The Dynamics of Racial Intermixture in the American Negro—Some Anthropological Considerations

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THE RECENT DEVELOPMENT, by Drs. Bentley Glass and C. C. Li (1953), of a method making use of gene frequencies for the study of the dynamics of race mixture is a welcome contribution to the genetic aspects of anthropological research. By the application of this method, the authors estimate the average rate of gene flow into the American Negro per generation from the White population, assuming ten generations of intermixture, to be .0358; the accumulated amount of White admixture in their American Negro sample is calculated to be 30.6%. The following note endeavours to amplify their conclusions in the light of information more recently available.

The use in their communication of gene frequencies pertaining to South African Bantu, East Africans and Sudanese was satisfactory for demonstration of the statistical model; Glass and Li had of necessity to include these in their calculations on account of the paucity of data then to hand. Acceptance of the gene flow values so obtained however implies that it is immaterial whence the African parental population gene frequencies are derived. That there is a "high degree of uniformity in the distribution of the Rh and MNS groups throughout tropical Africa" does not mean that Rh chromosome frequencies are constant throughout Negro Africa, but only that the overall pattern is generally similar. Thus in every sample yet investigated from Africa south of the Sahara, chromosome cDe is the most frequent, yet its calculated frequency varies between .34 and .82; cde is the second most frequent in more than 85% of samples, yet its value varies from .13 to .28. On the other hand frequencies of the genes of the MN blood group system do tend to be less variable, and much of the variation observed from sample to sample could be explained as random effects in sampling, though there is a slight tendency for the M frequency to increase from west to east. Statistically significant differences occur in the ABO frequencies, which in East Africa for example serve to distinguish the major ethnic subdivisions of the peoples. By reason of these variations, for computations involving actual blood group frequencies, such as are required by Glass and Li's method, it is obvious that in addition to the question of choice of characters to discriminate most clearly between the parental populations, attention has to be given to the choice of population whose gene frequencies are to represent the African parental contribution.

The extensive researches of Herskowits (1928, 1933, 1942) showed that the provenance of the Negro slaves in the U.S.A. was of more limited area than had been earlier thought. A few were derived from Madagascar and east coast localities, but the large majority originated from the western regions of Africa. The coastlands and a broad belt of territory behind them, in places several hundred miles in depth, ex-

Received February 16, 1955

tending from Gambia in the north to Angola in the south, provided the bulk of the American slaves. There was a shift in supply from area to area throughout the slaving period, and it is impossible to estimate the proportions of the different African peoples who contributed to the American Negro genetic constitution. Nevertheless the problem relates to an essentially western African population. It is from peoples occupying this zone that the gene frequencies should be drawn for the African parental population in the study of American Negro hybridization.

Relevant to the problem are comprehensive Rh data for four samples from different parts of Nigeria (Chalmers Ikin & Mourant, 1953) and two from the Gold Coast, for Ashanti and Ewe (Armattoe Ikin & Mourant, 1953), examined at the Blood Group Reference Laboratory, London, together with a second for the Ewe (Armattoe, 1951) referred to by Glass & Li; two samples from the lower Congo (Lambotte-Legrand, 1950) give simple Rh positive and negative data. Information on the MN blood group system is given for all except the two Congo samples, the Ss subdivisions being included among the Nigerian data. Data for the ABO system are to hand for more than than a dozen relevant samples, while several studies have been made, mainly on composite samples from West Africa, of the less widely investigated blood groups. Altogether there are now available frequencies of some twenty genes or gene combinations which allow comparisons of western Africans, American Negroes and American Whites.

From these data the gene flow rate into the American Negro has been recalculated, assuming ten generations of intermixture. In the Rh calculations allowance was made where possible for the fact that where no D^u tests are done possessors of the D^u gene may be classified as d (Mourant, 1954).

Table 1 shows the estimates of average gene flow rate obtained from the five genes or chromosomes that give the clearest discrimination between the parental populations—discrimination being assessed in terms of the minimum interval between the frequencies obtained in samples of the parental groups. The five characters are arranged in descending order of their discriminatory value. It is interesting that the trend of these estimates is considerably below those found by Glass & Li, the modal value of gene flow rate now occurring between .02 and .025. Plotting of 200 positive estimates obtained from seventeen genes or chromosomes, of which more than half are of little discriminatory value, gives a similar mode, though the range is considerably greater. The amount of White admixture (table 2) is likewise lower than previous estimates, the modal value, for the five characters given in table 1, lying between 18 and 22%. The estimate derived from the phenylthiocarbamide taste gene (T) probably may not be as reliable as its position in the table seems to suggest since the West African sample on which it is based, that of Barnicot (1950), comprised only 57 individuals. The gene frequencies used in the computations and the size of sample from which they were derived are given in table 3.

These figures for gene flow rate and intermixture must again be regarded as provisional. In addition to the difficulties noted by Glass & Li, there is no possibility of weighting the African frequencies to compensate for the different proportions of these peoples who were transported to the U.S.A. The estimates obtained for the gene flow rate from data relating to small local samples of American Negroes should

TABLE 1.—AVERAGE RATES OF GENE FLOW PER GENERATION, ASSUMING TEN GENERATIONS OF INTERMIXTURE, FROM THE AMERICAN WHITE INTO THE AMERICAN NEGRO POPULATION AS REPRESENTED BY SIX SAMPLES

African sample used	American Negro Sample								
	Baltimore[6]		Washington[7]		Ohio[8] and Southern	New York[9]		New York[10]	Michigan(?)[11]
	Estimate 1[12]	Estimate 2[13]	Estimate 1[12]	Estimate 2[13]		Estimate 1[14]	Estimate 2[15]		
R^o (Rh blood group system)									
Ewe[1]	.0214	.0215	.0208	.0209					
Ewe[2]	.0078	.0078	.0072	.0072					
Ashanti[2]	.0235	.0236	.0228	.0229					
S.W. Nigeria[3]	.0312	.0314	.0306	.0307					
S.E. Nigeria[3]	.0244	.0245	.0237	.0239					
Jos plateau[3]	.0253	.0254	.0246	.0248					
N. Nigeria[3]	.0199	.0200	.0191	.0194					
T (PTC taste)									
W. Africa[4]					.0384				
R^1 (Rh blood group system)									
Ewe[1]	.0219	.0210	.0208	.0198					
Ewe[2]	.0192	.0184	.0183	.0174					
Ashanti[2]	.0087	.0083	.0076	.0073					
S.W. Nigeria[3]	.0271	.0260	.0262	.0250					
S.E. Nigeria[3]	.0303	.0288	.0293	.0280					
Jos plateau[3]	.0398	.0383	.0388	.0373					
N. Nigeria[3]	.0154	.0147	.0143	.0137					
Jk^b (Kidd blood group system)									
W. Africa[5]						.0221	.0215		
S (MNS blood group system)									
S.W. Nigeria[3]								.0183	.0246
S.E. Nigeria[3]								.0237	.0300
Jos plateau[3]								—	.0041
N. Nigeria[3]								.0112	.0175

[1] Armattoe 1951 (gene frequencies calculated by Glass and Li 1953, Table 3).
[2] Armattoe, Ikin, and Mourant 1953.
[3] Chalmers, Ikin, and Mourant 1953.
[4] Included in results of Barnicot 1950.
[5] Ikin and Mourant 1952.
[6] Glass and Li 1953.
[7] Moore 1955.
[8] Lee 1934, using American White gene frequency of Snyder 1932.
[9] Rosenfield, Vogel, Gibbel, Ohno, and Haber 1953.
[10] Miller, Rosenfield, and Vogel 1951.
[11] Neel and Hanig 1951, using American White gene frequencies of Wiener, Di Diego, and Sokol 1953.
[12] Using American White gene frequencies of Unger, Weinberg, and Lefkon 1946.
[13] Using American White gene frequencies of Wiener 1945.
[14] Using American White gene frequencies of Allen, Diamond, and Niedziela 1951.
[15] Using American White gene frequencies of Rosenfield, Vogel, Gibbel, Ohno, and Haber 1953.

TABLE 2.—PERCENTAGE OF WHITE ADMIXTURE IN THE AMERICAN NEGRO SAMPLES OF TABLE 1

African sample used	American Negro Sample								
	Baltimore		Washington		Ohio and Southern	New York		New York	Michigan (?)
	Estimate 1	Estimate 2	Estimate 1	Estimate 2		Estimate 1	Estimate 2		
R^o									
Ewe	19.46	19.58	18.88	18.99					
Ewe	7.53	7.57	6.86	6.90					
Ashanti	21.14	21.26	20.57	20.68					
S.W. Nigeria	27.17	27.32	26.66	26.80					
S.E. Nigeria	21.88	22.00	21.31	21.43					
Jos plateau	22.59	22.71	22.04	22.16					
N. Nigeria	18.19	18.30	17.61	17.72					
T									
W. Africa					32.41				
R^1									
Ewe	19.83	19.05	18.95	18.21					
Ewe	17.67	16.95	16.77	16.09					
Ashanti	8.34	7.96	7.33	7.01					
S.W. Nigeria	24.03	23.14	23.20	22.34					
S.E. Nigeria	26.47	25.51	25.67	24.74					
Jos plateau	33.41	32.31	32.69	31.62					
N. Nigeria	14.33	13.72	13.40	12.84					
Jk^b									
W. Africa						20.00	19.56		
S									
S.W. Nigeria								16.90	22.07
S.E. Nigeria								21.34	26.23
Jos plateau								—	4.04
N. Nigeria								10.61	16.17

not be taken as representative of the whole American Negro population. It appears doubtful to assume that there has been no change in the gene frequencies of the populations concerned. Glass & Li have noted the possibility of different selective forces under African and American conditions. Historical facts have also to be taken into account. For example, concerning the White population, the pattern of immigration into the U.S.A. within the last century shows how the proportions of immigrants contributed by different regions of Europe has varied, with consequent fluctuation in gene frequencies of the White parental population. There should also be considered the tendency for particular European groups to settle in particular regions of the U.S.A., especially in the earlier days, with consequent restriction of potential hybridization to only part of the White population. Such effects however on the genes listed in the table may well have been slight.

Finally the assumption is made that the American Negro is the product of hybridization between two, and only two, parental populations, an assumption noted with reference to the American Indian by Stern (1953). In Meier's (1949) sample, 69% of his Mississippi born Negroes were recorded as having some American Indian

TABLE 3.—GENE FREQUENCIES FROM WHICH THE ESTIMATES IN TABLES 1 AND 2 WERE CALCULATED

African			American Negro			American White		
Sample	Sample size	Gene frequency	Sample	Sample size	Gene frequency	Sample	Sample size	Gene frequency
				R^o				
Ewe[1]	853	.547	Baltimore[6]	907	.446	New York[12]	7317	.028
Ewe[2]	161	.480	Washington[7]	937	.449	New York[13]	1000	.031
Ashanti[2]	113	.558						
S.W. Nigeria[3]	145	.602						
S.E. Nigeria[3]	106	.563						
Jos plateau[3]	124	.568						
N. Nigeria[3]	165	.539						
				T				
W. Africa[4]	57	.813	Ohio and Southern[8]	3156	.697	Ohio[14]	3643	.455
				R^1				
Ewe[1]	853	.077	Baltimore[6]	907	.145	New York[12]	7317	.420
Ewe[2]	161	.086	Washington[7]	937	.142	New York[13]	1000	.434
Ashanti[2]	113	.120						
S.W. Nigeria[3]	145	.058						
S.E. Nigeria[3]	106	.046						
Jos plateau[3]	124	.007						
N. Nigeria[3]	165	.099						
				Jk^b				
W. Africa[5]	85	.217	New York[9]	305	.269	Boston[15]	189	.477
						New York[16]	726	.483
				S				
S.W. Nigeria[3]	112	.124	New York[10]	580	.160	New York[17]	394	.337
S.E. Nigeria[3]	57	.112	Michigan[11]	96	.171			
Jos plateau[3]	123	.164						
N. Nigeria[3]	159	.139						

[1] Armattoe 1951 (gene frequencies calculated by Glass and Li 1953, Table 3)
[2] Armattoe, Ikin, and Mourant 1953.
[3] Chalmers, Ikin, and Mourant 1953.
[4] Included in results of Barnicot 1950.
[5] Ikin and Mourant 1952.
[6] Glass and Li 1953.
[7] Moore 1955.
[8] Lee 1934.
[9] Rosenfield, Vogel, Gibbel, Ohno, and Haber 1953.
[10] Miller, Rosenfield, and Vogel 1951.
[11] Neel and Hanig 1951.
[12] Unger, Weinberg, and Lefkon 1946.
[13] Wiener 1945.
[14] Snyder 1932.
[15] Allen, Diamond, and Niedziela 1951.
[16] Rosenfield, Vogel, Gibbel, Ohno, and Haber, 1953.
[17] Wiener, Di Diego, and Sokol 1953.

ancestry, while in Herskowits' (1930) sample, mainly from the mid Atlantic and southeastern states, 27% were so recorded. None of the few American Indian tribes whose serology has as yet been investigated in detail is likely to have made an important contribution to the American Negro hybrid, and known regional differences in blood group frequency among Indian tribes preclude accurate estimates of the gene frequencies which Indians of the South and East must have contributed. However the general pattern of gene frequency, as regards the characters listed in the table, may perhaps be inferred from what is known for Indians of the Plains and the South West. Only for gene T does the frequency found in the American Indian resemble that of the African—and it has been pointed out above that the estimate of intermixture here derived from this character may not be very reliable. Otherwise, as regards frequencies of R^o, R', Jk^b, and S, the American Indian tends to be much more similar to the European than to the African; in each does the hybrid frequency fall intermediately between the African figure on the one hand and those of the European and American Indian on the other. That is to say that for these characters the shift in gene frequency of the American Negro away from that of the African is due to the combined effect of European and Indian admixture, each reinforcing not counteracting the other. It therefore appears that the above estimates of the European contribution to the American Negro gene-pool may be too high, by a greater or lesser degree proportional to the magnitude of the Indian contribution.

SUMMARY

The average gene flow rate per generation from the American White population into the American Negro population has been recalculated using data from western Africa, the region whence the majority of the Negro slaves were derived, to represent the African parental population. The modal value for gene flow rate assuming ten generations of intermixture falls between .02 and .025, while the amount of accumulated White admixture is estimated as about 20%. That these estimates are provisional has been stressed.

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For the numerous publications on which are based the general statements in the text concerning gene frequencies, the reader is referred to the invaluable compilation of Mourant (1954).

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