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Fluctuating sexual characters in *Drosophila pseudoobscura* from Colombia

Environmental and genomic stresses have been found to be responsible for a wide range of morphological defects in *Drosophila*[1,2], in fowls[3–11], in mice[12–14], to support theories on evolutionary rates[15–17] or to elaborate new ones about associated fitness[18]. Hence, the phenomenon may be considered a general one with global implications in biology.

This paper presents observational data on the susceptibility of various isofemale lines of *Drosophila pseudoobscura* from Colombia to close inbreeding. These observations serve to test the hypothesis, long-claimed by Waddington[19], of whether developmental canalization is peculiar to stressed genomes.

Even as early as 1917 it became established[20] that crossing-over increases when the temperature at which *Drosophila melanogaster* develop is increased or decreased from 25°C (normal culture temperature). More recently, others have shown that there seems to be an increase of recombination in the range at which species continuity is threatened[17].

We report here the discovery of males of *Drosophila pseudoobscura* from Susa and Recreo in the high plateau of the Colombian Andes with significantly high fixation indexes (F_{IS}, F_{ST}, F_{IT}) that show departures from random breeding structures[21] with apparently normal external genitalia but without sexual combs. We also report the presence, within the same isofemale stocks, of females with sexual combs in the first pair of legs. Interestingly, the three individuals (two males and one female) from Susa and Recreo were fertile. In other experiments[22] males with similar phenodeviants were frequently found among colonizers in the region, but not in Susa and Recreo.

There is substantial literature indicating that structural heterozygosity due to pericentric inversions in one part of the genome of *Drosophila melanogaster* increases recombination in the rest of the genome[23,24]. In experiments with temperature induction, the major effect is in the centromeric region. Therefore, both environmental and genomic stresses can have parallel or similar effects upon recombination. Our tentative hypothesis, an extension of what we associated[18] with optimal fitness in 1968, is that the underlying mechanism perhaps involves enzymes that control normal pairing[24] as when nitrogen–oxygen generate effects on the repairing mechanism in meiotic chromosome breakage induced by X-irradiation of mature and meiotic germ cells of *Drosophila melanogaster*[25].

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