota</i> <i>Fa irmogonobasis</i> <i>rafragi</i> Haag <i>priono</i> <i>thecacoronateol</i> . <i>The ptera</i> <i>Cirmatak</i> <i>lug</i> .			<i>Rhytinota</i> sp.
Locality	France	France	Morac&soudan	Dharwad, India	Gulbarga, India	Aurangabad(M.S.)India

Genus – Gregarina

Dufour (1828) created a genus *Gregarina* to include a species, *Gregarinaovale*, from the carwig for *figulaamricularia* L. Hammerschmidt (1838) re-examined the G ovate and named it *clepsidrinapolymorpha* for the inclusion in the genus *clepsidrma* created by him he found a few characters common to some sporonts of these gregarines and summarized them as under:

1. Sporontssolifary and obese,
2. Protomerite large cylindrical structure terminating in obtuse angled cone,
3. Deutomerite short and ovoidal in shape and a) epimerite a retractile digitiformprocess which may be flattened or button like

Some confusion prevailed with regard to the validity of the genera *Gregarina*Dufour and *Clepsidrinahammerschmidt*But later studies by Diesing (1851) Schneider (1875) Leger (1892) and cuenot (1859) confined that both genera are synonyms. Therefore according to the law of priority the genus *Gregarina* got establishment Watson (1916, 1922) in her monograph on cephaline gregarines has listed *Gregarina* species described till them. Later, contributions to this genus have come from various workers in India and abroad the chronological list of species described after 1922 under the genus *gregarina*.

Gregarina havanuri

Host Rhytinota sp.
Site of infection Mid -intestine
Locality Aurangabad District

Cephalont

The smallest cephalont found in the gut smears is an ovoidal one which measures 17pm in length and 6 µm in with it is divided into three segments the epimerite is simple sessile structure which evidently large and bulged the length 5.3 µm and the width is same as length. The protomerite measures about 1.2 µm in length and 4 µm in width. Anterior region of the protomerite is covered by base of the epimerite The Deutomerite is ovoidal in shape and measures 10.5 µm in

length and 6 µm in breadth. The nucleus it is spherical and measures about 2.3 µm in diameter.

After shedding the epimerite parasite enters into tropic stage in this form protomerite is elongated rectangular (22µm x19µm) in shape and it is anterior and it is round. The protomerite is separated from the Deutomerite by a thick convex septum the Deutomerite is slender, elongated tubular structure. The nucleus is spherical and anterior measures about 6 pm in diameter which is posterior in Amoji Species.

Syzygy

The Sporonts are biassociative, slender, elongated, tubular in shape, themaximum length of association is 825 µm and the width 65 µm. The primate is longer (average length 85 µm to 420 µm) than the satellite.

Primate

The primate is hond shaped and its length (41pm) is always more than the width (23ym). The Deutomerite is elongated tube, little wider than the prtomerie and terminates in a flat end.

Satellite

The satellite in smaller (average length 65pm to 350 pm) than the primate and itsprotomerite is almost rectangular. The deutemerite shape is same that of primate but its posterior parts lerminates in a round end. Both in primate and satellite, nucleus is present the nucleus is anterior spherical and measures about 17 µm in diameter, Nucleus is anterior which is different to Amoji,

Gametocysts

The Gametocysts are spherical they meare 190 pm in diameter with thick cyst envelops. These cysts were subjected te moist chamber processes for sporulation. The Gametocysts mature on 4" day of their developments with 6 to 8 spore ducts through these ducts sporocysts are released in chains.

Sporocysts

The sporocysts are barrel shaped with truncate ends. Its measures 6.4 pm in length and 4.0 pm in breadth.

Systematic position

Sporonts in association simple epimerite, cysts with sporeducts symmetrical sporocysts are the characters with justly if the species inclusion in the family Gregarinidae. Labbe. Biassociative nature of the sporonts, are simple bulged epimerited barrel shaped. Sporocysts in chains assign this gregarine spores to the graur Gregarina Dufour.

Comments

Presently described species resembles with gregarinacuneate stein by possessing elongated hood-shaped protomerite in sporonts. But it differs radically in its unique nature of bulged epimerite and higher dimension of body PL. TL, PW: DW ratio and sporocysts all these characters are similar to the Gregarinahavauri. Which is first described by Amoji (1976) in Gonocephalumdepressum, from havanuri, Gulbarga district, India

So the present species is Gregarinahavanuri, there are some minor differences between the species of Amoji. Present author found the species in host Rhytionta SP. Aurangabad, M.S. India and Amoji host is Gonocephalumdepressumhavanuri, Gulbarga India.

Nucleus is placed posteriorly in the previous species where as in present species nucleus is anterior as well as posterior remaining features are same in both the species.

The comparative account of the present species with G havamari and (ie. havanuri is given in Table 2)

Ratios Primate satellite

PL - TL	PL - TL
41.2 - 10.2	15.0 - 17.0
PW - DW	PW - DW
11.2 - 1.7	1.2 - 2.1

Table No. 2 G.havanuri morphometric comparison of the species of Genus Gregarina (present author) with Geuneata All measurements are in microns

Comparative Characters	G.Cuneata Stain.	G.havanuri, Sp.	G.havanuri described by present author
Body shape	Cylindrical, Elongated, 380 µm	Elongated, tubular 900 µm	Elongated, tubular 825 µm
Protomerites	Elongated, dilated, anteriorly round	Elongated, dilated, anteriorly round	Elongated, dilated, anteriorly round
Epimerite		Large & bulged	Large & bulged
Nucleus	Spherical	Spherical	Spherical, anterior
PL TL ratio	Primate 1:2-1:3 Satellite 1:3.0-3.9	1:4.5-10.1	1:4.2-10.2
PW:DW ratio	Primate 1:1-1:26 Satellite 1:1.1-1.2	1:1.1-1.7 1:1.2-2.2	1:1.3-1.7 1:1.2-2:1
Gametocyst	Spherical, 240 µm diameter	Spherical, 210 µm diameter	Spherical, 190 µm
Sporocyst	5.7 µm X 4.0 µm	6.7 µm X 4.5 µm	6.4 µm X 4.0 µm
Host	Tenebrionmalitor	Gonocephalumdepressum (F)	Rhyntota sp.
Locality	France	Havanuri Gulbarga, India	Aurangabad M.S. India

CONCLUSION

From above work it is concluded that Xylocephalus africanus and Grigarina Havanuaru was reported as new species of Rhyntota species Family Gigrarinadeae. Aurangabad. In

Xylocephalus africanus, sporonts, gametocysta and sporocyst are similar in shape and size when compared to the Xylocephalus africanus only the host is different our host is Beetle –Rhyntota species. Ingriganorinahawanori, nucleus is placed posteriorly in the spirants in previous species, where as in present species nucleus is anterior as well as posterior remaining features are same in both the species. So overall it is concluded that, these two new species has been found in Aurangabad city.

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