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# 5 Histocompatibility

## 5.1 Immunogenetic transformation attempts in birds

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Red cells of birds are nucleated. Antigenic factors are predominantly codominant, and somatic admixtures as low as 5 % can be detected. Transformation in cell cultures of higher organisms has been successful. Therefore, pilot attempts to transform several species of birds with DNA from another species were made, especially in the altricial doves and pigeons. DNA was extracted from red cells of muscovy duck, jungle fowl, ringneck dove and white turkey after the technique of Marmur (1961). Eighty-three young birds of four species received amounts from 0.3 to 2 ml of 2 mg/ml of the DNA injected IP or IV. Most agglutination tests of the recipients' red cells with appropriate reagents were negative. However, five doves of 19 injected with DNA from white turkeys were reactive. Close relatives, including each parent for two reactors, were all non-reactive. Thirty-one progeny from the reactors were non-reactive, except for 1 of 17 progeny from one reactor. Somatic transformation likely occurred in the five recipients and possibly partial gonadal transformation in one of them. Alternatively, an infrequent recessive factor cross-reactive with turkey red cells may occur in doves.

## 5.2 Blood group analysis of a diploid, chimeric chicken intersex

William Oleson and W.E. Briles (DeKalb, Ill., USA)

An adult intersex chicken and eight of its full sibs were typed for ten blood group systems by isoimmune reagents. All isoantigens were inherited as expected on the basis of Mendelian segregation except in the intersex in which three isoantigens, each determined by a separate allele, were detected in each of two different systems. The intersex had erythrocytes of normal size and was presumed to be diploid, since triploid intersexes are known to have 50 % larger cells. The occurrence of large agglutinated masses of cells in a background of free cells in tests with certain reagents suggested chimerism. With differential agglutination the erythrocytes of the intersex were found

to consist of two distinct populations of cells - each apparently diploid for a separate set of blood group genes from each parent. The paternal and maternal contribution to each of the two cell populations revealed that the maternal gametes were antithetical, as if produced from the same reduction division. Thus, this intersex chicken appears to have resulted from separate fertilizations of the regular gamete and a polar body produced by the dam.

### 5.3 The DL system and the reproducibility of cytotoxic histocompatibility sera

Ruth Saison (Guelph, Ontario, Canada)

The number of cytotoxic antisera for the detection of DL specificities at both loci has been greatly increased during the past year. The efficiency of specific methods of immunization has been evaluated. A high percentage of dogs immunized with canine white blood cells produce cytotoxic sera, and under the most favourable conditions, the majority of these are of narrow specificity. With the reagents now available we are able to haplotype families and arrange immunizations between siblings with one haplotype difference at most, and in some cases a difference of only one specificity. Under these conditions we have obtained excellent correlation between antisera produced in Rotterdam (Vriesendorp) and in our own laboratory in unrelated animals for the same specificity.

The complexity of the so-called 'cross-reactions' encountered by histocompatibility workers in most species may be explained by the presence of 'subgroups' or 'factors' within an antigenic specificity.

### 5.4 Further observations on three tetraparental sheep chimaeras

Elizabeth M. Tucker, R.M. Moor and L.E.A. Rowson (Cambridge, England)

At the last conference in Vienna we described the blood types of three tetraparental sheep produced by ovum transfer experiments after injection of fertilized eggs from one set of parents with blastomere cells derived from eggs of different parental origin. The present report gives more recent results on these sheep and shows that the relative proportions of the blastomere- and egg-derived blood types changed with age of the chimaeras, the blastomere-derived population becoming less even when it had been the majority type at birth. All three sheep were normal males in appearance although two of them

were sex-chromosome mosaics. Breeding experiments showed that the latter two rams handed on to their offspring only blastomere-derived genes, whereas the 'fully male' ram handed on both blastomere and egg-derived genes. A fourth ram, whose blood was of blastomere-derived type only, maintained this type and handed it on to his offspring. The implications of these findings are discussed.