(3) Egg membranes are pierced by a fine needle; fixation 2 h at 4°C. (4) Chorion and yolk membranes are removed by special needle. (5) Washing in cold Hanks solution for 1 h at 4°C. (6) Incubation in the solution for histochemical staining, 5-30 minutes. (7) Hanks solution 30 min. at 4°C. (8) Alcohols (40, 70, 96, 100%) 5 min. in each concentration at 4°C. Alcohol + aceton (1:1), 10 min.; aceton, 10 min. (9) Araldite:aceton 1:3, 2 h; 1:1, 2 h; 3:1, 2 h. Araldite, 15 h. (10) Polymerization of araldite for 1 day at 43°C and 2 days at 60°C. (11) Preparation of sections. This method was used mainly for the staining of histological sections by the usual histological and cytological technique.

Second method (mainly for the histochemical investigations): (1) Washing of eggs (50-100) in some portions of distilled water. (2,3) Same as in the first method. (4) Hanks solution, 30 min. at 4°C. (5) Impregnation by solution of polyacryl amide gel. The solution is prepared by the mixture of 5 parts solution A and 3 parts solution B. Solution A: acryl amide 30 g, bisacryl amide 1 g, TEMED 0.25 ml, Tris-acetic buffer 0.05M, pH 8.2, 10 ml, distilled water 60 ml. Solution B: 2% ammonium persulfate 20 ml, distilled water 15 ml. (6) Polymerization 20-30 min. (7) Freezing of the gel slabs with eggs. (8) Preparation of sections (5-10 micron) in the cryostate. (9) Histochemical staining. We used histochemical methods according to Pearse (1960) and Burstone (1962). Aldehyde oxidase was detected according to Dickinson (1970).

The quality of our histochemical technique is illustrated in Fig. 1a,b,c. Designated on Fig. 2 are the periods of development when some enzymes are detected in the different tissues for the first time and a time when the increase of enzymatic activity is established histochemically. It was shown that alkaline phosphatase has been detected rather early during development (12-14 h of embryogenesis) before histochemical finding of the activity of most other enzymes investigated by us. Traces of aldehyde oxidase can be seen at the earliest stages of development. This activity is a result of the presence of the maternal products in the eggs. Then the activity of aldehyde oxidase in the embryos decreases. The increase of this activity and correspondingly the intense histochemical reaction is established rather late during development (1st-2nd instar larvae).

The increase of histochemical reaction of NADP-dependent malic enzyme takes place before the corresponding increase in activity of aldehyde oxidase. There is some similarity of the histochemical pattern between the organs which are developed from the same embryonic anlages. It was established that two chains of enzymes are sequentially expressed during development: (1) Alkaline phosphatase → esterase → octanol dehydrogenase → xanthine dehydrogenase. (2) Malic acid → aldehyde oxidase. It is possible that there is a correlation between the sequence of phenotypic expression of some enzymes and the sequence of distribution of genes coded for the corresponding enzymes (Korochkin 1978).

The histochemical pattern in the developing embryos and larvae of the stock with the inversion In(3LR)D/Sb has in general some similarity to the same in Canton-S but there are also some differences in the periods of the first histochemical detection of enzymes in the different tissues.

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Kaurov, B.A. Institute of Medical Genetics, AMS USSR, Moscow, USSR. To the definition of the notion "field of gene activity".

Studying the features of manifestation of mutations that changed the number of bristles on the body of Drosophila, Rokizky (1929) established that in any given mutation the reduction or addition of bristles extended over a definite region of the body. This region of visible gene effect was defined "field of gene activity" (Rokizky 1929). In this work special attention was given to the topographic features of gene manifestation, not to explanations concerning the reasons for gene behavior. This question was not well studied and its discussion confined to phenotypical gene manifestation. However, lately the data on the interaction of genes have been obtained which permit the attachment of new importance to this notion.

Studying the interaction of homoeotic mutations Ns and ss^a (transforms antennae to legs of mesothoracic type) with mutation sn (twists bristles), as well as homoeotic mutation pb (transforms oral lobes of proboscis to legs of prothoracic type) with "antenna" mutations

al and th (decreases the number of aristal filaments and the number of claws on the prothoracic legs) and "leg" mutations d and fj (decreases the number of tarsal segments on the prothoracic legs) at 16°C and 29°C in D. melanogaster, we found the appearance of essential signs of non-homoeotic mutations on the corresponding homoeotic structures (Kaurov et al. 1976, 1978). In addition, in double mutants pb ss^a we observed a special manifestation of mutation ss^a on homoeotic structures, caused by the action of mutation pb (Kaurov et al. 1977). Similar effects were also observed by other authors (Brown 1940, Ouwenell 1970, Lewis 1963, Stepshin and Ginter 1972).

On the basis of the data obtained I suggest defining the notion "field gene activity" as a totality of cells of definite determination, specific for manifestation of activity of a given gene, to which a definite phenotype of definitive structures corresponds. The consequences include application for definition of gene activities, morphogenetic relationship of normal and homoeotic structures and gene activity after the appearance of cells of definite determination, independently of its origin in ontogenesis and localization.

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Kaurov, B.A. Institute of Medical Genetics, AMS USSR, Moscow, USSR. Mutation aristapedia causes the transformation of distal segments of antennae to five-segmented tarsi in D. melanogaster.

Despite the fact that homoeotic mutation causing the transformation of distal segments of antennae to the distal structures of mesothoracic legs has been discovered by Balkaschina in 1928 in D. melanogaster, there was no information concerning the number of tarsal segments in the homoeotic tarsus up to now. This number is considered to be equal to four and to correspond to Ta2-Ta4 of the tarsus, which are homologous to AIY-AY of the antenna; Ta1 of the tarsus is homologous to AIII of the antenna (Postlethwait and Schneiderman 1971). So, the appearance of leg bristles on AIII and four tarsal joints on the homoeotic tarsus will indicate the presence of Ta1 on it.

Studying the different alleles of the aristapedia locus (ss^{ak}, ss^{ax} and ss^{a40a}) in D. melanogaster at 16, 25 and 28°C, we observed the appearance of four tarsal joints on homoeotic tarsi in the mutants ss^{a40a} at 16°C and between Ta1 and Ta2 (Kaurov and Ivanov 1977). The tarsal joints in the mutants ss^a at this locus have been observed by other authors (Mglinetz 1974). In addition, we observed leg bristles on AIII. The mean number of these bristles varied depending on the temperature (16, 25 or 28°C) and the genotype (ss^{ak}, ss^{ax} or ss^{a40a}) from 1.5±0.1 to 7.4±0.4. It can be noted that leg bristles on AIII in different mutants ss^a reacted to the change in temperature, as well as the bristles reacted to Ta2-Ta5 of homoeotic tarsus. At 16°C the number of leg bristles on AIII in the mutants ss^{ak} and ss^{ax} was increased, while in the mutants ss^{a40a} it was decreased in comparison with 28°C.

So, the data obtained show that the homoeotic mutation aristapedia causes the transformation of AIII-AY of the antenna to Ta1-Ta5 of the tarsus, i.e., the formation of five-segmented homoeotic tarsi.

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Kidwell, M.G. Brown University, Providence, Rhode Island. The use of pupation height as a method for distinguishing between the sibling species D. melanogaster and D. simulans.

Although males of the sibling species D. melanogaster and D. simulans may be readily distinguished by examination of their external genitalia, separation of females is difficult on the basis of morphological differences. We have found that pupation height in shell vial cultures provides a quick and reliable means of preliminary separation for females of the two species without time-consuming microscopic examination of male progeny.