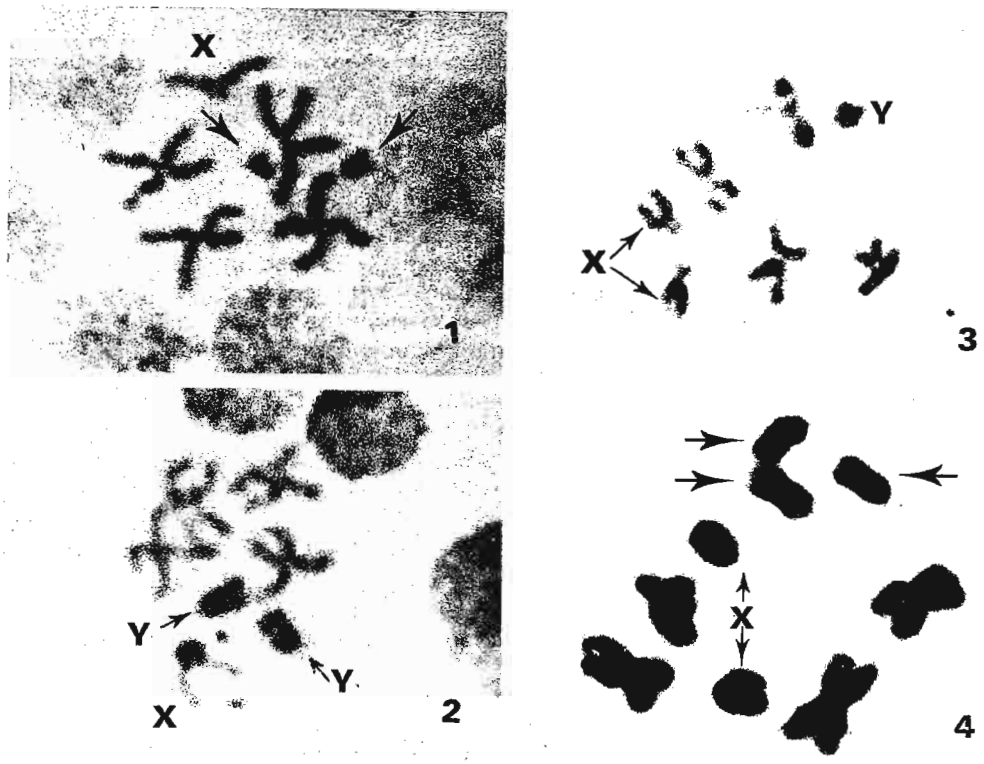


Figs. 1-4. Photomicrographs of larval brain metaphases of the four species showing different types of aneuploidy involved with the sex chromosomes and the fourth chromosome. (1) D. lacteicornis - XO. (2) D. nikananu - XYY. (3) D. barbarae - XXY. (4) D. kikkawai female - trisomic chromosome 4. Large microchromosomes are indicated by bigger arrows.

Balwin, G. University of Queensland, Australia. Hybrid chromosomes in three species of the D. nasuta complex.

Isolines of three species of the D.nasuta complex were collected in South-East Asia. All three species, D.S.albostrigata, D.albomicans and D.kohkoa, were captured at the River Kwai, Thailand. D.albomicans was also collected in Taiwan while the other two species were also collected at Luzon, Philippines. An inversion-free isoline for each species was then determined for each capture site of each of the species.

Table 1.

Species	Chromosome	Distal	Central	Proximal
D.s.albostrigata	I	-	-	-
	IIL	-	-	-
	IIR	-	-	-
	III	-	-	-
D.albomicans	I	*P_6+Q_6+R_6	-	C_2
	IIL	-	I_2	-
	IIR	-	-	H_2
	III	-	L_3+V_6+W_6	A_2
D.kohkoa	I	P_6+Q_6	-	C_6+R_6+S_6+T_6
	IIL	-	I_2	-
	IIR	-	-	H_2,U_6
	III	C	W_6	X_6

*inversion A + inversion B = inversion A overlapping inversion B.

Subsequently, intraspecific crosses were made between the different geographical populations for each species. The different populations of both D.S.albostrigata and D.albomicans displayed no cytogenetic differences. The two populations of D.kohkoa, however, exhibited inversion X_4 on chromosome I of their F_1 generation. This inversion has been previously recorded for this species at Phuket, Thailand (Mather & Thongmeearkom DIS 53:150). Hence it appears this inversion is fixed in the River Kwai population of D.kohkoa.

Isolines from nearest the centre of the species range were selected for the interspecific tests. Hence the Luzon isolines were chosen for D.kohkoa and D.S.albostrigata whilst D.albomicans was represented by the isoline from Taiwan. Sixteen inversions were then determined between crosses of these isolines (Table 1).

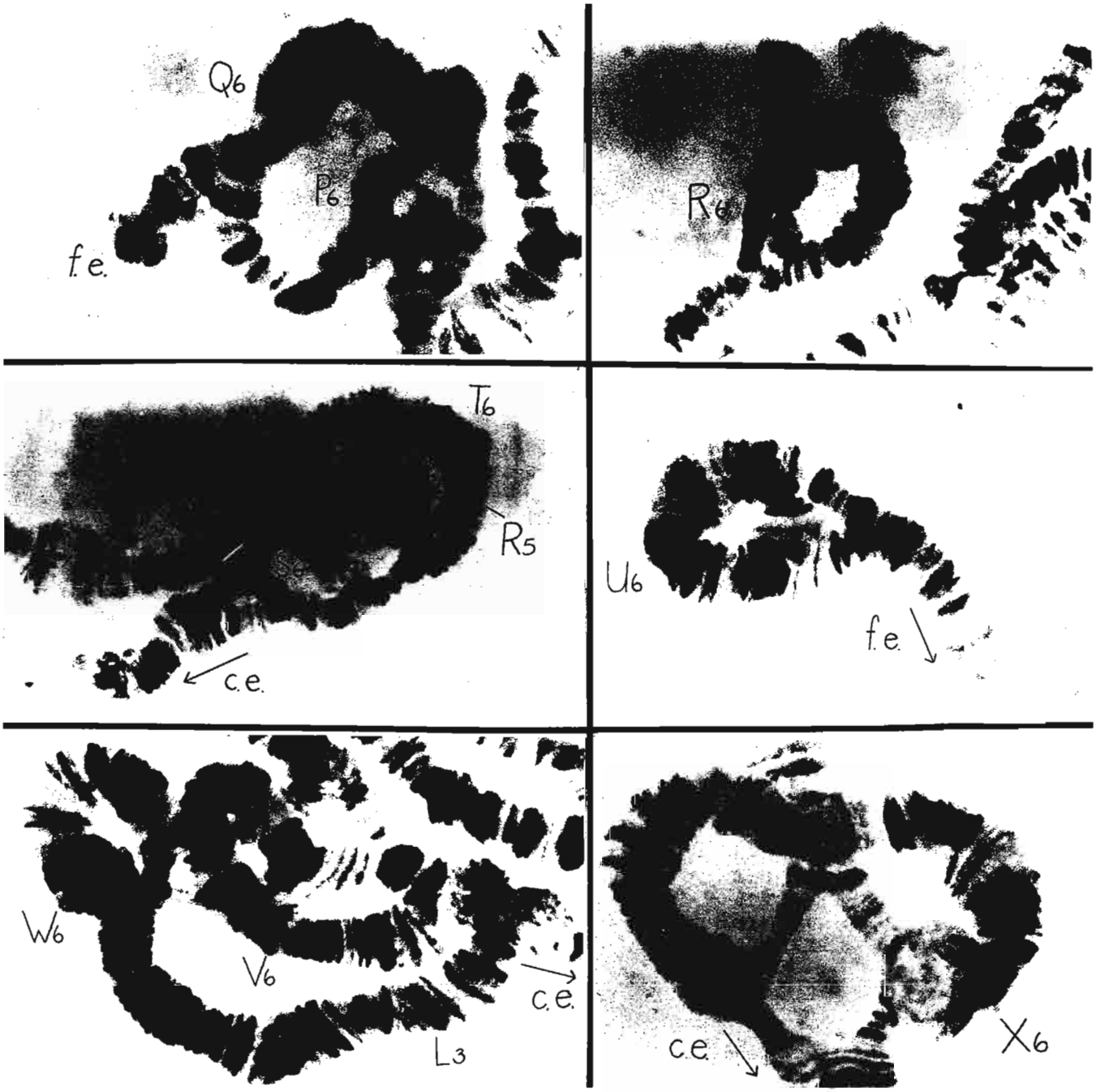


Figure 1. f.e. = free end; c.e. = centromere end.

Nine of these inversions had not been recorded and are presented in Fig. 1. Inversions A_2, C_2 H_2 and I_2 (Mather & Thongmeearkom DIS 50:60), C (Mather & Thongmeearkom, DIS 48:40), L_3^2 (Mather & Thongmeearkom, DIS 55:101) and R_5 (Mather & Balwin, DIS 55:99) have been previously recorded. These inversions then define the extent of cytogenetic divergence that has occurred during the evolution of these species and allow the phylogenetic relationships of these species to be determined. As chromosomes I and III are the most polymorphic, they provide the clearest indications of these relations (Figs. 2 & 3).

The isolines for these experiments were collected and established by Dr. W.B. Mather.

Figure 2.

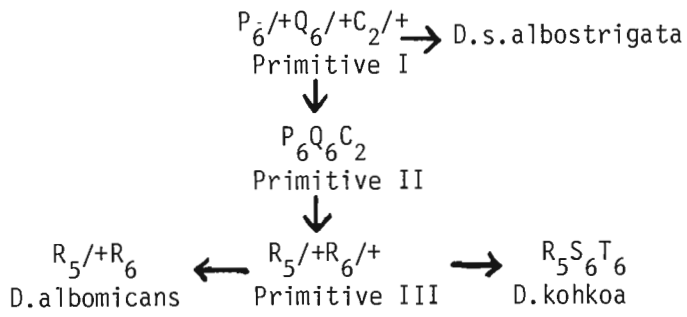
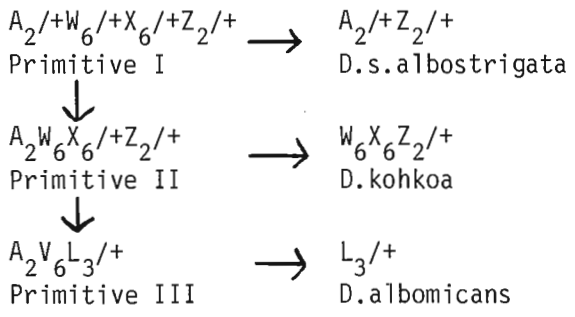


Figure 3.



Balwin, G. University of Queensland, Australia. Sexual isolation between three species of the D.nasuta complex.

The three species examined here are D.S.albostrigata, D.albomicans and D.kohkoa. An isoline each of D.S.albostrigata and D.kohkoa was collected from Luzon, Philippines, whilst another isoline of D.albomicans was collected from Taiwan.

Two forms of sexual isolations tets were conducted and these were "no choice" and "male choice" tests (Strickberger 1962). Both tests were employed in the intraspecific crosses whilst only the "no choice" test was used for interspecific tests.

Results of the intraspecific "no choice" and "male choice" tests are shown in Tables 1 and 2 respectively. For both tests, the different populations of D.S.albomicans and D.kohkoa display a high degree of crossability. Similarly, the "male choice" test indicates the same situation between the two populations of D.S.albostrigata. However, the "no choice" test indicates a significant divergence from the expected random mating pattern, especially between males from the River Kwai and females from Luzon. The sex of any F1 offspring were also recorded for these crosses (Table 3). Both D.S. albostrigata and D.kohkoa exhibited the expected 1:1

Table 1. Intraspecific "no choice" test

Species	Cross	Total	Insemi-nations	%Cross-ability	χ^2
D.s.albostrigata	L♂ × RK♀	145	105	72.41	11.03
	RK♂ × L♀	113	64	56.64	21.23
D.albomicans	T♂ × RK♀	116	116	100.00	0.00
	RK♂ × T♀	110	109	99.09	0.01
D.kohkoa	L♂ × RK♀	134	132	98.51	0.03
	RK♂ × L♀	110	106	96.36	0.15

*Cross: L = Luzon, RK = River Kwai, T = Taiwan

Table 2. Intraspecific "male choice" test.

Species	Cross	Homogamic inseminations	Heterogamic inseminations	I	χ^2
D.s.albostrigata	L♂ × (L♀• + RK♀)	89	80		
	L♂ × (L♀ + RK♀•)	80	73	0.049	0.80
	RK♂ × (RK♀• + L♀)	84	74		
	RK♂ × (RK♀ + L♀•)	82	72	0.064	1.28
D.albomicans	T♂ × (T♀• + RK♀)	113	113		
	T♂ × (T♀ + RK♀•)	116	116	0.000	0.0C
	RK♂ × (RK♀• + T♀)	97	95		
	RK♂ × (RK♀ + T♀•)	117	115	0.009	0.04
D.kohkoa	L♂ × (L♀• + RK•)	67	67		
	L♂ × (L♀ + RK♀•)	75	76	-0.003	0.04
	RK♂ × (RK♀• + L♀)	82	85		
	RK♂ × (RK♀ + L♀•)	74	74	-0.009	0.03

*Cross: L = Luzon, RK = River Kwai, T = Taiwan.
•Denotes the strain marked with ink.