of a given class occurred either singly or in groups of two or three. This distribution pattern is reminiscent of white-variegation, since those type I cells which are colorless usually occur singly or in small groups, and are frequently more common towards the distal than the proximal end of the tubule.

Two of the tubules (c and d in the illustrations) had been pre-fixed in 2% mercuric chloride (which preserves the pigmentation and improves the contrast between pigmented and unpigmented cells), and photographed before being fixed and stained. The DNA-content of individual cells could therefore be correlated with presence or absence of pigment. To investigate the possibility that degree of polyteny and variegated position effect are related, the DNA-content of pigmented and unpigmented cells was compared (Table 2). Cells with the lowest DNA content were always unpigmented, confirming the conclusion that they are of type II; the absence of pigment in this cell type is not related to variegation, since type II cells are colorless even in wild-type strains. All 12 unclassified nuclei belonged also to unpigmented cells, which suggests that they too may be of type II. The nuclei in the two highest DNA classes were found in similar proportions in pigmented and unpigmented cells; in neither tubule was the difference statistically significant (χ^2 = 0.421 and 0.086 respectively in c and d). Thus in larval Malpighian tubules the absence of pigment associated with variegated position effect does not appear to be related to degree of polyteny.

Reference: Wessing, A. and D. Eichelberg 1978, in: The Genetics and Biology of Drosophila (Ashburner, M. and T.R.F. Wright, eds., Academic Press) Vol. 2c:1-41.

Heed, W.B. University of Arizona, Tucson, Arizona. Central and marginal populations revisited.

D. mojavensis appears to be an exemplary species with which to study the ecology and life history strategies of populations containing substantial amounts of inversion heterozygosity ("central populations") and those with little or none ("marginal populations") chiefly because the geographic areas containing each kind of population are approximately equal in size and the host plants are well known in each case. Furthermore, detailed field studies may be accomplished on a year-round basis.

Central populations are considered by many investigators to be (1) geologically older and to live under conditions considered to be (2) spatially more heterogeneous and (3) temporally more predictable. The question arises whether all three conditions are necessary for the origin and maintenance of inversion heterozygosity. Our preliminary studies are demonstrating that increased trophic resource predictability is a characteristic feature of areas in which D. mojavensis maintains inversion heterozygosity while increased niche diversity or breadth is not immediately evident. The question of geologic age is at least not disputed.

D. mojavensis spends its entire life cycle on chiefly two host plants. In Baja California, the islands in the Gulf and in the Desemboque Region of Sonora, mojavensis utilizes agria cactus, while in the remainder of Sonora and in northern Sinaloa and southern Arizona, the species switches to the organ pipe cactus. Of special interest is the fact that all inversion heterozygosity on chromosome 2 (4 common gene arrangements and 3 rare gene arrangements) and the major portion of the heterozygosity on chromosome 3 (2 gene arrangements) are restricted to populations living in agria cactus. Furthermore, while there are areas in Baja California which have lower heterozygosities than other areas, none of the more than 30 localities sampled were completely monomorphic for gene arrangements. By contrast populations living in organ pipe are invariably monomorphic in the northern half of their distribution and three localities where heterozygous in chromosome 3 in the south. In general then, and as a first approximation, populations living in agria cactus are considered to be central or subcentral while those living in organ pipe are called marginal or submarginal populations. The data on the inversions was kindly supplied by William R. Johnson.

Trophic resource predictability is being measured by three different methods: (1) surveys of the host plant density and density of the necrotic tissue, (2) correlations of the variation in biotic and abiotic factors in the necrotic tissue and (3) comparison of yeast species diversity in both host plants. A total of 13 plant censuses have been conducted throughout the Sonoran Desert to date. Nine of these were made in agria cactus and four were made on organ pipe cactus (data kindly supplied chiefly by Robert L. Mangan, Jean S. Russell and William T. Starmer). The areas surveyed varied in size from 3 to 62 acres. In one area of 54 acres both agria and organ pipe were scored. The mean number of organ pipe plants per acre was 11.6 with a range of 2.4 to 21.7. The agria cacti averaged 46.9 plants per acre with a range of 4.3 to 167.1. The latter figure represents a survey of about 4 acres in southern Baja California. These occasional thickets are produced vegetatively and are probably nurtured by the decaying stems themselves as they bend down and take root. We can tentatively state that agria cactus is generally more abundant than organ pipe even though it is not as large. The mean frequency of rotting plants among all plants scored was 13.5% of 4,100 agria cacti compared to 6.1% of 286 organ pipes. The biological difference is even greater, however, since many organ pipe rots do not contain D. mojavensis larvae while the majority of agria rots do.

The second method for measuring resource predictability was attempted by correlating the variation in concentration of yeasts, low molecular weight volatiles, and abiotic factors such as pH and temperature, with each other, and with the presence or absence of adult D. mojavensis (information kindly supplied by Don C. Vacek). Four significant correlations were found in agria rots while only one was found in organ pipe rots. Therefore, a D. mojavensis female can better assess an agria rot for both feeding and egg laying. For instance, there is a positive correlation between the concentration of ethanol, 2-propanol and other volatiles with the presence of adult D. mojavensis and a negative correlation between the concentration of these volatiles and the concentration of yeasts in the substrate. As the necrotic tissue advances, the yeasts increase in density, at least in part, at the expense of the volatiles and subsequently for the benefit of the maturing larvae. In the case of organ pipe necrotic tissue, the only significant correlation found was a negative one between pH and volatile concentration. No correlations were detected for temperature in either host plant.

Yeast species comparisons among host plants showed agria rots to be more predictable because they are less variable (data kindly offered by William T. Starmer). There were 4 effective species out of 12 species recovered in this host compared to 5.4 effective species out of 9 species recovered in organ pipe. On a per-plant basis, agria averages 1.8 species of yeast while the organ pipe average is 2.2. Furthermore, on a per-isolate basis, the yeasts from agria utilize an average of 8.5 compounds for growth (N=183) while those from organ pipe utilize an average of 10.1 compounds (N=83). Since the variance of these means is twice as high in organ pipe (31.0 vs 16.5) it means this plant is a more variable environment. The most notable evidence we have for this lies in the presence or absence of Pichia cactophila, probably the most important yeast for D. mojavensis since it is a good indicator of the presence or absence of larvae. This yeast was recovered in 73% of 105 agria rots sampled compared to 59% of 41 organ pipe rots. The difference is marginally significant.

In summary, central populations live in a more predictable environment than marginal populations because of the greater abundance of rots which have higher resolving power for the flies and which are more suitable (chemically stable?) for the growth of the nutritionally favored yeast. The first and last points may be a reflection of the asexual reproduction periodically exhibited in agria cactus.

Hilliker, A.J. University of British Columbia, Vancouver, British Columbia.* Heterochromatic duplications and the meiotic segregation of compound second autosomes during spermatogenesis of D. melanogaster.

It is well documented that in D. melanogaster females bearing compound second or third autosomes (and no additional structural heterologues or supernumerary chromosomes) that the complementary compound autosomes regularly disjoin from each other at meiosis (Holm 1969; Grell 1970; Holm and Chovnick 1975). That this segregation was not dependent on heterochromatic homology between the two compound autosomes was clear as it could be easily perturbed by the introduction of a Y chromosome, by the substitution of an attached X chromosome for the two free X chromosomes or by structural heterozygosity for the other autosome.

The present of meiotic pairing sites active during spermatogenesis and responsible for the meiotic segregation of the X and Y chromosomes (reviewed in Peacock and Miklos 1973) led to the speculation that analogous sites may exist in the autosomal heterochromatin. Nevertheless, Holm (1969; Holm and Chovnick 1975) in the analysis of compound third autosomes

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