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## Chromosome number and sex-determining mechanism in 32 species of Indian Coleoptera (Insecta)

(chromosomes/Coleoptera/sex-mechanism)

J.S. YADAV, M.R. BURRA AND M.P. DANGE

*Cytogenetics Laboratory, Department of Zoology, Kurukshetra University, Kurukshetra-132 119, India.*

**ABSTRACT** The diploid number of chromosomes and the meiotic formulae in 32 species from 23 genera belonging to 4 families of the two major sub-orders of Coleoptera have been tabulated.

Karyologically, Coleoptera is an extensively investigated group of insects and data of more than 3500 species sub-species and parthenotes are on record to date. This number may touch the 4000 mark soon. However, a perusal of the literature reveals that the chromosomal data on Coleopteran fauna of India is approximately 600 Species<sup>1</sup>. The present

investigations were undertaken to add some more species in this group.

Table 1 gives a list of species investigated, the localities from which the specimens were collected alongwith the period of collection, their diploid number and the chromosomal formulae. Karyological preparations were made according to Yadav and Lyapunova<sup>2</sup>. Except for *Ceratoderus* species where preparations were made from ovariole tips, in all others spermatocytes were analysed.

Table 1- Classified list and chromosomal data of the species under report

Sr. No.	Species	Locality and period of collection	Diploid chromosome number	Meioformula
1	2	3	4	5
	Order- COLEOPTERA Sub-order-ADEPHAGA Family-Cicindelidae Subfamily-CICINDELINAE Tribe- CICINDELINI Genus- <i>Cicindela</i> L.			
1.	<i>C. (Rivaliera) albina</i> Wied	Chandigarh June, 1987	23	10 + X <sub>1</sub> X <sub>2</sub> Y
2.	Genus- <i>Cylindera</i> Westwood <i>C. (Ifasina) viridilabris</i> Chaud. var. <i>severnini</i> W. Horn	Kalimpong (Assam) June, 1987	21	9 + X <sub>1</sub> X <sub>2</sub> Y
3.	<i>C. (Ifasina) bigemina bigemina</i> Klug.	Chandigarh June, 1987	23	10 + X <sub>1</sub> X <sub>2</sub> Y

ess, Madras, p.

*Insect Life*, Thacker  
& London, p.

(1954) *Indian J.*

1	2	3	4	5	1	
4.	Genus- <i>Jansonia</i> Chaud. <i>Jansonia chloropleura</i> Chaud.	Pant Nagar (UP) May, 1987	23	$10 + X_1 X_2 Y$	17.	Tr Ge C.
5.	Genus- <i>Lophyra</i> Mots. <i>Lophyra (Lophyra) vittegera</i> Dej.	Kalasar Forest (Har.) August, 1986	23	$10 + X_1 X_2 Y$		Su Su Fa Di Su Ge
6.	Genus- <i>Lophyridia</i> Jean. <i>Lophyridia angulata</i> Fab.	Markanda River Shahabad (Har.) July, 1987	21	$9 + X_1 X_2 Y$	18.	T.
7.	<i>Lophyridia sumatrensis</i> Herbst.	Silcher (Assam) May, 1987	23	$10 + X_1 X_2 Y$		Su Tri Ge
8.	Family-Carabidae Tribe- BEMBIINI Genus- <i>Bembidion</i> Latr. <i>Bembidion hausurada</i> Andr.	Manali (H.P.) June, 1987	24	$11 + XY$	19.	A.
9.	Tribe-AGONIINI Genus- <i>Orthotrichus</i> Peyron <i>Orthotrichus indicus</i> Bates	Kurukshetra November, 1987	37	$18 + X$	20.	Su Tri Ger O.
10.	Genus- <i>Euleptus</i> Klug <i>Euleptus ooderus</i> Chaud.	Kurukshetra November, 1986	37	$18 + X$	21.	O.
11.	Tribe-HARPALINI Genus- <i>Trichotichnus</i> Morawitz <i>T. luparus</i> Andr.	Kurukshetra February, 1987	37	$18 + X$	22.	Div Sub Trit Gen S. a
12.	Tribe-LEBIINI Genus- <i>Risophilus</i> Leach <i>R. himalyicus</i> Andr.	Kurukshetra March, 1987	39	$19 + X$	23.	S. u
13.	Tribe- ZABRINI Genus <i>Amara</i> Stephens <i>A. batesi</i> Ciski	Manali June, 1987	37	$18 + X$	24.	Gen M. i
14.	<i>A. nila</i> Andr.	Manali June, 1987	22	$10 + XY$	25.	Sub Trib Gen A. c
15.	Tribe-ODDINI Genus- <i>Oodes</i> Dej. <i>Oodes monticola</i> Andr.	Shillong April, 1986	22	$10 + XY$	26.	A. p
16.	<i>Oodes parallelus</i> Laf.	Dehra Dun September, 1986	24	$11 + XY$	27.	Gen H. p
	Family-Paussidae Subfamily-PAUSSINAE					

5	1	2	3	4	5
10 + X <sub>1</sub> X <sub>2</sub> Y	17.	Tribe-PAUSSINI Genus- <i>Ceratoderus</i> Westwood <i>C. bifasciatus</i> Koll.	Kurukshetra April, 1988	28 +	13 + XX
10 + X <sub>1</sub> X <sub>2</sub> Y		Sub-order-POLYPHAGA Super family-SCARABAEOIDEA Family-Scarabaeidae Division-LAPROSTICTI Subfamily-TROGINAE Genus- <i>Trox</i> Fabricius			
9 + X <sub>1</sub> X <sub>2</sub> Y	18.	<i>T. costatus</i> Wied.	Gauhati (Assam) May, 1987	20	9 + Xy <sub>p</sub>
10 + X <sub>1</sub> X <sub>2</sub> Y		Subfamily-APHODIINAE Tribe-APHODIINI Genus- <i>Aphodius</i> Illiger			
11 + XY	19.	<i>A. pusillus</i> pusillus Herbst	Gauhati (Assam) May, 1987	20	-
18 + X		Subfamily-SCARABAEINAE Tribe-ONTHOPHAGINI Genus- <i>Onthophagus</i> Latreille			
18 + X	20.	<i>O. pacificus</i> Lansb.	Silchar (Assam) June, 1987	20	9 + Xy <sub>p</sub>
18 + X	21.	<i>O. bifasciatus</i> F.	Silchar (Assam) June, 1987	-	9 + Xy <sub>p</sub>
18 + X		Division-PLEUROSTICTI Subfamily-SERICINAE Tribe-SERICINI Genus- <i>Serica</i> Macleay			
19 + X	22.	<i>S. assamensis</i> Bk.	Shillong (Meghalaya) May, 1987	20	9 + Xy <sub>p</sub>
18 + X	23.	<i>S. umbrinella</i> Brske.	Shillong (Meghalaya) May, 1987	-	9 + Xy <sub>p</sub>
10 + XY		Genus- <i>Maladera</i> Mulsant.			
10 + XY	24.	<i>M. alcocki</i> Bk.	Jorhat (Assam) June, 1987	20	9 + Xy <sub>p</sub>
10 + XY		Subfamily-MELOLONTHINAE Tribe-MELOLONTHINI Genus- <i>Apogonia</i> Kirby.			
10 + XY	25.	<i>A. carinata</i> Brsk.	Haflong (Assam) June, 1987	20	9 + Xy <sub>p</sub>
10 + XY	26.	<i>A. proxima</i> Waterh.	Haflong (Assam) June, 1987	20	9 + Xy <sub>p</sub>
11 + XY		Genus- <i>Holotrichia</i> Hope			
11 + XY	27.	<i>H. problematica</i> Brenske	Shillong (Meghalaya) May, 1987	20	9 + Xy <sub>p</sub>

1	2	3	4	5
28.	Genus-Lachnosterna <i>L. longipennis</i> Blanch.	Shillong (Meghalaya) May, 1987	20	9 + X <sub>y</sub> <sub>p</sub>
29.	Subfamily-RUTELINAE Tribe-ANOMALINI Peringuey Genus- <i>Rhinyptia</i> Burm <i>R. indica</i> Burm	Gauhati (Assam) May, 1987	-	9 + X <sub>y</sub> <sub>p</sub>
30.	Genus- <i>Mimela</i> Kirby <i>M. glabra</i> Hope	Shillong (Meghalaya) May, 1987	20	9 + X <sub>y</sub> <sub>p</sub>
31.	Tribe-ADORETINI Genus- <i>Adoretus</i> Laporte <i>A. bombinator</i> Bm.	Gauhati (Assam) May, 1987	22	10 + X <sub>y</sub> <sub>p</sub>
32.	<i>A. epipleuralis</i> Arrow.	Jorhat (Assam) June, 1987	-	10 + X <sub>y</sub> <sub>p</sub>

1. Smith  
C  
2  
2. Yadav  
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3. Dasgu  
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In Adephaga the chromosomal data on 17 species and sub-species from 13 genera and 8 tribes of 3 families are recorded<sup>3-9</sup>. All these species are new determinations. The diploid number of chromosomes in the investigated Adephaga varies from 21-39. However, the commonest number found in five species of Cicindelidae is 23. Next to it is 37 in four species of Carabidae. Multiple sex-chromosome mechanism was depicted by all seven species of Cicindelidae under the present investigations. In Carabidae it is of the simple type, five species of which showed XO, and four species possessed XY type of male system. The *Ceratoderus* species which belongs to the family Paussidae depicted the XX type of female system.

The Major contributions in context with Indian fauna on Polyphaga are due to Aggarwal<sup>10-11</sup>, Joneja<sup>12</sup>, Lahiri and Manna<sup>13</sup>, Saha and Manna<sup>14</sup>, Saha<sup>15</sup>, Manna & Lahiri<sup>16</sup> Yadav and Pillai<sup>17-21</sup>.

In Polyphaga chromosomal data on 15 species from 10 genera belonging to 6 tribes of 5 sub-families of Scarabaeidae were

recorded. All the species are new additions. In the investigated Scarabaeids the diploid number of chromosomes is either 20 or 22. The sex-chromosome mechanism, being X<sub>y</sub><sub>p</sub> in male, is exhibited by all the species.

However, in *Aphodius pusillus pusillus* only the mitotic metaphases were available, and hence the association of sex-chromosomes could not be ascertained. The commonest karyotype found in 13 species was 9 + X<sub>y</sub><sub>p</sub> in male.

Details of structure and behaviour of chromosomes in the species under report will be published else where.

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9 + X<sub>y</sub><sub>p</sub>9 + X<sub>y</sub><sub>p</sub>9 + X<sub>y</sub><sub>p</sub>10 + X<sub>y</sub><sub>p</sub>10 + X<sub>y</sub><sub>p</sub>

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