

Distribution of Blood Groups Among the Eskimos, Indians, and Whites of Western Alaska¹

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EVER SINCE L. and H. Hirszfeld discovered during the first World War that the frequency of the four blood groups (A, B, O, and AB) varied in the different peoples of the Balkans, and that this variation was related to racial origins, geneticists and physical anthropologists have utilized this new tool in the study of "races." The discovery of other blood groups, namely the M-N and the Rh types which are unrelated to the ABO groups has further enhanced the value of this new tool.

The object of this paper is to present some preliminary findings pertaining to blood variations among the Eskimos, Whites, and Indians of Western Alaska. Previous studies on these peoples have been limited to those made by W. S. Laughlin in 1949 on the Aleuts; V. E. Levine in 1938 and 1944 on Eskimos in the Barrow and Nome areas; and G. A. Matson in 1947 on the Eskimos of the Kuskokwim Basin. The present study covers a large group of Eskimos along the Bering Sea and Arctic Ocean coasts and Indians of the Interior.

We wish to stress here that the materials presented in this paper are preliminary. They are presented now only because the full study will require another two or three years for final completion, and because it seems probable that a preliminary report at this time may be of some interest and value to others.

The present material covers the results on a total of 5,205 individuals from villages in the Kotzebue Sound, Norton Sound, Lower Yukon, Kuskokwim Basin, Nushagak Bay, and Bering Sea areas, and in Interior Alaska. For comparative purposes data on Whites were obtained from areas covered in the BCG program and the community-typing programs in Fairbanks and Palmer, Alaska.

Late in 1948 the Alaska Department of Health established a program of BCG vaccination in areas reporting a high incidence of tuberculosis. Since the BCG teams were visiting all of the remote areas, a serological survey for syphilis was added to the routine BCG program. Realizing that this was a unique opportunity to obtain blood specimens for special study, and that the results

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would be of value to geneticists, anthropologists, sociologists, and ethnologists, Dr. C. E. Albrecht, Commissioner of Health of the Alaska Department of Health, and Mr. R. B. Williams, Director of the Division of Public Health Laboratories, suggested that all available data on blood factors be extracted from the blood specimens. A program was carefully set up with this goal in mind.

The blood-typing program served several purposes: first, it encouraged more individuals to be blood-tested, giving a wider coverage for the VD survey; second, the individuals were furnished identification cards showing ABO and Rh blood types; third, it gave the Alaska Native Service Hospitals a "walking blood bank" for their areas; and fourth, it provided data for the present study and should continually provide data for new or extended studies.

The BCG nurses were carefully instructed as to the designation of race. Only putative Indian and Eskimo full-bloods were listed by race name. All admixtures were listed as such, showing the degree of admixture with White, if known. The nurses checked with the local teachers, missionaries, or Alaska Native Service Field Nurses when there was any question whether a given individual was full-blooded. Blood specimens were collected by venipuncture on persons 14 years of age or over, and forwarded to the Anchorage District Laboratory via air express.

The blood specimens were serologically checked for syphilis and the clots were used for blood-typing. Each specimen was tested for ABO blood group and Rh_o (D) type, and when possible, for sub-groups of A and for the M and N types by slide tests. Rh negatives were checked by tube test. All the A-B and Rh sera were obtained from the American Hospital Supply Company; M-N sera from Lederle Laboratories; and absorbed B serum from Certified Blood Donor Service, Jamaica Plains, N. Y.

A total of 5,205 specimens of blood were tested: 2,954 Eskimo, 333 Indian and 1,621 White; the others were from members of mixed race. For comparative purposes the frequencies of ABO groups among the Indians of Southeastern Alaska are shown in two of our tables. The data for Southeastern Alaska were obtained from R. B. Williams, Juneau, Alaska, who is conducting a similar study among the Tlingits of that area.

Tables 1-4 present the frequencies of the different blood groups and blood types among the different peoples which were studied and the gene frequencies which were calculated from these group frequencies. Since this report is only a preliminary one we shall not enter into any detailed discussion of differences and similarities, but we do wish to call attention to a few variations in the blood group frequencies of the groups and to comment briefly on their probable meanings.

The frequency of blood group A among the racial groups studied ranged from 36.34% (Indian) to 44.08% (Eskimo). Among the Whites it was found to be

TABLE 1. FREQUENCY OF BLOOD TYPES IN SPECIFIED RACIAL GROUPS IN WESTERN ALASKA

RACIAL GROUP	NO. TESTED	PERCENTAGE DISTRIBUTION OF TYPES				FREQUENCY OF GENES		
		A	O	B	AB	$I^A(p)$	$I^B(q)$	$i(r)$
White.....	1621	42.66	43.29	10.12	3.93	.2691	.0728	.6579
Eskimo.....	2954	44.08	38.08	13.08	4.77	.2878	.0974	.6146
Indian.....	333	36.34	60.96	2.40	0.30	.2048	.0169	.7783
Indian-White.....	39	38.46	53.85	5.12	2.56	.2281	.0342	.7376
Eskimo-White.....	258	40.73	41.86	13.18	4.26	.2605	.0949	.6445
Tlingits*.....		24.2	75.8					
White (US)†.....	141,774	40.77	45.55	9.96	3.72			

* Study of Tlingit, Haida and Southeastern Alaska Natives—R. B. Williams, Personal Communication. Figures may vary from final results.

† Studies of Hervey-Diamond—National Blood Program.

TABLE 2. FREQUENCY OF SUB-TYPES OF A AND AB IN SPECIFIED RACIAL GROUPS IN WESTERN ALASKA

RACIAL GROUP	TOTAL A + AB	A ₁		A ₂		A ₁ B		A ₂ B	
	No.	No.	%	No.	%	No.	%	No.	%
Eskimo.....	748	686	100	0	0	62			
White.....	189	133	76.8	40	24.2	10	62.5	6	37.5
Eskimo-White.....	56	39	82.9	8	17.1	7	77.7	2	22

TABLE 3. FREQUENCY OF M N TYPES IN SPECIFIED RACIAL GROUPS IN WESTERN ALASKA

RACIAL GROUP	NO. TESTED	PERCENTAGES			FREQUENCY OF GENES	
		M	MN	N	A_g^M	A_g^N
White.....	784	36.61	45.03	18.37	.605	.4285
Eskimo.....	604	63.91	30.46	5.62	.799	.237
Indian.....	17	58.82	35.29	5.88	.768	.2419
Eskimo-White.....	119	44.53	41.18	14.29	.667	.377
Tlingits*.....		73.3	26.67	0		

* Study of Tlingit, Haida, and Southeastern Alaska Natives.—R. B. Williams, Personal Communication. Figures may vary from final results.

TABLE 4. FREQUENCY OF RH FACTORS IN SPECIFIED RACIAL GROUPS IN WESTERN ALASKA

GROUP	NO. TESTED	Rh+		Rh-	
		No.	%	No.	%
White.....	1371	1312	83.51	259	16.49
Eskimo.....	2522	2521	99.96	1	0.04
Eskimo-White.....	156	153	98.08	3	1.92

42.66%; among Indian-White 38.46%; and among Eskimo-White 40.73%. The Tlingits of Southeastern Alaska studied by R. B. Williams showed a low frequency of A, namely 24.2%.

The frequency of blood group O ranged from 38.08% (Eskimo) to 60.96%

(Indian). The Eskimo-White had a higher percentage of O (41.86%) than the Eskimo, and the Indian-White a lower percentage (53.85%) than the Indian. The Tlingits had the highest percentage of O (75.8%); the Whites an intermediate one (43.29%).

The Eskimo-Whites had the highest percentage of blood group B (13.18%) with the Eskimo next (13.08%). The Whites had 10.11% and Indians 2.40%. The high percentage of B among the Eskimos of Alaska had been noted previously by Matson and Laughlin. Type B has not been reported among the Tlingits of Southeastern Alaska.

The Indian had the lowest incidence of blood group AB (0.3%); the Eskimo the highest (4.77%) and the Whites (3.93%). Type AB has not been found among members of the Tlingit group.

Of 748 Eskimos, of group A and AB combined, who were tested for subtypes of A, all or 100% were A₁ or A₁B. In contrast to this, 189 A or AB Whites gave 24.2% belonging to sub-type A₂. Of 56 Eskimo-Whites of group A and AB, who were tested, 17.1% were sub-type A₂.

Of the 1,524 specimens tested for M-N blood types the Eskimo and Indian showed the lowest incidence of N, (5.62% and 5.88% respectively), compared to the Eskimo-White (14.29%) and White (18.37%). Correspondingly the incidence of M was high in the Eskimo and Indian: 63.91% and 58.82% compared to the White incidence of 36.61%.

The Eskimos were 99.96% Rh positive. Only one out of 2,522 Eskimos was Rh negative, and though records indicate that this individual was a full-blooded Eskimo, there remains the possibility of admixture with White. In contrast to the Eskimos, the Whites were only 83.51% Rh positive; of the 156 Eskimo-White who were tested, 98.08% were Rh positive.

SUMMARY

1. The blood of a total of 5,205 individuals belonging to specified racial groups in Western Alaska were tested for ABO types. The Eskimo group had the highest frequency of Types A, B, and AB, in contrast to the low frequency of A, B, and AB among the Indians (Tinneh) of the Interior. The frequencies of ABO types in the Indian-White group differed from those of the Indian sample, and approached more closely the frequencies of the ABO types among the Whites. The same observation applies to the Eskimo-White sample.

2. The variation in the frequency of blood type A among the racial groups was not as great as were those for B, O, and AB.

3. Variations in the frequencies of the ABO groups among the Eskimos in six geographic areas were noted, but of these, only the variation in the frequency of group B was marked. The Eskimos of the Nushagak area has the highest frequency (19.8%) of B, and the Eskimos of the Kotzebue Sound had the lowest (10.3%). Of special interest is one group from Hooper Bay, not included in our figures. It had a frequency of 37% type B.

4. The Eskimos showed a complete absence of blood group A₂ compared to a percentage of 24.2 within all A and AB groups among the Whites, and 17.1% among Eskimo-Whites.

5. In Eskimos and Indians the incidence of N type was 5.6% and 5.88% respectively, compared to the White incidence of 18.37%.

6. Ninety-nine and ninety-six hundredths per cent (99.96%) of the Eskimos were Rh positive, i.e. only 1 Eskimo out of 2522 was found to be Rh negative.

7. An observation of extreme interest was that mixtures of Eskimo or Indian with White were observed, but in areas on both the Yukon and Kuskokwim Rivers where the Eskimo and Indian meet, and where trade and the villages are close together, exceedingly little Eskimo-Indian mixture was noted. In other words, our findings indicate that there has been very little genetic mixture of the races in the Eskimo-Indian border areas.

8. There have been frequent comments that the Eskimos of the Bering Sea areas were not full-blooded and had mixed with other peoples, particularly the White. This conclusion has been based on the fact that the ABO frequencies among the Eskimos closely correspond to those of the Whites. If this be true one should have expected to have found a small percentage of sub-type A₂, a high percentage of type N close to that of the Whites, and the presence of Rh negative among the natives. We found none of these. Hence our findings indicate that these Eskimos have not mixed with the Whites to any appreciable extent.

9. From the data presented here and other data on file in our laboratory but not yet reported, a great deal of information has been gained on the distribution of blood groups among the native races of Alaska and among the racial admixtures. We hope in future studies to present the blood groups and gene frequencies among tribal or dialectal groups covering a period of two or three generations. Further studies are also indicated on the Indians of Interior Alaska and the Eskimos of St. Lawrence Island, as well as the people of the border regions where questions exist relative to Eskimo-Indian admixture.

REFERENCES

- BOYD, WILLIAM C. 1950. *Genetics and the Races of Man*. Boston: Little, Brown & Company.
- HERVEY, G. W., DIAMOND, L. K., & WATSON, V. 1951. Geographic blood group variability in the United States. *J. Am. M. Ass.* 145: 80-81.
- LAUGHLIN, W. S. 1951. *Papers on the Physical Anthropology of the American Indian*. New York: The Viking Fund.
- LEVINE, V. E. The blood groups in Eskimos (quoted from Matson and Laughlin).
- MATSON, G. A. & ROBERTS, H. J. 1949. Distribution of the blood groups, M-N and Rh types Among eskimos of the kuskokwim basin in western Alaska. *Am. J. Phys. Anthropol.* 7 n.s. (1) 109-122.
- RACE, R. R., & SANGER, RUTH 1950. *Blood groups in man*. Springfield: Charles C Thomas.
- WIENER, A. S. 1943. *Blood groups and transfusion* (3rd Edition), Springfield: Charles C Thomas.
- WILLIAMS, R. B. 1951. Personal Communication.