

### Blood Groups of Brazilian Indians (Carajás)

THE Carajás Indians of Bananal Island, found by Golden<sup>1</sup> to include 51 per cent of persons of group *B*, are exceptional among South American Indians, who all belong to group *O*. The late Dr. E. M. da Silva died while working among the Carajás. He found the following distribution, in 113 of them :

$$O = 104; A = 1; B = 3; AB = 5.$$

Such an incidence is impossible; but it shows that the Carajás do not possess a high percentage of group *B*. Golden, as well as da Silva, used slide methods, which are not suitable for testing anæmic people. Last July one of us (P. C. J.) went to the Carajás village and bled sixty-six Indians. The tests were made in our laboratory in Rio de Janeiro for the following blood-group systems: *ABO*, *Rh-Hr*, *MNS*, *P*, *Kell*, *Duffy*, *Lutheran* and *Lewis*. The complete results will be published elsewhere, after we have tested larger numbers of people; but two points are of special interest. The first is that all sixty-six Indians tested with anti-*A*, anti-*B* and anti-*AB* sera, by the minimum volume technique, belonged to group *O*. Using slide tests, we obtained doubtful results with the same bloods. This probably accounts for Golden and da Silva's results. The second point is related to the *Duffy* system: among fifty-five Indians we found twenty-three *Duffy* positives. This observation seems important, since it is contrary to the results of Pantin and Junqueira<sup>2</sup> among other Brazilian Indians, and it indicates a lower incidence than those obtained by Pantin and Kallsen<sup>3</sup>, and several others working on North American Indians.

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Golden, G., *Lancet*, ii, 278 (1930).

<sup>2</sup> Pantin, A. M., and Junqueira, P. C., *J. Phys. Anthrop.*, 10, 395 (1952).

<sup>3</sup> Pantin, A. M., and Kallsen, R., *Amer. J. Phys. Anthrop.*, 11, 91 (1953).

### The Diego Blood Factor

IN 1953 a new low-incidence blood factor, *Diego* or *Di<sup>a</sup>*, responsible for hæmolytic disease, was described with the aid of an antibody produced by a mother living in Caracas, Venezuela<sup>1,2</sup>. The antibody, anti-*Di<sup>a</sup>*, reacted with the blood of the affected child (propositus) and two of the three siblings of generation IV. The blood factor was also present in the father and three of his six siblings of generation III. The factor was transmitted to them by the paternal grandmother (generation II) of the propositus, who received it from her mother of generation I. The

factor was present in the blood of nine out of twenty-nine members of the Diego family tested.

The antibody reacted only in the indirect anti-globulin test to a titre of 1:512. Anti-*Di<sup>a</sup>* failed to react with the red cells of a thousand group *O* individuals living in the United States—mainly caucasoids.

Study of the antigens for *Di<sup>a</sup>*, *ABO*, *MNSs*, *Rh*, *Kk*, *Fy<sup>a</sup>*, *Jk<sup>a</sup>*, *Le<sup>a</sup>* and *P* in this family failed to reveal obvious linkage. Nor was there any linkage to the sex chromosome.

More recently, it became possible to demonstrate that *Di<sup>a</sup>* was serologically independent of seven other low-incidence blood factors (*Mi<sup>a</sup>*, *Ven*, *Ca*, *Be<sup>a</sup>*, *Wr<sup>a</sup>*, *By<sup>a</sup>*, *Rm*) among the twelve listed by Hart, Bosman and Van Loghem<sup>3</sup>. (Levine and Robinson demonstrated duplication in the list of the Dutch investigators because *V<sup>w</sup>* was shown to be identical with *Mi<sup>a</sup>* (Miltenberger).) The factor was also independent of the following: *C<sup>w</sup>*, *C<sup>x</sup>*, *E<sup>w</sup>*, *He* and *V*. Nor was there any demonstrable serological or genetical relationship to such high-incidence blood factors as *H* (for group *O*), *U*, *Vel* or *Tj<sup>a</sup>*. These facts could be established in tests with the rare essential antibodies and selected test cells preserved in the frozen state.

In the course of the studies of the four generations of the Diego family, it was observed by Layrisse and Arends that some of them showed physical features indicative of admixture with native Indians. Accordingly, studies were carried out on caucasoids and Indians living in Venezuela<sup>4</sup>. The results of their tests on the Venezuelan Indians have been briefly discussed by Layrisse, M., and Arends, T. ("A High Incidence Blood-Group found in Venezuelan Indians" (in the press)). These findings, including those with the thousand caucasoids of the United States and forty-eight Indians of Brazil<sup>5</sup>, are presented in Table 1.

Table 1. INCIDENCE OF *Di<sup>a</sup>*

Population tested	No. tested	No. positive	Per cent positive
Caucasoid, United States	1,000	0	0
Random, Caracas	266	6	2.3
Random, Barcelona, Venezuela	61	2	3.3
Caribe Indians—Cachama	121	43	35.5
Arawaco Indians	152	8	5.3
Mixed Negroes, Venezuela	150	11	7.3
Kainganges Indians, Brazil	48	26	54.2

The studies with Venezuelan population were made by Layrisse, Arends and Sisco<sup>4</sup>. The anti-*Di<sup>a</sup>* serum for the study of the Brazilian Indians was made available to Fernandez *et al.*<sup>5</sup> by Dr. Layrisse.

Among the forty-nine individuals in the Aríbe group of the Caribe Indians, there were two large families many of whom were *Di<sup>a</sup>*-negative, and Layrisse *et al.*<sup>4</sup> offer this as an explanation for the lower incidence of *Di<sup>a</sup>* as compared to that of the Cachama group. Among the 170 members of both groups all but one were in group *O* and all were *Rh*-positive.

The occurrence of the blood factor in caucasoids of Venezuela is apparently indicative of admixture with native Indians characterized by a high incidence of the blood factor. *Di<sup>a</sup>* may not be completely absent in the caucasoid population free from admixture with Indians, since a second example of anti-*Di<sup>a</sup>* was recently found in the serum of a mother of an infant with hæmolytic disease (Levine, P., and Stroup, M., unpublished observations). The specimens, submitted to the Ortho Research Foundation by Witebsky and Rosamilia, were derived from a Polish family living in New York State, and there is no