Mettler, L. E. D. mojavensis baja, a new form in the mulleri complex.

The species of the repleta group have served as outstanding examples of Drosophila that exhibit little chromosome polymorphism (Wasserman, M., 1963). Contrary to this general phenomenon, populations of mojavensis in Southern Baja California, Mexico, have recently been found to be polymorphic for at least three banding sequences in chromosome 2, and two in chromosome 3. Collections of mojavensis were made by Mrs. Jean Russel (University of Arizona) at three localities in Baja California (La Paz, Muleje, and near Cabo San Miquel). The flies emerged from pieces of rotting cactus, Machaerocereus pammosus, which were taken to the laboratory. The species was also taken in the State of Sonora, near Sonoita and Magdalena, apparently associated with "saguaro" and "organ-pipe" cactus.

For two decades, one strain (simply identified as Chocolate-Mountains), from the Mojave Desert region of California, has been the exclusive representative stock of mojavensis. This stock is monomorphic for what I will refer to arbitrarily as the Standard banding patterns (ST) of the X, 2, and 3 chromosomes (the 4, 5, and 6 chromosomes have not been predisposed to alteration during the evolution of the repleta group). The newly discovered arrangements are named: La Paz (LP) and Baja (BA), in chromosome 2; and Muleje (MU), in chromosome 3. The breakage points of LP, BA, and MU are marked on the ST arrangements of chromosome 2 and 3 shown in the photograph. The BA sequence is included within that of LP; this, assuming inversions are unique events and multiple breakage does not occur, the chromosome 2 arrangements stand in a phylogenetic relationship, ST ← or → LP ← or → BA.

The collection sites and the chromosome types found to date (based on a small number of flies) are given below:

Collection Site	X Chromosome	Chromosome 2	Chromosome 3
Chocolate Mountains, Calif.	ST	ST -- --	ST --
La Paz, Baja Calif.	ST	ST LP BA	ST MU
Muleje, Baja Calif.	ST	ST LP --	ST MU
Cabo San Miquel, Baja Calif.	ST	ST LP --	-- MU
Sonoita, Sonora	ST	-- LP --	-- MU
Magdalena, Sonora (isofemale)	ST	-- LP --	ST --

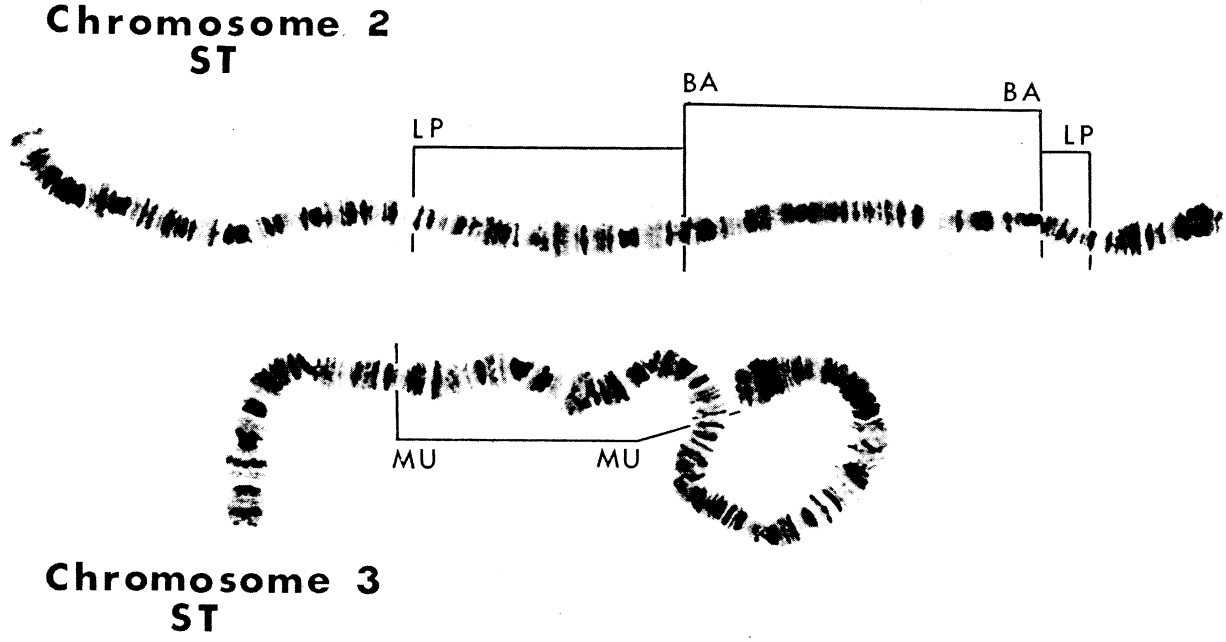
Additional chromosome types and the frequencies of each known arrangement are yet to be determined for every locality. Although the samples are too small to be conclusive at this time, it may turn out, according to the Mayr-Carson-Dobzhansky hypothesis concerning population distributions and the degree of heterozygosity, that the central populations of mojavensis exist in Baja California.

Flies recently collected in the five Mexican localities cross readily and produce fertile offspring with Chocolate-Mountains mojavensis. Their sexual behavior, fertility, and hybrid viability relationships are similar to those of Chocolate-Mountains mojavensis in tests with the semispecies, arizonensis. Thus, the new forms are considered to belong to the species, mojavensis. Additional evidence for this conclusion is the fact that all X chromosomes examined have carried the ST arrangement, which is found in no species of the mulleri complex other than mojavensis.

However, it is suggested that the recently discovered Mexican populations should be recognized as a distinct subspecies, D. mojavensis baja, differing from the Chocolate-Mountains form, D. mojavensis mojavensis. In addition to the obvious chromosome differentiation, the flies of the recent collections are morphologically distinct. They are smaller and darker than the Northern race, and are essentially sibling to arizonensis. Only by careful scrutiny of the abdominal pigment patterns can the baja race be distinguished from arizonensis under low magnification.

On a previous occasion, a fly from the Cape region of Baja California was identified as arizonensis (Wasserman, 1962). The chromosomes were checked eliminating any doubt of sibling species confusion. Thus, it is possible that the two semispecies, mojavensis and arizonensis, exist sympatrically near La Paz. Also, populations of arizonensis and the baja race of mojavensis are now known to be in close proximity, if not actually sympatric, in the border region between

the States of Arizona and Sonora. Work is planned to determine if sympatry exists and if an introgressive hybridization pattern occurs in nature as was found in experimental populations (Mettler, 1957).



(supported by N.I.H. grant GM 06981-04)

Forrest, H. S., J. M. Lagowski, and Maritha A. Burmeister. Studies on xanthine dehydrogenase in D. melanogaster. In a typical xanthine dehydrogenase (XDH) preparation, frozen, 1-3 day old, adult wild type D. melanogaster were placed in a balloon and squeezed to a pulp at 0°. The pulp was extruded from the balloon, thoroughly mixed with two volumes (w/v) of 0.1M Tris buffer, pH 7.45, and then centrifuged at 35,000 r.p.m. for 25 min. The supernatant was treated with Darco G-60 (30 mg./g. flies) and centrifuged at 35,000 r.p.m. for 10 min. The charcoal-treated supernatant was then heated at 60° for 5 min. with exclusion of oxygen (e.g. in a helium atmosphere), cooled to 0°, and centrifuged at 35,000 r.p.m. for 15 min. (4.3 fold purification of XDH with respect to the charcoal-treated preparation; assayed fluorometrically for the conversion of 2-amino-4-hydroxypteridine into isoxanthopterin); this heat-treated supernatant was used for the electrophoretic studies described below. To effect further purification the heat-treated preparation was adjusted to pH 5 with dilute acetic acid, centrifuged at 35,000 r.p.m. for 10 min., and the supernatant readjusted to pH 7.45 (7.5 fold purification with respect to the charcoal-treated preparation). Previous to our attempts to use electrophoretic techniques to study this enzyme, we had achieved a 47-fold purification of the XDH using the following scheme: Darco G-60 treatment, ammonium sulfate fractionation (40-50% saturation; 9.4 fold purification), and fractionation on a DEAE-I cellulose column (column developed with increasing concentrations of Tris buffer, pH 8; XDH eluted with 0.5M Tris; 47 fold purification). In some cases, the charcoal-treated preparation was treated with 2% protamine sulfate prior to ammonium sulfate fractionation, but the overall purification was of the same order of magnitude. Purification using columns of calcium phosphate on cellulose (developed with 0.02M sodium pyrophosphate in 0.1M Tris, pH 8) was explored; ca 50% of the XDH activity and essentially all of the protein placed on the columns could be recovered, but the purification was poor. During dialysis of the XDH-containing fractions, e.g. after ammonium sulfate fractionation, addition of an antioxidant such as β-mercaptoethanol or BAL (to the more dilute solution) decreased the loss of activity.