

STUDIES ON THE PHENOTYPIC POLYMORPHISM OF *MUSCA DOMESTICA* L.

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Abstract. Phenotypic polymorphism in *Musca domestica* L. was studied. Laboratory cultures and field collected flies were examined under the binocular microscope but no aberrant forms could be found. Breeding of single pairs, however, yielded a large number of variants, in the F₂ generation.

Since phenotypic polymorphism in housefly has proven to be a convenient source for developing good morphological markers,¹⁻⁶ it was considered desirable to initiate studies of this phenomenon in a local strain. As a result of this preliminary survey, several different phenotypes were observed, mainly in the F₂ progeny of four pairs of flies. They are briefly described in this paper. Such studies on housefly of Pakistan have never been reported before.

Materials and Methods

Breeding of single pairs of flies yielded a large number of visible aberrant characters in the F₂ generation. F₁ flies were also examined but very few variants were among them.

Single Pair Technique. Male and female were paired together in large wire-gauze cages (14½ × 26½ cm). Initially twelve pairs of such flies were isolated and bred separately, but only four of them produced F₂ progeny. A first and second batch of eggs were collected from each parental pair and inoculated on larval medium. F₁ Flies were allowed to mate among themselves to provide eggs for obtaining an F₂ generation.

Rearing Technique. Larval medium consisted of wheat bran, moistened with water. The adults were fed glucose solution on a cotton pad. Egg laying was induced on a moist paste of Glaxo milk. Fungous attack can be successfully countered if the medium is mechanically stirred with a rod daily. Later movement of the larvae also helps in this process.

These flies were reared at ordinary room temperature (23-25°C) and humidity (52%) in the local insectary.

Results and Discussions

Before the F₂ was discovered as the main source of polymorphism, about two thousand flies from the general laboratory culture were examined. No aberrant forms were found. Then an equal number of flies from meat shops of Malir area, Karachi, were collected and brought to the laboratory for observation and again no aberrant forms were found. Therefore, resort was made to culturing of single pairs. F₁ Flies yielded very few aberrant forms (Table 1), and hence, all the variants reported herein, except a few, belong to the F₂ generation.

These flies have never been exposed to any mutagenic treatment nor irradiated. Hence the phenotypes reported here are of spontaneous origin.

Baldness or Absence of Chaetotaxy. Degree of baldness varies and occurs in both sexes. Usually all of the body is bald and such individuals appear to be incapable of survival. Their general shape is abnormal in being dorsoventrally depressed and somewhat more quickly dried up after emergence. On the other hand, individuals with partial baldness like that of thorax or abdomen only are otherwise normal. They resemble 'spineless' and 'reduced' of Tsukamoto *et al.*⁵

F₂ Generation of each pair contained a large number of such individuals with total baldness. In a way this could be considered as the most common type of abnormality in this strain (Table 1). They differ from the 'Shaven' of Sullivan and Hiroyoshi³ in that the shape of wings and legs is normal. The 'Shaven' flies of these authors have curled wings and abnormalities of legs. Three females of F₁ were also bald.

Unexpanded Wings. A few adults including one in the F₁ of one pair, were found to emerge with unexpanded wings. This or a similar anomaly has been tested by Hiroyoshi² who reports it as a recessive character of poor penetrance.

One individual had its head and thorax bald, but abdomen with spines was observed with unexpanded wings.

Curled. (1) One wing curled upon at the tip; (b) only right wing unexpanded and curled up; and, (c) distal part of both wings curled downward.

White Eyes. Four females with white eyes were found. They were separated for further breeding but died after a few days without laying any eggs. They resembled w⁵ white, 1965 of Hoyer.⁶

Frontal Projection. Some individuals had a prominent protuberance in front of antennae. Probably this represents the ptilinum which did not recede after breaking through the puparium.

Vein-like Line. One male had a vein-like line, arising from a bubble-like structure, from anterior cross-vein and running posteriorly. Bubble resembles the 'blisters' of Hoyer.⁶ Some other flies showed only the line which became invisible on pressing the wing.

Faint Vein. A longitudinal faint-vein between third and fourth longitudinal veins. Only two flies showed this character.

Interrupted 4. Part of V₄, anterior to the anterior cross-vein is absent. Three flies showed this aberra-

TABLE I. NO. OF F₁ AND F₂ PUPAE AND FREQUENCY OF VARIOUS ABERRATIONS.

Parental pair No.	No. of F ₁ pupae	No. of F ₂ pupae	Complete baldness		P.C.V. aberration		Knot-like thickenings on	
			F ₁	F ₂	F ₁	F ₂	F ₁	F ₂
1	69	1040	—	13	—	11	—	—
2	83	371	—	5	1	—	—	16
3	88	1654	—	65	—	2	—	1
4	45	1154	3	45	—	5	1	—
Mixed	—	—	—	3	1	6	—	—
Total	285	4219	3	131	2	24	1	17



Fig. 1. Interrupted 4 on both wings.

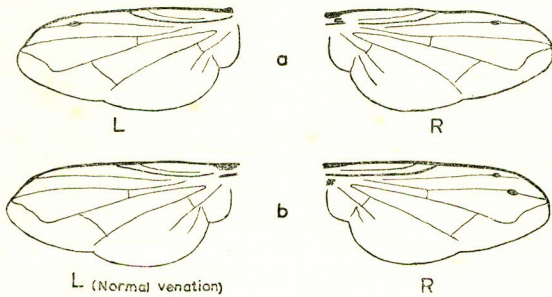


Fig. 2. Thickened knots; (a) on V₂ of both wings; (b) on V₂ and V₃ of right wing only.

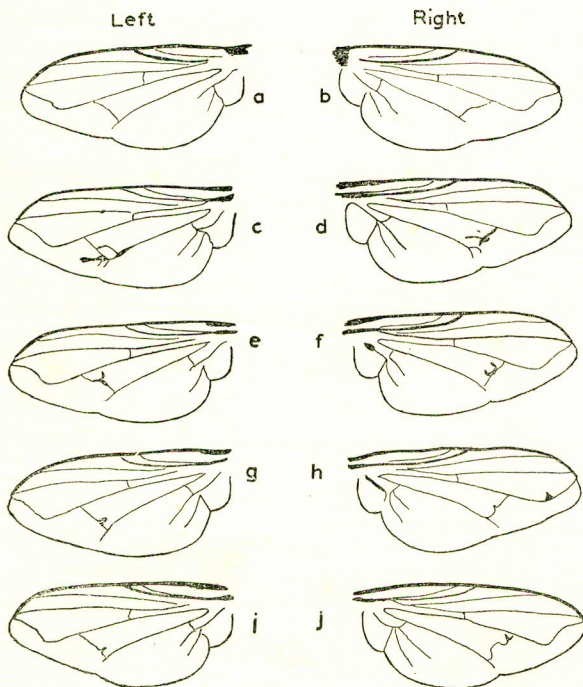


Fig. 3. Abnormalities in posterior cross vein, a-j.

tion on both wings (Fig. 1), while in one female it occurred only on the left wing. This seems to be similar to broken L₄, 1964 of Hoyer.⁶

Thickened Knots. Twelve F₂ flies of one parental pair had knot-like thickenings on V₂ of each wing near wing margin (Fig. 2a). Three females had this knot on V₂ of right wing only. One male had it on the left wing only. One female had such thickenings on both V₂ and V₃ of right wing (Fig. 2 a and b). One F₁ male had its left V₂ with a knob-like thickening. This male was not related to others which showed knots.

V₂ with a Black Mark. V₂ of each wing with a black mark towards proximal end. Two females of F₁ possessed this aberration. They however, were not isolated for being bred separately. This character of course, did not recur in the F₂.

Abnormalities in Posterior Cross Vein. F₂ Progeny of one parental pair showed radical abnormalities in the shape of its posterior cross-vein (Fig. 3 a-j). There are extra veins and abnormal thickenings. In some flies this character appeared grotesque (Fig. 4). Extra veins may be present on one or both wings



Fig. 4. Grotesque character of P.C.V. of left wing, right wing is normal.

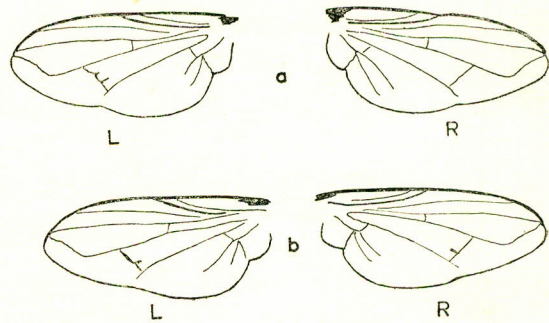


Fig. 5. Extra veins on posterior cross vein, (a) on left P.C.V. only, (b) on both left and right P.C.V.

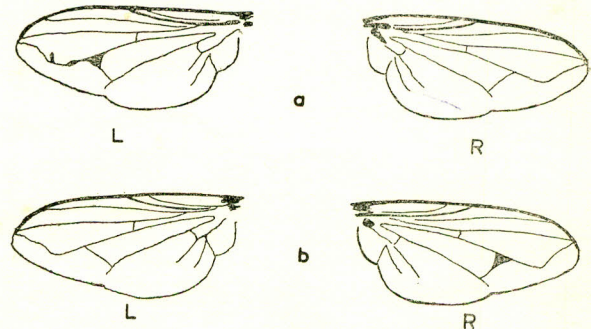


Fig. 6. (a) Extra vein on V₄ of left wing, also a triangular thickening on its P.C.V., right wing is normal, (b) triangular thickening on P.C.V. of right wing only, left wing is normal.

(Fig. 5a and b). They may arise from anterior or posterior or both sides of P.C.V. Each wing may have one or two such extra veins. One male and female of F_1 also showed this characteristic. They belonged to different parents. No individual of F_2 of these parents possessed this aberration.

Blackening. In one female of F_1 there was some blackening at the point of origin of Sc and V_1 .

V_4 with Extra Vein. V_4 of left wing with an extra vein (Fig. 6a). P.C.V. of this wing which is similar to fasciculate of Tsukamoto *et al.*⁵ was, however, heavily thickened at one end. It was a bald male. Such a triangular expansion or thickening of P.C.V. at its one end could be either on left (Fig. 6a) or right wing (Fig. 6b).

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