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# Genetics of «distorted» (d) in Culex pipiens fatigans

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The autosomal recessive mutant *«distorted» (d)*, isolated from the isogenic laboratory strain of *Culex pipiens fatigans,* affects the whole body in both sexes being more pronounced in females. The antennae are curved, wings curled and crumpled and legs often wobbly and undulating.

In the course of routine examination individuals of *Culex pipiens fatigans* showing abnormality in various parts of the body were discovered; the antennae appeared curved, wings crumpled and curled upward through almost half the length and the legs were wobbly and undulating. Females were generally more seriously affected than the males. Since various parts of the body are distorted, the character has been named *«distorted»* (Fig. 1).

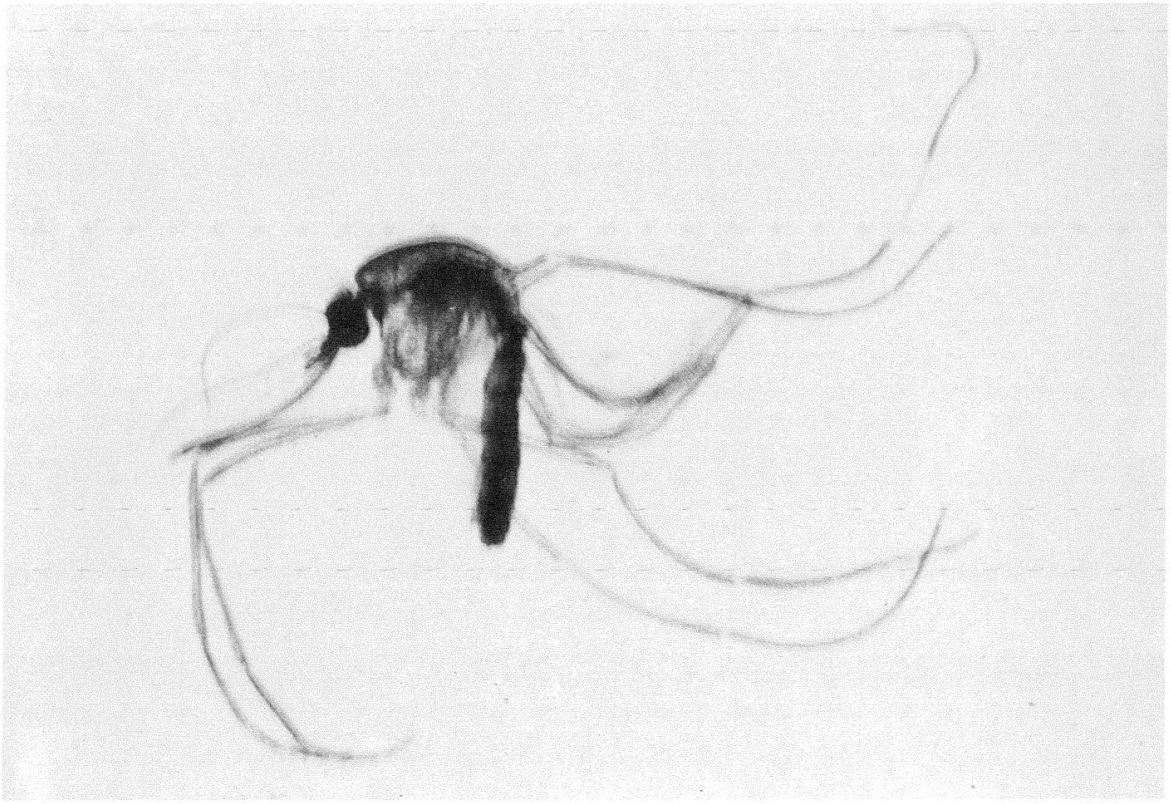

Fig. 1: The mutant *distorted (d)* in *Culex pipiens fatigans* showing curved antennae, curly wings and wobbly legs.

## METHODS

Much difficulty was encountered in breeding this mutant. Individuals appearing comparatively active and healthy were selected and given special attention in rearing operation. Crosses were still hampered due to difficulties in mating, low viability and high mortality associated at almost all stages. The rearing schedule described elswhere (AHMAD & ADHAMI, 1980) was applied under controlled conditions (27 ± 2°C & 75 ± 5% RH).

## RESULTS

The results of mass crosses as summarized in Table 1., show that when mutant females were crossed to wild type males, all of the progeny were normal. The same result was obtained in the reciprocal cross. $F_2$ progeny obtained by crossing $F_1$ individuals, consisted of both normal and mutant phenotypes, the proportion being concordant with a 3 : 1 segregation. Similarly, both backcrosses yielded an approximate 1 : 1 segregation. The cross between mutant females and males gave an all mutant progeny.

The data were further confirmed by single-pair matings in all the directions. The results, therefore, clearly indicate that «distorted» is a monofactorial trait controlled by an autosomal recessive gene, now being assigned the symbol *d*.

Expressivity showed a wide range depending on the intensity of the abnormality and the body parts affected. However, mutants could easily be separated from wild type in at least 85% of individuals.

Table 1: Inheritance of *distorted* in *Culex pipiens fatigans*. Phenotypes: m = mutant, w = wildtype

| No. | Type of Cross ♀x♂ | | Total | Wildtype | Mutant | $\chi^2$ |
|---|---|---|---|---|---|---|
| 1. | m x w | * | 119 | 119 | — | — |
| | | ** | 31.2 ± 2.24 | 31.2 ± 2.24 | | |
| 2. | w x m | * | 209 | 209 | — | — |
| | | ** | 40.8 ± 4.21 | 40.8 ± 4.21 | | |
| 3. | $F_1$ x $F_1$ | * | 120 | 94 | 26 | 0.53 |
| | | ** | 32.2 ± 4.97 | 24.9 ± 3.29 | 7.1 ± 2.01 | |
| 4. | m x $F_1$ | * | 163 | 86 | 77 | 0.24 |
| | | ** | 38.3 ± 3.00 | 22.0 ± 1.16 | 16.3 ± 1.14 | |
| 5. | $F_1$ x m | * | 120 | 66 | 54 | 0.60 |
| | | ** | 48.3 ± 5.76 | 28.0 ± 4.53 | 20.3 ± 2.23 | |
| 6. | m x m | * | 42 | — | 42 | — |
| | | ** | 30.3 ± 3.76 | — | 30.3 ± 3.76 | |

* Mass cross (10 ♀ : 10 ♂); $\chi^2$, $P<0.05$

** Single pair mating, 10 replicates; ± = standard error

The larvae seem to develop normally in early stages but have high mortality there-after, which becomes still higher during and shortly after emergence. Quite a few are unable to extricate their legs from the pupal case while others, unable to fly, fail to leave the surface of water and are drowned. The adults more frequently walk than fly in the cages. The difficulty in flying may result in reduced matings and low fertility, thus making the trait semi-lethal, whereby the *distorted* character is more pronounced in females.

The morphological characters as well as viability problems associated with this mutant are similar to the mutations involving wings like «short wing» in *Aedes aegypti* (Uppal *et al.*, 1976); and *Culex tritaeniorhynchus* (Sakai & Baker, 1977); «curved wing» in *Aedes togoi* (Tadano, 1978) and «curly» in *Culex tritaeniorhynchus* (Baker & Sakai, 1977), and also comparable to.


RESUMÉ

*Génétique de «distorted» (d) chez Culex pipiens fatigans* - Le mutant récessif autosomal (d), isolé d'une souche isogène de *Culex pipiens fatigans,* s'expresse dans le corps entier chez les deux sexes, plus particulièrement chez les femelles. Les antennes se courbent, les ailes se bouclent et se froissent, et les jambes souvent tremblent et font des mouvements ondulents.



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