

# The indigenous contribution to the formation of the population of the Brazilian Amazon Region

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## ABSTRACT

A total of 5417 individuals were investigated in terms of 13 genetic systems and one dispersal measurement, birthplace, in 11 populations of the Brazilian Amazon Region characterized by a White + Indian + Black contribution. The genetic data were used to estimate the contribution of the different ethnic groups to the population of each town and to the population as a whole. The results showed that in most towns the Indian contribution was greater than the Black but smaller than the Caucasian proportion. When considering the data as a whole, the contribution of Whites, Indians and Blacks was estimated to be 47%, 41% and 12%, respectively. This estimate corresponds to the existence of approximately four million "Indians" amalgamated into the urban population of the Amazon region.

## INTRODUCTION

The human population of the Amazon Region can be considered as excellent material for genetic studies, among other reasons, because they are the product of interethnic crosses between the white colonizers, mainly represented by the Portuguese, African descendents and native Indians.

Portuguese colonizers first settled in the Amazon Region at the beginning of the 17th century, with the founding of the city of Belém occurring in 1616. The size of the indigenous population present before the arrival of the first colonizers to the American continent is a highly controversial matter. Carneiro da Cunha (1992) has reported estimates ranging from one to 8.5 million inhabitants for the southern part of South America and one to 6.8 million for Brazil as a whole.

During the period from the early colonization to our time, many indigenous peoples disappeared either because they were decimated by war or by epidemics such as measles, whooping cough, chicken pox, typhoid fever and malaria, or because they were physically and socially incorporated into the urban populations that began to form. In the Amazon Region, the policy of native assimilation was highly incentivated, mixed marriages were favored, and soldiers who married native women were rewarded with arms, land and money (Cruz, 1973). What we definitely know today is that, regardless of decimation and/or incorporation, native Indians were reduced from millions to the current two hundred thousand survivors over a period of less than five centuries.

It should be pointed out that White-Indian miscegenation started to occur long before the arrival of Black slaves to the region. Africans were brought to the Amazon Region on a sizable scale only after the second half of the 18th century, with the creation of the "Companhia Geral de Comércio do Grão-Pará e

Maranhão" (General Commerce Company of Great Pará and Maranhão) (1755-1778). The number of slaves imported up to 1820 is estimated at about 53,000. The distribution of these persons in the region was not homogeneous, with a high concentration in the State of Pará. In 1787 officials of the "Capitania do Rio Negro", today the State of Amazonas, registered only 247 slaves (Salles, 1971).

After Brazil became independent, foreign immigrants of various origins joined these three basic ethnic elements, as also did Brazilians from the Northeast in several migration waves. More than 100,000 northeastern Brazilians are estimated to have immigrated to the Amazon Region just between 1869 and 1870, at a time when the population of the region was estimated at 400,000 (Salles, 1971).

## MATERIAL AND METHODS

Samples and demographic information were collected from 5417 individuals in 11 towns as part of a wider project of investigation of Amazon populations. Part of the results obtained in the analyses have been previously considered by Santos *et al.* (1983) for Manaus, Schüller *et al.* (1982) for Parintins, Rosa *et al.* (1984) for Coari, Santos *et al.* (1987) for Oriximiná, Guerreiro *et al.* (1993) for Óbidos, Santos *et al.* (1991) for Santarém, Ribeiro dos Santos *et al.* (1991) for Castanhal, and Guerreiro and Chautard-Freire-Maia (1988) and Corvelo and Salzano (1984) for Belém.

In the present study we investigated 13 genetic systems (Table I). The systems in parenthesis were not studied for the populations from Manaus (ESD, CA2, ACP, GLO, CHE1 and CHE2), Parintins (ACP, GLO, CHE1 and CHE2) and Oriximiná (GLO, CA2, CHE1 and CHE2). The techniques employed have been described by Guerreiro *et al.* (1993).

Gene frequencies were estimated using the maximum likelihood (MAXLIK) software developed by Reed and Schull (1968). Estimates of racial admixture were obtained using the MISTURA 3 software developed by Krieger *et al.* (1965).

## RESULTS AND DISCUSSION

The data obtained were grouped to form what we decided to call the Total Population (Table I). Some proteins considered to be variants were detected but are not presented in the Table because the objective of this study was just to discuss general trends.

**Table I** - Phenotypes and gene frequencies of 13 genetic systems investigated in 11 populations of the Brazilian Amazon Region.

System and phenotype	Number	Alleles	Frequencies
<b>HP</b>	<b>4017</b>		
1-1	999	HP*1	0.4965
2-1	1974	HP*2	0.5014
2-2	1027	HP*2M	0.0021
2-1M	17		
<b>CP</b>	<b>3435</b>		
B	3316	CP*B	0.9823
AB	94	CP*A	0.0143
BC	23	CP*C	0.0034
A	02		
<b>TF</b>	<b>5293</b>		
C	5169	TF*C	0.9883
CD	108	TF*D	0.0102
BC	16	TF*B	0.0015
<b>ALB</b>	<b>5417</b>		
A	5401	ALB*A	0.9985
VARIANT	16		
<b>CHE1</b>	<b>3069</b>		
U	2991	CHE1*U	0.9871
UA	77	CHE1*A	0.0129
A	01		
<b>CHE2</b>	<b>2646</b>		
C5+	318		
C5-	2328		
<b>ABO</b>	<b>4558</b>		
O	2511	ABO*O	0.7849
A	1324	ABO*A	0.1676
B	347	ABO*B	0.0475
AB	76		
<b>RH</b>	<b>4540</b>		
D-	207	RH*D-	0.2135
D+	4333	RH*D	0.7865
<b>ESD</b>	<b>2266</b>		
1-1	1438	ESD*1	0.7899
2-1	703	ESD*2	0.2101
2-2	125		
<b>CA2</b>	<b>2059</b>		
1-1	2022	CA2*1	0.9907
2-1	36	CA2*2	0.0093
2-2	01		
<b>ACP</b>	<b>1870</b>		
B	1434	ACP*B	0.8614
AB	326	ACP*A	0.1301
A	78	ACP*C	0.0086
AC	04		
BC	28		
<b>GLO</b>	<b>1519</b>		
1-1	235	GLO*1	0.3670
2-1	751	GLO*2	0.6330
2-2	533		
<b>HBB</b>	<b>3872</b>		
A	3773	HBB*A	0.9871
AS	82	HBB*S	0.0106
AC	17	HBB*C	0.0023

**Table II** - Birth places of the individuals investigated in 10 populations of the Amazon Region according to geographic region.

Population	Birth place					Reference
	North	Northeast	C-West	Southeast	South	
Manaus	70.2	20.6	2.0	2.7	4.5	1
Parintins	99.0	0.8	-	0.2	-	2
Oriximiná	92.7	4.4	0.5	2.4	-	3
Óbidos	98.7	1.3	-	-	-	4
Santarém	85.0	11.6	1.0	1.2	1.2	5
Castanhal	80.7	13.8	1.4	3.3	0.8	6
Alenquer	95.1	4.1	0.4	-	0.4	*
M. Alegre	96.1	3.5	-	-	0.4	*
Bragança	70.5	28.5	0.5	-	0.5	*
Belém	86.9	9.7	0.8	2.5	0.1	7
Total Pop.	85.0	11.1	1.0	1.7	1.2	

1. Santos *et al.* (1983); 2. Schüller *et al.* (1982); 3. Santos *et al.* (1987); 4. Guerreiro *et al.* (1993); 5. Santos *et al.* (1991); 6. Ribeiro dos Santos *et al.* (1991); 7. Guerreiro and Chautard-Freire-Maia (1988); \*. Unpublished data.

The Total Population showed a persistent lack of Hardy-Weinberg equilibrium both for the esterase D system, characterized by a decrease in heterozygotes and an excess of 2-2 homozygotes, and for the acid phosphatase system, characterized by an excess of A homozygotes. The former was detected individually in the populations of Bragança, Castanhal and Oriximiná, and the latter in the populations of Bragança, Óbidos, Castanhal, Santarém and Monte Alegre.

The birthplaces of the individuals investigated are listed according to geographic region in Table II. This information is unavailable for Coari.

Some migration characteristics are shared by all populations: the percentage of individuals born in the Northern Region was always very high, and immigration from the Northeastern Region was four-fold higher than that from all other geographic regions taken together. The percentage of immigrants in the Total Population was 15%. The values for this parameter are not homogeneous. The populations of Parintins, Oriximiná, Óbidos, Alenquer and Monte Alegre, located in the region of the middle Amazon River, showed immigration rates of 1 to 8%. In Manaus and Belém, the capitals of the States of Amazonas and Pará, respectively, in Castanhal and Bragança, two towns close to Belém, and in Santarém, the most important port along the middle Amazon River, the immigration rates were higher (13 to 30%).

Table III presents the parental gene frequencies used to calculate the accumulated ethnic admixture of these populations.

Table IV presents the estimates of accumulated ethnic admixture in the 11 towns studied and in the

**Table III** - Gene frequencies in the parental populations used to estimate the ethnic admixture of populations from the Amazon Region.

Alleles	Frequencies (x1000) in the parental populations		
	Indian	Black	White
HP*2	364	320	591
HP*1	636	658	409
HP*2M	0	22	0
CP*A	0	35	13
CP*C	0	5	2
CP*B	960	985	1000
TF*C	989	968	994
TF*B	0	0	6
TF*D	11	32	0
ALB*A	980	1000	1000
CHE1*U	1000	1000	980
CA2*1	1000	931	1000
RH*D-	17	224	413
ABO*O	1000	702	631
ABO*A	0	156	303
ABO*B	0	142	66
ESD*2	276	62	143
ACP*A	114	166	351
ACP*B	886	833	590
ACP*C	0	1	59
GLO*1	308	309	437
HBB*A	1000	895	1000
HBB*S	0	83	0
HBB*C	0	22	0

Source: Santos *et al.* (1987); Bortolini *et al.* (1992).

Total Population. In most towns the Caucasian contribution exceeded that of native Indians and was higher than that of Blacks. In the populations of Bragança, Castanhal and Santarém, but not of the other towns, the contribution of the Blacks was higher than 20%. The opposite occurred in Monte Alegre, with an estimate of only 2%. In Parintins, Óbidos and Bragança, the native Indian contribution exceeded that of the other two ethnic groups.

**Table IV** - Estimates of accumulated ethnic admixture in 11 populations of the Brazilian Amazon Region.

Population	% of accumulated admixture			No. of systems used	Reference
	Indian	Black	White		
Manaus	27	12	61	03	1
Parintins	51	13	36	07	2
Coari	43	14	43	08	8
Oriximiná	28	15	57	10	3
Óbidos	52	10	38	11	4
Santarém	33	28	39	12	5
Castanhal	25	33	42	12	6
Alenquer	55	12	32	08	*
M. Alegre	36	02	62	08	*
Bragança	45	31	24	11	*
Belém	35	16	49	12	*
Total Pop.	<b>41</b>	<b>12</b>	<b>47</b>	<b>09</b>	

1. Santos *et al.* (1983); 2. Schüler *et al.* (1982); 3. Santos *et al.* (1987); 4. Guerreiro *et al.* (1993); 5. Santos *et al.* (1991); 6. Ribeiro dos Santos *et al.* (1991); 8. Rosa *et al.* (1984); \*. Unpublished data.

The data demonstrate a clear association between increased Black contribution, coupled with a larger number of migrants, mostly from the Northeast, and a reduced Indian contribution. In the towns with a low immigration rate (Parintins, Oriximiná, Óbidos, Alenquer and Monte Alegre), the native contribution was high, i.e., 36 to 55% (except for Oriximiná) and the Black contribution was low, with a maximum of 15%. In the other towns, the Black contribution was higher, i.e., 16 to 31% (except for Manaus) and the native contribution was lower, i.e., 26 to 35% (except for Bragança). Assuming that in the northeastern populations the African contribution is higher than in the Amazon populations, it is reasonable to propose that in populations with a greater northeastern migration the relative contribution of Blacks is also greater.

Considering that the population estimated for the region is 10 million (IGBE, 1991) and assuming that the Total Population is representative of the Brazilian Amazon Region, the results indicate the presence of an equivalent of at least four million "Indians" amalgamated into the hybrid populations of the region. We conclude that the process of native assimilation was indeed significant in the Brazilian Amazon Region.

## RESUMO

Um total de 5.417 indivíduos foram investigados em relação a 13 sistemas genéticos e uma medida de dispersão, local de nascimento, em onze populações brasileiras da região Amazônica, caracterizadas por uma constituição de Branco + Índio + Negro. Os dados genéticos foram utilizados para estimar a contribuição dos diferentes grupos étnicos a cada população e à população como um todo. Os resultados demonstraram que na maioria das cidades a contribuição dos Índios foi maior que a dos Negros mas menor que a dos Caucásios. Quando consideramos o conjunto dos dados, a contribuição de Brancos, Índios e Negros foi estimada como sendo de 47%, 41% e 12%, respectivamente. Esta estimativa corresponde à existência de aproximadamente 4 milhões de "Índios" amalgamados na população urbana da região Amazônica.

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