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## MICRO — EVOLUTION AND VARIATION: A STUDY AMONG THE MIGRANTS IN THE ANDAMANS

**ABSTRACT.** — Human situations with some kind of control so necessary for studies on micro-evolution do, more or less, exist in the Andaman Islands. An attempt is made here to assess changes, if any, that might have affected the character of the migrant tribal populations due to micro-evolution in the islands. The migrants are: the Oraon, Munda, and Kharia, whose original homeland was the Chotanagpur plateau of Bihar, India.

Among the migrants, there is no evidence to show that they have changed in their ABO locus as well as in the pattern intensity index compared to their mainland counterparts. Neither does the ABO system indicate significant local genetic variation among themselves; but it is not quite so with the pattern intensity index. With respect to stature, a trend of increase in mean values of the migrants could be identified. All the three anthropometric characters suggest some degree of significant variation between any two populations.

### INTRODUCTION

Elucidation of the dynamics of ongoing human evolution, precisely of the processes of micro-evolution, is one of the cardinal problems of physical anthropology. But its study is beset with much practical difficulties, because human situations do not generally afford the conditions required for undertaking such studies. The conditions, according to Oliver & Howells (1957: 966), are: "... knowledge of the genetic stock, relative isolation of the experiment, subdivision into a kind of block design, some knowledge of factors involved, and a culturally caused differentiation in breeding behaviour". Although these are not quite satisfied, a situation, more or less, with some kind of control is met with in the case of migrant tribal populations in the Andaman Islands.

The Andaman group of islands (10°–14° N, 92°–94° E) is situated at the mouth of the Bay of Bengal. Its land surface is hilly. It enjoys a tropical climate with two well-marked seasons, dry and wet. Humid weather prevails there for more than eight months a year.

At the beginning of this century several tribal groups were brought from the mainland of India to the Andaman Islands (Vidyarthi, 1971). They came from the Chotanagpur plateau of Bihar, particularly the Ranchi District (20°20'–23°44' N, 84°3'–85°57' E). They were taken there by the British colonists to build up a labour force for exploiting the forest resources of the islands. Some of them eventually found a new home for themselves in the Andamans and settled there permanently. These migrants, comprising more than 3,000 souls, live in different parts of the islands. About 50 per cent of them inhabit Baratang Island of Middle Andaman, spreading over in more than eleven small villages.

Three ethnic groups are numerically dominant among the migrant tribals. These are the Oraon, Munda and Kharia. Each of them has its cultural distinction. Linguistically, the Oraon are a Dravidian speaking people, while the Munda and Kharia are Mundari speaking. But there is subtle difference between the two latter groups. The Munda speak the Kherwari dialect and the Kharia the non-Kherwari. Although neighbours, there is practically no marital relationship among these three populations.

TABLE 1. ABO blood group distribution among the migrant tribals and their mainland counterparts

Group	No.	Percentage				Gene frequency			Source
		O	A	B	AB	p	q	r	
Andamans									
Oraon	218	22.02	27.52	34.40	16.05	.247	.294	.459	Present study
Oraon	100	19.00	25.00	38.00	18.00	.242	.333	.423	Lehman & Ikin (1953)
Munda	72	26.39	37.50	26.39	9.72	.275	.202	.523	Present study
Kharia	82	29.27	24.39	29.27	17.07	.230	.262	.508	Present study
Ranchi									
Oraon	100	35.00	15.00	40.00	10.00	.133	.290	.577	Shukla & Tyagi (1975)
Oraon	186	26.34	22.58	40.32	10.75	.184	.300	.516	Das Sharma (1976)
Munda	105	30.47	33.33	26.66	9.50	.244	.202	.554	Shukla & Tyagi (1975)
Munda	180	27.78	22.78	29.44	20.00	.242	.281	.477	Das Sharma (1976)
Kharia (Dudh)	184	21.20	33.15	29.89	15.76	.284	.262	.454	Bhattacharjee & Kumar (1969)

They were separated to a larger extent from their respective mainland stocks. Marriage is restricted within each of the migrant groups.

The situation, though the generation gap is rather small, possibly permits a study to inquire into changes, if any, in biological characters of the populations owing to the processes of micro-evolution.

#### MATERIAL AND METHOD

The material was collected from Baratang Island and Port Blair by one of us (SKB) during March–May 1977.

Blood samples were obtained from 372 unrelated school children. Grouping was determined according to the standard tube technique given by Dansford & Bowley (1967). Finger prints were collected from 407 individuals, following the technique of Cummins & Midlo (1943). Anthropometry comprises the characters of stature, body weight, and chest girth. All the characters were measured on 331 males, while only stature and body weight could be taken on 187 females. Apparently healthy adults aged between 20 and 50 years were measured, following Martin (1928).

#### RESULTS

##### Serology

The frequencies of the ABO blood group phenotypes together with the estimated gene frequencies for the three migrant populations as well as those available for their mainland counterparts in Ranchi are set out (Table 1). The inter-population analysis does not yield any significant difference, suggesting that the Oraon, Munda and Kharia do not really differ in the ABO system (Table 2). Furthermore, there is also no difference between the present migrant Oraon and the earlier Oraon sample of Lehman & Ikin (1953).

TABLE 2. Test of significance ( $df = 3$ ) between the migrant

Pair: Migrants	Value of $\chi^2$	P
Oraon $\times$ Munda	4.8195	.10—.05
Oraon $\times$ Kharia	2.0395	.75—.50
Munda $\times$ Kharia	3.9095	.50—.25
Oraon $\times$ Oraon <sup>1</sup>	0.8654	.90—.75

<sup>1</sup> Sample of Lehman & Ikin (1953)

TABLE 3. Test of significance between migrant and mainland populations ( $df=3$ )

Pair: Andamans vs. Ranchi	Value of $\chi^2$	P
Oraon $\times$ Oraon <sup>1</sup>	11.3509	<.01
Oraon $\times$ Oraon <sup>2</sup>	4.7708	.25—.10
Munda $\times$ Munda <sup>2</sup>	7.5208	.10—.05
Munda $\times$ Munda <sup>1</sup>	0.6259	.90—.75
Kharia $\times$ Kharia (Dudh) <sup>3</sup>	3.0584	.50—.25

<sup>1</sup> Sample of Shukla & Tyagi (1975)

<sup>2</sup> Sample of Das Sharma (1976)

<sup>3</sup> Sample of Bhattacharjee & Kumar (1969)

In order to examine the change in the blood group system, the migrant populations of the Andamans have been compared with the corresponding populations of Ranchi (Table 3). Out of five inter-population comparisons, four suggest that there is no difference between the migrants and the mainland populations. Only one comparison shows a highly significant difference.

##### Finger Pattern Intensity

The index of finger pattern intensity (PII), one of the vital ethnic determinants (Newman, 1960), has been utilised. It gives also a good estimate of proportions of the dermal patterns to no pattern

TABLE 4. Pattern intensity index of the migrants and mainland populations

Group	Sex	No.	Mean s.e.	S.D.	Source
Andamans					
Oraon	M	109	15.49 $\pm$ 0.29	3.09	Present study
Oraon	F	128	14.73 $\pm$ 0.31	3.55	Present study
Munda	M	43	15.44 $\pm$ 0.54	3.54	Present study
Munda	F	37	13.46 $\pm$ 0.57	3.44	Present study
Kharia	M	53	14.40 $\pm$ 0.49	3.61	Present study
Kharia	F	37	14.25 $\pm$ 0.54	3.43	Present study
Ranchi					
Oraon	M	62	15.38 $\pm$ 0.42	3.33	Shukla & Tyagi (1975)
Oraon	F	109	11.32 $\pm$ 0.79	4.10	Shukla & Tyagi (1975)
Munda	M	63	14.39 $\pm$ 0.44	3.48	Shukla & Tyagi (1975)
Munda	F	52	14.65 $\pm$ 0.79	4.06	Shukla & Tyagi (1975)

TABLE 5. Test of significance between the migrants

Pair	Value of $t$
Male	
Oraon $\times$ Munda	0.13
Oraon $\times$ Kharia	3.27*
Munda $\times$ Kharia	1.91
Female	
Oraon $\times$ Munda	3.04*
Oraon $\times$ Kharia	1.22
Munda $\times$ Kharia	1.29
Oraon male $\times$ Oraon female	4.08**
Munda male $\times$ Munda female	3.24**
Kharia male $\times$ Kharia female	0.28

\* Significant at .005 level of P

\*\* Significant at .001 level of P

TABLE 6. Test of significance between migrant and mainland populations

Pair: Migrant vs. Mainland	Value of $t$
Andamans	
Oraon male $\times$ Oraon male	0.21
Oraon female $\times$ Oraon female	2.42*
Munda male $\times$ Munda male	1.51
Munda female $\times$ Munda female	1.49

\* Significant at .025 level of P

TABLE 7. Stature (mm), body weight (kg) and chest girth (mm) of the migrants

Population	Sex	No	Stature		Body Weight		Chest Girth	
			Mean s.e.	S.D.	Mean s.e.	S.D.	Mean s.e.	S.D.
Oraon	M	207	1616.65 $\pm$ 4.73	68.04	50.98 $\pm$ 0.41	5.96	828.69 $\pm$ 2.49	35.48
Oraon	F	107	1151.23 $\pm$ 6.17	68.84	45.37 $\pm$ 0.60	6.22	—	—
Munda	M	56	1609.70 $\pm$ 7.90	59.12	52.22 $\pm$ 0.89	6.68	830.96 $\pm$ 6.00	43.70
Munda	F	33	1518.58 $\pm$ 7.85	45.11	44.80 $\pm$ 1.49	8.59	—	—
Kharia	M	68	1608.43 $\pm$ 7.56	62.33	51.95 $\pm$ 0.90	7.40	832.00 $\pm$ 4.94	39.82
Kharia	F	47	1495.17 $\pm$ 9.75	66.85	43.51 $\pm$ 0.80	5.51	—	—

at all. The mean PII for the migrant populations as well as those available for their mainland counterparts are presented (Table 4). The values immediately reflect that among the migrants the Kharia males and females have relatively less whorls and fewer arches compared to others.

Inter-pair comparisons of the PII between the migrant populations suggest significant differences in two cases only (Table 5). The differences noted are between Oraon male and Kharia male samples and also between Oraon females and Munda females. This indicates that the Oraon population is, to some extent, at variance with either the Kharia or the Munda.

Sexual dimorphism with respect to the finger ball patterns could be discerned from the PII values. Of the three male-female pair comparisons, two yield highly significant difference. They indicate real sex dichotomy in the migrant Oraon and Munda.

The migrant samples are compared with the mainland samples, excepting the Kharia because of the paucity of material (Table 6). Comparisons show that the migrants do not differ from their mainland counterparts, except in one case. The difference is noted for the Oraon female.

##### Anthropometry

Mean values and standard deviations of three characters for the migrant populations are recorded (Table 7). It shows that in stature, the Oraon are

TABLE 8. Test of significance of variability (variance ratio test) and mean (t-test) between any two migrant samples

Pair	Stature		Body Weight		Chest Girth	
	F	t	F	t	F	t
Oraon (M) × Munda (M)	1.30	0.01	1.25	0.12	1.51*	0.22
Oraon (M) × Kharia (M)	1.18	0.12	1.54*	0.23	1.26	0.12
Munda (M) × Kharia (M)	1.11	0.02	1.22	0.10	1.20	0.09
Oraon (F) × Munda (F)	2.28*	5.69**	1.90**	0.34	—	—
Oraon (F) × Kharia (F)	1.05	5.01**	1.27	0.12	—	—
Munda (F) × Kharia (F)	2.17*	1.09	2.43**	0.44	—	—

\* Significant at .05 level of P

\*\* Significant at .01 level of P

the tallest and the Kharia the shortest. However, the average stature of all the migrants lies within "below medium" class of Martin (1928: 246). In body weight, they are quite close to one another. The Munda males are the heaviest and the Oraon males the lightest. But the Oraon females are the heaviest compared to other females. In chest girth also there is no appreciable variation in mean values of the groups.

Comparisons of the male migrant samples do not reveal differences in character means and their variabilities (Table 8). But two exceptions are noted.

The Oraon males significantly differ from the Kharia males in the variance of body weight, and such is the case with chest girth between the Oraon males and the Munda males. Contrary to the situation, the female samples explicitly display more significant differences between themselves, both at the level of character mean and of variability.

With a view to assessing the change, if any, only the character of stature for the Oraon and Munda groups could be examined (Table 9). Out of the three sets of comparisons between the Oraon

TABLE 9. Stature (in mm) of the migrants and mainland populations

Group	No.	Mean s.e.	S. D
Andamans			
Oraon — male	207	1616.65 ± 4.73	68.04
— female	107	1511.23 ± 6.17	68.84
Munda — male	56	1609.70 ± 7.90	59.12
— female	33	1518.58 ± 7.85	45.11
Kharia — male	68	1608.43 ± 7.56	62.33
— female	47	1495.17 ± 9.75	66.85
Ranchi			
Oraon — male <sup>1</sup>	100	1597.90 ± 5.80	60.00
— male <sup>2</sup>	250	1618.00 ± 2.23	52.29
— male <sup>3</sup>	100	1604.00 ± 6.00	60.00
— female <sup>3</sup>	110	1493.70 ± 5.00	52.00
Munda — male <sup>2</sup>	250	1581.52 ± 2.04	47.73
— male <sup>1</sup>	105	1597.20 ± 5.00	50.90

<sup>1</sup> Sample of Shukla & Tyagi (1975)<sup>2</sup> Sample of Basu (1933—34)<sup>3</sup> Sample of Banerjee (1960)

TABLE 10. Test of significance in mean and variance of stature between migrants and mainland populations

Pair: Migrants vs. Mainland		Value of	
		F	t
Andamans	Ranchi		
Oraon (M) × Oraon (M) <sup>1</sup>		1.29	0.27
Oraon (M) × Oraon (M) <sup>2</sup>		1.69**	1.58
Oraon (M) × Oraon (M) <sup>3</sup>		1.29	2.49*
Oraon (F) × Oraon (F) <sup>3</sup>		1.75**	2.21*
Munda (M) × Munda (M) <sup>3</sup>		1.53*	3.33**
Munda (M) × Munda (M) <sup>3</sup>		1.35	1.33

\* Significant at .05 level of P

\*\* Significant at .01 level of P

<sup>1</sup> Sample of Basu (1933—34)<sup>2</sup> Sample of Banerjee (1960)<sup>3</sup> Sample of Shukla & Tyagi (1975)

males of the Andamans and Ranchi, two suggest clear indication of differences in stature (Table 10). A similar trend could also be discerned for the Oraon females. Again, of the two tests between the migrant Munda and the mainland Munda males there is a marked difference in both the variability and character mean.

## DISCUSSION

The data have been treated at two levels of inquiry. One intends to assess changes, if any, in the migrant populations that might have occurred due to microevolutionary factors. And the other attempts to evaluate inter-population variation of the migrants in the Andaman Islands. The migrants represent three tribal groups, the Oraon, Munda and Kharia.

To assess changes at the ABO locus of the migrant populations, five samples are available for study from the mainland. These are: two samples of the Oraon, two of the Munda and one of the Kharia. Of the five sets of inter-pair comparisons, four sets (comprising one test between the Oraon samples, two between the Munda and one between the Kharia), do not reveal any evidence of significant difference between the migrants and their mainland counterparts. Only one comparison bet-

ween the migrant and mainland Oraon gives a significant results, suggesting a change in the ABO system. It may be said that the migrants have not changed from their corresponding mainland counterparts.

With respect to pattern intensity index, four sets of comparisons could be examined. Only one test (between the Oraon females of the Andamans and Ranchi) shows a high t-value. But the other three comparisons do not display differences between samples. The change noted either in the pattern intensity index or in the ABO system might be due to some chance factor, and not due to any specific reason.

Owing to the paucity of data on body weight and chest girth from the mainland populations, only the stature of the Oraon and Munda could be examined. Six sets of inter-pair tests suggest three cases (between the Oraon males, Oraon females and Munda males) of highly significant differences. The F-ratio, on the other hand, suggests differences in variance with another Oraon male sample as well as with the same Oraon female and the Munda male samples which also indicate differences in mean values. The evidence of change in stature among the migrants cannot perhaps escape notice. The real changes, however, lack a systematic order.

Contrary to this, the absolute mean values of stature exhibit a distinct pattern. It relates to a consistently larger body size (except for a single instance) and also variance in the migrant Oraon and Munda. This speaks for an intrinsic trend of a systematic increase of stature in the migrants. Of course, stature is relatively more responsive to factors of nutrition and environment as well. And, obviously, it is not easy to isolate the causal factor(s) for such a modification, without the exact knowledge of relationship between stature and those factors.

Interpopulation analysis shows that the three migrant populations do not differ with respect to the ABO system. In this context, it is worth referring to a study of red-cell enzyme systems on these populations (Bhattacharya et al., 1980). Of the 11 systems studied, six are found invariant. When another four systems, viz. PGM<sup>1</sup>, Ac. phos., 6-PGD and Esd, are considered together, no evidence of significant difference among these migrants is available. Thus, the data on ABO system and some red-cell enzymes do not indicate genetic variation among the migrants.

The situation is not perhaps quite so with morphology. The pattern intensity index displays some difference among the migrants. Out of six sets of comparisons, two show significant difference — indicating that the Oraon males differ from the Kharia males and the Oraon females from the Munda females. Two migrant groups also express a clear sex dichotomy in the index values.

In anthropometric traits, male samples particularly do not show any statistical variation of any order among the migrants. Contrary to the situation with the males, the female samples expressedly come up with a tendency of variation among themselves. This phenomenon of a subtle male-female incongruity in variation is perhaps hard to explain from the present data. But, on the whole, both the pattern intensity index and anthropometric traits do suggest that there are some degree of significant variation between any two of the migrant tribal populations.

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