

TABLE I

Parasites recovered in the laboratory on the eggs, larvae and pupae of *Pieris brassicae* Linn.

Order/Family	Parasites	Stage attacked	Parasitism (%)
<i>Hymenoptera</i>			
Braconidae	1. <i>Apanteles</i> sp.	Caterpillar	4
	2. <i>A. glomeratus</i> L.	"	13-30
	3. <i>Bracon</i> sp.	"	2.5
Chalcididae	4. <i>Brachymeria</i> sp.	Pupa	2.3
Eulophidae	5. <i>Tetrastichus sokolowskii</i> Kurdj.	Caterpillar	7-10
Ichneumonidae	6. <i>Nythobia</i> (<i>Diadegma</i>) sp.	Pupa	2-4.5
	7. <i>Ecphoropsis perdistinctus</i> Vier.	Caterpillar	1.3
Pteromalidae	8. <i>Pteromalus puparum</i> L.	Pupa	20-35

The pupal parasite, *Pteromalus puparum* L., was the most common and it attacked about 20% to 35% pupae. The other two pupal parasites, viz., *Nythobia* (*Diadegma*) sp. and *Brachymeria* sp. are the first records on *P. brassicae* from India. Some species of the genus *Nythobia* (*Diadegma*) have been recorded on other crop pests^{3,5,7-9}. *Nythobia* (*Diadegma*) sp. is a black coloured ichneumonid parasite. The front and middle leg segments are light yellow, hind coxae and tarsi black and rest of the leg light yellow. It is about 4 mm in length and 0.9 mm in width across the head. The parasitization by *Nythobia* (*Diadegma*) sp. was only about 2% to 4.5%. Some of the species of *Brachymeria* have been recorded on other crop pests, e.g., *Brachymeria bicolorata* on *Earias* sp. in Pakistan⁴, *Brachymeria phya* on *Plutella xylostella* L. in Canada¹¹, *Brachymeria* sp. on *Plutella xylostella* L. in India⁶ and *Brachymeria femorata* on *Pieris brassicae* L. in Bulgaria³. Its parasitism was found at 2.3% only.

Authors wish to thank Dr. N. C. Pant, Head of the Division of Entomology, I.A.R.I., New Delhi, for encouragement and facilities for the work.

Thanks are also due to the Director, Commonwealth Institute of Entomology, London; Entomologist-in-charge, Commonwealth Institute of

Biological Control, Bangalore, and Dr. S. I. Farooqi, Division of Entomology, I.A.R.I., New Delhi, for identification of various parasites.

Ind. Agri. Res. Inst.,
Regional Station, Katrain,
Kulu Valley, H.P., February 6, 1976.

O. P. LAL.

J. CHANDRA.

1. Cherian, M. C. and Basheer, M., *Proc. Indian Acad. Sci.*, 1939, 1 B, 87.
2. Harcourt, D. G., *Canad. Ent.*, 1960, 94, 419.
3. Kaitazov, A., *Rast. Zashit.*, 1963, 11, 20.
4. Khokhar, K. F., Qudri, M. A. H. and Ahmed, M., *Pakistan J. Sci. Ind. Res.*, 1971, 14, 261.
5. Ootmann, E. R. and Plantner, G. R., *Hilgardia*, 1969, 40, 1.
6. Patel, V. C. and Patel, H. K., *Indian J. Ent.*, 1968, 30, 86.
7. Rao, V. P. and Nair, K. R., *Tech. Bull. Commonwealth Inst. Biol. Control*, 1967, 9, 73.
8. Rojas, P. S., *Agriculture Tec.*, 1965, 25, 39.
9. Tikar, D. T. and Thakre, K. R., *Indian J. Ent.*, 1962, 23, 116.
10. Ullyett, G. C., *Ent. Mem-Dep. Agric. S. Afr.*, 1947, 2, 77.
11. Yarrow, W. H. T., *Queen. J. Agril. An. Sci.*, 1970, 27, 321.

A NOTE ON THE CYTOLOGY OF *BOERHAAVIA REPANDA* WILLD.

THE present study deals with the karyomorphology and meiosis of *B. repanda* Willd. The material was collected locally and grown in pots. For somatic preparations, excised root tips were pretreated with 8-hydroxyquinoline for about 2½ hrs at 10° to 15° C, and stained according to Feulgen's schedule. Permanent slides were made by passing through acetic acid butanol series and mounted in euparal. Meiotic studies were made by fixing the flower buds at different stages of development in 1:3 acetic alcohol for 24 hrs. Smear preparations were made in 1% propionocarmine.

Karyotype description is made following Levan *et al.*². For determining the type of chromosome the centromeric index ($r = l/s$), where 'r' as the arm ratio, 'l' as the length of the long arm, and 's' as the length of the short arm is taken into account. The diploid chromosome number of this plant is found to be $2n = 42$ (Figs. 1, 2). The chromosomes fall in a series of close gradations. However, a pair of long submedian chromosomes (2.36μ) is distinguishable in the karyotype. There are five pairs of chromosomes with median centromeres, and all the rest of the chromosomes show submedian centromeres. The chromosome-measurements and classification are given in Table I.

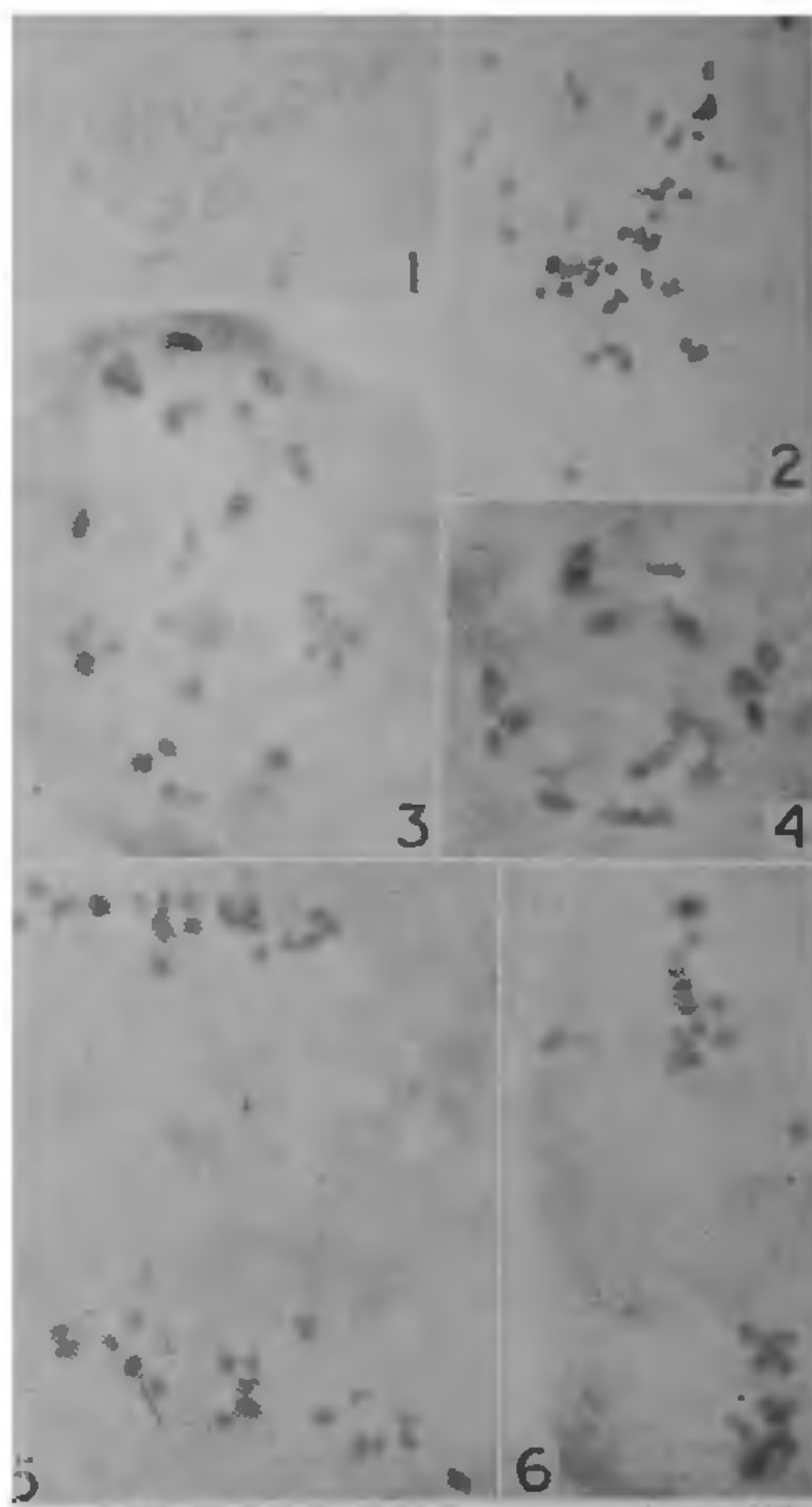
TABLE I
Karyotype analysis in *B. repanda* Willd.

Chromosomes	Length in microns		Total length in μ	Arm ratio	Centromere
	Long arm	Short arm			
I	1.62	0.74	2.36	2.18	Sm
II	1.21	1.08	2.29	1.12	Sm
III	1.08	0.74	1.82	1.45	Sm
IV	1.14	0.81	1.95	1.53	Sm
V	1.08	0.81	1.89	1.33	Sm
VI	1.08	0.81	1.89	1.33	Sm
VII	1.08	0.81	1.89	1.33	Sm
VIII	1.08	0.81	1.89	1.33	Sm
IX	1.02	0.81	1.83	1.14	Sm
X	1.03	0.74	1.82	1.45	Sm
XI	0.88	0.88	1.76	1.00	M
XII	0.94	0.74	1.68	1.27	Sm
XIII	0.88	0.81	1.69	1.09	Sm
XIV	0.81	0.81	1.62	1.00	M
XV	0.81	0.81	1.62	1.00	M
XVI	0.81	0.81	1.62	1.00	M
XVII	0.81	0.74	1.55	1.09	Sm
XVIII	0.81	0.54	1.35	1.50	Sm
XIX	0.67	0.60	1.27	1.11	Sm
XX	0.67	0.54	1.21	1.25	Sm
XXI	0.54	0.54	1.08	1.00	M

Meiosis is found to be mostly regular. At diakinesis and metaphase-I 21 bivalents are observed (Figs. 3, 4). A bivalent is attached to the nucleolus at diakinesis (Fig. 3). There is regular disjunction of chromosomes at anaphase-I (Fig. 5). However, occasionally one or two precociously moving chromosomes are observed at metaphase-II (Fig. 6).

The chromosome number reported for *B. diffusa*^{6,3-14} as $n = 58, 47, 13$ and $2n = 26$ is quite varying. For *B. repanda* the only report is $n = 21$ by Tandon and Rao⁵. It was the intention to know whether the chromosome number in *B. repanda* is also varying or not. The present studies both of somatic and meiotic chromosomes confirm the findings of Tandon and Rao⁵ in that the chromosome number in *B. repanda* was not varying as in *B. diffusa*.

The author is grateful to Prof. M. S. Chennaveerajah, Head of the Department of Botany, Karnatak University, Dharwar, for encouragement and valuable suggestions.



FIGS. 1-6. Figs. 1-2. Photomicrograph of somatic metaphase chromosomes ($2n = 42$), $\times 1,800$. Figs. 3-6. Meiosis, $\times 1,000$. Fig. 3. Diakinesis showing 21 bivalents. Fig. 4. Metaphase-I chromosomes showing 21 bivalents. Fig. 5. Anaphase-I showing equal distribution of chromosomes. Fig. 6. Metaphase-II showing 2 precociously moving chromosomes.

Department of Botany,
Karnatak University,

B. B. NANDYAL.

Dharwar-3, January 31, 1976.

- Gill, L. S. and Abubakar, A. M., "IORB Chromosome Number Report," *Taxon*, 1975, 24, 371.
- Levan, A., Fredga, K. and Sandberg, A. A., *Hereditas*, 1964, 52, 201.
- Sharma, A. K. and Bhattacharyya, G. C., *Ind. Agriculturist*, 1961, 5, 9.
- Srivastava, A. K. and Misra, K. C., *Science and Culture*, 1966, 32, 315.
- Tandon, S. L. and Rao, G. R., *Curr. Sci.*, 1963, 32, 234.
- Thombre, M. V., *Science and Culture*, 1959, 25, 208.