Anders, F., A. Altmaier, A. Anders and R. Prüssing. Genetisches Institut der Justus Liebig-Universität Giessen, Germany. Investigations about the bar- and antibar-effects.

In connection with our investigations about the bar- and antibar-effects, we have analyzed the free amino acids of a standard, of a bar, and of an ultrabar strain of D. melanogaster (homogenates of larvae, which were in the first part of the last stage, temperature = 24°C). The result (average of 6 quantitative determinations) is to be seen in Fig. 1.(opposite page)

In general, it seems to be the rule that the ultrabar strain has a lower concentration of amino acids than have the other strains (see the right part of Fig. 1).

Only Ala and - probably - Gly have a distinct positive correlation between their concentration and the bar-effect. The correlation of the amount of Leu, Ileu and Met to the bar-effect is not significant. The concentration of Pro has a negative correlation to the bar-effect. Furthermore, it is striking that the basic amino acids, Lys, His and Arg, form a specific group. They reach their highest concentration in the bar and the lowest in the ultrabar strain.

As duplication and triplication of the 16A-region (=bar-region) represent a destructive principle (bar-effect), which can be reduced by adding certain amino acids to the food (Kaji 1958; Anders et al. 1967), we have incubated homogenates of the three strains at times with 5 µ Mol pro 1 g wet weight of the amino acids, which had been analyzed (see Fig. 1). The incubated homogenates were hatched at 24°C. The free amino acids were analyzed 30, 75 and 120 minutes after the beginning of the experiment. Homogenates without supplementation of amino acids were need for control.

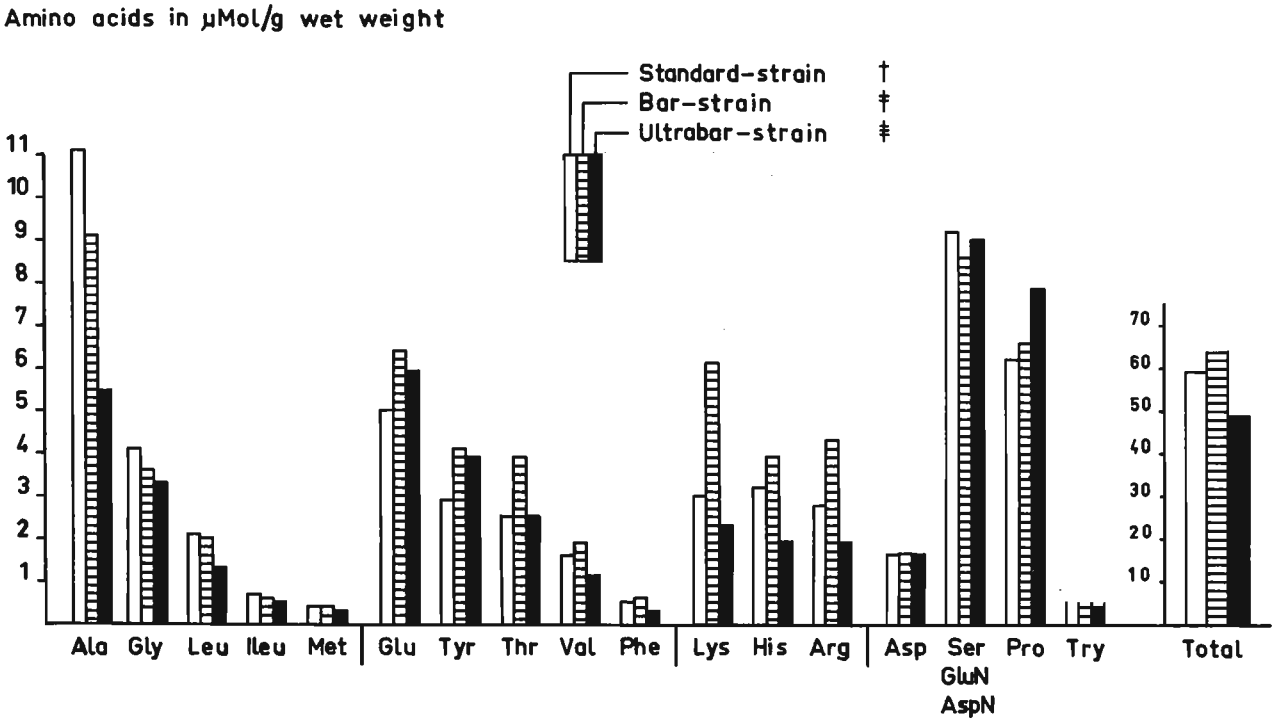

Fig. 1

For simplicity's sake, in the following only those substances shall be regarded, which have shown specific relations to the bar. In order to facilitate the comparison of alterations in homogenates with and without supplementation of amino acids, the amino acids which were added at the beginning of the experiment, were subtracted by calculation. The main results of these experiments are to be seen in Fig. 2.

In all the acid and neutral amino acids, it is striking that the concentration of Ala (and probably Gly) decreases (after supplementation of amino acids) in comparison with the controls (compare Fig. 2b with a). But it is of great interest that this is only to be seen in the standard and (not yet as distinct) the bar strains. In the ultrabar strain, the kinetics of Ala remains unchanged by incubation with amino acids.

In His, Lys and Arg (they are summarized in Fig. 2), the case is contrary. In this case, the standard-strain homogenate remains unchanged, while the bar shows a decrease, and the ultrabar even a deficit (compare Fig. 2 d with c).

In this paper, the fate of Ala (and Gly), His, Lys and Arg shall not be discussed. We only wish to state that in general, molecular His, Lys and Arg have the highest, and Ala (and Gly) the lowest antibar-effect of all amino acids proved. Furthermore, it is striking that the antibar-effect can be increased by adding mixtures of basic amino acids to the food. Of the greatest interest, however, is the fact that oligopeptides of Ala (and Gly) have a very high antibar-effect, while molecular Ala (and Gly) has only a very low one (see Kaji 1958). Mixtures of oligopeptides of Ala, Gly and molecular basic amino acids have the highest antibar-effect, we have ever observed in our laboratory. We suppose that the oligopeptides of Ala and Gly and the molecular basic amino acids influence two different functions of the bar-region. The oligopeptides may act against a natural proteolytic process initiated by the 16A-region, and the basic amino acids may repress the activity of this region.

Methods and more special results see Anders et al., Uber den Bar-Effekt bei Drosophila melanogaster, Verhandl. Deutsch.Zool.Gesellschaft in Heidelberg 1967, in print.
(This work is supported by Deutsche Forschungsgemeinschaft and Stiftung Volkswagenwerk.)

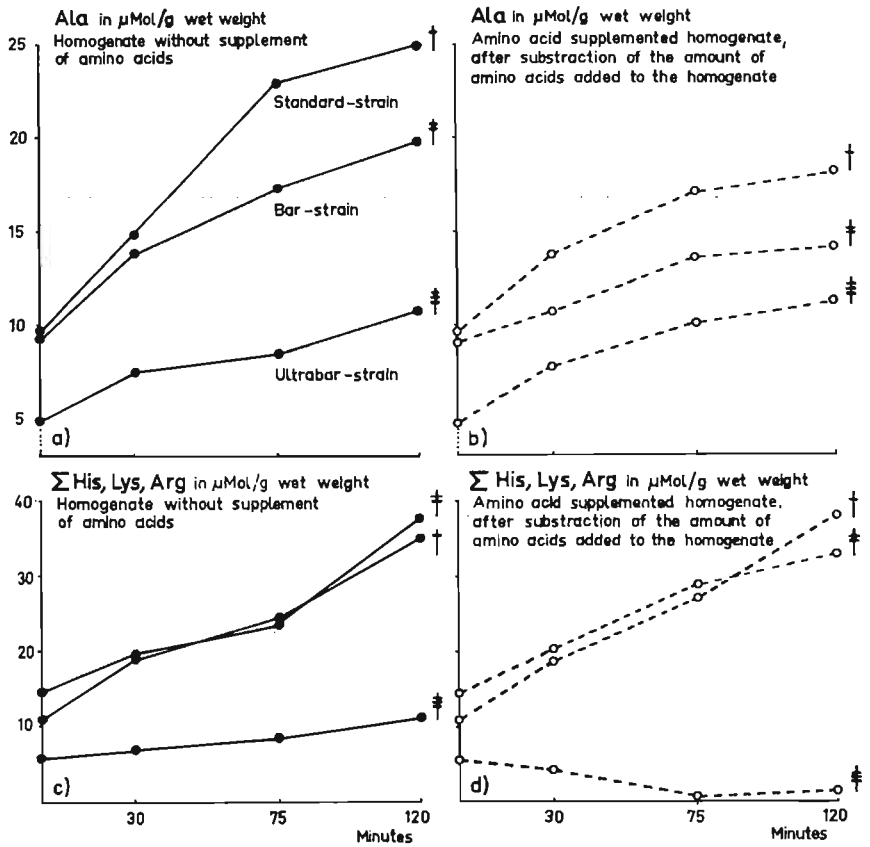

Fig. 2