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DERMATOGLYPHICS OF THE APATANI OF ARUNACHAL PRADESH, INDIA

ABSTRACT — Paper describing the results of finger and palmar dermatoglyphics of the Apatani tribe.

KEY WORDS: Dermatoglyphics — Finger — Palm — Apatani — Arunachal Pradesh — India.

INTRODUCTION

The Apatani inhabit the Apatani Plateau in the Subansiri region of Arunachal Pradesh at a height of about 1524 metres from sea level occupying an area of about 52 Sq.km. According to 1981 Census they number 16, 335 (8347 males and 7988 females). This small tribe is unique in having developed a distinctive culture in a valley surrounded by high hills. This area was explored by Christoph von Fürer Haimendorf in 1944 as Officer on Special Duty of the British India Government. He reported that Apatanis had virtually no connection with Assam Valley at that time and had very little interaction with the neighbouring tribes. Till 1962 they remained more or less unchanged but after that Apatanis have shown tremendous change in all walks of life. The change has been documented by von Fürer Haimendorf in the restudy of this tribe (von Fürer Haimendorf, 1955, 1962, 1980). This population is characterised by a high incidence of colour blindness (Jaswal 1975). Apatani is the only tribe practising indigenous settled cultivation (wet rice) in north east India and also exhibit the highest population density in the tribal areas of this region. A detailed bio-anthropological investigation of the tribe was undertaken. The tribe was investigated for seroanthropology (Jaswal and Padmanabham, 1983); anthropology (Jaswal and Jaswal 1983), demogenetics (Pad-

manabham and Jaswal, 1985). The present paper deals with the results of finger and palmar dermatoglyphics of this tribe.

MATERIAL AND METHODS

Rolled finger prints of 98 unrelated Apatani individuals (50 males, 48 females) were collected using common printer's ink and analysed by methods suggested by Cummins and Midlo (1961). Methodology for palmar ridge counts and *C* line termination classification was followed after Holt (1949), Plato (1970) and Bhattacharya (1971) respectively.

RESULTS AND DISCUSSION

Percentage frequencies of digital patterns in Apatani males and females are given in *Table 1A and 1B*. The whorls are the commonest pattern type, while ulnar loops occupy the second place in both the sexes. Radial loops occur not only on the second but also on the first and fifth finger. The Apatani exhibit arches in a proportion of 4.0 per cent in males and 2.08 in females. The bisexual difference is significant at 5.0 % level ($\chi^2 = 6.49$, $0.05 > p > 0.01$ for 2 *d.f.*).

TABLE 1A. Percentage frequencies of fingertip patterns in Apatani Males (N = 50)

Digit	Side	Whorls	Ulnar loops	Radial loops	Arches
I	Right	7.20	2.40	—	0.40
	Left	5.80	3.40	—	0.80
II	Right	7.40	2.00	0.20	0.40
	Left	5.20	3.60	0.80	0.40
III	Right	4.40	5.40	—	0.20
	Left	6.00	3.40	—	0.60
IV	Right	6.60	3.20	—	0.20
	Left	6.20	3.20	—	0.60
V	Right	3.40	6.40	—	0.20
	Left	3.00	6.00	—	0.20
I-V	Right	29.00	19.40	0.20	1.40
	Left	26.20	20.20	0.80	2.60

TABLE 1B. Percentage frequencies of fingertip patterns in Apatani Females (N = 48)

Digit	Side	Whorls	Ulnar loops	Radial loops	Arches
I	Right	6.04	3.33	0.21	0.42
	Left	6.46	2.50	—	1.04
II	Right	7.92	1.67	0.42	—
	Left	7.71	1.67	0.42	0.21
III	Right	5.62	4.38	—	—
	Left	6.88	2.71	—	0.42
IV	Right	7.29	2.71	—	—
	Left	7.92	2.08	—	—
V	Right	3.13	6.88	—	—
	Left	3.13	6.88	—	—
I-V	Right	30.00	18.96	0.63	0.42
	Left	32.08	15.83	0.42	1.67

TABLE 2. Finger pattern indices in male and female Apatani

	Male	Female	M + F
Pattern intensity index	15.05 ± 0.53	15.88 ± 0.45	15.46 ± 0.35
Furuhata's index	135.29	173.26	152.66
Dankmeijer's index	7.25	3.36	5.23

TABLE 3. Total finger ridge count and a-b ridge count of palm in Apatani

	Male	Female	M + F
Total finger ridge count	145.81 ± 9.46	169.67 ± 5.17	151.96 ± 5.00
a-b ridge count of palm	75.65 ± 1.56	73.23 ± 1.35	74.36 ± 1.03

TABLE 4. Percentage frequencies of main line formulae

Formulae	Male			Female		
	Right	Left	Total	Right	Left	Total
11.9.7.-	14.00	10.00	12.00	18.75	2.08	10.42
9.7.5.-	24.00	22.00	23.00	14.58	18.75	16.67
7.5.5.-	16.00	28.00	22.00	20.83	29.17	25.00

TABLE 5. Percentage frequency of modal type of main line C

Sex	Hand	Ulnar	Radial	Proximal	Absent
Male	Right	62.00	22.00	12.00	4.00
	Left	72.00	14.00	8.00	6.00
	R + L	67.00	18.00	10.00	5.00
Female	Right	70.83	22.92	2.08	4.17
	Left	68.75	12.50	10.42	8.33
	R + L	69.79	17.71	6.25	6.25

TABLE 6. Percentage frequencies of palmar patterns in Apatani

Pattern	Right	Left	R + L
Thenar/First interdigital			
Males	28.00	26.00	27.00
Females	29.17	33.33	31.25
Hypothenar			
Males	8.00	14.00	11.00
Females	8.33	20.83	14.58

TABLE 7. Percentage frequency of patterns in the II, III and IV interdigital area

Combination	Male		Female	
	Right	Left	Right	Left
O-O-O	26.00	32.00	27.08	31.25
O-O-L	54.00	56.00	56.25	58.33
O-L-L	6.00	—	10.42	6.25
O-L-O	10.00	4.00	4.17	2.08
L-O-L	—	—	2.08	2.08
O-O-I	4.00	2.00	—	—
O-I-O	—	6.00	—	—

TABLE 8. Percentage frequencies of types and combination of axial triradii

	Male		Female	
	Right	Left	Right	Left
t	60.00	52.00	62.50	37.50
t'	32.00	46.00	37.60	62.50
t''	2.00	2.00	—	—
u'	4.00	—	—	—
u''	2.00	—	—	—

In the case of Furuahata's index, the female values are higher than males. Cummins and Midlo (1961) stated that Dankmeijer's index is almost without exception higher in females. In this regard the Apatani are exception. Though not much sexual variation is noticed in the pattern intensity index ($t = 1.19$) the females show slightly higher means. A rise in whorl/loop or pattern intensity index is due to the increase of whorl configuration, while loops play a delicate role in influencing this index (Dankmeijer 1938).

The total finger ridge count of the males is 145.81 ± 9.46 and for females 169.67 ± 5.17 .

The two sexes differ significantly for total finger ridge count. Sexual variations in total finger ridge count have been noticed in various reports from this region. The mean a-b ridge count of Apatani shows that the males show slightly higher means than their female counterparts. However, the sex heterogeneity is found to be non-significant ($t = 1.17$, $0.50 > p > 0.10$).

Omitting the ending of main line A the frequencies of Wilder's three main line formulae are obtained and are presented in Table 4. Most of the males exhibit the main line formulae 9.7.5.-, while a majority of females show the formulae 7.5.5.-. The

TABLE 9A. Frequencies of finger patterns of some tribes of North East India (Males)

Population	No	Whorl	Loop	Arch	Dankmeijer's index	Furuhata's index	Pattern intensity index	Source
Apatani	50	55.20	40.80	4.00	7.25	135.29	15.06	Present study
Minyong	52	57.31	40.15	2.53	4.41	142.70	15.48	Bhattacharya 1955
Padam	54	53.83	43.93	2.24	4.16	122.54	15.16	Bhattacharya 1955
Pasi	41	47.28	50.00	2.72	5.75	94.56	14.46	Bhattacharya 1955
Gallong	152	46.00	52.00	2.00	4.35	88.46	14.40	Kumar 1954
Wancho	61	53.60	43.90	2.46	4.59	122.01	15.11	Dutta and Sengupta 1983
Bangni	50	51.20	47.20	1.60	3.13	108.47	14.98	Sengupta 1984
Minyong	30	43.34	54.33	2.32	5.42	75.88	14.13	Das 1980
Dafla (Nishi)	50	49.40	48.40	2.30	4.53	103.35	13.64	Dutta 1977
Miji	39	69.97	30.76	0.25	0.37	224.17	16.87	Duttachoudhury (Unpublished)
Deuri	48	52.08	46.67	1.25	2.40	111.61	15.08	Sengupta (Unpublished)
Deuri	57	54.56	43.51	1.93	3.54	125.40	15.51	Das et al. 1980
Rabha	295	50.66	47.79	1.55	3.24	106.57	14.91	Das 1963
Boro Kachari	109	54.66	43.41	1.84	3.36	125.91	15.27	Das 1963
Miri	110	40.28	58.63	1.09	2.71	68.68	13.92	Chakravarty and Mukherjee 1962
Miri	100	49.29	49.61	0.90	1.83	101.03	14.74	Sharma 1962
Miri	50	48.20	46.60	5.80	12.18	102.14	14.18	Dutta 1976
Miri	37	37.56	58.64	3.78	10.07	64.05	13.40	Srivastava 1969
Mishing (Miri)	57	37.67	60.18	3.18	8.61	60.93	13.35	Das et al. 1980
Moran	55	48.18	50.55	1.24	2.64	95.32	14.69	Das et al. 1980
Chutiya	62	49.19	47.26	3.55	7.21	104.10	14.79	Das et al. 1980
Khamiyarg	56	35.98	61.13	2.88	8.00	58.85	13.09	Das and Bhagabati 1962
Mikir	100	38.40	55.90	5.70	14.80	68.70	13.27	Deka and Bora 1973
Mikir	108	53.98	43.89	2.13	3.95	122.99	15.19	Deb 1979
Lalung	52	50.19	47.50	2.31	4.59	105.66	14.79	Das et al. 1980
Lalung	106	51.04	47.45	1.51	2.96	107.55	14.96	Chakravarty and Mukherjee 1961
Boro Kachari	138	55.22	43.62	1.61	2.89	126.57	15.41	Chakravarty and Mukherjee 1962
Meeh Kachari	72	40.28	57.22	2.50	6.21	70.39	13.78	Chakravarty and Mukherjee 1962
Garó	170	49.34	48.22	2.36	4.81	102.40	14.67	Das 1963
Garó	134	41.90	55.50	2.50	6.05	75.54	13.94	Chakravarty and Mukherjee 1961
Hajorg	75	44.68	53.69	1.63	3.64	83.21	14.30	Das 1959
Khasi	292	45.28	53.36	1.35	3.42	79.85	14.14	Das 1978
Khasi	242	35.34	61.28	3.38	—	—	—	Miki et al. 1960
Angami Naga	124	52.34	47.42	0.24	—	—	15.21	Chakravarty and Mukherjee 1962
Sema Naga	158	54.81	44.43	0.76	—	—	15.41	Chakravarty and Mukherjee 1962
Rengma Naga	104	53.37	46.34	0.29	—	—	15.31	Chakravarty and Mukherjee 1962
Lotha Naga	106	53.77	42.86	3.40	—	—	15.03	Chakravarty and Mukherjee 1962
Konyak Naga	111	52.34	46.03	1.62	—	—	15.07	Chakravarty and Mukherjee 1962
Ao Naga	8	55.00	45.00	—	—	—	15.50	Chakravarty and Mukherjee 1962
Metthai	118	51.95	46.19	1.86	—	—	15.01	Chakravarty and Mukherjee 1962
Kabui Naga	164	44.27	55.61	0.12	—	—	14.42	Chakravarty and Mukherjee 1962
Mao Naga	153	55.10	44.77	0.13	—	—	15.50	Chakravarty and Mukherjee 1962
Tangkhal	270	53.45	45.15	1.40	—	—	15.21	Chakravarty and Mukherjee 1962
Hmar	100	48.60	50.30	1.10	—	—	14.75	Chakravarty and Mukherjee 1962
Anal	45	34.44	63.33	2.22	—	—	13.22	Chakravarty and Mukherjee 1962
Chothe	84	49.05	50.48	0.48	—	—	14.86	Chakravarty and Mukherjee 1962
Zou	84	38.81	61.19	—	—	—	13.88	Chakravarty and Mukherjee 1962
Veiphei	148	45.54	52.84	1.62	—	—	14.49	Chakravarty and Mukherjee 1962
Moyon Monsarg	116	48.28	51.38	0.34	—	—	14.79	Chakravarty and Mukherjee 1962
Thado	100	43.80	55.20	1.00	—	—	14.28	Chakravarty and Mukherjee 1962
Paite	101	51.39	46.93	1.68	—	—	14.97	Chakravarty and Mukherjee 1962
Gangte	100	46.00	52.00	2.00	—	—	14.40	Chakravarty and Mukherjee 1962
Lushai	134	41.64	57.01	1.34	—	—	14.02	Chakravarty and Mukherjee 1962

TABLE 9B. Frequencies of finger patterns of some tribes of North East India (Females)

Population	No	Whorl	Loop	Arch	Dank-meijer's index	Furuhata's index	Pattern intensity index	Source
Apatani	48	62.08	35.83	2.08	3.36	173.26	15.88	Present study
Minyong	61	47.37	51.48	1.15	2.43	92.02	14.62	Bhattacharya 1955
Padam	40	46.70	50.77	2.54	5.44	91.98	14.42	Bhattacharya 1955
Pasi	62	41.94	54.27	3.78	9.01	77.28	13.82	Bhattacharya 1955
Gallong	161	37.40	59.21	3.39	9.06	63.17	13.40	Kumar 1954
Wancho	25	59.20	39.60	1.20	2.03	149.49	15.80	Dutta and Sengupta 1983
Minyong	30	46.32	49.00	4.67	9.35	94.56	14.27	Das 1980
Singpho	50	40.20	51.40	8.40	20.89	78.21	13.24	Dutta 1973
Miji	20	60.00	39.50	0.50	0.83	151.90	15.95	Duttachoudhury (Unpublished)
Deuri	62	52.58	46.13	1.29	2.45	113.99	15.13	Sengupta (Unpublished)
Deuri	58	54.14	42.24	3.62	6.69	128.16	15.08	Das et al. 1980
Rabha	295	44.98	50.71	4.31	9.62	89.04	14.06	Das 1960
Boro Kachari	104	47.90	49.10	3.00	—	—	—	Chakravarty & Mukherjee 1961
Miri	112	40.10	56.90	3.10	—	—	—	Chakravarty & Mukherjee 1961
Mishing	54	35.74	55.93	8.33	23.32	63.91	12.72	Das et al. 1980
Moran	52	50.77	48.27	0.96	1.89	105.18	14.98	Das et al. 1980
Chutiya	57	41.55	57.76	0.69	1.66	71.94	14.09	Das et al. 1980
Khamiyang	61	38.62	57.30	3.94	10.20	67.39	13.45	Das and Bhagabati 1962
Mikir	100	34.90	59.20	5.90	16.91	58.95	12.90	Deka and Bora 1973
Garo	104	48.10	50.20	1.70	—	—	—	Chakravarty and Mukherjee 1961
Khasi	295	35.60	61.29	3.05	9.73	57.53	13.18	Das 1978
Khasi	75	39.49	55.12	5.39	—	—	—	Miki et al. 1960
Angami Naga	122	45.57	52.30	2.13	—	—	14.34	Chakravarty and Mukherjee 1962
Rengma Naga	103	55.63	42.82	1.55	—	—	15.41	Chakravarty and Mukherjee 1962
Lotha Naga	108	49.26	49.54	1.20	—	—	14.81	Chakravarty and Mukherjee 1962
Sema Naga	112	53.57	46.07	0.36	—	—	15.32	Chakravarty and Mukherjee 1962
Konyak Naga	112	42.59	55.62	1.79	—	—	14.08	Chakravarty and Mukherjee 1962
Matthei Manipuri	128	43.36	55.15	1.48	—	—	14.19	Chakravarty and Mukherjee 1962
Kabui Naga	118	36.44	62.71	0.85	—	—	13.56	Chakravarty and Mukherjee 1962
Mao Naga	102	51.67	48.04	0.29	—	—	15.14	Chakravarty and Mukherjee 1962
Tangkhu	172	55.70	42.79	1.51	—	—	15.42	Chakravarty and Mukherjee 1962
Hmar	148	41.62	57.98	0.41	—	—	14.12	Chakravarty and Mukherjee 1962
Anal	30	45.00	55.00	—	—	—	14.50	Chakravarty and Mukherjee 1962
Chothe	68	38.82	61.17	—	—	—	13.88	Chakravarty and Mukherjee 1962
Zou	30	58.33	41.67	—	—	—	15.83	Chakravarty and Mukherjee 1962
Veiphei	86	46.23	52.33	1.40	—	—	14.48	Chakravarty and Mukherjee 1962
Moyan Monsang	62	40.00	58.71	1.29	—	—	13.87	Chakravarty and Mukherjee 1962
Thado	124	40.48	56.62	2.90	—	—	13.75	Chakravarty and Mukherjee 1962
Paite	150	47.20	52.40	0.40	—	—	14.68	Chakravarty and Mukherjee 1962
Gangte	100	45.00	54.00	1.00	—	—	14.40	Chakravarty and Mukherjee 1962
Lushai	124	41.13	55.64	3.23	—	—	13.79	Chakravarty and Mukherjee 1962

TABLE 10. Total finger ridge count in certain populations of North East India

Population	No	Total finger ridge count		Author	Population	No	Total finger ridge count		Author
		Mean	± S. E.				Mean	± S. E.	
MALES					FEMALES				
Apatani	32	145.81	9.46	Present study	Apatani	45	169.67	5.17	Present study
Wancho	60	144.67	5.71	Sengupta 1984	Wancho	25	149.00	7.88	Sengupta 1984
Minyong	30	148.90	2.23	Das 1980	Minyong	30	134.07	2.42	Das 1980
Sonowal					Singpho	50	118.55	5.95	Dutta 1973
Kachari	61	117.48	5.56	Das 1974	Sonowal				
Mikir	108	142.04	3.90	Das & Das 1972	Kachari	55	123.16	5.96	Das 1974
Khamiyang	39	119.09	7.74	Srivastava 1969	Khamiyang	38	124.44	7.87	Das & Das 1972
Miri	37	143.60	5.25	Borgohain 1984	Turung	36	107.72	—	Borgohain 1984
Turung	94	133.07	—	Buchi & Das 1971	Khyriam	54	122.00	7.33	Das 1978—1979
Garo	90	152.53	5.23	Das 1978—1979	Pnar	72	125.01	5.70	Das 1978—1979
Khyriam	50	135.10	4.79	Das 1978—1979	War	57	119.75	6.08	Das 1978—1979
Pnar	78	137.64	4.74	Das 1978—1979	Bhoi	35	133.02	5.74	Das 1978—1979
War	75	140.44	4.90	Das 1978—1979					
Bhoi	25	149.25	6.67	Das 1978—1979					

TABLE 11. Percentage frequencies of three principal palmar main line formulae in certain populations of North East India

Population	11.9.7.	9.7.5.	7.5.5.	Author
MALES				
Apatani	12.00	23.00	22.00	Present study
Pati Rabha	7.5	23.5	24.3	Das 1960
Rangdani Rabha	3.6	15.6	32.5	Das 1960
Maitori Rabha	1.5	25.0	28.1	Das 1960
Kachari	12.00	31.33	35.33	Das 1960
Mishing	19.16	44.11	18.63	Das et al. 1980
Moran	16.33	36.73	25.51	Das et al. 1980
Chutiya	24.50	33.32	24.50	Das et al. 1980
Deuri	20.40	24.48	28.57	Das et al. 1980
Lalung	26.25	26.25	25.00	Das et al. 1980
Khamiyang	6.00	29.00	40.00	Das & Bhagabati 1964
Khamiyang	7.50	35.00	25.83	Barua 1976
Garo	14.61	30.41	32.91	Das 1966
Khyriam	9.23	27.69	44.61	Das 1978
Hajong	26.62	34.67	38.70	Das 1966
Pnar	24.37	36.87	38.75	Das 1978
Bhoi	31.67	43.35	24.98	Das 1978
War	26.03	36.46	37.50	Das 1978
Angami Naga	8.87	35.08	40.73	Chakravarty & Mukherjee 1962
Rengma	12.50	46.63	35.10	Chakravarty & Mukherjee 1962
Lotha	15.01	37.74	28.24	Chakravarty & Mukherjee 1962
Sema	10.76	29.75	42.41	Chakravarty & Mukherjee 1962
Ao	—	12.50	75.00	Chakravarty & Mukherjee 1962
Konyak Naga	9.46	28.38	51.35	Chakravarty & Mukherjee 1962
Matthei Manipuri	11.44	32.63	40.25	Chakravarty & Mukherjee 1962
Kabui Naga	11.59	37.20	37.80	Chakravarty & Mukherjee 1962
Mao Naga	7.84	19.93	54.58	Chakravarty & Mukherjee 1962
Tangkhu	14.50	29.75	45.25	Chakravarty & Mukherjee 1962
Hmar	5.50	37.50	49.50	Chakravarty & Mukherjee 1962
Anal	16.67	38.89	27.78	Chakravarty & Mukherjee 1962
Chothe	19.05	28.57	42.86	Chakravarty & Mukherjee 1962
Zou	3.57	16.67	59.52	Chakravarty & Mukherjee 1962
Veiphei	12.16	27.03	53.38	Chakravarty & Mukherjee 1962
Moyan Monsang	16.38	41.38	31.03	Chakravarty & Mukherjee 1962
Thado	12.00	22.50	49.00	Chakravarty & Mukherjee 1962
Paite	9.90	34.65	39.11	Chakravarty & Mukherjee 1962
Gangte	12.00	29.00	60.00	Chakravarty & Mukherjee 1962
Lushai	15.67	38.06	29.85	Chakravarty & Mukherjee 1962
FEMALES				
Apatani	10.42	16.67	25.00	Present study
Singpho	8.00	14.03	6.00	Dutta 1974
Pati Rabha	3.4	19.7	24.4	Das 1960
Rangdani Rabha	5.0	16.4	27.8	Das 1960
Maitori Rabha	3.3	18.3	35.0	Das 1960
Deuri	16.00	32.00	34.00	Das et al. 1980
Chutiya	36.73	30.61	15.30	Das et al. 1980
Mishing	19.57	30.44	33.70	Das et al. 1980
Moran	23.17	26.84	28.05	Das et al. 1980
Khamiyang	5.83	29.16	32.50	Das & Bhagabati 1964
Khamiyang	11.66	25.00	39.16	Barua 1976
Khyriam	26.62	40.92	32.45	Das 1978
Pnar	37.38	30.14	32.24	Das 1978
Bhoi	15.31	44.41	40.27	Das 1978
War	17.70	53.05	29.24	Das 1978
Angami Naga	9.02	36.07	39.34	Chakravarty & Mukherjee 1962
Rengma	9.22	27.18	45.14	Chakravarty & Mukherjee 1962
Lotha	16.66	29.16	43.52	Chakravarty & Mukherjee 1962
Sema	7.14	33.04	43.75	Chakravarty & Mukherjee 1962
Konyak Naga	8.48	23.21	55.35	Chakravarty & Mukherjee 1962
Matthei Manipuri	20.31	19.53	48.83	Chakravarty & Mukherjee 1962
Kabui Naga	11.86	35.42	45.76	Chakravarty & Mukherjee 1962
Mao Naga	14.71	21.57	45.59	Chakravarty & Mukherjee 1962
Tangkhu	13.37	26.75	44.19	Chakravarty & Mukherjee 1962
Hmar	9.46	20.27	52.72	Chakravarty & Mukherjee 1962
Anal	—	16.67	83.33	Chakravarty & Mukherjee 1962
Chothe	11.76	20.59	64.71	Chakravarty & Mukherjee 1962
Zou	8.33	8.33	75.00	Chakravarty & Mukherjee 1962
Veiphei	3.49	23.26	62.79	Chakravarty & Mukherjee 1962
Moyan Monsang	4.84	27.42	62.90	Chakravarty & Mukherjee 1962
Thado	16.13	21.77	50.00	Chakravarty & Mukherjee 1962
Paite	8.67	21.33	46.67	Chakravarty & Mukherjee 1962
Gangte	7.50	25.00	65.00	Chakravarty & Mukherjee 1962
Lushai	10.48	31.45	49.19	Chakravarty & Mukherjee 1962

TABLE 12. C line termination in certain populations of North East India

Population	Sex	No	Ulnar	Radial	Proximal/ Abortive	Author
Apatani	M + F	98	68.37	17.86	13.78	Present study
Waneho	M + F	85	77.06	13.53	9.41	Sengupta & Dutta (Unpub.)
Singpho	F	50	71.00	16.00	13.00	Dutta 1976
Deuri	M + F	108	51.85	28.70	19.44	Sengupta 1980
Khamiyang	M + F	120	79.99	17.08	2.91	Barua 1976
Khamiyang	M + F	110	68.33	11.66	20.00	Das & Bhagabati 1964
Pati Rabha	M + F	205*	75.61	16.59	7.80	Das 1960
Rangdani Rabha	M + F	162*	75.31	14.81	9.88	Das 1960
Maitori Rabha	M + F	124*	82.26	12.10	5.65	Das 1960
Lalung	M	45	57.77	27.77	14.44	Das & Sengupta 1985
Mishing	M	60	60.83	19.16	20.00	Das & Sengupta 1985
Moran	M	52	69.23	23.07	7.68	Das & Sengupta 1985
Chutia	M	56	47.32	30.35	22.32	Das & Sengupta 1985
Deuri	M	54	55.55	32.40	12.03	Das & Sengupta 1985
Hajong	M	65	76.16	11.53	12.30	Das 1966
Khinriem	M + F	156	59.51	23.71	17.27	Das 1968
Pnar	M + F	164	58.08	26.50	15.47	Das 1968
Bhoi	M + F	66	60.93	18.89	20.16	Das 1968
War	M + F	161	61.78	20.12	18.00	Das 1968
Khinriem	M + F	280	62.30	23.40	14.30	Chakravarty 1976

* indicates the number of palms studied

bisexual differences with regard to this trait are not significant ($\chi^2 = 1.16, 0.70 > p > 0.50, d.f. = 2$).

Qualitative aspects of palmar main line C show that for the radial type higher frequencies are found on the right hand, whereas on the left hand, the tendency is on the ulnar side or absent. This is evident in both the sexes. Test of significance fails to record any bisexual variation ($\chi^2 = 1.05, 0.90 > p > 0.70, d.f. = 3$).

Of the patterns on the three interdigitals II, III and IV in combination, the combination of O-O-L is most frequent in both the sexes which is followed by the combination O-O-O-. The axial tri-radii t occur more frequently among males whereas both t and t' occur equally among females. Only three per cent of the males show two tri-radii.

Table 9 summarizes papillary pattern frequencies and indices of some tribal populations of North East India. On the whole, Apatani are within the broad range of variations of mongoloids. According to World summaries (Chamla 1962-1963) whorl loop vary among mongoloids between 43% to 59% and 38% to 59%. The arch frequency and pattern intensity index variation among mongoloids is of the order of 0.0% to 5.5% and 13.45 to 15.90 respectively. According to Dankmeijer (1938) arch/whorl index below 10 is typical for mongoloids. In respect of papillary patterns male Apatani seem to be closer to the Adi tribe of Arunachal Pradesh, more particularly to the Minyong (Bhattacharya 1955) while the females are closer to Miji (Dutta-Choudhury, personal communication). The frequency of arches is relatively lower in all the populations. They are however significant from the ethnic point of view (Rife 1953). The male Apatani sample show slightly higher frequency of arches and seems to be

closer to some of the tribes of Brahmaputra valley of Assam viz. Mishing, Chutiya and Mikir. In most of the male samples of North East India, whorl predominates over loops, while it is just reverse in most of the female samples. The index of pattern intensity displays almost similar pattern in all the populations under consideration. Unlike pattern intensity index both Dankmeijer's index and Furuata's index among the various mongoloid populations of North East India display a wide range of variation.

The Sonowal Kachari exhibit a very low total finger ridge count, which is least of all that obtained from all the populations under consideration. The similarity of Apatani males with all other samples in this respect is well evidenced. The Apatani females stand far apart from all other populations in this regard.

The very common occurrence of 11.9.7.- which is supposed to be the 'White formula' (Wilder 1922) is observed in lesser frequency in most of the populations. Tiwari (1952) has opined that 9.7.5.- is the mongoloid formula, percentage figure of which is relatively higher in most of the populations under consideration. However, 7.5.5.- is the predominant type in most cases.

C line in the populations under consideration has a tendency to segregate on the ulnar side. This is in agreement with the study of Bhanu et. al. (1975) who observed that the populations from Eastern India have a tendency to segregate on the ulnar side. The ulnar type of C line is more frequent in mongoloids than in the Indids (Castes and Muslims). The table also suggests that ulnar type shows widest range of variation (47.32% to 82.26%). At the next stage stand radial type (32.40% to 11.53%) followed by combined data of proximal and absent (22.32% to 2.91%) type.

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