A NOTE ON UNEXPECTED CHICKEN 7S IMMUNOGLOBULIN ALLOTYPES

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INTRODUCTION

Allotypes have been detected on both chicken low molecular weight (7S) (1-3) and high molecular weight (17S) (2,4) immunoglobulins (Ig), and their inheritance is similar to allotype inheritance in mammals. The expression of the 7S heavy (H) chain allotypes and their segregation ratios are indistinguishable from those expected for codominant alleles at a single autosomal locus (3,5,6). In addition, genetic analysis of the inheritance of 7S and 17S Ig allotypes is consistent with the presence of alleles at two closely linked loci (7).

Immunoglobulin allotypes have been assumed to be inherited in a simple Mendelian fashion as codominant alleles, but recently this has been questioned. A number of observations suggest the possibility that allelic regulatory genes may be controlling the expression of sets of redundant variable and constant region structural genes. These data include: (a) the analysis of Ig levels in patients with hypogammaglobulinemia's and their relatives (8-10); (b) intermittent expression of a "wrong" Gm allotype in hamsters transplanted with a human lymphoid tumor line (11); (c) the detection of allotypic specificities in supernates of human mixed lymphocyte cultures (12) and PHA stimulated lymphocytes (13) from patients who lack the allotype in their serum; (d) concurrent expression of three alleles at both the a and b loci in individual heterozygous rabbits (14,15) and two IgG constant region alleles in congenic mice homozygous for Ig allotypes (16); and (3) the great sequence variation between the constant regions of b4, b6

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A. A. Benedict (ed.), Avian Immunology
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and b9 kappa light chain molecules in the rabbit (17,18).

During the course of studies on the chicken 7S Ig allotypes (19) fluctuating low levels of "wrong" allotypes were observed in two inbred lines thought to be homozygous for allotypes. Low levels, detectable only in undiluted sera by radioimmunoassay (RIA), of an allotypic specificity (CS-1.2) were found in sera of UCD 2 birds (see the report by Wakeland, et al. on nomenclature of 7S Ig allotypes for characterization of inbred lines) in which anti-CS-1.2 antibody was generated. In the present report, data are given on an unexpected allotype detected in inbred chicken line RPRL 15I_4.

**SPECIFICITIES IN CHICKEN LINES STUDIED**

Six allotypic specificities, designated CS-1.1 through CS-1.6, have been demonstrated on chicken 7S Ig (3,5,6). CS-1.1, CS-1.2, CS-1.3, CS-1.4, and CS-1.6 have been localized to the 7S Ig H chains (5,20). The distribution of all six allotypes have been determined for 47 inbred lines (21), and based on these data, 10 alleles have been defined at the CS-1 locus which controls the synthesis of 7S Ig H chains (21).

The UCD 2 and RPRL 15I_4 inbred lines are homozygous for the alleles designated by Wakeland, et al. (21) as CS-1^a and CS-1^f, respectively. Allelic designations are based on the formation of phenogroups which are unique combinations of alloantigens present on different regions of the H chains (3,5,22,23). Birds having the CS-1^a allele express phenotypically CS-1.1 and CS-1.4, while those with the CS-1^f allele have specificities CS-1.3 and CS-1.6 (5,20).

**DETECTION OF AN UNEXPECTED ALLOTYPE IN 15I_4 SERA**

Employing double diffusion in agar gels, the CS-1.1 specificity was not detected in 15I_4 sera; however, in the dinitrophenylated alloantibody (DAA) RIA (5) undiluted 15I_4 sera specifically inhibited binding of anti-CS-1.1 and specific alloantigen (UCD 2 125I-7S Ig). As shown in Fig. 1, low levels of inhibitory activity were detected in 22 out of 22 sera from 60-day-old chickens. Inhibition values ranged from 36 to 56% with a mean of 43%.

The presence of the unexpected allotype in 15I_4 sera may represent either low levels of the CS-1.1 determinant(s) or CS-1.1 cross-reacting determinants. To distinguish between these two possibilities, the inhibition curves formed by either 15I_4 sera or pooled 15I_4 7S Ig were compared to the homologous inhibition curves [inhibition of UCD 2 (CS-1.1) and anti-CS-1.1]. Quantitative comparisons were made on the basis of the dilution or concentration