

Comparative Account of Karyotypes of Three Arctiidae Moths

Abstract

Cytogenetic studies making use of *in vitro* injection of colchicine and conventional Giemsa staining have been carried out on three species of Lepidoptera belonging to family Arctiidae. Chromosomal preparations were made from brain ganglia by using NaCl-acetic Carnoy-air drying method. The chromosomes bore typical dot like or elongated structures. Karyotype of the mitotic metaphase chromosomes on the basis of size and morphology showed $2n=62$ in *Arctia villica*, *Euplagia quadripunctaria* and *Ammobiota festiva*.

Keywords: Cytogenetic, Colchicine, Karyotype, Mitotic

Introduction

The order Lepidoptera belonging to class Insecta has been discussed in the present research work with a view that very scanty cytogenetic data is available for this group because of earlier technical difficulties. Insecta is the largest class of Animal Kingdom. It includes 30 orders and the order Lepidoptera is one of the largest. Lepidoptera (butterflies and moths) are the second most species rich order of insects, with about 170,000 recognised species and perhaps 300,000 still undescribed (Imms, 1965). Karyological analysis of Lepidoptera has been a difficult task due to small dot-like chromosomes of similar sizes. On account of inadequate techniques in early work, sex chromosomes could not be clearly differentiated from the autosomes in a majority of the species investigated in this group. In respect to Indian Lepidoptera, only meager data are available, namely, 8 by Gupta and Narang (1980); 30 by Rishi (1973); 45 by Mohanty and Nayak (1983); 31 by Kaur (1988) and 7 by Sharma and Bajwa (1992, 1995a, b). However, the cytological data do not give satisfactory information to elucidate the cytotaxonomic relationships among lepidopteran species. Chromosome structure and size are of great significance in relation to evolution, speciation and chromosome organization. The size and number of chromosomes reflects the size of the whole genome since genome refers to all DNA embodied in the haploid set of chromosomes. The characterization of chromosomes includes the study of whole group of characteristics that allow the identification of a particular set of karyotype *i.e.* relative size, the number, length of the arms, position of centromere, secondary constrictions and satellites. The karyotype of species is the physical basis of its genetic system. Therefore, more chromosomal investigations should be done in various taxonomic groups of Lepidoptera.

In this report, the chromosomes of three species of Lepidoptera are investigated with *in vitro* colchicine treatment established by Rishi *et al.*, (1997).

Aim of the Study

The aim of the present study is to compare the karyotypes of three moths of the same family *i.e.* Arctiidae for evolutionary purpose. Identification of a particular set of karyotype will help in taxonomic positioning of various families of Lepidoptera.

Materials and Methods

Different instar larvae of the three species of moths were collected from their respective host plants from different regions of Jammu. Male and Female specimens were fed to maturity in the laboratory. Brain ganglia and testes were processed for chromosome analysis following *in vitro* colchicine treatment (Rishi *et al.*, 1997) followed by a pretreatment in 0.7% NaCl for 15-20 minutes, the tissues were transferred to 1% sodium citrate for 15 minutes and then fixed in methonal- acetic acid (3:1) for 30 minutes and further processed according to air drying Giemsa technique for slide preparation.



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Results

Arctia villica

Somatic Metaphase

Male, 2n = 62 (Fig.1) Female, 2n=62 (Fig.3)
 The karyotype of male *Arctia villica* (Fig.2) consisted of 31 pairs of elongated chromosomes showing diffused nature. Sex chromosomes (ZZ) were the largest chromosomes. The karyotype of female *Arctia villica* (Fig.4) revealed 31 pairs of chromosomes showing diffused centromere. One pair of heteromorphic sex chromosomes (ZW) comprised the largest 'Z' chromosome and the smallest 'W' chromosome.

Euplagia quadripunctaria

Somatic metaphase

Male, 2n=62 (Fig. 5) Female, 2n=62 (Fig.7)
 The karyotype of male *Euplagia quadripunctaria* (Fig.6) consisted of 31 pairs of elongated chromosomes showing diffused nature. Sex chromosomes (ZZ) were the largest chromosomes. The karyotype of female *Euplagia quadripunctaria* (Fig. 8) revealed 31 pairs of chromosomes showing diffused centromere. One pair of heteromorphic sex chromosomes (ZW) comprised the largest 'Z' chromosome and the smallest 'W' chromosome.

Ammobiota festiva

Somatic metaphase

Male, 2n=62 (Fig. 9) Female, 2n=62 (Fig.11)
 The karyotype of male *Ammobiota festiva* (Fig.10) consisted of 31 pairs of elongated chromosomes showing diffused nature. Sex chromosomes (ZZ) were the largest chromosomes. The karyotype of female *Ammobiota festiva* (Fig.12) revealed 31 pairs of chromosomes showing diffused centromere. One pair of heteromorphic sex chromosomes (ZW) comprised the largest 'Z' chromosome and the smallest 'W' chromosome.

Discussion

Family Arctiidae

The Arctiidae comprises the 'Tiger' and 'Ermine' moths with their allies. This family is cytologically known by only 34 species. The modal number was found to be n=31. The diploid number of 62 chromosomes reported from male and female mitotic metaphases of *Diacrisia obliqua* confirms the earlier reports of Rishi and Rishi (1981) and Malik (1988).

Conclusion

Family Arctiidae, in general, does not indicate any significant variation in the chromosome numbers in the various cytologically known forms so far.

Acknowledgments

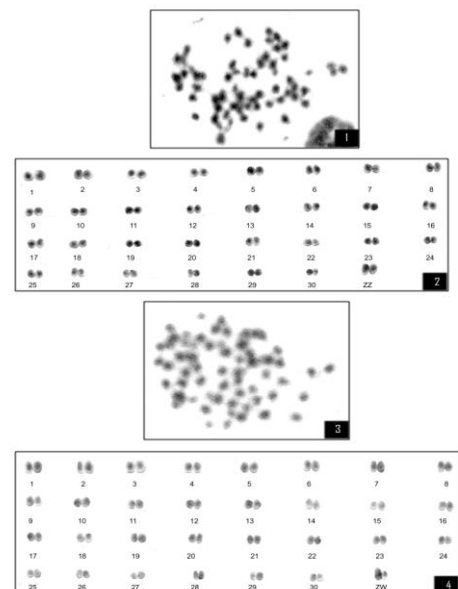
The author is thankful to Deptt. of Zoology, University of Jammu, Jammu-180006 (J&K) for providing the necessary facilities.

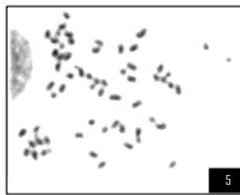
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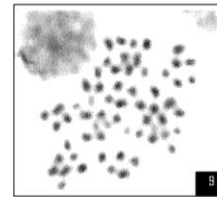
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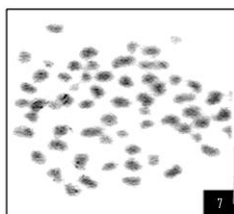




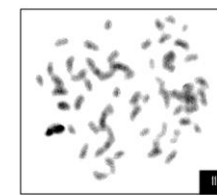
1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	ZZ	



1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30						



1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30						



1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27
28	29	30						