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Experimental Study of Morphometric and Non-Metric Skull Variations in Inbred Strains of Mice Under Various Environmental Factors.

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The tolerance of morphological characters both morphometric and non-metric to environmental impact during the development process is of principle importance in using them as indicators of genetic differences between wild populations. The aim of the present study was to reveal the relative role of genetic and environmental factors in variability of two kinds of characters.

The experiments were carried out on three inbred strains of mice BALB/cJLacSto, CBA/CaLacRap, BC/IPAE. Additionally intact mice of C57BL/6JSto and a randombred stock were studied. Pregnant females were exposed to a number of stress factors which changed their endocrine status at various stages of pregnancy or lactation period. The after effects of these treatments were estimated in progeny. The factors under study were: keeping the females at low temperatures (two regimes), injections of adrenocorticotropic or parathyreoid hormones, injections of some chemical substances, unbalanced maternal diet (several variants). A total of 1391 cleaned skulls of mice of the same age (45 days) and both sexes were examined for 27 non-metric traits and 13 linear mandible measurements. Control and treated samples were compared by means of mean measure of divergence (MMD) according to Smith's formula for non-metric traits. Mandible measurements were analyzed by two methods of multivariate statistics: the discriminant function analysis (DFA) and the factor analysis (FA). High tolerance of non-metric traits to all the factors was found. Between-strain (genotypic) differences in MMD distances were several times larger than within-strain (environmental) ones. These facts confirm the opinion of many specialists that non-metric traits are mainly under the genetic control.

As for morphometric traits, it was found during the

multivariate analysis that within-strain differences under stress factors were comparable with between-strain ones in values but not in the direction. Within every strain studied experimental samples differed in mandible size while various strains differed in mandible shape. Thus, with the help of DFA and FA we managed to separate the genotypic and environmental components of the variance. Authors have concluded that the size of mandible depends on the environmental factors to a large degree but its shape is determined mainly by the genotype. The suitability and determined mainly by the genotype. The suitability and relative effectiveness of the two methods for population comparisons is discussed.

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