



Preliminary report on electrophoretic pattern of acid phosphatase of a few species belonging to *ananassae* subgroup of *Drosophila* in Dharwad District.

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Abstract

Acid phosphatase in 3 different species of *Drosophila* belonging to *ananassae* subgroup collected from Dharwad district was studied using native page. The isozyme analysis revealed that there are about 9, 8, and 7 different patterns in *D. ananassae*, *D. bipectinata*, and *D. malerkotliana*, respectively. Each pattern of all the species analyzed differs in their number of bands.

Introduction

Isozymes are the multiple forms of enzymes that are specially considered as examples of the structural variations that occur in proteins. These enzymes catalyze the same chemical reaction but differ in amino acid sequence (Kaplan, 1968; Latner, 1970). Genetic variations at different enzyme loci help in characterizing a strain or a species and are analyzed by gel electrophoresis (Ausubel *et al.*, 1993).

Acid Phosphatase (Acph) is a lysosomal enzyme, which is involved in dissociation of phosphoryl groups from other molecules during digestion. It is a ubiquitous enzyme commonly found in all or most all tissues of the body. In *Drosophila* it is found in second and third instar larvae, pupae, and adults. In general, pupae seem to have the highest amount of enzyme activity among all developmental stages. Acid phosphatase has been used by earlier workers to analyze the genetic variations in *Drosophila* (Beckman and Johnson, 1964; MacIntyre, 1966; Prakash *et al.*, 1969; Norman and Prakash, 1980; Kojima *et al.*, 1970; Ayala *et al.*, 1974; Hyytia *et al.*, 1985). Studies on genetic variations of acid phosphatase in *ananassae* subgroup were done by Hegde (1979) and Nagaraj (1985) in different populations of *D. ananassae* (Chitradurga, Sagar, Mysore, Kemmangundi, Jog falls, Dimbam, Kerala, Poona, Bombay), *D. malerkotliana* and *D. bipectinata* (Sirsi, Mavinagundi, Malemane, Karwar). There is no information on genetic variation with respect to acid phosphatase in natural populations of *Drosophila* in Dharwad District. Most of the areas studied by the earlier workers come under the forests of Western Ghats region, whereas geographically Dharwad is considered as a transition zone where western zone consists of deciduous forests and eastern zone consists of plain (arid) lands. Hence the present investigation on genetic variations among three species of *ananassae* subgroup was undertaken.

Materials and Methods

a. Collection of flies

Drosophila flies were collected from different localities of Dharwad district. The study area includes different habitats such as domestic places, fruit markets, agriculture fields, and forests. The wild males collected from natural populations were directly used for the present work. Single fly homogenate was prepared in 40% sucrose solution and stored at 4°C. The samples were prepared as per the procedure described by Bayrami *et al.* (2010) with slight modifications. A total of 10 samples were prepared per locality.

b. Electrophoretic analysis (NATIVE PAGE)

Native polyacryl amide gel electrophoresis of (7.5%) 1 mm thickness was prepared. 20 µl of the sample was loaded into each slot of the stacking gel. For the first slot, Bromophenol blue is added as the tracking dye. Electrophoresis was performed at 4°C with 50 volts for 1 hour and later increased to 80 V until the dye migrated to 7 cm in the small pore running gel. NaOH – Boric acid (0.3M) was used as tray/ tank

buffer (Bayrami *et al.*, 2010). After electrophoresis the gels were stained for acid phosphatase using suitable substrate. The staining was carried out at 37°C.



Figure 1a

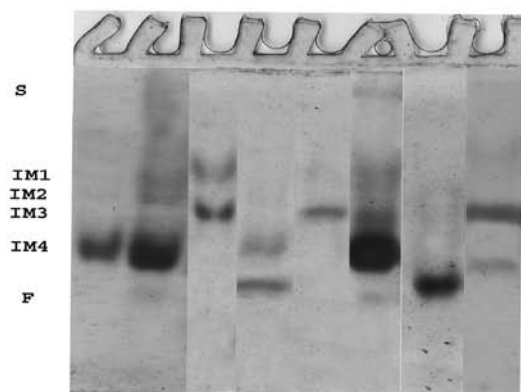


Figure 1b

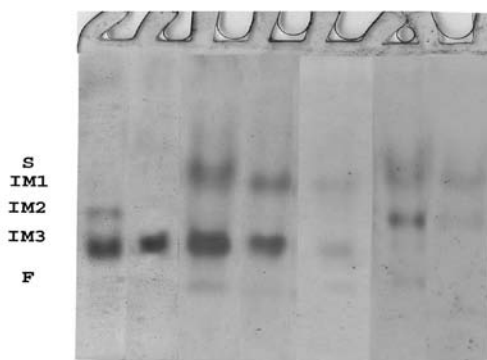


Figure 1c

Figure 1. Native Page Analysis of Acid Phosphatase in different populations of *Drosophila*. a, *D. ananassae*; b, *D. bipectinata*; c, *D. malerkotliana*; S – Slow; IM – Intermediate; F – Fast.

Results

Figure 1a shows the whole body homogenate native page analysis of acid phosphatase in case of *D. ananassae*. It revealed that there are about 9 different patterns. Each pattern differs in number of bands. The total number of bands varies from 1 – 7 based on their mobility and were named as F (Fast), IM (Intermediate)₁₋₅, S (Slow). Pattern 1 has 6 bands, pattern 2 has 4, patterns 3, 5, and 6 have 2, patterns 4, 7 and 9 have 3 bands, and pattern 8 has 1 band. Pattern 1 has the highest, whereas pattern 8 has the lowest, number of bands.

A total of 8 types of patterns were found in *D. bipectinata*. The total number of bands varied from 1 – 6. Patterns 1, 5, and 7 have 1 band; pattern 2 has 4; patterns 3, 4, and 8 have 2; and pattern 6 has 5 bands. Pattern 6 has the highest number of bands whereas patterns 1, 5, and 7 have the lowest number of band (Figure 1b).

D. malerkotliana revealed that there are about 7 different types of patterns; each pattern differed in number of bands (Figure 1c). The total number of bands based on their mobility varied from 1 – 5. Patterns 1, 4, and 7 have 2 bands; pattern 2 has 1; patterns 3 and 6 have 4; pattern 5 has 3 bands. Patterns 3 and 6 had the highest number of bands, whereas pattern 2 had the lowest number of bands.

Discussion

The bands can also be classified based on their movement towards the anode. The S, F, and IM bands represent different banding patterns (Beckman and Johnson, 1964). Studies on molecular variation were based on the genetic basis of allelic frequency of the loci. Ayala *et al.* (1972 a, b) observed allelic variations at 28 and 27 gene loci in natural populations of *D. willistoni* and *D. equinoxialis* from Mexico, Florida, and South

America. They found a great deal of genetic variation, and on an average 58% of loci were found to be polymorphic for *D. willistoni* and 71% polymorphic for *D. equinoxialis*. Acid Phosphatase was also studied in adult *D. melanogaster* and *D. simulans*, which revealed three types of variants in both the species (MacIntyre, 1966). The present study differs from the studies of Hegde (1979) as they have reported a total of 7 bands in *D. ananassae*.

Nagaraj (1985) reported 3 and 2 patterns of acid phosphatase in *D. bipectinata* and *D. malerkotliana*, respectively, from Uttara Kannada district. Dharwad, which is an adjacent district, showed 8 and 7 different patterns. The present study showed more patterns and bands in each pattern compared to earlier studies of Hegde (1979) and Nagaraj (1985). This provides evidence for the polymorphic nature of the acid phosphatase enzyme in *D. ananassae*, *D. bipectinata*, and *D. malerkotliana*.

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Age and sex related change in the heritability of locomotor behavior in *Drosophila melanogaster*.

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Abstract

Locomotor behavior is a crucial and fitness-related trait which has a polygenic basis. Here in this study we estimated basic quantitative genetic parameters of locomotion using isofemale lines of *D. melanogaster*. Negative geotaxis and startle response were used as component traits defining locomotion. We have estimated narrow sense heritabilities and its components for three different age groups for both sexes. Our results show that these indices can change with age and sex, though differently for geotaxis and startle response. Change in heritability of negative geotaxis with age was more or less negligible, whereas the heritability for startle response decreased with age. We infer this difference between the traits in amount of change they had with increasing age could indicate that the putative genes influencing additively each trait phenotype are distinct, and, accordingly, act differently. **Keywords:** Locomotion, aging, genetic variance, heritability, *Drosophila*

Introduction

Locomotor behavior is one the most important evolutionary features of an organism affecting its feeding, mating success, dispersal ability under normal or stressful conditions, and its ability of predator