

Somatic Variability in South Goalpara, Assam

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Introduction

South Goalpara in Assam is a narrow strip of land with an area of about 1275 square miles. It is bounded by the Brahmaputra river in the north, the Garo Hills in the south, Kamrup district in the east and East Pakistan to its west (Fig. 1).

Garo, Kachari, Rabha and Rajbansi form the major bulk of the population of South Goalpara. Besides them, Hajong, Mech and some Hindu castes and Muslims are also met with.

The Garo can be divided into Hill Garo and Plains Garo according to their habitat. The former is confined to the hills, while the latter lives in plains in small villages along with other peoples, namely, Kachari and Rabha.

The Rabha tribe is divided into several groups, of which Pati, Rangdani and Maitori constitute the majority and form the subject of the present study. Rajbansi are a detribalized group, forged out of the various tribal societies. They now form an integrated part of the Assamese.

All the above mentioned tribal groups appear to belong to the same racial stock — the Bodo. Linguistically, it forms a family of the Assam-Burmese branch of the Tibeto-Chinese languages.

The above peoples can be divided into three ecological categories: — 1) Hill Garo — essentially a hill people living on the hills. 2) Plains Garo — now settled on the plains. Of the three Rabha groups, Rangdani have kept themselves somewhat aloof by choosing small hillocks as their villages and thus appear to have reverted to the original Garo ecology. 3) Rajbansi and Kachari — now settled on the river valleys for facilities of fishing and agriculture.

The above peoples are also met with in three different stages of detribalization. Firstly, Hill Garo, who have been treated as a base line in the present study, are yet in the most primitive state. They possess their own tribal solidarity. Secondly, Plains Garo, Rabha and Kachari appear to be in the transitional stage. Lastly, Rajbansi appear to be the end product of the process of detribalization, since they have secured a place in the caste fold of the Hindu society. They claim a higher place in the social hierarchy among the various tribes. The differences in the phys-

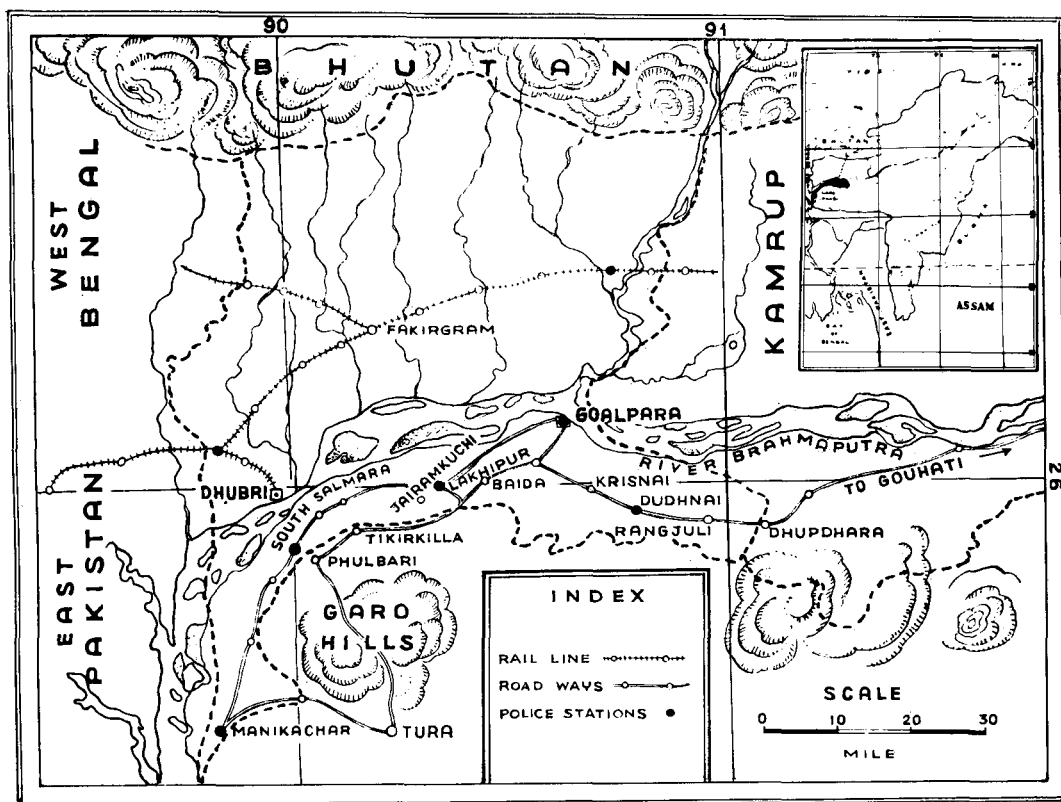


Fig. 1

ical features of an average Hill Garo and an average Rajbansi are obvious, at the same time the difference between them does not appear to be racial in nature.

An attempt was made to find out whether there has been any change in the physical features of the above peoples involved in the process of detribalization (Das, 1964). It is not, however, meant in any way that detribalization has brought about those changes in physical features, since there are some other factors, like hybridization and environment, which deserve careful consideration.

Material and method

The following measurements were taken into consideration for the purpose of the study: (a) stature; (b) sitting height; (c) maximum head length; (d) maximum head breadth; (e) head height; (f) horizontal circumference of head; (g) minimum frontal diameter; (h) maximum bizygomatic breadth; (i) bigonial breadth; (j) nasal

height; (*k*) nasal breadth; (*l*) upper facial height; (*m*) total facial height; (*n*) girth of calf.

The following indices were worked out; (*a*) cephalic index; (*b*) length-height index; (*c*) breadth-height index; (*d*) nasal index; (*e*) upper facial index; (*f*) total facial index.

Somatoscopic characters, which include hair form, hair texture, forehead, supra-orbital ridges, nose, lips and chin, were also observed.

For the purpose of comparison the 't' test of significance was applied and the formula used is:

$$t = \frac{M_1 - M_2}{\sqrt{(\sigma_1^2 + \sigma_2^2)}}$$

where M_1 and M_2 stand for mean values of the two samples and σ_1 and σ_2 the standard error of the two mean values. The value of 3 was taken as the standard of significance.

One hundred adult male members were measured in each group. Persons above 50 and below 21 years of age were avoided.

Scope of the present study

The study (Das, 1964) revealed significant differences in physical characters among the above samples. They were accompanied by an increase and decrease of the various characters as shown in Tab. 1.

Shapiro (1939) in his study of Japanese immigrants into Hawaii also found similar phenomenon of increase and decrease in respect of anthropometric characters. In the above study, the (*i*) Japanese sedentes formed the base line, whereas the other two variants were (*ii*) Japanese immigrants resident in Hawaii and (*iii*) Hawaiian born Japanese.

In this study the data of the present author have been compared with those of Shapiro. Shapiro's study includes a large number of anthropometric characters, which could not be taken in the present study but it is worthwhile comparing the behaviour of the anthropometric characters in the two studies. Only those characters which differ significantly from the statistical point of view have been first of all considered.

Comparison of somatoscopic characters

HAIR ON HEAD

Hair Form: In respect of hair form, an increased tendency towards greater waviness is seen from the sedentes to the immigrants and then to the Hawaiian born. In the same manner from the Hill Garo base line the percentage of wavy hair increases to the other groups.

Hair Texture: From the sedentes to the immigrants and then finally to the Hawaiian

Tab. 1

Variation in the mean values of different measurements (in cm)

Stature		Sitting height	
	163.05 K		85.49 K
	162.65 R		84.95 RR
	162.01 RR		84.71 MR
	161.92 PG		83.98 PR
162.83 H.b.	160.97 MR		83.95 R
158.72 Imm	160.77 PR	85.48 H.b.	83.80 PG
158.39 Sed	159.49 HG	84.50 Sed	82.21 HG
		83.10 Imm	
Head length		Head breadth	
	18.93 MR		14.39 PR
	18.87 RR		14.33 K
18.97 Sed	18.79 HG	15.50 H.b.	14.19 PG
18.93 Imm	18.75 PR	15.27 Imm	14.18 RR
18.65 H.b.	18.72 PG	15.19 Sed	14.10 HG
	18.69 K		14.05 MR
	18.46 R		14.01 R
Head height		Nasal height	
	12.55 R		5.00 K
	12.19 RR		4.97 R
	12.09 MR		4.82 PR
	12.07 PR		4.78 PG
13.68 H.b.	12.06 PG	5.18 H.b.	4.74 MR
13.41 Imm	12.05 K	5.16 Imm	4.72 RR
12.73 Sed	12.01 HG	5.05 Sed	4.69 HG
Nasal breadth		Upper facial height	
3.65 Sed	4.00 HG	8.16 H.b.	6.90 PR
3.58 Imm	3.94 PG	8.14 Imm	6.79 K
3.45 H.b.	3.90 RR	7.26 Sed	6.70 HG
	3.84 K		6.68 R
	3.82 MR		6.59 PG
	3.79 PR		6.56 MR
	3.58 R		6.39 RR
Bizygomatic breadth		Total facial height	
14.23 Imm			
14.17 Sed	13.87 HG	12.32 Imm	11.44 PG
14.13 H.b.	13.77 PG	12.17 H.b.	11.43 K
	13.72 PR	11.96 Sed	11.34 HG
	13.70 K		11.31 R
	13.40 MR & RR		11.30 PR
	13.24 R		11.21 MR
			11.09 RR

Minimum frontal diameter		Bigonial breadth	
11.26	Imm		
11.24	H.b.		10.79 MR
11.21	Sed	10.62 HG	10.67 PR
		10.50 K	11.09 H.b.
		10.48 PG & R	10.64 RR
		10.29 PR	10.94 Sed
		10.23 RR	10.10 HG
		10.14 MR	10.08 PG
			9.99 K
			9.75 R

Variation in the mean values of the indices

Cephalic index		Length-height index	
	76.74 K		66.55 R
	76.72 PR		64.92 PR
83.32	H.b.	76.10 R	64.55 RR
80.72	Imm	75.77 PG	64.46 PG
80.72	Sed	75.17 HG	73.36 H.b.
		75.06 RR	70.82 Imm
		74.43 MR	67.06 Sed
			63.96 HG
			63.89 MR
Breadth-height index		Nasal index	
88.32	H.b.	86.27 RR	72.44 Sed
87.90	Imm	85.88 MR	69.64 Imm
83.72	Sed	85.35 HG	66.82 H.b.
		85.32 PG	85.33 HG
		84.44 PR	83.07 RR
		83.77 K	82.36 PG
		79.45 R	81.44 MR
			80.06 PR
			76.99 K
			72.39 R
Upper facial index		Total facial index	
	50.33 R		85.65 R
	49.91 PR		83.45 MR
57.74	H.b.	49.64 K	83.07 PR
57.35	Imm	49.01 MR	86.53 Imm
51.41	Sed	48.33 HG	86.14 H.b.
		47.98 RR	84.25 Sed
		47.48 PG	82.10 HG
			80.27 K

* H.b. = Hawaiian born K = Kachari PR = Pati Rabha
 Imm = Immigrants R = Rajbansi MR = Maitori Rabha
 Sed = Sedentes PG = Plains Garo RR = Rangdani Rabha
 HG = Hill Garo

born, the frequency of coarse hair decreases. In Assam decrease in percentage of coarse hair is noted from the Hill Garo base line to Rajbansi through Plains Garo and Kachari, while the increase from the base line is seen in the case of the three Rabha groups.

FOREHEAD

As regards height and slope of forehead little differences are observed among the three groups of Shapiro. The same is true in respect of height among all the samples from South Goalpara. But in respect of the slope, a gradual unilateral increase of straight forehead and unilateral decrease of medium retreat of forehead from the Hill Garo base line are observed.

SUPRAORBITAL RIDGES

Both the Hawaiian born and the immigrants show greater development of supra-orbital ridges than the sedentes, whereas all the groups of South Goalpara are distinguished from Hill Garo, except the Plains Garo, by lesser development of supra-orbital ridges.

NOSE

Both the Hawaiian born and the immigrants possess more medium and high nasal roots and fewer deep nasal roots than the sedentes. In Assam also the same tendency is observed in deep nasal roots, the percentage of which shows a unilateral decrease from the Hill Garo stage. Medium roots show both increase and decrease. In respect of bridge of nose little variation is observed among the three groups of Shapiro, while in South Goalpara the frequency of straight nasal bridge shows both increase and decrease.

LIPS

The percentage of medium lips increases while that of thick lips decreases from the sedentes to the Hawaiian born. Similarly a decreasing tendency of medium and an increasing tendency of thin lips are observed as one passes from the Hill Garo base line to the Rajbansi through the other five groups.

CHIN

The Hawaiian born possesses much more prominent chin than the sedentes. A tendency towards increasing number of prominent chin is noted from the Hill Garo stage to the other groups excepting the Plains Garo who show a slightly higher frequency of medium chin than the Hill Garo.

Besides these, a tendency towards finer and probably weaker physical features from the Hill Garo stage to the Rajbansi stage is apparent in other characters also. For instance, zygomatic arch which is marked among the Hill Garo has become

weakly marked among the Rajbansi. Similarly, the high amount of prognathism of the Hill Garo is no longer present among the Rajbansi. The eye-slit has become straight, the palpebral fissure wide and the mongolian fold less marked. An increasing tendency of percentage of the growth of hair in the eyebrows, beard and moustache is also apparent. In body musculature, however, the Rajbansi appear to be much weaker than the sturdy, somewhat rugged Hill Garo type.

Comparison of somatometric characters

STATURE

Shapiro has found a gradual increase of stature from the sedentes to the immigrants and then to the Hawaiian born. The difference of means between the first two is not statistically significant, it is significant between the last two groups. Hill Garo are significantly shorter than Plains Garo, Rangdani Rabha, Rajbansi and Kachari, while the increase to Pati Rabha and Maitori Rabha is not statistically significant. It thus appears that stature is likely to increase not only due to a change in environment as seen in Shapiro's data, but it shows the same increase due to change in habitat within the same geographical area as is obvious from the above remarks.

SITTING HEIGHT

Shapiro found the sedentes mean significantly decreasing to the immigrants from which it again significantly increases to the Hawaiian born, thus ultimately showing an increase from the sedentes. In South Goalpara only the increase is manifested from the Hill Garo stage to the Kachari stage and it is significant beyond the Pati Rabha stage. This is in accordance with the increase of the Hawaiian born from the sedentes and appears to behave in the same manner as stature, stated above.

HEAD LENGTH

Head length appears to behave differently from the above two characters. Shapiro found a slight decrease from the sedentes to the immigrants, from which it significantly decreases to the Hawaiian born. In Assam both increase and decrease have been noted and only the Rajbansi decrease is statistically significant. This is in harmony with the statistically significant decrease found by Shapiro.

HEAD BREADTH

The mean significantly increases from the sedentes to the immigrants, then it shows a significant increase to the Hawaiian born. On the other hand in Assam head breadth shows both an increase and decrease similar to that of head length though the decrease is not statistically significant. The increase is, however, statistically significant beyond the Plains Garo stage.

HEAD HEIGHT

A significant increase from the sedentes to the immigrants and then to the Hawaiian born is observed in respect of this character. The same increase is seen in the case of all the samples from Assam.

MINIMUM FRONTAL DIAMETER

The mean shows a significant increase from the sedentes to the Hawaiian born and then to the immigrants. The reverse is seen in Assam, where the mean shows only a decrease from the Hill Garo stage. The decrease is statistically significant beyond the Plains Garo and Rajbansi stage.

BIZYGOMATIC BREADTH

The sedentes, the immigrants and the Hawaiian born exhibit no significant difference amongst them, but there is an increase between the first two and a decrease between the last two. In Assam we find a unilateral decrease from the Hill Garo base line which is statistically significant beyond the Kachari stage.

BIGONIAL BREADTH

Bigonial breadth significantly increases from the sedentes to the immigrants from where the mean falls insignificantly to the Hawaiian born. In Assam both increase and decrease have been observed and only the Rajbansi decrease is statistically significant, while all increases, shown by Pati Rabha, Rangdani Rabha and Maitori Rabha, are statistically significant.

NASAL HEIGHT

Shapiro's data show a significant increase from the sedentes to the immigrants in respect of nasal height. It shows further increase to the Hawaiian born though the latter increase is not statistically significant. The same unilateral increase is seen in Assam also. The Hill Garo show a significantly lower mean than that of Kachari, Rajbansi and Pati Rabha, while the increase in the cases of Rangdani Rabha, Maitori Rabha and Plains Garo is not statistically significant.

NASAL BREADTH

A significant decrease of nasal breadth is observed from the sedentes to the immigrants and then to the Hawaiian born. The same picture is also seen in Assam with four of the seven groups showing significant differences.

UPPER FACIAL HEIGHT

Shapiro found significant increase in upper facial height from the sedentes to the immigrants, then the increase to the Hawaiian born was insignificant. On the other

hand in Assam upper facial height shows both an increase and a decrease from the Hill Garo base line. The increase is significant in the case of Pati Rabha and the decrease in Rangdani Rabha.

TOTAL FACIAL HEIGHT

As regards total facial height, the mean significantly increases from the sedentes to the Hawaiian born and then to the immigrants. In Assam it shows both decrease and increase, though they are not statistically significant except in the case of decrease to Rangdani Rabha.

CEPHALIC INDEX

Shapiro found cephalic index increasing insignificantly from the sedentes to the immigrants and then significantly to the Hawaiian born. Thus Shapiro's data show a unilateral increase, whereas in Assam both increase and decrease are observed from the Hill Garo base line. The decrease is, however, not statistically significant, but Kachari and Pati Rabha show significant increase from the base line.

LENGTH-HEIGHT INDEX

The mean significantly increases from the sedentes to the immigrants and then to the Hawaiian born. A significant increase from the Hill Garo base line to the Rajbansi through the various groups, except Maitori Rabha which show an insignificant decrease, is seen in Assam.

BREADTH-HEIGHT INDEX

From the sedentes, the mean breadth-height index significantly increases to the immigrants, then it increases insignificantly to the Hawaiian born. In Assam, both increase and decrease are noted and only the Rajbansi decrease is statistically significant.

NASAL INDEX

Shapiro has found a gradual, but statistically significant decrease of nasal index from the sedentes to the immigrants and then to the Hawaiian born. The same gradual decrease from the Hill Garo base line is seen in Assam also, where five of the seven groups show significant difference.

UPPER FACIAL INDEX

The mean increases significantly from the sedentes to the immigrants, then the increase to the Hawaiian born is insignificant. In Assam both increase and decrease have been noticed. The decrease is not, however, statistically significant, while increase is significant beyond the Kachari stage.

TOTAL FACIAL INDEX

Shapiro's data show a significant increase in the mean total facial index from the sedentes to the immigrants then it significantly decreases to the Hawaiian born. The difference between the sedentes and the Hawaiian born is, however, significant. In Assam Rajbansi show a statistically significant increase over Hill Garo through the other groups except Kachari which show an insignificant decrease.

Discussion

It appears from the above analysis that the results obtained by the present author agree with that of Shapiro in respect of some characters, while in respect of some they vary. For example:

I. The following characters show unilateral increase from the sedentes base line of Shapiro and the Hill Garo base line of the present author: 1) stature 2) head height and 3) nasal height.

II. Unilateral decrease from the base line is observed in respect of 1) nasal breadth and 2) nasal index.

III. In respect of 1) head length 2) head breadth 3) cephalic index 4) length-height index 5) upper facial index 6) total facial index 7) upper facial height 8) total facial height 9) bigonial breadth and 10) breadth-height index, the present author found both decrease and increase which, when the statistically insignificant values are ignored appear to behave in the manner similar to that in Shapiro's data, excepting upper facial height, total facial height, bigonial breadth and breadth-height index. The bigonial breadth shows a statistically insignificant decrease from the immigrants to the Hawaiian born, but the most striking variation is seen in total facial height, which increases from the sedentes to the immigrants and then decreases in the Hawaiian born. Both these increase and decrease appear to be statistically significant. The present author found upper facial height and bigonial breadth to show increase and decrease in a statistically significant manner.

IV. In respect of minimum frontal diameter and bizygomatic breadth no significant difference is observed amongst the three groups of Shapiro. The former increases from the sedentes to the immigrants and then decreases in the Hawaiian born, while the latter, from the sedentes increases to the immigrants and decreases to the Hawaiian born. In the present study both minimum frontal diameter and bizygomatic breadth show unilateral decrease from the Hill Garo base line. On the other hand from the sedentes sitting height increases to the Hawaiian born but decreases to the immigrants, both these increase and decrease being statistically significant. The present data show a gradual increase of sitting height from the Hill Garo base line.

Thus it appears from the above comparative study that the changes in physical characters due to migration into two widely different geographical regions — from a temperate country like Japan to a tropical country like Hawaii — are nearly of similar nature in a small area like South Goalpara.

Summary

The present author found significant differences in physical characters among some populations, namely the Garo, the Kachari, the Rabha and the Rajbansi of South Goalpara, Assam. They were accompanied by an increase and decrease of the various characters. Shapiro in his study of Japanese immigrants into Hawaii also found similar phenomenon of increase and decrease in respect of anthropometric characters. In this study the data of the present author have been compared with those of Shapiro.

It is seen that the results obtained by the present author agree with those of Shapiro in respect of some characters, while in respect of some they vary. But it appears that the changes in physical characters due to migration into two widely different geographical regions — from a temperate country like Japan to a tropical country like Hawaii — are nearly of similar nature in a small area like South Goalpara.

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RIASSUNTO

Sono state riscontrate differenze significative nei caratteri fisici fra alcune popolazioni del Goalpara Meridionale (Assam), insieme ad aumento o diminuzione dei vari caratteri. Nel suo studio sugli immigrati giapponesi nelle Hawaii, Shapiro riscontrò un analogo fenomeno di aumento o diminuzione nei caratteri antropometrici. Ai dati di Shapiro vengono raffrontati i dati del presente lavoro. In alcuni casi si riscontra concordanza dei dati, e in altri discordanza. Ma le variazioni nei caratteri fisici, dovute a migrazione in due regioni molto diverse (temperato il Giappone, tropicali le Hawaii) sono di natura simile a quelle riscontrate nel Goalpara Meridionale.

RÉSUMÉ

L'Auteur a trouvé des différences significatives pour des caractères physiques parmi quelques populations du Goalpara Méridional (Assam), ainsi qu'une augmentation ou diminution des divers caractères. Dans son étude sur les immigrantes japonais aux Hawaii, Shapiro a aussi remarqué un phénomène semblable d'augmentation ou diminution des caractères anthropométriques. Les résultats obtenus sont donc comparés aux résultats de Shapiro: l'on remarque des concordances ou discordances d'après les cas. Mais les variations des caractères physiques causées par la migration dans deux régions géographiques très différentes (tempéré le Japon, tropicales les Hawaii) sont presque du même genre de celles remarquées dans le Goalpara Méridional.

ZUSAMMENFASSUNG

Es wurden wesentliche Unterschiede in den Körpermerkmalen zwischen einigen Bevölkerungen des südlichen Goalparas (Assam) zugleich mit Anstieg und Verminderung der verschiedenen Merkmale festgestellt. Bei einer Untersuchung über die japanischen Einwanderer auf den Hawai-Inseln fand Shapiro ein ähnliches Phänomen des Anstiegs oder der Verminderung der anthropometrischen Merkmale. Vorliegende Arbeit bringt einen Vergleich mit den Erhebungen von Shapiro. In einigen Fällen stimmen die Daten überein, in anderen hingegen sind sie diskordant. Aber die Variationen der Körpermerkmale auf Grund von Auswanderung von einer temperierten Gegend wie Japan in eine Tropenregion wie die Hawai-Inseln sind ähnlicher Art wie diejenigen, die man im Süd-Goalpara feststellen konnte.