The mutation impairing the heat-shock response does not prevent the development of the stress-reaction in *Drosophila*.

Gruntenko, N.E., I.A. Vasenkova, M.Zh. Sukhanova, and T.M. Khlebodarova. Institute of Cytology and Genetics, Siberian Branch of Russian Academy of Sciences, Novosibirsk 630090, Russia.

It is known that unfavorable effects produce in insects an unspecific adaptive response both on the level of the cell (the heat shock response) and the whole organism (the neurohormonal stress reaction) (see reviews: Rauschenbach, 1991; Cymborowski, 1991; Lindquist, 1993). There are many studies concerned with each of these adaptive mechanisms conducted worldwide. However, the interrelations of the two systems remain unestablished. The open questions are whether the heat shock response arising during the first minutes of the onset of the effect of a stressor is the trigger link for the development of the stress reaction or do these systems respond independently to the stressor, each providing adaptation on its own level? We present here the results of studies of the response of two central links on the stress reaction (the systems of the juvenile hormone and octopamine metabolism) to stress in line ts403 of *D. melanogaster* carrying the recessive temperature-sensitive lethal mutation *l(1)ts403* in the X chromosome (Arking, 1975). When temperature is raised, HSP83 and HSP35 are not synthesized and the synthesis of a number of proteins of the HSP70 group is suppressed in individuals of this line (Evgen'ev *et al*., 1990).

We have previously demonstrated that the changes in the activities of JH-hydrolyzing enzymes and of the first enzyme involved in the pathway for OA synthesis, tyrosine decarboxylase (TDC), can serve as indicators of the development of the stress reaction in *Drosophila* (Rauschenbach *et al*., 1995; Sukhanova *et al*., 1997). TDC activity was determined using a radioisotopic method of McCaman and co-authors (1972). Measurement of hydrolysis of radioactive JH were carried out by the method of Hammock and Sparks (1977).

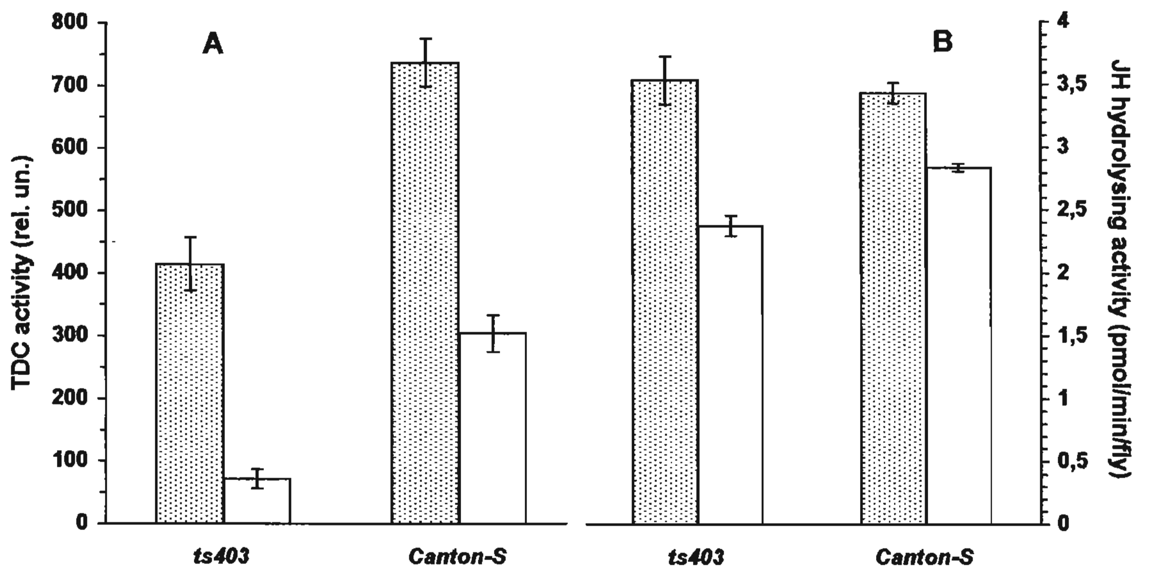

Figure 1. TDC activity (A) and level of JH-hydrolyzing activity (B) in 5-day-old females of lines ts403 and Canton-S under normal and stressful conditions (38°C, A - 60 min; B - 120 min).

The results of TDC activity measurements in individuals of line ts403 and of wild-type line Canton-S (the latter was used as control) demonstrated that exposure to stress evoked in line ts403 individuals, as a Canton-S flies, a significant ($P < 0.001$) decrease in enzyme activity compared to control (Figure 1).

The level of JH-hydrolyzing activity also considerably decreased under the effect of the stressor in females of line ts403 (Figure 1), as well as in wild-type Canton-S females (the differences from the control are significant in both lines, $P < 0.001$).

Thus, we demonstrated that the system of JH degradation in flies of line ts403 responds to a stressful agent by a sharp reduction in JH-hydrolyzing activity. The response of the system of OA metabolism to the action of the stressor was also strongly manifested in individuals of line ts403. It may be concluded that impairment of the synthesis of the HSPs in this line does not result in perturbance in any one of the links of the hormonal stress reaction we studied. It may be inferred that the heat shock response presumably is not a trigger link of the stress reaction and that the two adaptive mechanisms to unfavorable conditions in insects are triggered independently or in parallel, being under the common central control of a, so far, unknown factor.

Acknowledgments: This study was supported by Grant from the Russian fund of fundamental research No. 97-04-49384, by Grant from the Russian State Scientific Program "Priority Directions in Genetics", and by a grant from the Siberian Branch of Russian Academy of Sciences for support of young prominent scientists.

References: Arking, R., 1975, Genetics 80: 519-523; Cymborowski, B., 1991, *Hormones and Metabolism in Insect Stress*. CRC Press, Boca Raton, pp. 99-114; Hammock, B.D., and T.C. Sparks 1977, Analyt. Biochem. 82: 573-579; Evgen'ev, M.B., and O.M. Denisenko 1990, Russian J. of Genetics 26: 266-271; Lindquist, S., 1993, *Translational Regulation of Gene Expression 2*, Plenum Press, New York, pp. 279-320; McCaman, M.W., R.E. McCaman, and G.J. Lees 1972, Analyt. Biochem. 45: 242-252; Rauschenbach, I.Yu, 1991, *Hormones and Metabolism in Insect Stress*. CRC Press, Boca Raton, pp. 115-148; Rauschenbach, I.Yu, T.M. Khlebodarova, N.A. Chentsova, N.E. Gruntenko, L.G. Grenback, E.I. Yantsen, and M.L. Filipenko 1995, J. Insect Physiol. 41: 179-189; Sukhanova, M. Jh., I.A. Ankilova, N.E. Gruntenko, T.M. Khlebodarova, L.Z. Kaidanov, and I.Y. Rauschenbach 1997, Biochem. Genet. 35: 91-103.

Frugivorous *Drosophila simulans* begins to exploit *Opuntia ficus-indica* cladodes.

Eisses, Karel Th.*, **Ian C.W. Hardy**[1], **Mauro Santos, and Adam Leibowitz.** Universitat Autònoma de Barcelona, Departament de Genètica i de Microbiologia, Bellaterra (Barcelona), Spain, [1]Leiden University, Institute of Evolutionary and Ecological Sciences, The Netherlands, *Address for correspondence: Utrecht University, Department of Plant Ecology and Evolutionary Biology, Padualaan 8, 3584 CH Utrecht, The Netherlands, E-mail: kteisses@dds.nl:

The introduction of exotic plants creates potential new niches for endemic animals. European tradespeople brought the cactus *Opuntia ficus-indica* in the 16th century from Mexico to Europe to serve as substrate for the cochineal insect (*Dactylopius coccus*), which is used for the production of red dye. Cosmopolitan frugivorous *Drosophila* species as *D. melanogaster*, *D. simulans*, and *D. hydei* are known to use the fruits of this exotic plant (Carson, 1965; Haouas *et al.*, 1984, Santos *et al.*, 1999). Whereas the cactophilic species *Drosophila buzzatii* is not known to breed outside its plant-specific niche, *i.e.* decaying cladodes and cactus fruits (Carson, 1965), we show that *D. simulans* made a start to adapt to the non-fruit part of *O. ficus-indica*. **(A)** Naturally rotting *O. ficus-indica* pads were collected in a semi-abandoned *O. ficus-indica* plantation in southern Spain, 3 km north of Carboneras (37 01'N, 1 52'W) (Eisses and Santos, 1997). These pads yielded low but increasing numbers of *D. simulans* in two successive years (Table 1). In a few cases (3/10), the frugivorous *D. simulans* outnumbered the cactophilic *D. buzzatii*. Inherently to cactophilic *Drosophila*, *D. buzzatii* emerged from rotting pads in much higher numbers, *e.g.* in September 1993 and 1994 up to 1109, and 1861, respectively, per cladode. **(B)** The non-accidental occurrence of *D. simulans* in cladodes was tested by placing baits in the field in June 1995 (Table 1). Fresh *O. ficus-indica* cladodes were cut into discs (7 cm diameter) and placed on moist vermiculite in plastic plant-breeding trays. After about 100 h in the field, the cladode-discs were brought back to Barcelona, and checked for emerging flies (Table 1). All 39 *D. simulans* emerged from 6/12 discs placed near a flowering *Agave ricana* and a solitary *O. ficus-indica* at one of the six sites. Only one of these discs produced both *D. buzzatii* and *D. simulans*. The mature *D. simulans* and *D. buzzatii* were very small compared with those emerging from standard laboratory medium or *O. ficus-indica* fruits. In contrast with the normal situation, some *D. simulans* males were bigger than females. Emerging *D. simulans* males and females were paired and placed on standard laboratory medium to check their fertility: all pairs produced offspring. The fresh cladode discs yielded only a total of 33 adult *D. buzzatii*. **(C)** Discs, which did not yield flies but continued to decay, were used for additional experiments in the