— Research Note —

A preliminary note on linkage relationships of alkaline and
acid phosphatase loci of chickens

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Six polymorphic systems of enzymes in chickens have been reported. These include serum alkaline phosphatase⁶⁾, liver acid phosphatase⁹⁾, serum esterases^{1,2,4,5)}, serum amylase⁸⁾ and liver esterase⁸⁾. The linkage relationships among them, however, are unknown, except for that between the two serum esterase loci, *Es-1* and *Es-2*⁵⁾. This note presents preliminary results concerning the linkage relationships between the two phosphatase loci and blood groups and plumage color loci.

Materials and Methods

Chickens used in the studies were from two populations; one was White Leghorn and the other crossbred. Horizontal starch gel electrophoresis was carried out to examine serum alkaline phosphatase (*Ap*) and liver acid phosphatase (*Acp-2*) phenotypes. The details of methods were presented previously by LAW and MUNRO⁶⁾ and OKADA and HACHINOHE⁹⁾. Blood groups were determined by the method of MATSUMOTO and OKADA⁷⁾.

To study linkage, double heterozygous males (or females) were selected as parents, and were mated to females (or males) having genotypes with recessive or different alleles for the traits concerned. Offspring were classified according to the combination of alleles derived from the double heterozygous parent's sire and dam.

Results

Segregation data in the progeny of double heterozygous testcross matings are presented in Table 1. There were no significant deviations from the segregation ratio, 1:1, expected

Table 1. Segregation of alleles derived from the double
heterozygous parent's sire and dam

Segregating loci	No. of mating	No. of progeny	Distribution of progeny		χ^2
			Parental	Non- parental	
<i>Ap</i> : Blood group <i>A</i>	7	21	11	10	0.048
<i>Ap</i> : Blood group <i>B</i>	25	105	54	51	0.088
<i>Ap</i> : Blood group <i>D</i>	3	15	7	8	0.067
<i>Acp-2</i> : Blood group <i>A</i>	8	27	14	13	0.037
<i>Acp-2</i> : Blood group <i>B</i>	14	44	23	21	0.091
<i>Acp-2</i> : Plumage color <i>C</i>	6	15	7	8	0.067
<i>Acp-2</i> : <i>Ap</i>	6	28	14	14	0

Linkage studies on chicken phosphatase loci

with independent loci. It is, therefore, concluded that there are no close linkages between serum alkaline phosphatase *Ap* locus and blood groups *A*, *B* and *D* loci, between liver acid phosphatase *Acp-2* locus and blood groups *A* and *B* and plumage color *C* loci, and between the two phosphatase loci.

Summary

The linkage relationships between two phosphatase loci (*Ap* and *Acp-2*) and blood groups *A*, *B* and *D* and plumage color *C* loci were examined. The segregation data were compatible with expectation for independent loci.

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