Gupta, A., W. Tadei, A. Monzato, E. Maciel, and E. Godoi. Univ. Fed. da Paraíba, CCEN/DBM, 58.059-900 Joao Pessoa - PB, Brazil. A genetic study on gene regulatory systems between sibling species of *Drosophila*.

It is well established that *D. pseudoobscura* and *D. persimilis* are two sibling species. However, the two may have genetic differences in their gene regulatory systems underlying morphological characters. In order to answer this question, we have analyzed the data collected by Gupta, for the following meristic characters: 1) bristle number on 4th and 5th sternites in both sexes, 2) tooth number on proximal and distal sex combs on both legs, 3) genital arch tooth number on both sides (for details of materials and methods, see Gupta 1978, Evol. 32: 580-587). For each individual fly, average bristle number was computed using both sternites, both proximal as well as both distal sex combs, and genital arch tooth number on both sides. Such calculations were made for parental, F1 and backcross classes at two temperatures: 17.5° and 25.5°C. The results showed that the bristles on sternites are sex-linked. The transmission of such bristles from parental to F1's occurs in additive fashion and later segregate accordingly in their backcross classes. This holds true at both temperatures. A comparison (2x2) between the parental and backcross classes made by Tukey test showed that the backcross individuals, obtained from *D. pseudoobscura* Sc-h-11 x *D. persimilis* FC-46, gave higher number of significant classes than their parental classes at 17.5° than at 25.5°C, while the backcross classes obtained from *D. pseudoobscura* Sc-f-8 x *D. persimilis* FC-51B males gave the opposite results at these temperatures. In general, it clearly demonstrates that the temperature plays a significant role in the development of bristles analyzed in question (with the exception of bristles at distal sex combs where the backcross classes obtained from both the crosses were higher in number at 17.5° than at 25.5°C, when compared with the parental classes).

The ANOVA showed the existence of not only the effect of genotype and temperature but also a significant interaction effect, for each meristic character in question. This implies that the regulatory genes for the decrease or increase in bristle number are also influenced by such an interaction effect. That is to say, the increase or decrease in bristle number does depend upon the degree of an interaction that occurred during its development.

For each of the parental, F1's and backcross classes, the correlation analysis for the bristle number at two temperatures was made for the following: 1) sternites vs. proximal sex combs, 2) sternites vs. distal sex combs, 3) proximal vs. distal sex combs, 4) proximal vs. genital arch tooth number, and 5) distal vs. genital arch tooth number. The backcross individuals, in general, showed larger correlation values than their parental classes. It holds true at both the temperatures. Such observations indicate that there exists a common relationship among the gene regulatory systems for the development of the types of bristles studied. However, we do not know yet the degree of such relationship. It is interesting to note that specifically for bristle number on sternites vs. proximal sex combs, *D. pseudoobscura* Sc-h-11 males showed negative correlation at 17.5° but positive at 25.5°C. On the other hand, *D. persimilis* FC-46 males gave negative correlation value at both temperatures. The F1 classes showed positive or negative correlation value depending upon whether the parental males of the species had positive or negative correlation. However, the correlation values for each of the four backcross classes, obtained from *D. pseudoobscura* Sc-h-11 x *D. persimilis* FC-46, were found to be positive at 17.5° and negative at 25.5°C. Such results indicate that the developmental pathways for such bristles controlled by the gene regulatory systems are disturbed. That is to say that the gene regulatory systems of *D. pseudoobscura* are different from those of *D. persimilis* responsible for the development of bristles analyzed in question, and that such genes express their effects only in backcross individuals, and that clearly explains for the existence of very low viability in backcross classes. Thus, such a divergence in the structural as well as regulatory genes between the two species is the main cause for the occurrence of very low viability (specifically for males) in the backcross progeny. These results, therefore, imply that in addition to the reproductive characters such as spermatogenesis, the gene regulatory systems are also affected at the time of speciation. In other words, *D. pseudoobscura* and *D. persimilis* did diverge in their gene regulatory systems at the time of speciation (however, to what extent we do not know yet).

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Kekic, V. Institute of Zoology, Faculty of Biology, University of Belgrade, Studentski trg 16, 11000 Belgrade, Yugoslavia. *Drosophila* community in barrels containing fermenting grapes.

It is common for fruit and wine growers in my country to distill homemade brandy, and it is still done in an old way: fruit is placed in barrels covered by cotton (or by plastic nowadays) cover, and stirred at least once a day (in order to prevent molding), until the end of fermentation.

Above three such barrels, placed outdoors close to a distillery, containing 1,500 kg of fermenting grapes, I collected flies by sweeping on October 10 and 11, 1996, from 5 to 5:30 p.m., both days when there were plenty of flies, at a temperature of 18°C. It was in Sremska Kamenica (200 m a.s.l.) on Fruska gora Mt. (about 70 km north from Belgrade) in a habitat most closely described as a settlement with summer houses with vineyards, orchards and vegetable gardens. The habitat contains numerous trees (mostly coniferous), bushes and flowers around the houses, for decorative purposes.

Table 1 presents collected *Drosophila* species, as well as results of our previous study (Kekic *et al.*, 1983, 1985) which was performed in similar microhabitats (next to barrels with fermenting plums) and in the same season (during October and the beginning of November) on 29 geographic localities in Bosnia and Herzegowina (in a range of 90 to 1.031 m a.s.l.).

The general similarity in *Drosophila* species composition in both studies is obvious. But there are dissimilarities that can be explained by differences in habitats and, above all, in methods of collecting. Flies from Fruska gora were captured in barrels, while in Bosnia and Herzegowina they were captured near them (alcohol concentration in barrels is several times higher than by the barrels).

All captured *Drosophila* flies belong to domestic species (Dobzhansky, 1965; Parsons and Stanley, 1981), except *D. subobscura*. As it was expected, *D. melanogaster* was a dominant species. Someone can be surprised by a relatively minor presence of its sibling species *D. simulans*. This species is rather rare in Sremska Kamenica, and these were the first specimens captured at this locality after almost twenty years (Kekic, 1990). In studies of grape breeding *Drosophila* communities in vineyards of southern France, also in October, Capy *et al.* (1987) found the relative frequencies of the sibling cosmopolitan species highly variable: in the two places *D. simulans* was almost absent, and in one place, on the other hand, *D. simulans* was much more abundant than *D. melanogaster*.

Table 1. *Drosophila* species collected by sweeping over barrels containing fermenting grapes on Fruska gora Mt., Yugoslavia. For Bosnia and Herzegowina collections see text.

Species	Fruska gora Mt.	Bosnia & Herzegowina*
D. melanogaster	10,929	9,508
D. hydei	32	58
D. busckii	6	25
D. immigrans	6	54
D. simulans	9	48
D. subobscura	1	—
D. funebris	—	85
Total	10,983	9,778

* Kekic et al., 1983

The finding of *D. subobscura* is more interesting because of its relatively low tolerance of alcohol - if it is expressed by LC50 (the lethal concentration of ethanol killing 50% of the flies), then for the French population of *D. subobscura* the LC50 was 3.3%, while, for the sake of comparison, in the various French populations of *D. melanogaster* the LC50 was on average 19.8± 0.6% (Capy *et al.*, 1987). On the other hand, various studies demonstrate *D. subobscura* being rather widespread and ecologically versatile, e.g. it is dominant in most of "wild" (forest) habitats of ex Yugoslavia, very frequent in "semi-domestic" habitats (vineyards, orchards, city parks, etc.), and it can be scarcely found even in "domestic" habitats, sometimes inside the apartments (Kekic and Bächli, 1995). The recent colonization of the species in America, and its efficient spreading over the continent, also affirm the adaptability of *D. subobscura* (Krimbas, 1993). And, finally, Capy *et al.* (1987) found it emerges from grape, also, like *D. melanogaster* and *D. simulans*.

On the basis of 20 years continuing studies of *Drosophila* fauna in vineyards and orchards of Sremska Kamenica, it is to my knowledge that in this habitat live 16 *Drosophila* species (Kekic, 1990). They can all be captured by sweeping over a small quantity of fermenting fruit bait. The larger portion of fermenting fruit, producing high concentration of alcohol, is attractive only to several species (Table 1) probably only as a feeding substrate for most of them. At this moment I am not convinced if the found species lay eggs on this substrate - the only thing I am positive about is that only *D. melanogaster* can complete its development in it (maybe *D. simulans* and *D. hydei*, also, but it is only an assumption).

References: Capy, P., J.R. David, Y. Carton, E. Pla, and J. Stockel 1987, Acta Ecologica, Ecol. Gener. 8(3):435-440; Dobzhansky, Th., 1965, In: The Genetics of Colonizing Species (H.G. Baker and G.L. Stebbins, eds.), Academic Press, New York and London; Kekic, V., 1990, Biosistematika 16(2):81-88; Kekic, V., R. Hadziselimovic, and Z. Smit 1983, Dros. Inf. Serv. 59:61-62; Krimbas, C.B., 1993, In: *Drosophila subobscura* - Biology, Genetics and Inversion Polymorphism, Verlag Dr. Kovac, Hamburg; Parsons, P.A., and S.M. Stanley 1981, In: Genetics and Biology of Drosophila (M. Ashburner., H.L. Carson, and J.N. Thompson, eds.), Vol. 3a. p. 349, Academic Press, New York and London.