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## MORPHO-GENETIC STUDIES AMONG THE ANDAMAN AND NICOBAR ISLANDERS

**ABSTRACT:** In the present paper an attempt has been made to review the physical anthropological work and to compile the data in tabular form among the Andaman and Nicobar Islanders with respect to the morpho-genetic traits i. e. anthropometry, dermatoglyphics, blood groups, P. T. C. taste sensitivity, middle phalangeal hair, secretor/non-secretor.

**KEY WORDS:** Andamanese — Nicobarese — Morpho-genetic traits.

A good number of studies on morpho-genetic traits i.e. the anthropometry, dermatoglyphics, blood groups, P.T.C., taste sensitivity, middle phalangeal hair, secretor/non secretor among the Andaman and Nicobar islanders have been done by various workers. The objectives of these studies have been multifold: (a) to report the frequency distribution and to see the sexual dimorphism with respect to the morpho-genetic traits, (b) to see the inter-island similarities and dissimilarities, (c) to determine the racial status of the tribes with respect to the ethnic groups in neighbouring South-East Asia.

In the present paper an attempt has been made to review the morpho-genetic studies among the Andaman and Nicobar Islanders and to compile the data in tabular form.

### ANTHROPOMETRIC STUDIES

The anthropometric and somatoscopic studies among the Andamanese were undertaken by Man (1885), Molesworth (1893), Von Eickstedt (1928), Goha (1954), Sarkar (1954), Chatterjee (1955), Bhattacharya S.K., Bhattacharya S. (1986) and Sarkar (1985, 1989) whereas the anthropometric studies among the people of Nicobar islands were undertaken by Agrawal (1967), Ganguly (1976) and Gopal Krishan (1986). The distribution of mean stature, cephalic index and nasal index among the various population groups so far reported is compiled in *Table 1*.

B.S. Guha with S.S. Sarkar contacted the Onge of Little Andaman and the Great Andamanese of Neil Island in the year 1948. Guha (1954) has given general account of their contact with the Onge and described their physical characteristics and their affinities with other Negrito populations. The Onge are dwarfish in stature, the mean stature of males being 1482.8 mm and that of females 1378.6 mm. The hair on the head is of the paper-corn type and grows in isolated tufts. The nuances of skin colour vary from reddish brown to black. Sarkar (1985, 1989) reported on the body height, cephalic index and nasal index of the Jarawas.

During the years 1957 and 1960 Ganguly visited the Nicobar Islands and collected data on the physical anthropology of the Nicobarese in Car-Nicobar, Terressa, Chowra and Great Nicobar islands. It is evident from his study that the Nicobarese are not

homogeneous and the analysis of metric and non-metric characters shows sexual differences in almost all characters. Through comparison of the Nicobarese with the various groups of South-East Asia, he has shown that proto-Malays of South Nias resemble the Northern Nicobarese. In addition to Ganguly's work, Gopal Krishan (1986) has provided valuable anthropometric data on the Shompen and Nicobarese of Great Nicobar.

### DERMATOGLYPHIC STUDIES

Dermatoglyphic studies on the Andamanese were undertaken by Sarkar (1954), Gupta and Basu (1960), Pandey and Agnihotri (1983), Sarkar (1987) and Roy (1988), whereas those of the tribes of Nicobar islanders were undertaken by Ganguly and Mukherjee (1964), Gopal Krishan (1977, 1983), Malhotra and Sarkar (1984). The distributions of whorl, loop and arch, pattern intensity index, total finger ridge count, palmar main line formulae 11.97, 9.7.5 and 7.5.5, and main line index are compiled in *Table 2*.

Finger-print patterns of the Andamanese were reported by Sarkar (1954), Pandey and Agnihotri (1983), Gupta et. al (1960), who have analysed finger and palmar prints of the Onge in order to trace the biological relationship, if any, of the Onge with other Negrito populations of Asia and Africa. With respect to dermatoglyphic arches, the Onge show a similarity with Asiatic Pygmies, while in the occurrence of whorls and loops they seem to be closer to some of the Bushmen groups of Africa.

In the pattern intensity index the Oceanic Pygmies show higher average values than the African Negritos. The Onge stand at an intermediate position in this respect, while the Bushmen are rather close to the Onge.

In the occurrence of whorls and loops the Jarawa (Sarkar 1987) reveal a marked difference with the Great Andamanese and the Onge. The pattern intensity index of Andaman Negritos ranges between 12.27 (Great Andamanese) and 17.14 (Jarawa). Further, the Jarawa show a close similarity with the Asiatic Negritos; particularly with the Semang of the Malayan peninsula rather than with the African.

TABLE 1. The distribution of mean stature cephalic index and nasal index among the various populations of Andaman and Nicobar Islands.

Population	Male				Female				Investigator
	No.	Stature	Cephalic	Nasal	No.	Stature	Cephalic	Nasal	
		Index	Index	Index		Index	Index	Index	
Andamanese	40	1458.50	—	—	37	1381.25	—	—	Man (1885)
Andamanese North	50(N)	1485.6	82.00	93.01	50(N)	1385.40	81.95	94.76	Molesworth (1893)
Andamanese South	50(S)	1481.70	83.07	88.60	50(S)	1402.50	82.79	90.21	Molesworth (1893)
	10	1468.00	81.40	71.60	22	1385.00	81.60	72.00	Von Eickstedt (1928)
	8	1515.00	81.18	75.79	8	1393.90	80.35	73.88	Sarkar (1954)
Onge	42	1418.00	83.50	73.40	38	1383.04	83.10	75.00	Von Eickstedt (1928)
	14	1482.80	82.09	83.64	15	1378.60	83.01	82.07	
	27	1477.85	—	—	23	1389.47	—	—	
	2	1518.00	84.80	77.05	6	1407.00	83.22	77.20	
Jarawa	8	1550.30	83.74	—	8	1468.80	79.41	—	
	19	1526.93	—	80.95	11	—	—	85.60	Sarkar (1989)
Nicobarese									
Car-Nicobarese	175	1586.54	74.33	81.02	166	1484.77	75.02	79.64	Ganguly (1976)
Chowrite	111	1566.95	76.71	78.24	58	1494.47	77.09	77.62	Ganguly (1976)
Terressan	77	1591.40	79.51	73.47	81	1496.00	81.51	74.80	Ganguly (1976)
Southern Nicobarese	66	1614.37	86.11	69.58	54	1507.86	87.92	70.87	Ganguly (1976)
Nicobarese	20	1572.95	86.97	80.81	—	—	—	—	Gopal Krishan (1986)
Shompen	25	1591.50	80.06	74.52	11	1486.60	80.79	73.75	Agrawal (1967)
	4	1581.00	78.94	73.55	1	1480.00	78.77	74.47	Ganguli (1976)
	11	1564.45	79.52	81.44	7	1448.42	80.24	84.04	Gopal Krishan (1986)
Munda	—	1604.53	—	—	—	—	—	—	Bhattacharya and Bhattacharya (1986)
Kharia	—	1612.82	—	—	—	—	—	—	Bhattacharya and Bhattacharya (1986)
Oraon	—	1622.83	—	—	—	—	—	—	Bhattacharya and Bhattacharya (1986)

TABLE 3. The percentage distribution of ABO blood groups among the various populations of Andaman and Nicobar Islands.

Population	No.	ABO Frequency				Investigator
		O	A	B	AB	
Andamanese	22	9.09	59.09	22.72	9.09	Sarkar (1952)
	16	31.25	31.25	25.00	12.50	Lehman and Ikin (1954)
	24	16.67	50.00	25.00	8.33	Tandon (1987)
Onge	11	27.27	27.27	36.36	9.09	Gates (1940)
	34	14.71	67.65	5.88	11.76	Sarkar (1952)
	52	13.46	71.15	7.69	7.69	Lehman and Ikin (1954)
Jarawa	5	100.00	—	—	—	Gates (1940)
	2	100.00	—	—	—	Seneath (1976)
Car-Nicobarese	136	86.03	3.68	10.29	—	Sarkar (1952)
	25	92.00	4.00	4.00	—	Solunin and Sneath (1953)
	200	89.00	4.00	7.00	—	Gupta (1956)
	324	79.32	12.96	7.10	0.62	Agrawal (1964)
Chowrite	15	—	—	—	—	Sarkar (1952)
Central Nicobarese	58	72.41	20.69	5.17	1.72	Agrawal (1964)
Southern Nicobarese	113	52.21	10.62	33.63	3.53	Agrawal (1968)
Shompen	55	100.00	—	—	—	Agrawal (1966)
Bhantu (Andamans)	122	36.06	18.85	40.98	4.09	Agrawal (1963)
Burmese (Andamans)	207	35.75	26.57	31.88	5.79	Agrawal (1966)
Karens (Andamans)	571	25.53	34.24	27.85	12.38	Roy (1980)
Kharia (Andamans)	23	21.7	26.1	34.8	17.4	Roy (1980)
Oraon (Andamans)	100	19.0	25.0	38.0	18.0	Lehmann and Ikin (1953)

TABLE 2. The distribution of whorls, loops, arches, pattern intensity index, total finger ridge counts, palmar main line formulae and main line index among the various populations of Andaman and Nicobar Islands.

Population	Sex	No.	Whorl	Loop	Arch	PII	TFRC	11.9.7.	9.75.	7.5.5.	MLI	Investigations
Andamanese	M + F	15	23.33	76.00	0.67	12.27	—	—	—	—	—	Sarkar (1954)
Andamanese	M	9	32.22	63.33	4.44	12.77	—	—	—	—	—	Pandey and Agnihotri (1983)
Andamanese	F	5	44.00	56.00	—	15.22	—	—	—	—	—	Pandey and Agnihotri (1983)
Onge	M	24	35.71	62.18	2.10	13.37	135.40	10.09	21.7	26.1	7.39	Gupta and Basu (1963)
	F	19	31.55	67.91	0.53	13.10	125.77	5.3	28.9	21.1	7.11	Gupta and Basu (1963)
Jarawa	M	12	55.93	42.37	1.69	15.42	170.62	37.50	33.33	16.67	7.63	Sarkar (1987)
	F	5	71.43	28.57	—	17.14	148.00	50.00	20.00	10.00	8.40	Sarkar (1987)
Shompen	M + F	7	57.14	42.86	—	15.67	178.43	—	—	—	6.50	Ganguly and Mukherjee (1964)
Shompen	M	20	46.2	54.8	—	—	—	10.0	32.5	56.0	7.25	Gopal Krishan (1977)
	F	18	36.60	63.4	—	—	—	—	44.5	36.1	6.30	Gopal Krishan (1977)
Car-Nicobarese	M	200	53.3	45.6	0.9	15.24	183.0	21.0	22.75	18.0	7.51	Gopal Krishan et al. (1983)
	F	200	47.8	51.8	0.3	14.74	163.3	17.75	21.75	24.25	7.32	Gopal Krishan et al. (1983)
Car-Nicobarese	M	48	53.13	46.04	0.83	14.62	139.13	15.96	25.53	11.70	7.78	Malhotra and Sarkar (1984)
Nicobarese of Great Nicobar	M	30	41.3	52.7	6.0	—	112.90	20.0	33.3	16.7	9.09	Gopal Krishan (1977)
	F	20	45.5	44.5	10.0	—	101.65	22.5	17.5	12.5	9.70	Gopal Krishan (1977)
Mopillas	M	100	51.2	46.2	2.6	14.86	—	—	—	—	8.92	Rao (1983)
Mopillas	F	100	44.8	51.6	3.1	14.17	—	—	—	—	7.76	Rao (1983)
Karens (Sgaw)	M	228	48.6	48.3	3.19	14.44	137.58	—	—	—	—	Roy (1990)
Karens (Sgaw)	F	238	40.6	55.2	4.2	13.58	124.08	—	—	—	—	Roy (1990)
Karens (mixed)	M	89	33.6	61.9	4.5	12.91	123.04	—	—	—	—	Roy (1990)
Karens (mixed)	F	67	34.5	62.7	2.8	13.16	124.63	—	—	—	—	Roy (1990)

Note: PII = Pattern Intensity Index, TFRC = Total Finger Ridge Count, MLI = Main Line Index

TABLE 4. The percentage distribution of PTC, secretor-non-secretor and middle phalangeal hair among the various populations of Andaman and Nicobar Islands.

Population	Sex	No.	PTC	Frequency	Secretor –	non-Secretor	Middle	Phalangeal	Investigator
			Taster	Non-Taster	Frequency		Hair	Frequency	
					Secretor	Non-Secretor	Present	Absent	
Bhantus of Andaman	M	58	56.89	43.10	—	—	43.10	56.89	Agrawal (1963)
Bhantus of Andaman	M + F	122	—	—	71.31	28.69	—	—	Agrawal (1963)
Bhantus of Andaman	F	64	54.69	45.31	—	—	40.62	39.38	Agrawal (1963)
Barmese of Andaman	—	207	19.81	80.19	—	—	63.77	36.23	Agrawal (1966)
Car-Nicobarese	M	100	—	—	89.00	11.00	—	—	Gupta S.M. and P. Das Sharm (1973)
Car-Nicobarese	F	141	90.07	9.92	—	—	—	—	Gupta S.M. and P. Das Sharm (1973)
Car-Nicobarese	—	324	88.27	11.73	—	—	32.69	56.38	Agrawal (1964)
Nama Sudhra Bengalee	M	100	—	—	—	—	37.00	63.00	Gopal Krishan (1978)
Nicobarese of Non-Cowry	—	96	81.25	18.75	—	—	45.83	54.17	Agrawal (1964)
Nicobarese of Camotra	—	58	89.66	10.34	—	—	72.41	27.59	Agrawal (1964)
Nicobarese of Chowra	—	197	—	—	—	—	24.37	75.63	Ganguly (1963)
Nicobarese of Terressa	—	198	—	—	—	—	29.29	70.71	Ganguly (1963)
Onge of Little Andaman	M + F	66	66.67	33.33	—	—	0.00	100.00	Buchi (1955)

Ganguly and Mukherjee (1964) studied the dermatoglyphic traits of Shompen, Gopal Krishan (1977) restudied the Shompen dermatoglyphics. The distribution of finger and palmar main line formulae indicated statistically significant sex differences among the Shompen. The dermatoglyphic finger traits, with respect to the Car-Nicobarese, show a marked variation among the Southern Nicobarese for the occurrence of arch-pattern, the mean total finger ridge counts and the main line index. Gopal Krishan (1977) studied finger and palmar dermatoglyphics of the Nicobarese of Great Nicobar. Rao (1983, 1990) undertook dermatoglyphic studies among the two settler-groups, the Mopillas and the Karen, and reported high incidence of loops followed by whorls and arches.

#### SERO-GENETIC STUDIES

Systematic studies available on ABO blood groups are presented by Gates (1940), Sarkar (1952), Polunin and Sneath (1953), Lehman and Ikin (1954), Gupta (1956), Agrawal (1963, 1964, 1965, 1966 a,b), Bhattacharya (1990), Roy (1980) and Tandon (1987). The percentage distribution of ABO blood groups is presented in Table 3.

The Great Andamanese of the Andaman island and the Onge of Little Andaman exhibited the highest incidence of group A, rather than of groups O, B or AB for the ABO blood group system as reported by Sarkar (1952), Lehman and Ikin (1954) and Tandon (1987). The Jarawa, as studied by Gates (1940) and Sneath (1976) belonged with hundred percent to O group. Sarkar (1952) has reported that the Nicobarese show a high incidence of O group, unknown in South-East Asia. He has further reported that although the Nicobarese are believed to have migrated to their present place from lower Burma, they are quite different in their blood group frequencies from the people of Burma. Polunin and Sneath (1953), Gupta (1956) and Agrawal (1964) also reported on a very high incidence of O group among the Car-Nicobarese. The Shompen of Great Nicobar studied by Agrawal (1966) are observed to be of O — type. Agrawal (1963) further studied the ABO blood groups of the Bhanthus of Andaman and reported that group B is preponderant over O and A. Similarly the Oraon studied by Lehman and Ikin (1954) show a higher incidence of group B than A and O, whereas the Karen studied by Roy (1980) show a high incidence of blood group A, followed by B and O.

#### P.T.C. TASTE SENSITIVITY

Buchi and Roy (1955) studied the Onge of Little Andaman for P.T.C. taste sensitivity and reported on a relatively high frequency of non-tasters. This fact favours the theory that the Andaman Negritos have no connection with the African aborigines who show a very low non-taster incidence. Agrawal (1964) reported that Nicobarese show a slightly higher frequency in non-tasters as compared to the Car-Nicobarese and Nicobarese of Camorta. In P.T.C. taste sensitivity the non-taster frequencies show resemblance with some of the Mongoloid population of Burma and China. Gupta and Das Sharma (1973) also reported on the P.T.C. taste sensitivity distribution among the Car-Nicobarese and observed non-taster frequency as 9.92 (Table 4).

#### SECRETOR/NON-SECRETOR STUDIES

Agrawal (1963) reported on a considerably high percentage of secretors among the Bhanthus of Andaman. Gupta and Das Sharma (1973) reported that the secretor gene is more frequent than non-secretor among the Nicobarese of Car-Nicobar, which is in agreement with some of the Mongoloid populations of India where the secretor gene frequency has been found to vary between 56.00 and 68.00 percent (Table 4).

#### MIDDLE PHALANGEAL HAIR STUDIES

Buchi and Roy (1955) reported that middle phalangeal hair are totally absent among the Onge. This result suggests that the Onge (probably all Andaman Negritos) have gone further towards freeing their fingers from hair than any other known investigated group. Agrawal (1963) reported middle phalangeal hair among the Bhanthus of Andaman. Agrawal (1964) also studied the Nicobarese of Car-Nicobar, Nancowry and Comorta for the distribution of middle phalangeal hair. Ganguly et al. (1963) undertook a study for this trait among the Nicobarese of the Chowra and Terressa Islands. Gopal Krishan (1978) reported on the distribution of middle phalangeal hair among the Nama-Sudhra Bengalee males of Andaman.

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