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Protein Polymorphism in *Drosophila melanogaster*

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Protein polymorphism was studied in *D. melanogaster* by disc polyacrylamide gel electrophoresis. In all, 24 fractions of protein were obtained at three developmental stages: 84 hr old larvae, 120 hr old pupae and 5 days old adults. Qualitative changes in protein fractions along the time axis of development were noted. Fast-moving proteins were absent in 5 days old adults.

Key Words: Protein polymorphism, ***Drosophila***

Introduction

Proteins play an important role in structural and functional organization of cells. Three-dimensional arrangements of the protein molecules with different polypeptide combinations differ in their electrophoretic mobilities. The method most commonly used for characterization of proteins is electrophoresis, in which proteins are separated in the presence of an electrical field, depending on the net electric charge. The present interest is to report on the polymorphism of the protein molecules at different developmental stages of *D. melanogaster*.

Materials and Methods

Protein molecules were recognised by their physical separation by disc polyacrylamide gel electrophoresis. Fresh larvae (84 hr old), pupae (120 hr old) and adult flies (5 days old) of *D. melanogaster* were taken separately in a glass homogenizer tube (5ml) and a drop of 0.05 M tris-phosphate buffer (*p*H 8.4) was added to it. The organism was ground by a tissue grinder at 0°C and then centrifuged at 10,000 rpm for 6 min at 0°C. The supernatant was loaded on 10% polyacrylamide gel and electrophoresis was performed for 2 hr at 25 volts/cm length of the gel at 20–22°C in 0.05 M tris-phosphate buffer, *p*H 8.4. The gels were incubated at 37°C in a solution containing 1% amidoschwarz dissolved in 7% acetic acid. Destaining of the gels was done by keeping them in 7% acetic acid for 24 hr.

Results

Twenty-four fractions of protein molecules, synthesized in cells of the larvae (84 hr),

pupae (120 hr) and 5 days old adults of *D. melanogaster*, were identified individually. They can be divided into three groups: (*a*) slow-moving protein molecules, (*b*) intermediate forms, and (*c*) fast-moving proteins. The 84 hr old larvae express three slow-moving proteins, four intermediate groups of proteins with different polypeptide composition and four fast-moving proteins (figure 1, A). The pupae of *D. melanogaster* manifest two slow-moving proteins, four proteins of intermediate mobilities and two fast-moving proteins (figure 1B). The young adults (5 days old) of the species show one slow-moving protein and four protein fractions of intermediate mobilities (figure 1, C). No fast form of protein was found in the 5 days old adults. Homology of the protein bands in the gels is related to the composition of the genes (DNA) and their action. Considering the larval, pupal and adult protein molecules, homology of the larval and pupal proteins is of five bands, larval and adult protein is of three bands. These figures convey an idea of working of the same structural genes at different developmental stages of the species.

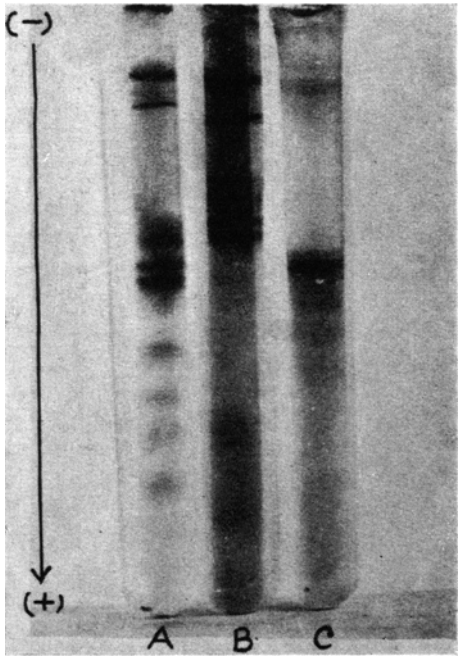

Figure 1 Protein polymorphism in *D. melanogaster A*, Larva; *B*, Pupa; *C*, Adult

Discussion

Hubby (1963) has reported thirty-six fractions of proteins in different mutant stocks of *D. melanogaster*. The locus controlling the protein is situated on the third chromosome of *D. melanogaster* (Hubby 1963). Hubby and Throckmorton (1965) reported 360 fractions of proteins from nine species of the *virilis* group of the genus *Drosophila*. Here, we report 24 fractions of protein during developmental stages of *D. melanogaster*.

Our results show that there is emergence of new proteins and suppression of the previously existing ones during the sequential development of the organisms, as is borne by the total absence of fast-moving proteins in the 5 days old adults and their presence with altered patterns in the 84 hr old larvae and 120 hr old pupae of *D. melanogaster*. Qualitative as well as quantitative changes in proteins have been found during development of *sorghum* grains (Johari et al. 1977). Our results from *D. melanogaster* lend support to their finding.

The distribution of protein fraction in the different organs of *D. melanogaster* so as to reveal their physiological functions, should certainly form an interesting study.

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References

Johari R P, Mehta S L and Naik M S 1977 Changes in soluble proteins and isoenzymes in developing sorghum grains; *Curr. Sci.* **46** 409–411

Hubby J L 1963 Protein differences in *Drosophila*. I. *Drosophila melanogaster*; *Genetics* **48** 871–879

—— and Throckmorton L H 1965 Protein differences in *Drosophila*. II. Comparative species genetics and evolutionary problems; *Genetics* **52** 203–215