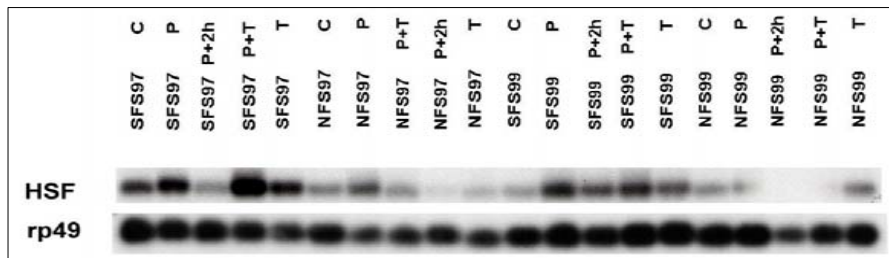


EXPRESSION OF HEAT SHOCK CANDIDATE GENES

Patterns of expression of genes involved in stress response are among the most relevant targets for microscale comparisons in the canyon. Our tests are focused on heat-shock protein genes. The central item in transcriptional regulation of heat-shock response is the activity of stress-regulated heat-shock transcription factor (*Hsf*). Induced changes in transcription of *HSF* are of primary importance within the framework of our studies. We were interested in the association between the expression of heat-shock protein genes and thermotolerance. The experiments were conducted using Northern blot analysis on flies collected in the canyon during 1997–2004.

The SFS population manifested higher levels of *Hsf* expression compared to NFS after heat shock and after moderate heat-shock treatment followed by severe heat stress (I. Baca, unpublished results).

Hsf mRNA levels in SFS and NFS flies



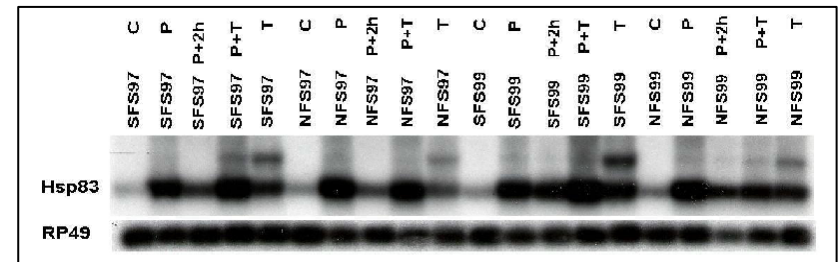
Northern blot hybridization with ³²P-labeled *Hsf* genomic DNA probe. *Rp49* - RNA loading control. C - control, P - pretreatment, P+2h - pretreatment followed by 2h recovery; P+T - pretreatment followed by recovery and treatment, T - severe treatment.

Pretreatment procedure was found to be more effective for *Hsf* expression in SFS populations. *Hsf* expression and thermotolerance under combined heat stress correlated positively with survivorship.

Basal and acquired thermotolerance scores showed positive correlation with induced expression of *Hsp40* gene. Mean thermotolerance and expression of *Hsp40* displayed by SFS flies significantly exceeded those for the NFS samples (J. Carmel, unpublished results).

Genotypic differences were found in the dynamics of heat shock protein gene *Hsp83* expression after moderate, severe, or combined heat-shock treatments (I. Baca, unpublished results).

Reaction of *Hsp83* to heat treatments



C - control, P - pretreatment, P+2h - pretreatment followed by recovery, T - treatment, P+T - pretreatment followed by treatment, *Rp49* - RNA loading control.

Expression of the *Hsp83* gene was higher in NFS flies at moderately elevated temperature, but considerably decreased under more severe subsequent treatment. In contrast, the expression of *Hsp83* in SFS flies greatly increased when exposed to severe heat shock.