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Salivary gland polytene chromosomes of larvae of *Telmatoscopus* SP: A source of polytene chromosomes

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Abstract

Polytene chromosomes of chironomids are big and beautiful and taxonomically important. But the differentiation and collection are rather difficult. The non-seasonal and abundant sources of polytene chromosomes are the larvae of *Telmatoscopus* sp. which are available in every habitats. The larvae from the drainage or sewage from locality were procured and reared in a beaker and preserved the pupae to able to collect the adults. The salivary glands from the larvae were dissected out under simple microscopes in the Carnoy's fluid I, and stained with 2% acetocarmie. The salivary gland cells with prominent nuclei with visible polytene chromosomes were further squashed. A single nucleus contain roughly 6 (six) mostly intertwined polytene chromosomes. The six distinct polytene chromosomes with a lot of unpaired regions, puffs, Balbiani's ring, two nucleoli and inter-bands might serve the study for systematic evaluation. The difficulties of the material are that the salivary collection and observation of small chromosomes. The centromeric regions were very prominent. In future the practical classes could be done with these larvae in order to avoid difficulties in collection of the chironomids and seasonality. One other important aspect of the materials are that there is no enough literature to compare and study will light on the evolution and structural differentiation of the chromosomes particularly from the Manipur.

Keywords: Manipur, drain fly, *Telmitos scopus* species, polytene chromosomes

Introduction

One of the most neglected insects but very much close to human environment is the drain fly also called the bathroom fly. This insect is somewhat adapted to dirty drainage and even though they are harmless they are reluctant to be around. So not many go for the insect. They have an important role as they degrade the organic materials and provide food to other organisms in the food chain.

The source polytene chromosomes in the practical classes are done with the larvae of chironomid species which are available in the aquatic habitats like sewage drain, rivers, lakes, pond, etc. but finding them in when required needs some effort. The drain fly is available in drain, tank, wet backyard etc. meaning finding them in the surrounding is much easier as compare to chironomids.

The literature survey for study in Manipur is scanty. So it is important to initiate the study on this insect for the first time and inspect this be used in the practical purposes in the institute. From point of its applicability in future present study was taken for the first time. The larval insect show 6 distinct, intertwined polytene chromosomes with a lot of asynaptic/unpaired regions and characteristics of the polytene chromosomes. In future taxonomic systematics will enlightened the structural and evolution of polytene chromosomes.

Materials and methods

The 25 larvae were captured from local sewage drain alive. The pupae and some larvae were reared in the water from the drain in order to obtain the adults (Fig. 1 A.)

A larva was put in the fixative, Carnoy's solution I and dissect out the salivary gland. Initially the head was cut off and squeeze out the cellular content from the 4th segment towards the anterior ends. The paired gland in cylindrical structure of 60 X 5-8 micron meter in dimension could be seen. One of the salivary gland was stained with 2% Acetocarmine solution in another slide and let it stained for 5 minute then covered cover slide and observed under microscope Olympus CH 20i.

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The selected cells were photographed with 9 pro MI mobile handset through the eye piece.

Results

The paired salivary glands consisted of 28 cells at minimum and posterior ones are smaller than the anterior ones (Fig. 1 F). The polytene chromosomes were condensed and intertwined in a cell (Fig. 1 G) and whole salivary gland at

10X showed the polytene chromosomes clearly. The chromosomes were without a conspicuous chromocenter meaning the chromosomes are freely swimming inside the nucleus. The chromosomes showed the characteristics puff, centromeres, two nucleoli, Balbiani's ring and many unpaired regions along the length of the chromosomes (Fig. 2). The presumptive polytene chromosomes of the species was 6 (six) indicating the $2n$ number is 12 in the species (Fig. 3).

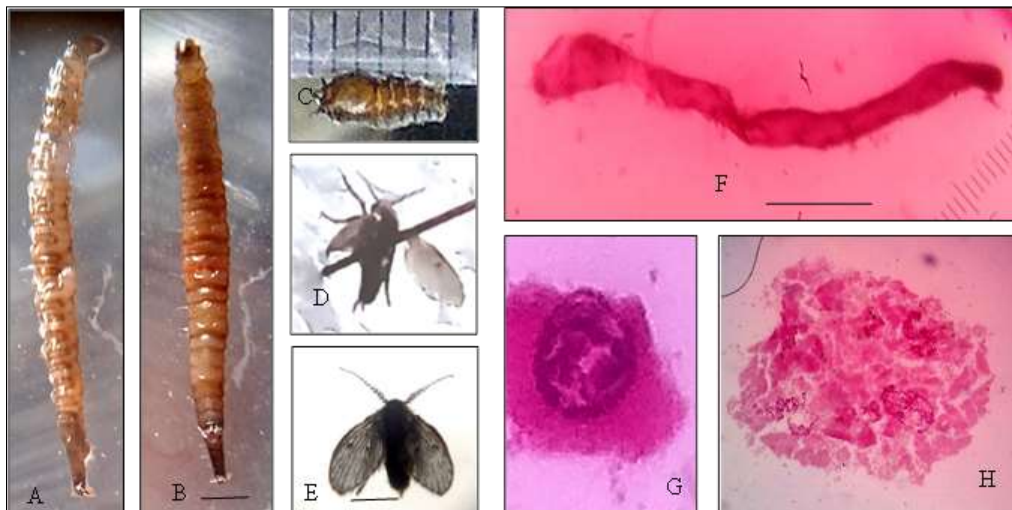


Fig 1: The different stages of *Telmatoscopus* sp (A-B, III larva dorsal and ventral respectively), Pupa –C, adult male-D and female-E. Bar represents 0.5 mm. A salivary gland with polytenic nuclei (F), single nuclei (G) and partial squashed salivary cells with polytenic chromosomes (G). Bar represents 10 μ .

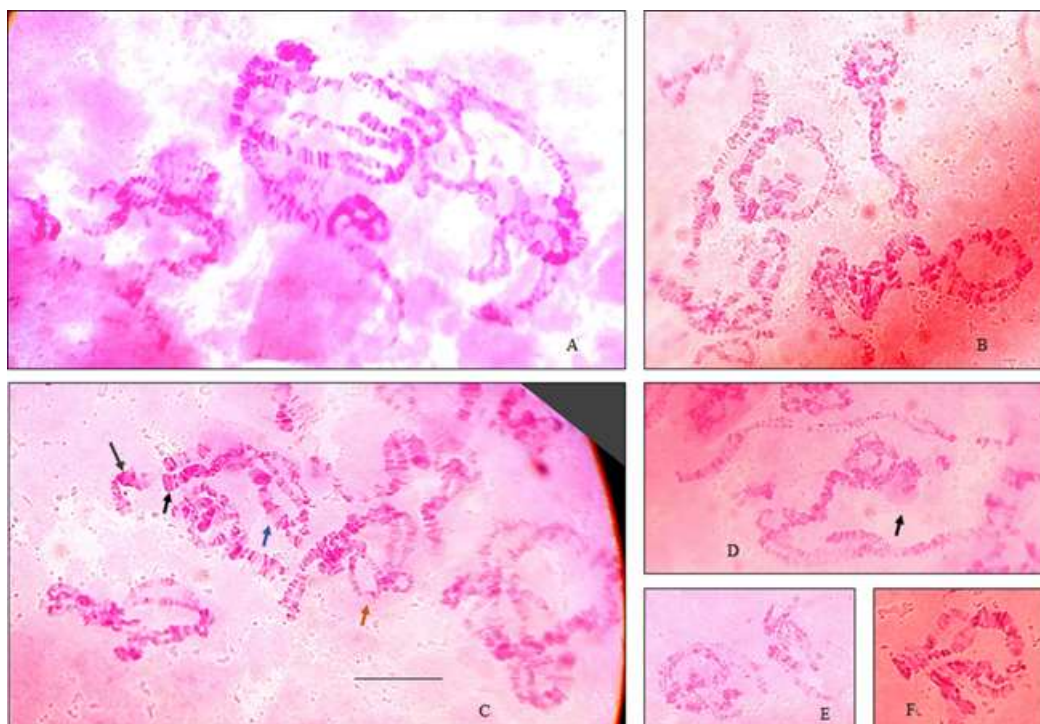


Fig 2: Polytene nuclei of salivary gland with different dimensions. The isolated polytene chromosomes (A-F). C- the polytene chromosomes indicates centromere (black arrow), puff (gray), Balbiani's ring (blue) and the asynaptic/unpaired regions of the homologous chromosomes (red arrow) while the nucleoli (D-black arrow). Bar represents 3 μ .

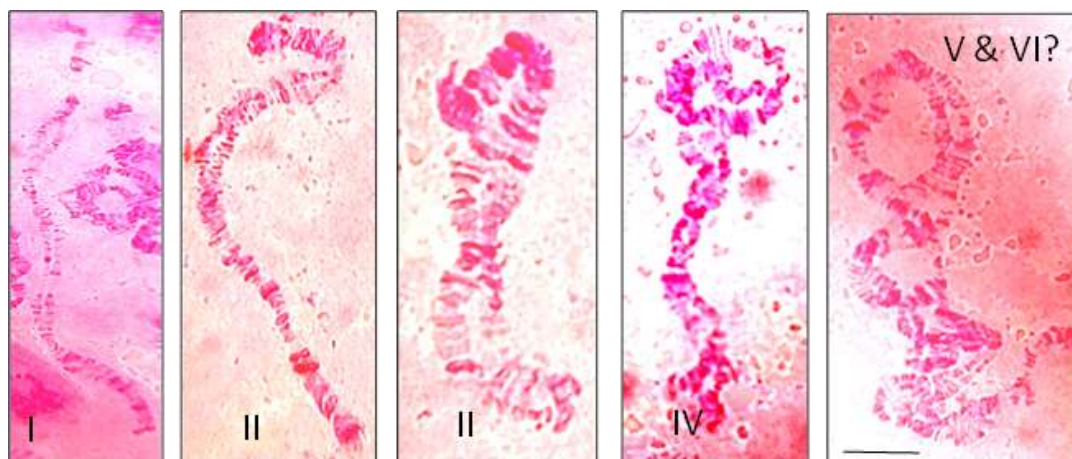


Fig 3: Isolated polytene chromosomes of the *Telmatoscopus* sp. Bar represents 3 μ

Discussion

The present species seem to be *Telmatoscopus albipunctata* [1]. Initially it was described as *Clogmia albipunctata*. It was first described in 1893 by Williston [2], under the name *Psychoda albipunctata*. This species became the type species of the genus *Clogmia* Enderlein 1937 [2] but for a long time specialists considered *Clogmia* to be a synonym of *Telmatoscopus* Eaton 1904 [2]. Vaillant placed most *Clogmia* species, in a newly defined genus *Telmatoscopus* Vaillant [1]. The current situation is that in much of the medical, toxicological and ecological literature the species is referred to as *Telmatoscopus albipunctatus*, whereas taxonomists typically adhere to name *Clogmia albipunctata*. The latter is the valid name according to Fauna Europaea [1]. In addition, this cosmopolitan species has been described independently several times, so that a number of less commonly used synonyms exist. More taxonomic details are provided by Vaillant [1], Wagner [3] and Ibanez-Bernal [4]. From Manipur no such work has been reported so far so much is needed on the taxonomic and systematic approaches to ascertain the true identity of this fascinating species. Many new genera had been reported like from Brazil [5], Hunduran [6] etc. so from Manipur there is much prospect working on this family and thorough examinations from different habitats.

This species is causal organism of rare urinary myiasis in India [7] meaning eggs or small larvae can enter through mouth and ultimately parasite on the human organ so much precautions should be taken while dealing with this insect or drinking in wild.

The cytological studies went back to 1972 as per the available literatures. Amabis and Simoes [8] reported both the mitotic and polytene chromosomes and developed the cytological map. The mitotic heterochromatin regions of 12 metacentric or submetacentric chromosomes were reported by Troiano [9]. But till now such reports are scanty in the region. So much is needed to carry out. The polytene chromosomes numbering (Fig. 3) was in accordance with Amabis and Simoes [8]. How much the numbering in the present study is yet to conclude as variations or inversions could result in the polytene chromosomes differences. In future the cytological map study and systematic analysis of the species are much needed to arrive at a conclusive point and exploration from the region.

Conclusion

The insect provides the nice polytene chromosomes for the study and has a very interesting prospect in the species/genera exploration. The systematic studies in accordance to evolution

and mechanism of the polymorphism in the different species will yield a fruitful conclusions in future.

Acknowledgements

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