ISOZYME VARIABILITY IN THE DROSOPHILA NASUTA SPECIES COMPLEX.

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Allelic variations at individual structural-enzyme loci have been studied in a species complex, the Drosophila nasuta subgroup of the Drosophila immigrans group. Using the starch-gel zymogram technique, single-fly homogenates of individuals from twenty different geographical locations in the Pacific Ocean area were analyzed for various kinds of enzyme activity – esterase, leucine aminopeptidase, acid phosphatase, alkaline phosphatase, alcohol dehydrogenase, octanol dehydrogenase, xanthine dehydrogenase and catalase. Variation within and/or between strains was observed at thirteen of twenty zones of activity of these enzymes. Xanthine dehydrogenase was the only enzyme showing no variation. The variations were demonstrable either as a change in electrophoretic mobility or as an absence of detectable enzyme activity. In addition, variation was detected as activity limited only to males.

Absence of an eserine-inhibited esterase which has been previously demonstrated to be uniformly present without variation in over a hundred different Drosophila species was found in some individuals from several iso-female lines of recent collections from the islands of Hawaii and Oahu. Genetic studies indicate the lack of this enzyme is inherited as an autosomal recessive.

Heterozygotes for the electrophoretic variant forms of one esterase (Esterase F) displayed an enzyme of intermediate mobility in addition to the parental enzyme forms. In experiments in which mixtures of two variant forms were frozen in NaCl and thawed before the samples were electrophoresed, enzymes of intermediate mobility were also produced. These results suggest that the additional esterase bands may be due to the random combination of two different Esterase F subunits produced by different alleles at a single locus, and that the functional enzyme exists as at least a dimer. The in vitro experiments suggest further that the monomeric unit is

functionally homologous in strains which do not hybridize readily in the laboratory.

Allele frequencies have been estimated from natural populations of four localities for an esterase, Esterase F and for an acid phosphatase, Acph B.

On the basis of characteristics of other enzyme patterns, substrate specificity and activation-inhibition responses coupled with the results of hybridization tests, the strains analyzed were tentatively separated into three distinguishable groups. **Microfilm $3.00; Xerography $5.80. 119 pages.**