TdR (Sp. Act. 6000 mCi/mM; BARC; Trombay). DNA replication patterns were analysed from autoradiograms prepared after a 25 day exposure by categorizing the patterns into 2C (light continuous, 3C (heavy continuous), 3D (heavy discontinuous), 2D (medium discontinuous). 1D (light discontinuous) types after Rodman (1968). It was seen that in comparison with the control, the treatment series showed a significant reduction in the overall labeling frequency in both sexes. When a comparison of the absolute frequencies (amongst all nuclei examined, both labeled and unlabeled) of the continuous and discontinuous types is made, it is seen that though MC affects both types of patterns, the effect is more pronounced on the former. It has been shown earlier that inhibitory action of MC on DNA synthesis (Szybalski and Iyer, 1964) is restricted mainly to cells which are about to enter or have just entered into a new replication cycle (Doi et al., 1967). Our data, in the light of this action of MC, gives further proof of our earlier postulation (Lakhotia and Mukherjee, 1970) that the continuous type of pattern and not the discontinuous type is at the initiation of the DNA replication cycle.

References cited: Doi, O., S. Takai, Y. Aoki, H. Higashi and G. Kosaki 1967 Gann 58:125; Lakhotia, S.C. and A.S. Mukherjee 1970 J. Cell Biol. 47:18; Rodman, T. 1968 Chromosoma 23: 271; Szybalski, W. and V.N. Iyer 1964 Fed. Proc. 23:946.

Paik, Y.K. and K.C. Sung. University of Hawaii, Honolulu, Hawaii. Chromosomal polymorphism in Hawaiian populations of D. immigrans.

In most cases, Drosophila flies adjust themselves to new habitats, where environmental stresses are different, through the formation of races or ecotypes by selection. This formulation, however, appears not to fit the populations of all species of Drosophila, especially those which are geographically very widespread or cosmopolitan. Drosophila immigrans represents the latter though displaying remarkable ability to colonize diverse natural habitats on the islands of Hawaii. Unfortunately, our ideas of what constitutes such a successful colonization of this species are much too vague and are purely speculative at present, despite the fact that solution of the problems posed is biologically very important.

As an initial step toward attacking the problems, we have analyzed the inversion polymorphisms of this species on the islands of Hawaii. Preliminary report of part of this work is presented in this communication.

The population samples presented here were taken from the islands of Oahu and Hawaii, Hawaii. The Oahu samples were from three different habitats: the first population sample (OT-70) was taken in late November, 1970, in Mt. Tantalus - moist forest - at 1500-1700 foot levels. A second collection (OT-71) was taken in mid-January, 1971. Another sample (OM-70) was collected in Mt. Mauna Kapu - dry forest - at 2100-2300 foot levels in late October, 1970 and a second collection (OM-71) in early January, 1971. The final sample (OP-71) was collected in mid-March, 1971, in Mt. Puu Keaau - cactus forest - at 100-1000 foot levels.

The Hawaii samples were taken in early April, 1971, in Hawaii Volcanoes National Park (HS-) and in Kilauea Forest Reserve (HK-) - a virgin rain forest. In the first collecting area samples were taken at six elevations along Mauna Loa Strip Road extending from 3000 to 6700 feet; in Kilauea Forest a sample was collected at an altitude of approximately 5300 feet. In Tables 1 and 2 are summarized the data on chromosomal polymorphisms obtained from these populations by "egg sample" technique.

Table 1. Frequencies (in per cent) of inversion heterozygotes in the Oahu populations (N, total number of larvae examined, one larva per line).

		Heterozygous Inversions						
Sample	N	A	B	C	A+B	A+C	B+C	Total Het. Inversions
OT-70	83	25.3	2.4	1.2	-	-	-	28.9
OT-71	120	18.3	3.3	0.8	0.8	-	-	23.3
OM-70	53	24.5	1.9	-	1.9	1.9	-	30.2
OM-71	158	22.8	6.3	1.3	2.5	1.3	1.3	35.4
OP-71	54	18.5	5.6	-	3.7	1.9	-	29.6
All samples	468	22.0	4.3	0.9	1.7	0.9	0.4	29.9

A, B, and C denote different inversions on the 2nd chromosome; and these are identical with or similar to those described by Brncic (1955).

The average frequency of the total heterozygous inversions in the Oahu populations was 29.9 per cent. Compilation of the total number of separate inversions showed that the distribution of the inversions is uniform for the three populations ($0.25 > P > 0.10$). The mean frequency of heterozygosity per larva in the Oahu populations was 0.33, based on the total examinations of 903 larvae, nearly the same as found in Maui populations, Hawaii, by Richmond and Dobzhansky (1968).

The chromosomal polymorphism in the Hawaii populations is, however, quantitatively quite unlike the Oahu populations (see Table 2). First, the incidence of the inversion heterozygotes is generally much higher in all the Hawaii populations as compared with the average frequency of the heterozygous inversions in the Oahu populations. It is particularly noticeable to find the exceptionally high frequencies of the inversion heterozygotes in the HS-4000' and HS-5100' populations where the greatest number of samples were actually examined. Secondly, it was found for the two populations that the distribution of separate inversions is significantly nonuniform ($0.05 > P > 0.025$). It is worth noting that the two collecting sites are separated by only four miles. In addition, the mean frequency of the inversion heterozygosity per larva in the HS-4000' and HS-5100' was found to be 0.66, based on the total examination of 334 larvae. This mean frequency is twice as high as those found in the Oahu and Maui populations and at least three times higher than those reported from the other geographical areas.

Table 2. Frequencies (in per cent) of inversion heterozygotes in the Hawaii populations . (N, total number of larvae examined, one larva per line)

Sample	N	Heterozygous Inversions A	B	C	A+B	A+C	B+C	Total Het. Inversions
HS-4000'*	67	17.9	10.5	16.4	5.9	-	5.9	56.7
HS-4300'	12	25.0	-	8.3	-	-	-	33.3
HS-5100'*	101	31.7	9.9	6.9	5.9	2.9	2.9	60.4
HS-6100'	11	36.4	-	-	-	-	-	36.4
HS-6700'	15	26.7	-	6.7	6.7	-	-	40.0
HS-3000'	24	12.5	-	8.3	4.2	-	4.2	29.2
HK-5300'≠	10	10.0	10.0	10.0	-	10.0	-	40.0

* Statistical comparison for the distribution of the heterozygous inversions was possible only for these two samples (see text).

≠ A new pericentric inversion of the 2nd chromosome was detected in this po population.

In summary 1) comparison of the frequency of heterozygous inversions and distribution pattern of the separate heterozygous inversions in the Hawaii populations (particularly in those at HS-4000' and HS-5100') with those on Oahu suggests that the three common inversions respond in different ways to the potential ecological differences between the two islands; 2) the striking similarity of all the Oahu populations studied (both in time and areas) i.e., the lower frequency and the comparatively uniform distribution of the inversions, both suggest that the populations of this species on Oahu are not differentiated; and 3) the striking difference in the distribution of separate inversions between the HS-4000' and HS-5100' suggests that the two populations on Hawaii are differentiated. This finding is reinforced by our more recent unpublished data.

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