Table 1. Results of sensitivity tests.

Metal ion	8-Quinolinol	2-Methyl-8-quinolinol
Lanthanum	0.91	36
Cerium	0.93	18
Praseodymium	3.7	37
Neodymium	3.7	37
Samarium	1.9	39
Gadolinium	1.0	6.0
Yttrium	0.57	23
Scandium	1.2	2.9

The theoretical basis for sensitivity tests has been discussed by Irving and Rossotti (*3*). Although quite complex, the sensitivity of a precipitation reaction depends on the intrinsic solubility of the chelate and also the stability of the metal chelate. The intrinsic solubility of the chelate, in turn, is subject to the structural factors of the chelating agent. Since the introduction of a methyl group on the 8-quinolinol molecule should not alter the solubility of the metal chelates appreciably, the main factor here must be the stability of the chelate. Further work is needed to evaluate the stability constants of these chelates.

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2. H. Irving, E. J. Butler, M. F. Ring, *J. Chem. Soc.* **1949**, 1489 (1949).
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4 March 1957

First Example of Genotype $r^y r^y$—a Family Study

In 1954 blood of a D-negative patient (F.S.) was submitted with a history of hemolytic disease of the newborn. The patient—the propositus—had two normal children followed by two infants with severe hemolytic disease. The infant born in 1952 died from kernicterus at 72 hours, while the infant born in 1954 recovered following numerous small transfusions. The serum of the propositus, when tested during the fourth pregnancy, contained anti-D (anti-Rh_0) to a titer of 1/128.

The blood of the propositus, II-2 in Fig. 1, failed to react with anti-D serums, but it reacted with anti-C and anti-E serums. The absence of reactions with several different anti-c and anti-e serums suggested that the gentoype of the propositus was $r^y r^y$ (*dCE/dCE*). The negative reactions for D^u and the production of anti-D further confirmed that the patient was D-negative. Because genotype $r^y r^y$ (*dCE/dCE*) had never been observed previously (*1*) studies were carried out with all available members of three generations shown in Fig. 1.

Only nine of the 12 members were available for testing, and a summary of the findings is presented in Table 1. The reactions were confirmed in tests with numerous examples of anti-D, anti-E, and anti-c and fewer samples of anti-C and anti-e. For the blood of the propositus, II-2, the following reagents were employed: 10 anti-D saline (complete) agglutinins, 16 anti-D albumin (incomplete) agglutinins, 11 anti-C, 12 anti-E, 8 anti-c, and 6 anti-e serums. Each of the 16 albumin (incomplete) agglutinins failed to react with the blood of the propositus both in the direct tests and in the antiglobulin test. These negative reactions further established the absence of the weakly reacting D^u in the blood of the propositus. Similarly, the absence of factors c and e was definitely proved by negative direct and indirect antiglobulin reactions.

From the data in Table 1, shown also in Fig. 1, it is noted that, excluding the husband of the propositus, there are seven members whose blood contains the very rare chromosome r^y (*dCE*)—the propositus who is $r^y r^y$ (*dCE/dCE*) and six who are heterozygous for r^y (*dCE*), associated with chromosome *r* once, with

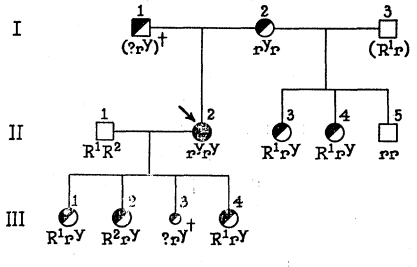

Fig. 1. Family tree with seven members containing the rare chromosome r^y (*dCE*) and the first example of genotype $r^y r^y$ (*dCE/dCE*).

Table 1. Summary of reactions with five antiserums. Siblings II-3, II-4, and II-5 were products of the second marriage. Their father was not available for testing.

Member	Anti- D	C	E	c	e	Genotype	
I-2 Mother	o	+	+	+	+	*dCE/dce*	$r^y r$
II-1 Husband of propositus	+	+	+	+	+	*DCe/DcE*	R^1R^2
II-2 Propositus	o	+	+	o	o	*dCE/dCE*	$r^y r^y$
III-1	+	+	+	o	+	*DCe/dCE*	$R^1 r^y$
III-2	+	+	+	+	o	*DcE/dCE*	$R^2 r^y$
III-4	+	+	+	o	+	*DCe/dCE*	$R^1 r^y$
II-3 Sibling	+	+	+	o	+	*DCe/dCE*	$R^1 r^y$
II-4 Sibling	+	+	+	o	+	*DCe/dCE*	$R^1 r^y$
II-5 Sibling	o	o	o	+	+	*dce/dce*	*rr*

R^1 four times, and once with R^2. In addition, r^y (*dCE*) must have been present in the blood of I-1, the deceased father of the propositus, and also in the fatally affected infant III-3.

This family tree, excluding the random I-3 and II-1 (whose genotype can be constructed) consists of 10 individuals, and among them there are 10 r^y (*dCE*) chromosomes, the absence in II-5 being neutralized by its presence in double dose in the propositus II-2. As could have been anticipated from the rarity of the chromosome involved, the parents of the propositus, I-1 and I-2, were consanguineous, each contributing one r^y (*dCE*) chromosome to the propositus.

This unique family provided an opportunity to study the suppression of D by its partner chromosome containing factor C, first described by Ceppellini, Dunn, and Turri (*2*). This suppression is exerted not only by chromosome r' (*dCe*) but also by chromosome r^y (*dCE*). A new variety of suppression of factor c in certain combinations was also observed (*3*).

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References and Notes

1. R. Race and R. Sanger [*Blood Groups in Man* (Thomas, Springfield, Ill., 1954)] estimate that chromosome r^y (*dCE*) should have a frequency of 1 in 48 million. Thus, one homozygote can be expected in testing about 400 million individuals in Western Europe. A. S. Wiener [*Am. J. Human Genet.* 1, 127 (1949)] calculates that the homozygote has an incidence of 1 in 100 million.
2. R. Ceppellini, L. C. Dunn, M. Turri, *Proc. Natl. Acad. Sci. U.S.* 41, 283 (1955).
3. A discussion of these findings is in preparation.

4 March 1957