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Research Article

CYTOGENETIC PROFILE OF TWO TEAK PESTS LEPIDOPTERANS: FIRST REPORT FROM J&K, INDIA

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ABSTRACT

In the present study, the karyotype of two teak defoliator sps. of, *Eutectona, Hyblaea* was studied from Jammu region, India. Chromosomal studied were made from testis by using 2% Giemsa air drying method. The chromosomes at metaphaseI stage appeared almost of similar size. The haploid chromosome numbers observed in *E machaeralis and H purea* were 18 and 31, respectively. The largest chromosome was 1.3µm and 0.9 µm in length while the shortest chromosome was 0.4µm &0.3µm respectively. Centromeric fusion of chromosome in these species must played active role leading to decrease in diploid chromosome number.

INTRODUCTION

The order Lepidoptera comprises over 160,000 species of butterflies and moths, with most of these being moths. Moths are not always thought of so highly, no doubt due to their nocturnal habits and duller colours. However, many moths are brightly coloured and fly during the day. Even the tiniest moths can look spectacularly beautiful when viewed closely.

In early days of cytogenetics, Lepidoptera were repeatedly the subjects of chromosome research. Since then, relatively few studies gone beyond establishing chromosome numbers. This was certainly so because butterflies and moths have small genomes and at same time high chromosome numbers. Moths belong to order Lepidoptera, a second largest order of insects and one of the most destructive and easily recognizable of all the insects. The species of this group have high numbers of small sized chromosomes. Chromosomes lack a distinct centromere and thus holocentric in nature (Bedo, 1984).

The studies on chromosome number of Lepidoptera initiated by Henking (1890) were followed by many workers and in the mid 20th century, about 245 species were known as reported by White 1957. Later on many workers added data to this list (Bigger,1975,1976; De Lesse ,1960,1966, 1967,1970 ; Maeki 1957 a,b,c ,1961, 1981 Maeki and Ae 1966; Saitoh,1960; Suomalainen 1953, 1963, 1965; Ennis, 1976; Trentini and Marini 1986; Sharma and Sobti 2000).

Chromosome studies on Indian Lepidoptera have made very little headway although some attention has been paid to this branch in recent years (Mohanty and Nayak, 1983; Gautam and Paul, 2012; Thakur and Gautam, 2013). So far there is no cytogenetic report on teak defoliator moth species from Jammu and Kashmir, India. Keeping this in view, the present investigation was undertaken to study the chromosomes of two species belonging to order Lepidoptera viz. *Eutectona Machaeralis, Hyblaea Purea* from J&K, India.

METHODOLOGY

The larvae of these two species were collected from their host plants from different regions of Jammu. The caterpillars were reared at room temperature in insect cages in the laboratory conditions. The prepupal stages become rather sluggish and took little interest in food. A few pupae were made to emerge as adult moths for identification. Both *in vivo* and *in vitro* colchicine treatment was applied during the present study.

The testes were dissected out in 0.7% saline solution and cleared off fat bodies. These were then pretreated with 1.0% sodium citrate solution and fixed in 1: 3 acetic-methanol for 25-30 min. The pretreated material was dabbed on a clean slide with help of a pair of fine forceps. The air dried slides were then stained in 2 % Giemsa. Well spread chromosome plates were obtained only in male moths. Actual lengths of the chromosomes were measured by using ocular micrometer and from these total complement length (TCL) was calculated. Relative length of each chromosome was calculated by multiplying the actual length of a chromosome with 100 and then dividing the product by total complement length (TCL) of the haploid set.

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RESULTS AND DISCUSSION

The haploid chromosome numbers observed in *E. machaeralis* and *H. puera* were found to be 18 and 31 respectively (Table1, figs. 1a,2a). The mean actual lengths and percent relative lengths of the metaphase I chromosomes of both the species are given in Table 2. The karyotypes of both the species (figs. 1b,2b) showed that the chromosomes do not have localized centromere. Histograms were constructed from the relative length data. Figs. 1c and 2c revealed a gradual decrease in chromosome size where some chromosomes are of equal length. There was one long pair of chromosomes in both the species.

The chromosomal information on species *E. macheralis* has been reported for the first time from Jammu region. In number of metaphase stages the diploid chromosome number was found to be 2n=36 and haploid as n=18. This being the second lowest chromosome number in this family. Centric fusion might have played the role leading to decrease in the number of diploid chromosome in this case.

Present work on *H.purea* belonging to super family Noctuidea is in confirmty with earlier work. About 87 different species of this family have been cytologically worked out so far. Of these 69% of species possess diploid chromosome number as 2n=62, and haploid chromosome number as n=31including the presently worked out species. This 2n =62 can be designated as the modal chromosome number in this group. Many scientist have reported holocentric chromosome in Lepidoptera (Bauer 1967, Suomalainen, 1969, Murakami and Imai, 1974).

The holokinetic nature of lepidopterans chromosomes has led to the hypothesis that fusions and fragmentations would be the most frequent mechanisms of karyotypic evolution. The non-localized kinetic activity doesnot have the constraints imposed by a localized centromere in species with monocentric chromosomes. In such species, acentric fragements or dicentrics are mitotically and meiotically unstable (Papeschi and Bressa, 2006).

During present studies no constriction or bending of chromosomes has been observed at any stage any of the species. Thus, present investigation also suggest a diffused nature of centromere in both the species investigated in conformity with findings of (Bauer 1967, Suomalainen 1969, Murakami and Imai 1974). However Bigger (1975 and 1976), and Rishi and Rishi (1979) have reported localized centromere in such chromosomes with improved techniques in family Pyralidae.

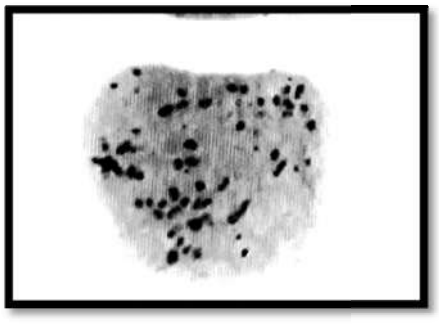

Fig.1a

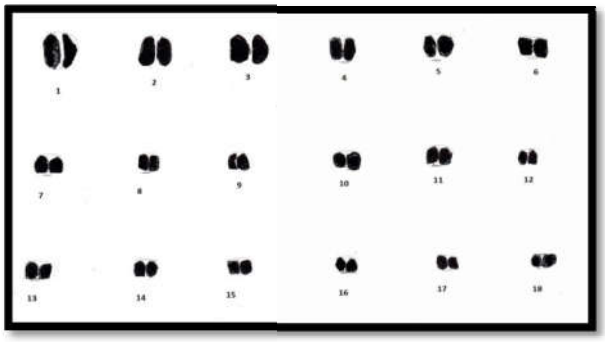

Fig. 1b

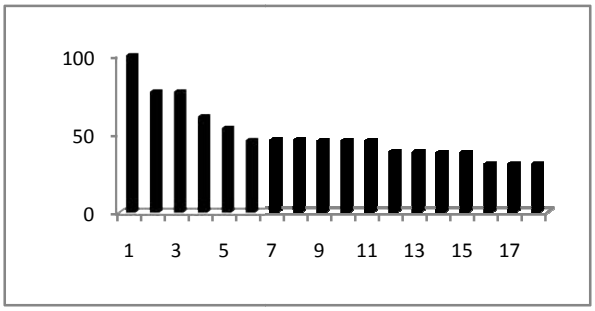

Fig.1c

Table 1 Morphometric data of Spermatogonial metaphase karyotype of *Eutectona machaeralis* male 2n=36.

Chromosome Pair Number	Mean Total Length(µm)
1	1.3
2	1.0
3	1.0
4	0.795
5	0.7
6	0.6
7	0.6
8	0.6
9	0.595
10	0.595
11	0.515
12	0.5
13	0.5
14	0.495
15	0.495
16	0.4
17	0.4
18	0.4

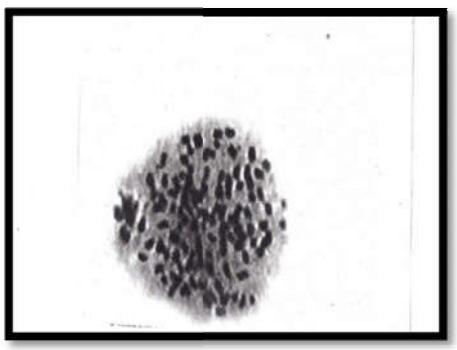

Fig.2a

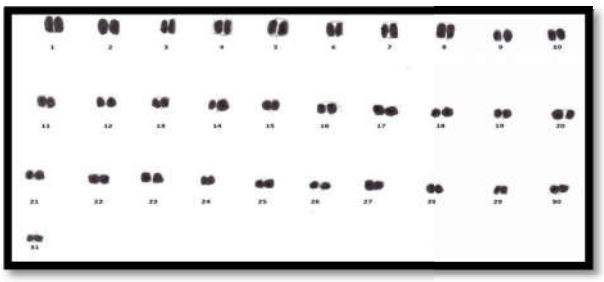

Fig.2b

Fig.2c

Table 2 Morphometric data of spermatogonial karyotype of *Hyblaea puera* male 2n=62.

Chromosome Pair Number	Mean Total Length(µm)
1	0.9
2	0.8
3	0.8
4	0.8
5	0.8
6	0.795
7	0.795
8	0.795
9	0.6
10	0.6
11	0.595
12	0.5
13	0.5
14	0.5
15	0.5
16	0.5
17	0.5
18	0.4
19	0.4
20	0.4
21	0.4
22	0.4
23	0.4
24	0.4
25	0.380
26	0.350
27	0.320
28	0.310
29	0.310
30	0.301
31	0.3

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