related to the *TL* antigen[9], although a proportion of primary lymphatic leukæmias induced by Moloney, Rauscher or Gross viruses are *TL*+. In contrast to *TL*+ leukæmias induced by other means, we have observed that *TL* antigen may be lost from virus-induced leukæmias in the course of serial transplantation.

Table 5. ANTIGENIC RELATIONSHIPS AMONG MOUSE LEUKÆMIAS OF VARIOUS TYPES AS INDICATED BY CYTOTOXIC TESTS *in vitro*

Leukæmia used for absorption or for direct cytotoxic test	Antiserum from mice immunized with leukæmia of the following type: Friend	Moloney	Rauscher	*TL*+
Gross	−	−	−	− or +
Friend	+	+	+	−
Moloney	+	+	+	− or +
Rauscher	+	+	+	− or +
TL+	−	−	−	+
AKR spontaneous	−	−	−	−
DBA/2 chemically induced*	−	−	−	−

* Induced by percutaneous application of 9,10-dimethyl-1,2-benzanthracene.
\+ Sensitive in the direct cytotoxic test or capable of absorbing specific cytotoxic activity.
− = No reaction in direct cytotoxic or absorption tests.

Table 5 summarizes these results on the serological relationships among leukæmias of various types, according to the cytotoxic method. Further antigenic systems will undoubtedly be defined in this manner. The availability of a sufficient range of monospecific cytotoxic sera should be of value in establishing the relationship of newly isolated leukæmogenic viruses to those already recognized, and in evaluating the importance of these agents in the induction of naturally occurring leukæmias. It seems possible that these methods may provide a satisfactory immunological classification of mouse leukæmias.

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Genetic Determination of the *TL* (Thymus–leukæmia) Antigen in the Mouse

WE have recently described an antigen that is found in the normal thymus of certain strains of mice[1]. The antigen is present in no other normal tissue, but is found in a proportion of leukæmias of probably all mouse strains. The designation *TL* was suggested by the restriction of the antigen to cells of normal thymus and leukæmias. Strains which possess *TL* in their thymus are incapable of forming *TL* antibody, no doubt because these mice are tolerant of the antigen. Specific antisera have been obtained by immunizing mice that do not possess thymic *TL*, with a histo-incompatible *TL*+ leukæmia. To produce a reagent with single specificity for *TL*, these antisera are absorbed *in vivo* in mice of the strain providing the leukæmia used for immunization. *TL* antibody is not absorbed under these conditions in mice with *TL*+ thymus, presumably because the antigen in thymus is inaccessible or represents too small an absorbing mass. *TL* antibody is demonstrated by the cytotoxic test *in vitro*. In this test[2,3], nucleated cells containing *TL* antigen are killed on incubation with *TL* antibody for 45 min in the presence of complement (guinea pig serum). This article concerns the genetic determination of the *TL*+ thymus character in normal mice of the *A* strain.

In crosses between *C57BL*/6(*TL*−) and *A*(*TL*+) mice, it was observed that the thymic cells of the F_1 progeny contained half the quantity of *TL* antigen present in the thymic cells of the *A* parent. This was determined by quantitative absorption of a *TL* antiserum with counted numbers of viable thymic cells from the parental and hybrid populations. In the back-cross to *C57BL*/6, *TL* antigen was present in the thymus of approximately 50 per cent of the mice. These mice were previously typed by the hæmagglutination technique[4] for the *D* and *K* antigens of the *H*–2*a* locus with the antisera (*C3H* × *C57BL*)F_1 anti *H*–2*a*, and (*BALB*/*c* × *C57BL*)F_1 anti *H*–2*k*. The results indicate close linkage between *H*–2 and the genetic determinant of *TL* (Table 1). One cross-over within *H*–2 was observed in the 197 mice examined. The mouse had the *H*–2 phenotype *D*–*K*+, confirmed in the progeny of matings with *C57BL*/6. All progeny of this cross were *TL*–, indicating that the *TL* determinant of the *A* strain mice is associated with the *D* end of the *H*–2 region. This was confirmed by examining the cross-over strains *H*–2*H* and *H*–2*I* established by the late P. A. Gorer[5] (breeding stocks kindly provided by Dr. D. B. Amos and Dr. J. R. Batchelor). The phenotype of *H*–2*H* is *TL*–*D*–*K*+ and that of *H*–2*I* is *TL*+*D*+*K*−. With regard to the possibility of crossing-over between *TL* and *H*–2, two of the mice shown in Table 1 have the phenotype *TL*−*D*+*K*+. The phenotype *TL*+*D*−*K*− has not yet been obtained.

Table 1. TESTS FOR LINKAGE BETWEEN *H*–2 AND *TL* IN (*C57BL*/6 × *A*)F_1 MICE BACK-CROSSED TO *C57BL*/6

		H–2 genotype		Cross-over	
		D+*K*+	*D*−*K*−	*D*+*K*−	*D*−*K*+
TL genotype	*TL*+	95	0	0	0
	TL−	2	99	0	1

The 197 mice examined included an approximately equal number from the two back-crosses (*C57BL*/6 × *A*)F_1 × *C57BL*/6 and *C57BL*/6 × (*C57BL*/6 × *A*)F_1 and equal numbers of females and males.

The determinant of the *TL*+ thymus character in normal *A* mice thus behaves as a single dominant gene with its locus in linkage group IX in close proximity to the *D* end of the *H*–2*a* group of alleles. Perhaps the most outstanding feature of the *TL* antigen is its appearance in leukæmias of strains of mice with a *TL*− thymus. The *TL* antigen of normal thymus is apparently identical to that found in leukæmias, and its frequent induction in the course of leukæmogenesis in *TL*− strains raises questions as to the nature of the factor determining the presence of *TL* antigen in many leukæmias. Whether or not this factor will prove to be of extraneous origin remains to be seen.

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