A RARE ALLELIC ISOFORM Z2 OF ERYTHROCYTE HISTONE H1 IN A PEKIN DUCK POPULATION

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The family of avian erythrocyte histone H1 is composed of approximately 7 non-allelic proteins. Previously, we detected a genetic polymorphism for three histone H1 variants (H1.a, H1.b and H1.z) in duck erythrocytes. In particular, allelic isoforms of histone H1.z have been revealed in some duck populations (A55, K01 and P77) as well as in quail. A histone H1.z spot from homozygous ducks migrated in a two-dimensional gel either more slowly (z1) or more rapidly (z2) than a histone H1.a spot nearby on the same gel.

Recently, we were unable to detect any bird with the z2 phenotype in a P77 duck population while searching for homozygotes for each of the H1.z proteins. Although z1z2 heterozygous individuals occurred at a frequency of 0.12 to 0.25 in this population, we found only a single z2 homozygous individual in the natural population many years ago. As we identified 14 z1z2 heterozygotes (out of a total of 56 individuals) in a current population screening, we decided to perform a genetic crossing to obtain the rare z2 homozygotes. At the end of each breeding season, we crossed four females and two males, split evenly, and we obtained a small progeny flock of 23 ducklings. Blood, collected separately from the wing vein of the 21 ducklings that survived to the age of 4-6 weeks, was a source of the histone H1. Surprisingly, we identified as many as 6 z2 homozygotes in the progeny after resolving the protein aliquots on a two-dimensional gel. Thus, breeding appeared to be an efficient method of acquiring rare histone isoforms.

The reason for the lack of homozygous z2 birds in the older population is unclear at present. It could be speculated that individuals containing the histone H1 isoform z2 in their chromatin are either less viable and, hence, very rarely survive to a more advanced age, or are actively eliminated from the population and subsequent matings as a result of breeding selection because of a presumable association of the homozygous genotype z2z2 with unfavorable breeding trait(s). It is likely that an inclusion of the linker histone isoform z2 into the chromatosome might alter the interactions between the nucleosome and trans-acting factors leading to some functional changes in chromatin.