search is given first priority in these rooms. The overflow of teaching needs is met by the use of additional lower fidelity facilities. Transcripts of recordings, recordings, and live observations have been instrumental in pursuing such problems as the investigation of supervision of psychotherapy, clinical and objective studies of the intake interview, clinical and objective analyses of continuously recorded individual and group psychotherapy, an experimental study in hypnosis, and an investigation by structured interviews of the psychodynamics of pregnant women. Recordings and/or live observations are used for individual supervision of psychotherapy and psychological testing, for teaching to small observation groups as well as larger seminar and clinic conference groups, and for self-teaching.

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3. Grants by the John and Mary R. Markle Foundation and the Social Research Foundation, Inc., to Dollard and Redlich made possible the construction and use of these facilities. The preparation of this description was possible because of aid from the Foundations Fund for Research in Psychiatry.
4. E. J. Content, registered acoustic and radio engineering consultant, Stamford, Conn., was our expert consultant for both the acoustic and electronic aspects of the project. He was also kind enough to check the technical details in this article. Robert Coolidge, New Haven, Conn., designed the decor. E. J. Behler, superintendent of maintenance, construction, and stores of Yale University cooperated in the project. We wish to express our appreciation to these individuals.

5. Acoustic power, or intensity, is commonly measured in watts per square centimeter. Because such measurements have an extremely wide range of values, they are converted into and expressed in decibels for convenience. The conversion relationship is defined as follows: decibels $= 10 \log_{10} \frac{I_1}{I_0}$. In the decibel measurements in this paper, $I_0 = 10^{-13}$ w/cm^2 and I_1 is the energy level in the interviewing rooms. The sound meters are calibrated and equipped with scales to give the decibel readings directly.
6. We selected Ampex and Altec equipment at all points in the system.

The Rare Human Isoagglutinin Anti-Tj^a and Habitual Abortion

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In 1951, Levine *et al.* (*1*) described a remarkable isoantibody in the serum of a 66-yr-old female patient suffering from gastric adenocarcinoma which hemolyzed or agglutinated each one of more than 5000 random bloods of all groups and Rh types except the blood of her 45-yr-old sister who was physically normal (family I, Virginia, U.S.A.; cases 1 and 2; see Table 1). It was assumed that the antibody, anti-Tj^a, by virtue of its hemolytic nature was of the immune variety, in spite of the fact that the patient was never transfused and none of her four full-term pregnancies ended in hemolytic disease. Since the antibody could not be demonstrated in the serum of the compatible sister (case 2) when tested in 1951, it was suggested that the tumor could perhaps supply the antigenic stimulus. Indeed, absorption experiments on a limited scale carried out with minute amounts of the dried tumor cells and antibodies for several different human blood factors seemed to indicate a specific affinity of the tumor and anti-Tj^a.

In 1952, the same antibody was identified by Zoutendyk and Levine (*2*) in the serum of a 38-yr-old white South African patient (case 3) who had four consecutive miscarriages. This observation and the fact that in 1953 the antibody could be demonstrated in the serum of the physically normal sibling of the Virginia family I (case 2) made it necessary to reappraise the relationship of the tumor and the presence of anti-Tj^a.

In any event, anti-Tj^a is found in the serum of individuals who are homozygous for the very rare gene, Tj^b, that is, Tj^bTj^b. It was assumed that both parents are heterozygous, that is, Tj^aTj^b, so that 25 percent of the offspring may be Tj^bTj^b and could possess or potentially produce anti-Tj^a. The presence of the very rare gene Tj^b in both parents suggested the possibility of consanguinity, and indeed a history of cousin marriages was elicited in family I and in family V.

In rapid succession anti-Tj^a was found in five other families in Australia (*3*), Poland (*4*), the United States (*5*), Canada (*6*), and Japan (*7*). In two of these families, this rare antibody was present in two siblings each, and in the Japanese family it was found in four siblings. Some of the essential details in the seven families with 13 examples of anti-Tj^a are listed in Table 1.

The Australian family was reported by Walsh and Kooptzoff (*3*), who demonstrated anti-Tj^a in the serums of two young physically normal sisters, not married when the first observations were made. The serum of the older sibling agglutinated every one of 2900 random bloods tested, 1208 whites and 1692 natives of South Korea and the Pacific islands. The older of the two siblings, now married, lost her first pregnancy and is currently in her second pregnancy. Walsh and Kooptzoff (*3*), however, failed to confirm the specificity of the absorption of anti-Tj^a by tumor cells from the Virginia patient (case 1).

The Japanese family studied by Iseki and Masaki, of Gumma University, Maebashi (*7*), is most remarkable, because anti-Tj^a was found in four out of five siblings, two brothers and two sisters. The older sister (Rit. Ho., case 10) is married, and each one of her six pregnancies ended in a miscarriage at 2 to 5 mo. The antibody in each of four cases was identified in tests of both serum and red cells sent by airmail to us. As in the other cases, the red cells failed to react with anti-Tj^a from cases 1, 2, 7, and the antibody in the serums of the siblings. Futhermore, the Japanese serums reacted with numerous random bloods except that from case 1.

Anti-Tj^a must be differentiated from another rare and remarkable antibody, anti-H, produced by individuals of the rare genotype *OcOc* (*8*). Both antibodies hemolyze or agglutinate all random bloods tested, but their specificities have been shown to be distinctly different. This form of anti-H, which has been found in only three group-O male natives of India (all Le^a positive) (*9*), is inhibited by secretor substances (saliva) which do not influence the activity of anti-Tj^a. The reactions attributable to anti-Tj^a appear to be independent of O, A (probably also B), MNSs factors, and the Rh or secretion status.

Anti-Tj^a is active at 37°C and, in almost all instances, hemolyzes red cells. Upon inactivation, only agglutination is observed, but hemolysis may be restored by adding group-compatible, fresh serum. The maximum titer in the case reported by Zoutendyk and Levine was 1:128 at 37°C, but in most instances lower values of 1:2 to 1:16 were observed at this temperature. In spite of its hemolytic nature, optimal agglutination in the several cases in which comparative titrations were carried out at 18° and at 37°C occurred at the lower temperature. Lesser degrees of hemolysis were observed at 18°C.

As was to be expected from its capacity to hemolyze red cells, anti-Tj^a was responsible in at least one case for a severe hemolytic reaction after a test injection of 20 ml of incompatible blood (*1*). As a result of this antigenic stimulation, the titer increased from 1:8 to 1:512. The difficulty in finding compatible donors for any of the 13 cases, widely scattered over five continents, is obvious even without taking into account the OAB blood factors and the requirement that Rh-negative individuals, particularly females, must receive Rh-negative blood.

Reference to the summary presented in Table 1 reveals the following facts: (i) Anti-Tj^a is present in the serum of all 13 individuals whose red cells, of genotype Tj^bTj^b, do not react with the antibody. (ii) A history of a tumor is evident only in the older of the Virginia siblings (case 1). (iii) The antibody was present in three male individuals in families V and VII. (iv) Only the Virginia siblings—the oldest of the group—had normal full-term pregnancies with surviving offspring. (v) Among the five married women of childbearing age, there are a total of 18 pregnancies, each one of which ended in a miscarriage at 2 to 5 mo.

There is undoubtedly a casual relationship of this pregnancy wastage and the presence of anti-Tj^a. This is all the more remarkable, since antibodies for Rh and other blood responsible for hemolytic disease do not cause early fetal death. It is characteristic of classical hemolytic disease that only the fully or almost fully developed fetus or infant is affected, in spite of the fact that the responsible antibody in high titer may be present throughout the course of the pregnancy. This state of affairs applies also to anti-A and anti-B, and although ABO incompatibilities are suspected of playing some role in causing early miscarriages, the evidence is indirect and not yet con-

Table 1. Thirteen examples of anti-Tj^a in seven families. The parents of the siblings in families I and V are first cousins.

Family	Location	Case	Sex	Age	Blood group	Obstetrical history	
						Full-term	Abortions
I	Virginia, U.S.A.	1. DJ*	♀	66	O	4, l & w†	0
		2. BD	♀	45	O	7, l & w	0
II	South Africa	3. MC	♀	37	O	None	4
III‡	Australia	4. —*	♀	23	O	None	1
		5. —	♀	19	O		
IV	Poland	6. Za	♀	30	A	None	4
V§	Michigan, U.S.A.	7. EE*	♀	30	O	None	3
		8. GG	♂	36	A		
VI	Canada	9. El	♀	33	O	None	0
VII	Japan	10. Rit.Ho*	♀	27	A	None	6
		11. Ris.Hag	♀	22	A	None	0
		12. Yoi.Hag	♂	17	O		
		13. Yas.Hag	♂	14	O		

* In the four families with more than one example, the asterisk refers to the first sibling in whose serum the antibody was first found. This observation led to the study of the serums of the siblings.

† l & w indicates "living and well."

‡ The red cells of the parents and four other siblings reacted with anti-Tj^a.

§ The red cells of the parents and one other sibling reacted with anti-Tj^a.

vincing (*10, 11*). In the vast majority of ABO incompatible matings, the pregnancies go to term, and the infants, with occasional and rather unpredictable exceptions, do not suffer the effects of hemolytic disease.

Possibly anti-Tj^a may be considered as a naturally occurring antibody, as indicated by its presence in the serums of three male individuals who were never transfused. On the other hand, anti-Tj^a which was not found in case 2 in 1951 was demonstrable 2 yr later. If there is a direct relationship of anti-Tj^a and miscarriages, then one must conclude that the antibody was also not present during her childbearing age, when she had seven full-term infants, and the same considerations apply to her older sibling, who had four normal children. There is, however, no evidence to support the assumption that a form of anti-Tj^a exists which fails to penetrate the placental barrier.

The pregnancy wastage of 18 consecutive fetuses suggests a lethal effect specific for the heterozygote Tj^aTj^b, but exceptions must occur because it is the double heterozygous mating that is the most likely source for the rare genotype Tj^bTj^b, and this indeed is established for at least two of the families, III and V (Table 1). With a very low frequency for gene Tj^b, the chances are that also in the remaining five families the parents are both heterozygotes. Assuming a frequency of 0.1 percent for gene Tj^b, the ratio of Tj^aTj^b/Tj^bTj^b is 1998 : 1.

In any event, the data presented indicate that a very rare antibody, specific for a blood factor present in almost all bloods, may be responsible for habitual abortion in certain patients. Such a mechanism, however, can hardly explain the vast majority of early pregnancy wastage, unless future studies reveal the presence of antibodies not detectable by methods currently employed.

The concomitant presence of anti-Tj^a with the red cell structure of genotype Tj^bTj^b, in the absence of obvious antigenic stimuli, provides an analogy to the Landsteiner rule governing the distribution of anti-A and anti-B in the scheme of the four blood groups. The same pattern is followed by the regular occurrence of a presumably physiologic antibody, anti-H, determined by the antigen structure *OcOc,* as recently described by Bhende *et al.* (*8*); and indeed, this antigen-antibody relationship is considered to be an integral part of the ABO (H) system. With regard to the apparent exception in case 2, it may be mentioned that examples of group A with complete or almost complete absence of anti-B have been observed (*12*). In the light of these facts, the failure in 1951 to demonstrate anti-Tj^a in case 2 may be more apparent than real, because exhaustive studies were not made to exclude the presence of the antibody in low titer and perhaps active only at lower temperature (18°C).

The sex distribution of anti-Tj^a, ten females to three males, does not indicate a sex relationship, because the 13 examples were not found in study of a random sample. A history of 17 miscarriages in four patients (4, 4, 3, and 6, respectively) suggested blood studies that led to the detection of anti-Tj^a in their serums and, incidentally, also in the serums of the three male sibs.

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Fred E. Wright: 1878-1953

FREDERICK EUGENE WRIGHT, for many years a petrologist on the staff of the Geophysical Laboratory of the Carnegie Institution of Washington, died on 25 August, 1953 at his summer home on Sagastaweka Island in the Thousand Islands. He was recognized as a pioneer in the development and application of optical methods for the identification of minerals, especially fine-grained ones such as are found in synthetic preparations. He was born at Marquette, Michigan, in 1878, and received his early education in that vicinity. He then went to the University of Heidelberg in Germany and in 1900 was granted the degree of doctor of philosophy. After serving successively as instructor in petrology at the Michigan College of Mines (1901–04), as assistant state petrologist of Michigan (1903–04), and as state petrologist (1904–05), he came, in 1906, to the U.S. Geological Survey in Washington. About the same time he became associated with the Geophysical Laboratory and, after a few years, relinquished his formal connection with the Geological Survey.

The results of his researches in crystallography, experimental petrology, and related subjects are embodied in about 150 scientific papers. His book entitled *The Methods of Petrographic-Microscopic Research* (Carnegie Institution of Washington, 1911), now long out of print, had a powerful influence in stimulating interest in petrology and petrography by demonstrating the accuracy and practicability of