These results are consistent with the threshold theory of behavioral elicitation, where each behavioral element in the sequence has a higher threshold than the element directly preceding it. In the event this threshold level of stimulation is not achieved the particular behavioral element is not elicited; rather a preceding element with a lower threshold appears in the sequence (Bastock 1956).

References: Bastock, M. and A. Manning 1955, Behavior 8:7-111; Bastock, M. 1956, Evolution 10:84-92; Manning, A. 1965, Viewpoints in Biology 4:125-169; Tracey, M.L. and S.A. Espinet 1976, Nature 263:321-323.

Fadda, S., S. Sangiorgi and E. Pieragostini. Istituto di Genetica, Universita di Bologna, Italy. G6PD electrophoretic phenotype variation during development of D. melanogaster laboratory populations.

Developmental pattern of G6PD isozymes in D. melanogaster was investigated from egg deposition up to the 48th hour by Wright and Shaw (1970). When they crossed parents exhibiting different electromorphs, F_1 embryos showed both maternal and paternal forms of the enzyme by the 23rd hour; they concluded that genetic and molecular models, proposed for adult G6PD (Young et al. 1964; Steele et al. 1968), could hold also for the developmental expression of the enzyme.

This does not seem to be the case in our lab populations: when investigated through electrophoresis of mass homogenates, they exhibited different electrophoretic phenotypes, that did not reflect adult variation nor were inherited following any simple Mendelian scheme (Pieragostini et al. 1978; Fadda et al. 1979).

These observations agree with a good deal of evidence about complex determination of G6PD in D. melanogaster adults of our populations (Pieragostini et al. 1978) and others studied by several authors (Komma 1968; Giesel 1976). With the present communication we complete the picture of G6PD developmental polymorphism through electrophoretic observations of two day old pupae and discuss them in relation to larval and adult stages.

We sampled pupae from Canton strain, from an unrelated strain carrying the vg marker and from six populations having a Canton x vg cross as their common origin, plateaued for a quantitative trait after about 70 generations of selection (Palenzona and Alicchio 1973). We maintained these populations in mass culture at 25°C for several generations and then took random samples of about 100 individuals in the proper developmental phase. Cellogel electrophoresis was carried out on multiple homogenates of the above samples, following the procedure detailed in Pieragostini et al. 1978. We also calculated experimental errors affecting relative mobilities in order to base our homology statements upon statistical testing. For all cases where we suspected the existence of mobility differences, we examined electrophoretically mixed samples and took single band patterns as evidence of homology.

The results obtained analyzing electrophoretically our lab populations are presented in Fig. 1, which summarizes published observations of adult samples (from Pieragostini et al. 1978), of larval samples (Fadda et al. 1979) and original data from pupal samples. In general, we may point out that both larval and adult stage exhibit several differences between populations, while pupal stage has a single variant common to all populations (Fig. 2); however, the pupal electromorph is slower than any other observed variant.

For larval stage in particular it is worth noticing that the variants from parental populations (Canton and vg) disappear in the progeny (selected lines), where bands of intermediate mobility are present; parental variants of adult stage behave differently, because they are maintained in the progeny and are rearranged in patterns typical of vg and winged populations. Since genetic analyses, performed on each of the two stages separately (Fadda et al. 1979 for larvae; Pieragostini et al. 1978 for adult flies), provided evidence that these variants are not inherited in simple Mendelian fashion, the authors suggested regulatory hypotheses for these phenomena. However, as these phenomena exhibit no similarities in larval and adult stages, we might add to the regulatory hypothesis that the mechanisms controlling the expression of adult and larval variants depend on the specific developmental stage, whether the structural genes are the same or not.

As for the pupae, they seem to differ "non-specifically", that is, depending on the very developmental stage rather than on the genetic complement of each population. We suggest the expression of pupal G6PD to depend on the physiological state, either because the electromorph actually has a peculiar function in pupal metabolism, or because it is modified as a metabolic side effect. Examples of such epigenetic developmental variation, due to modifiers present in

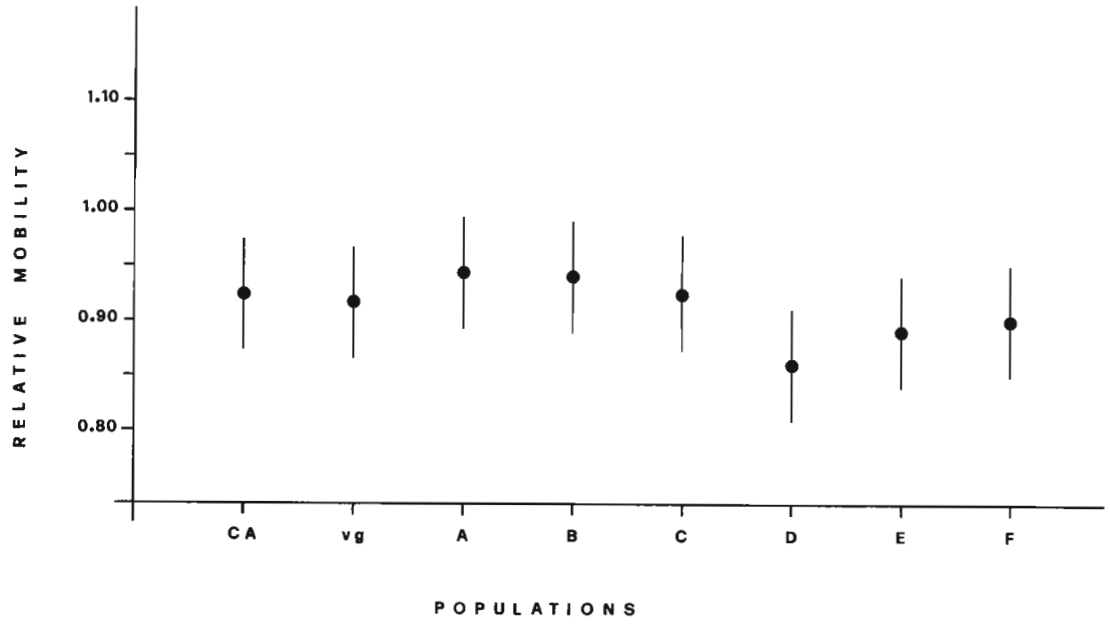

Fig. 1. Summary of polymorphic patterns for G6PD throughout development of D. melanogaster populations. Bands are listed in order of decreasing electrophoretic mobility at distances proportional to the real ones. Horizontally in the diagram we list variant populations or population groups: for larval and adult stages we represent, from left to right, Canton and vestigial parental strains (Ca and vg), winged selected lines (vg^+ L) and vestigial selected lines (vg L) mobilities; for pupal stage we represent the only variant common to all populations.

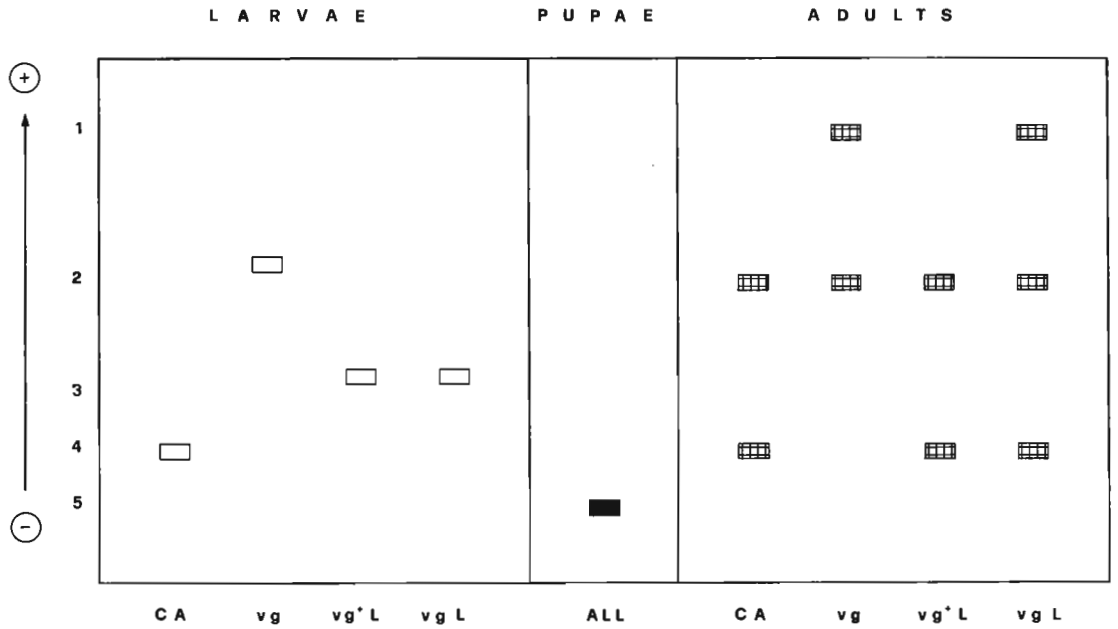

Fig. 2. Relative mobilities of two day old pupae from our 8 populations. From left to right: Canton strain (Ca), vg strain (vg), $PMvg^+$, $PFvg^+$, $PKvg^+$ winged selection lines (indicated by A, B, C) and PMvg, PFvg, PKvg vestigial selection lines (indicated by D, E, F); mobilities, which were averaged over 5 determinations per population, are reported with their "t_{95}" confidence intervals.

crude extracts, are reported for other gene-enzyme systems, such as α-GPDH (Bewley and Lucchesi 1977) and alkaline phosphatase (Schneidermann 1967; Wallis and Fox 1968).

Experiments are in progress to detect post-translational modifiers, if any; as a preliminary test, we mixed crude extract of larvae or adults to pupal extracts in vitro: upon electrophoresis, the components migrated independently and formed bands of dissimilar mobility. No modifiers seemed to be present; however, these observations do not provide a definite answer, because we cannot be sure that our homogenization procedure simulates adequately the in vivo situation.

In any case, the determination of these isozymes throughout development seems to be very complex and the Mendelian models proposed for adult and embryo G6PD do not apply to our populations. These experiments emphasize how dangerous it is to generalize structural models to whole species on the basis of electrophoretic observations. G6PD gene enzyme system throughout development reveals a remarkable polymorphism of regulatory origin mainly (Steele et al. 1969; Komma 1968; Giesel 1976; Pieragostini 1978; Fadda et al. 1979); in our opinion, such systems deserve to be studied in further detail because they can draw more attention to the importance and the evolutionary significance of regulatory variation in respect to structural one.

References: Fadda, S., S. Sangiorgi and E. Pieragostini 1979, Experientia, in press; Giesel, J.T. 1976, Biochem. Genet. 14:823-833; Komma, D.J. 1968, Biochem. Genet. 1:337-346; Palenzona, D.L. and R. Alicchio 1973, Genetics 74:533-542; Pieragostini, E., M.L. Vanelli, S. Sangiorgi and D.L. Palenzona 1978, DIS 53:180-181; Schneiderman, H. 1967, Nature 216: 604-605; Steele, M.W., W.J. Young and B. Childs 1968, Biochem. Genet. 2:159-175; Steele, M.W., W.J. Young and B. Childs 1969, Biochem. Genet. 3:359-370; Wallis, B.B., A.S. Fox 1968, Biochem. Genet. 2:141-158; Wright, D.A. and C.R. Shaw 1970, Biochem. Genet. 4:385-384; Young, W.J., J.E. Porter and B. Childs 1964, Science 143:140-141.

Fleuriet, A. University of Clermont-Ferrand II, France. Analysis of a polymorphism quite common in French natural populations of Drosophila melanogaster.

From a survey made since 1969, it has been established that French natural populations of Drosophila melanogaster are polymorphic for two features. First of all, 10 to 20% of the flies are infected by a Rhabdovirus called "sigma". It has been known for years that this virus is not contagious but transmitted from fly to fly only through gametes and is responsible for CO_2 sensitivity of infected flies. This situation is presently arousing more interest since the discovery that some pathogenous viruses of vertebrates are transmitted transovarially in their insect vectors. When experimental populations of flies are raised in cages, the sigma virus usually infects most of the individuals. Further experiments are now being performed to explain the discrepancy between natural and experimental populations.

A second feature, very constant at least in French populations, is a polymorphism for two alleles of a gene for resistance to the sigma virus: ref(2)P^o and ref(2)P^P. The respective frequencies of these two alleles are very similar among all the populations studied and they are quite the same in experimental populations, whether the sigma virus is present or not. The strong selective forces working on this equilibrium are now being analyzed.

From a few other observations, it seems that these two features may, at least, exist in populations of flies living in other countries.

References: Fleuriet, A. 1976, Evolution 30:735-739; Fleuriet, A. 1978, Genetics 88: 755-759.

Fontdevila, A.*, W.T. Starmer, W.B. Heed and J.S. Russell. *Universidad de Santiago, Santiago de Compostela, Spain, and University of Arizona, Tucson, Arizona. Differential mating activity in two coexisting species of Drosophila.

Ecologists have disclosed many cases of character displacement as a means to avoid species competition (see Margalef 1974 for a revision). This seems particularly true among closely related species occurring together and less so when species are genetically different. However, under certain conditions where convergence of non-related species is favored by natural selection, character displacement may be established. The present work provides a new example of