

In Table 2 we compared the heterochromatin percentages of the three species of *inca* subgroup, highlighting the accumulation referred and the upward trend from *D. huancavilcae* to *D. yangana* and to *D. inca*. This gradient is similar to what was observed in the values mentioned in the introduction. This fact could be a confirmation of the correlation between accumulation of heterochromatin and acquiring greater biological fitness during the speciation process. Likewise, the extensive range of distribution that we had evidenced in *D. inca* could be interpreted like a stroke of major fitness of this species in comparison with their sisters that recently we had registered in the interandean province of Imbabura in the north of Ecuador Rafael, V., and Acurio, A. (2008, personal communication).

Consequently *D. inca* could be a derivative species and *D. huancavilcae* probably more ancient, and it could be related with *D. yangana*.

Polytene chromosomes of *D. huancavilcae* were analyzed, and we identified a new inversion called $2y^5$ and inversions: Xabc, 2ab, 3b of Hypothetic Primitive I sequence (Romero and Mafla, 2008 in press), while we are cultivating the two others species: *D. inca* and *D. yangana* to continue with the cytologic analysis of giant chromosomes.

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Response to light and distribution of *Drosophila* larvae in a feeding environment.

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Introduction

Photoresponses are widespread between invertebrates. The sign of the photoresponse may adjust to variations in the external stimulus situation. In this way, the response to illumination

conditions of *Drosophila* larvae may act as to a token stimulus (Andrewartha and Birch, 1954). That is, the response to light may bring the larvae to places where there are ecological resources. For example, Godoy-Herrera (1977) and Godoy-Herrera *et al.* (1992) reported that *D. melanogaster* larvae burrowed deeper into medium in the dark than in the light gaining access to more food and space. Thus, the response to light may influence *Drosophila* spatial larval distributions in relationship to ecological resources as food and space. Photoreception in invertebrates is mediated in part by the inositol 1,4,5-trisphosphate (IP₃) second messenger pathway, and phototransduction in *D. melanogaster* uses a G protein coupled phosphoinositide pathway (Hardie and Raghu, 2001) wherein photoisomerization of rhodopsin to metarhodopsin in the photoreceptor rhabdomeric microvilli activates heterotrimeric Gq. Gq- then activates a phosphatidylinositol (PI)-specific PLC, which hydrolyzes PI 4,5-bisphosphate (PIP₂), generating inositol 1,4,5-triphosphate (IP₃). This knowledge comes from genetic analysis using mutations that eliminate the light-evoked responses of photoreceptors. One of these genes is the *norpA* (no receptor potential; Hotta and Benzer, 1970). Here we used *D. melanogaster norpA*⁷ allele to investigate spatial distributional patterns of mutant and wild type larvae in a feeding environment. We want to understand how genes expressed in the nervous system of the larva may influence feeding strategies and use of space.

Materials and Methods

Subjects: The strains employed were: *norpA*⁷, CS (wild type strain from which *norpA*⁷ was isolated; Hotta and Benzer, 1970), and Oregon R-c (wild type). All the stocks were kept in Burdick's medium (Burdick, 1954) at 24°C.

Experimental design: We used 15 × 15 × 2 cm (width × length × height) plastic boxes filled with agar. On the agar surface was distributed a film of 4% yeast suspension in plain water. Each box was covered with a plastic lid. On the center of each lid, a thick, black paper disk of 8.5 cm in diameter was attached (details in Godoy-Herrera *et al.*, 1992). The boxes were illuminated by a white cold bulb of 60 watts placed 25 cm above them. In this way, each box had two different visual environments: (a) a dark area produced by the shadow of the paper disk cast on the agar at the center of each box, and (b) a more highly illuminated annulus surrounding the center disk. Larvae found in the dark zone presumably prefer a less illuminated environment for feeding; those found eating on the more illuminated area were classified as larvae showing a photopositive behavior. We individually tested 35 third instar larvae of each of the *norpA*⁷, CS, and Oregon R-c strains. Each individual was deposited onto the agar of the boxes between the dark area and the illuminated area, and the position of each larvae in each visual environment was recorded continuously for 5 min. In other experiments, we drew for 2 min the track made on agar by each one of 35 larvae of the same age for each one of the strains used. We measured the length of each track and the number of turns.

Results

Larvae of the *norpA*⁷ strain were distributed at random in the boxes (at the end of observation period 48.57% of the larvae were on the illuminated area, 45.71% were on the dark zone and 5.71% were on the limit between these two zones; *G*-test of independence, $\chi^2 = 1.56$, *df* = 2; NS). In contrast, Oregon R-c and CS larvae preferred the dark zone to feed (Oregon R-c: illuminated area, 25.71%; dark zone, 68.57%; limit between the two zones, 5.71%; *G*-test of independence, $\chi^2 =$

12.38; $df = 2$; $P < 0.05$). In the case of CS larvae the percentages were, respectively, 24.69% (illuminated area), 72.21% (dark zone), and 3.10% (limit between the zones) (G -test of independence, $\chi^2 = 15.26$; $df = 2$; $P < 0.05$).

Larval locomotion of the Oregon R-c and CS strains was also greater than that of the *norpA*⁷ larvae (t -test, Oregon versus *norpA*⁷, $t = 4.34$, $df = 58$; $P < 0.05$. CS versus *norpA*⁷, $t = 5.25$, $df = 58$; $P < 0.05$). Larvae of the three strains did not show significant differences in number of turns made to crawl on agar (t -test).

Discussion

A variety of behavioral factors are involved in habitat choice in *Drosophila* (Powell, 1997). The present work indicates that *D. melanogaster* larvae may use their photoresponse to influence the direction of their movements. Differences in photoresponse between larvae of different genetic backgrounds indicate the importance of genotype in habitat selection in *Drosophila* larvae. On the other hand, the data suggest that neurological mutants that affect the sensory system of *Drosophila* larva by altering the signal transduction pathways could help us to link cell biology of nervous system with ecology of *Drosophila* breeding sites. Additionally, neurological mutants may also provide a means to understand how *Drosophila* larvae perceive and react to some environmental cues associated with the distribution and abundance of resources such as food. Little work has been done on the relationship between mutants that affect specific neural circuits and the ecology of larval stage. The altered response to light of *Drosophila* larva produced by the *norpA*⁷ mutation could serve as a model system to understand the functioning of their nervous system in relationship with the ecology of *Drosophila* larval stage.

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First record of *Zaprionus indianus* (Diptera: Drosophilidae) in the Urucu Petroleum Province in Amazonas, Brazil.

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The genus *Zaprionus* Coquiliet 1901 (Diptera Drosophilidae) is composed of two subgenera and 56 species. By now, only one species was found in other tropical areas of the world (De Toni *et al.*, 2000).