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## HAND DERMATOGLYPHICS OF THE GIPSY POPULATION IN ŠÁROVCE

**ABSTRACT** — The author presents the dermatoglyphic patterns of the papillary areas of fingers and palms in 181 Gipsies from Šárovce, Slovakia; 93 of them males and 88 females. Besides processing the material, comparisons were made with the all-Slovakian population, with Gipsy populations from various regions, with results of dermatoglyphic studies of Indian populations, as well as with the occurrence of the transversal crease furrow and its comparison with the Hungarian population. On the basis of the study the author arrived to the following conclusions:

*In Gipsies from Šárovce the following frequencies of basic pattern types have been found:*

$L = 56.44 \pm 1.16 \%$

$W = 39.91 \pm 1.15 \%$

$A = 3.65 \pm 0.57 \%$

*The total quantitative value in males =  $130.90 \pm 3.91$ , in females =  $133.34 \pm 3.94$ , and in the material as a whole  $132.12 \pm 2.78$  lines. Compared with the Czechoslovak population there were significant differences in the L and W values. Significantly higher is the mean number of lines in males of the all-Slovakian population compared with the males of the Gipsy population from Šárovce. The occurrence of the transversal crease line found in the Gipsy population from Šárovce is closest to that of the Hungarian populations of Katymár and Pereg (central Hungary). These results provide the conditions for further study.*

**KEY WORDS:** *Dermatoglyphics — Czechoslovakia — Gipsies — Šárovce — Katymár — Pereg.*

### INTRODUCTION

We learn from various publications of authors dealing with the problem of Gipsies that this ethnic group differs in many aspects from the rest of the population living in our territory. The Gipsies have characteristic morphological and physiological features (the index cephalicus of the skull, colour of the

skin, hair, eyes, blood group systems, etc.), the language, and to a lesser degree also the culture and psychics. The intensity of mixing with the rest of the population is relatively low, therefore most characteristics of this population have remained unchanged through generations or have changed slightly. The material used for this paper comes from the West Slovakian Region, from the village Šárovce (south

of Levice), where the Gipsies live their traditional way of life, in their isolated settlement. They are practically not integrated into the local population, there are no intermarriages and endogamy prevails; a basic condition for the preservation of the group's ethnic and biological features.

The objective of this paper has been to mention the frequency of occurrence of dermatoglyphic patterns of fingers and palms in the studied area, to compare the data obtained in the studied region with the data of the all-Slovakian population, with the results obtained by the authors specializing in the dermatoglyphics of the Gipsy population, to compare the occurrence of the transversal crease furrow in the studied material with the situation in the Hungarian population, and finally to compare the studied population with Indian populations. The latter has been included in this paper as the Gipsies have their origin in India.

The material deals with dermatoglyphic patterns on the fingers and palms, which, as we know, are of utmost importance for comparing relationship between various populations. One of the objectives of this study is to extend knowledge on dermatoglyphics in Slovakia in general, and on the dermatoglyphics of the Gipsy population in particular.

## MATERIAL

The material for the study is formed by finger and palm prints of 181 people, of 93 males and 88 females. All probands are settled or semi-nomadic Gipsies. The studied individuals are not in direct relationship. The prints were taken in the years 1973 and 1974.

## METHODS

For taking the prints I used printer's black. For the interpretation I applied Cummins' method (1929), with the only difference that I mark the absence of C line in the palm as Y, and the absence of triradii c as X according to Valšík (1924). Further this method has been extended by the method of papillary number P and its derivatives, according to Valšík (1932). To obtain the difference number at papillary number (P. No.) I proceeded according to Sharma (1962). For statistical processing the usual statistical methods were applied. For the papillary lines on the fingers we distinguish eight types of patterns: Lu, Lr, W, CP, LP, TL, A and At. During the quantitative processing of the data I was proceeding in the usual way. In the palm I evaluated: the ending of main lines, thenar patterns and the 1st interdigital areas, hypothenar, interdigital areas IIInd, IIIrd and IVth and the position of carpal triradii (Walker 1957). Further I assessed also the constellation of crease furrows, with special regards to the presence of the so-called transverse crease furrow (Weninger-Navrátil, 1957), but I took into

account only classical types and types close to them.

I calculated the following indices: Volocki's index, Dankmeijer's index, Furuhashi's index, Geipel's index, Poll's index, as well as the main-line index, but also the papillary number and its derivatives.

To compare the significance of differences in the individual patterns test t was applied.

## RESULTS

### Finger patterns

1. Of the individual types of patterns most frequent in both sexes and on both hands is the ulnar loop (Lu), more on the left than on the right hand. It is most frequent on the Vth finger, least frequent on the IIInd and IVth fingers. Radial loops occur in low percentage in both sexes, and almost exclusively on the IIInd finger (in two cases in males on the IIIrd finger). Complicated patterns (W, CP, LP, TL) form the second most frequent group, both in males and in females, they appear more on the right than on the left side, more frequently in males than in females. The se patterns are represented most on the IVth and least on the Vth regardless of the sex. Least represented are patterns A and At, they are more frequent with males than with females (4.09 % and 3.18 %), differing from other populations. As far as fingers are concerned, this pattern is most frequent on the IIInd and on the IIIrd, least frequent on the Vth.

TABLE 1. Frequency of patterns on the fingers of males

Left					
	I	II	III	IV	V
Lu	50.53	30.11	63.36	38.71	84.94
Lr	—	19.35	2.15	—	—
W	15.05	13.65	17.20	34.41	7.52
CP	1.07	6.45	5.38	17.20	3.22
LP	3.22	10.75	3.23	7.53	3.22
TL	18.27	1.07	2.15	1.08	1.07
A	3.22	7.53	6.45	1.08	—
At	—	1.08	1.08	—	—

Right					
	I	II	III	IV	V
Lu	40.86	30.91	59.78	29.03	78.49
Lr	—	17.20	—	—	—
W	26.88	25.80	16.30	49.46	5.38
CP	1.08	6.45	6.52	12.90	9.68
LP	6.45	6.45	4.35	5.38	4.30
TL	24.73	6.45	3.26	2.15	—
A	—	5.37	7.61	1.08	2.15
At	—	2.15	2.17	—	—

TABLE 2. Frequency of patterns on the fingers of females

Left					
	I	II	III	IV	V
Lu	46.59	39.77	67.05	43.18	79.55
Lr	—	18.18	—	—	—
W	13.64	18.18	12.50	30.68	6.82
CP	2.27	9.09	5.68	17.05	9.09
LP	13.64	10.23	6.82	4.55	2.27
TL	18.18	1.14	4.55	2.27	1.14
A	5.68	1.14	3.41	1.14	1.14
At	—	2.27	—	1.14	—

Right					
	I	II	III	IV	V
Lu	40.11	45.45	70.45	38.64	88.64
Lr	—	7.95	—	—	—
W	18.18	19.32	14.77	27.27	3.41
CP	5.68	4.55	4.55	26.14	5.68
LP	19.32	12.50	6.82	6.82	—
TL	13.64	3.41	—	—	—
A	2.27	4.55	3.41	1.14	2.27
At	—	2.27	—	—	—

2. Frequency of the three basic pattern types. In order to compare my results with the results of other authors I have included all patterns into three basic groups, into the group of loops, whorls and arches and I have calculated the indices. The percentual occurrence of the individual patterns in males and in females in the entire population is as follows:

TABLE 3

	Males	Females	Males and females
L	54.36	58.64	56.44
W	41.55	38.18	39.91
A	4.09	3.18	3.65

The individual indices have been calculated from the above values in the following way:

Dankmeijer's — males 9.90 females — 8.33  
Furuhashi's — males 76.43 females — 65.11  
Volocki's — males 13.75 females — 13.50  
Poll's — males 7.52 females — 5.42  
Geipel's — males 259 females — 288

From the indices follow systematically higher values for males than for females, with the exception of Geipel's index.

3. The quantitative finger values. The highest number of lines both in males and in females occurs on the IVth and Ist fingers, the lowest on the IIInd finger.

The mean number of lines in males per finger is 13.09 and in females 13.33, i.e. it is higher in females than in males. The differences are not significant. The mean per finger value for the population as a whole is  $13.21 \pm 0.56$  lines. The total number of lines for the studied population in males is 130.79, in females 133.35 lines, i.e. higher in females than in males. For the population as a whole TRC — 132.07 lines.

TABLE 4. Quantitative values of the individual fingers

Males		
	left	right
I	$14.93 \pm 5.46 \pm 0.57$	$16.51 \pm 5.30 \pm 0.55$
II	$9.84 \pm 6.82 \pm 0.71$	$10.16 \pm 5.82 \pm 0.60$
III	$11.98 \pm 5.34 \pm 0.55$	$10.96 \pm 5.43 \pm 0.57$
IV	$15.93 \pm 4.96 \pm 0.51$	$15.08 \pm 4.68 \pm 0.49$
V	$13.08 \pm 4.40 \pm 0.46$	$12.38 \pm 5.16 \pm 0.54$

Females		
	left	right
I	$13.92 \pm 5.61 \pm 0.60$	$15.59 \pm 5.37 \pm 0.57$
II	$11.66 \pm 5.94 \pm 0.63$	$11.30 \pm 5.72 \pm 0.61$
III	$12.38 \pm 5.01 \pm 0.53$	$12.03 \pm 4.95 \pm 0.53$
IV	$15.99 \pm 5.12 \pm 0.55$	$15.49 \pm 5.27 \pm 0.54$
V	$12.66 \pm 4.90 \pm 0.52$	$12.33 \pm 4.41 \pm 0.47$

TABLE 5. Mean number of lines of the hands as a whole

	Left	Right
Males	$13.15 \pm 0.56 \pm 5.40$	$13.02 \pm 0.55 \pm 5.28$
Females	$13.32 \pm 0.57 \pm 5.32$	$13.37 \pm 0.54 \pm 5.08$
Total	$13.24 \pm 0.57 \pm 5.36$	$13.19 \pm 0.55 \pm 5.18$
Both		
Males	$13.09 \pm 0.56 \pm 5.34$	
Females	$13.33 \pm 0.56 \pm 5.20$	
Total	$13.21 \pm 0.56 \pm 5.27$	

### Palmar patterns

1. The termination of main lines — the most frequent formula in males: 11.9, 7(5'') and 3(5'). In females — 9(11), 9(7), 5''(7) and 3(5'). In the material as a whole the main lines on the left hand end more often at lower positions than is the case on the right hand. It is important to add, however, that both in males and in females the reduction of the main C line, as well as triradii c are significantly higher on the left hand (22.10 %) than on the right one (11.60 %), and more so in females than in males.

TABLE 6. Termination of main lines in males

Left				Right			
1	1.08						2.15
2	1.08						50.54
3	51.61						10.75
4	10.75					3.23	32.26
5'	34.41	8.60				33.33	4.30
5"	1.08	45.16	17.20		9.68		
6		1.08					
7		44.09	27.96	19.35	10.75	12.90	58.06
8						3.23	
9		1.08	33.33	34.41	25.81	64.52	2.15
10				5.38	1.08	2.15	
11				40.86	62.37	1.08	
12							
13							
X			4.30			4.30	
Y			17.20			5.38	

TABLE 7. Termination of main lines in females

Left				Right			
1	3.41						3.41
2	2.27						1.14
3	37.50						47.73
4	11.36						18.18
5'	44.32	11.36			1.14		29.55
5"		51.14	12.50	6.82	45.45		
6			2.27	1.14			
7	37.50	29.55	18.18	6.82	29.55		50.50
8			1.14				
9		32.95	43.18	42.05	46.59		2.27
10			4.55	1.14			1.14
11		3	32.95	50.00	2.27		
12							
13							
X		5.68			4.55		
Y		17.05			9.09		

TABLE 8. Termination of main lines in the materials as a whole

Left				Right			
1	2.21						1.66
2	1.66						1.66
3	44.75						49.17
4	11.05						14.36
5'	39.23	9.94				2.21	30.94
5"	0.55	48.07	14.92		8.29	39.23	2.21
6		0.55	1.10		0.55		
7		40.88	28.73	18.72	8.84	20.99	54.14
8				0.55			1.66
9		0.55	33.15	38.67	33.70	55.80	2.21
10				4.97	1.10	1.10	0.55
11				37.02	56.35	1.66	
12							
13							
X			4.97			4.42	
Y			17.13			7.18	

2. The values of papillary number are higher on the right hand than on the left hand, both in males and in females.

Males: left 26.78 right 28.50  
Females: left 26.59 right 27.37

TABLE 9. Papillary number

	Left	Right
Males	26.78 ± 0.43 ± 4.10	28.50 ± 0.41 ± 3.93
Females	26.59 ± 0.37 ± 3.60	27.37 ± 0.43 ± 3.99
M + F	26.69 ± 0.40 ± 3.85	27.93 ± 0.42 ± 3.96
Individual number		
Males	27.54 ± 0.37 ± 3.60	
Females	27.16 ± 0.35 ± 3.24	
M + F	27.35 ± 0.36 ± 3.42	

The differences in values are statistically not significant.

3. The index of main lines (MLI) gives the following results:

	Left	Right	Both
Males	8.27	8.86	8.56
Females	8.26	8.66	8.46
M + F	8.26	8.76	8.51

Similarly as in papillary number the index of right hand is higher than that of the left hand, the indices of males and females differ very little. The difference number gives the following results:

males 1.27  
females 1.36  
m + f 1.31

4. The occurrence of patterns in the individual configuration areas: *Thenar/I*. — in the entire material there are 11.04 more real patterns in females than in males, and they are significantly more frequent on the left hand than on the right one. The most frequently occurring pattern is *L/L. Hypothenar* — there were 30.66 real patterns. There are neither bilateral, nor intersexual differences. We should mention the occurrence of *Lr*, represented in both sexes at 1.38%, significantly more on the right than on the left hand, regardless of the sex. The occurrence of patterns in the *II. interdigital* area is 3.03, occurring significantly more frequently on the right than on the left hand, regardless of the sex.

On interdigital area *III* there are 45.28% real patterns, significantly more on the right than on the left hand, and statistically more significantly in males than in females. Remarkable is the occurrence of whorls — 1.10% in both sexes — in this field.

The richest in patterns is interdigital area *IV*, where 55.25% real patterns were found. There are

significantly more patterns in both sexes on the left than on the right hand.

5. The occurrence of palmar triradii: In total there occurred 8 types and combinations of palmar triradii and most frequently there occurred the proximal triradius *t*, followed by *t'*, *tt'* and *tt''*. Other patterns were less frequent. Cases without palmar triradius also occurred, in the total material amounting to 2.21%. Proximal triradius *t* amounted to 63.54%.

6. The occurrence of transversal flexional furrow was followed in males and in females, on the left and right side. I evaluated specially cases of Simian crease, but only "classical" and close-to-classical types, and of Sidney crease.

#### Transversal crease — Simian crease

	Left	%	Right	%	Both	%
Males	5	5.53	7	7.53	12	6.45
Females	2	2.27	2	2.27	4	2.27
M + F	7	3.87	9	4.97	16	4.42

#### Sidney crease

	Left	%	Right	%	Both	%
Males	2	2.15	1	1.08	3	1.62
Females	—	—	—	—	—	—
M + F	2	1.10	1	0.55	30	0.83

It follows from the above tables that Simian crease occurrence is quite rare, it occurs more frequently in males than in females, and more frequently on the right than on the left hand. Sidney crease does not appear in females at all.

#### DISCUSSION

I have compared the results obtained by processing the materials on Gypsies from Šárovce with the following four sets of materials:

1. With the results of dermatoglyphic studies of the Slovak population as a whole (Pospíšil 1970, 1971), where I have obtained the following data:

a) occurrence of the three basic types of patterns

	All-Slovakian population		Gypsies from Šárovce	
L	61.93	0.77%	56.44	1.16%
W	34.07	0.75%	39.91	1.15%
A	4.00	0.31%	3.65	0.57%

The test has revealed that the differences in whorls and complicated configurations are significant.

I have compared the indices of Gypsies from



Šarovce with the values of indices for Slovakia as a whole and I obtained the following results:

Furuhata's index		
	All-Slovakian population	Gipsies from Šarovce
Males	60.65	76.43
Females	49.62	65.11

This index is higher in both sexes in the Šarovce Gipsies.

Dankmeijer's index		
	All-Slovakian population	Gipsies from Šarovce
Males	7.38	9.90
Females	16.74	8.33

There is significant difference in the females of the populations being compared; this fact can be explained by differences in the occurrence of W and A.

Geipel's index		
	All-Slovakian population	Gipsies from Šarovce
Males	284.39	259.00
Females	271.43	288.00

This index does not show any significant differences in the populations being compared.

Voločki's index		
	All-Slovakian population	Gipsies from Šarovce
Males	13.30	13.75
Females	12.60	13.50
M + F	13.00	13.63

Voločki's index is higher in Gipsies in Šarovce than in the all-Slovakian population. The mean number of lines in the two compared populations is as follows:

	All-Slovakian population		Gipsies from Šarovce	
Males	151.60	3.30	130.90	3.91
Females	129.80	3.46	133.34	3.94
M + F	140.50	2.44	132.12	2.78

Statistically significant is the difference between the mean number of lines in the males of the two populations. Significant is the higher number of mean lines in females than in males in the Gipsies from Šarovce. Rare is also the practically identical number of lines in males and females in Gipsies from Šarovce, as found out in certain diseases. In the

termination of main lines I have found statistically significant differences. The reduction of line C and of triradii c is higher in the Šarovce population group than in the all-Slovakian population, and occurs more frequently on the left hand than on the right one. The differences in values have not appeared as statistically significant. Significant have been the differences: in MLI, in the patterns of the II and interdigital area on the right hand, and in the occurrence of the transversal crease — in the all-Slovakian population 2.0%, in Gipsies from Šarovce 4.42%.

## 2. Comparison with the results obtained by authors studying the dermatoglyphics of the Gipsy population (Beneš 1965, 1967, Štampach 1929, Chamla 1962, 1953)

Comparisons have shown that closest to the values of the Gipsies from Šarovce are the results obtained by Beneš (1965, 1967). Biggest were the differences compared with the values obtained by Štampach (1929). As regards quantitative finger values I found significant differences between the results of Beneš (1965) and the values in Šarovce Gipsies in the I and II fingers of the right hand and on the I finger of the left hand.

The termination of main lines: between the two above-mentioned populations there are differences in the termination of line A (Beneš 1967): A 5/4, Šarovce A 3/5. Very significant has been also the difference in MLI in the two compared populations on the right hand, which can be explained by the fact that only the A and D lines are being taken into account, and value A includes the termination of the two populations being compared.

## 3. Comparison with the Indian population

Many authors hold that the Gipsies come from India (central, eventually northern India). This made it necessary to compare our materials with the data of the Indian population. On the basis of the available materials I have arrived to the following conclusions:

### A. Occurrence of finger patterns (A, L and W)

	A	L	W	
India: Sika	7.0	59.0	33.0	Chamla (1962)
India: Rajput	5.0	53.0	39.0	Chamla (1963)
India: Punjab	2.0	56.0	41.0	Chamla (1962)
India (σ ♀)	1.6	61.9	36.1	Schlaginhaufen (1906)
Calcutta (σ)	2.3	55.2	42.4	Biswas (1936)
India (σ ♀)	4.0	67.0	29.0	Collins (1913)
North India (σ ♀)	2.5	56.1	41.5	Chakrawartti (1960)
Slovakia — Šarovce (σ ♀)	3.6	56.9	39.9	Studied population

The above results show that the results from Šarovce are closest to the results obtained by Chamla in Punjab, India (2.0; 56.0; 41.0) and by Chakrawartti in northern India (2.5; 56.1; 41.5). These data support the views that the Gipsies have their origin in India.

## B. Palmar patterns

Termination of line D (modal types)

	7	9	11
Schlaginhaufen (1906) (σ ♀)	23.0	23.0	54.0
Biswas (1936) (σ)	19.0	25.0	56.0
Šarovce (σ ♀)	14.1	39.2	46.7

Common for termination is the percentual occurrence in the individual fields as regards size. Less frequently there occurs line D in field 7, while it appears most frequently in field 11.

## C. Occurrence of pattern in the individual configuration areas

	Hypothenar	T/L	II.	III.	IV.	
India (σ ♀)	42.5	15.3	15.3	63.4	53.8	Schlaginhaufen (1906)
India (σ)	32.0	13.0	3.0	49.0	48.0	Biswas (1936)
South India (♂)	32.8	21.0	1.7	21.8	50.4	Chatterjee, Chakrawartti (1960)
South India (♀)	22.9	16.7	—	20.8	56.8	Chatterjee, Chakrawartti (1960)
North India (σ ♀)	52.3	22.7	8.8	40.7	65.5	Geipel (1961)
India (σ ♀)	13.0	2.5	1.6	10.8	19.3	Sharma (1962)
Slovakia-Šarovce (σ ♀)	30.7	11.0	2.7	43.3	55.3	Studied population

The results obtained from the Šarovce population are closest to the results obtained by Biswas, Chatterjee, Chakrawartti and Geipel.

4. Comparison of the occurrence of the transversal flexion crease (Simian crease) in the population from Šarovce, and in several Hungarian populations of non-Gipsy origin (Gyenis 1971, 1974) shows an increased occurrence of the transversal crease as compared with other populations.

Transversal crease	Males	Females
Kiskunlacháza (1974)	3.1	3.9
Dömsöd (1974)	2.1	0.7
Lajosmizse (1974)	1.8	0.5
Szakmár (1971, 1974)	2.8	2.8
Pereg (1974)	2.2	2.2
Katymár	4.9	2.2
Šarovce	6.45	2.27

In the results found by Gyenis in various Hungarian populations (Gyenis 1971, 1974), in males the highest Simian crease values appear in the village Katymár (4.9), while the values of Šarovce amount to 6.45. In females the results are most similar in the populations in Katymár and Pereg (2.2), Šarovce (2.27).

Sidney crease	Males		Females	
	left	right	left	right
Kiskunlacháza (1974)	—	—	—	—
Dömsöd (1974)	0.4	—	0.4	—
Lajosmizse (1974)	0.5	—	—	—
Szakmár (1971, 1974)	—	—	—	1.2
Pereg (1974)	—	—	0.4	—
Katymár (1974)	—	—	—	—
Šarovce	2.15	1.0	—	—

The Sidney crease occurred only in males of the Gipsy population from Šarovce. The difference from Hungarian populations is significant.

## CONCLUSION

The paper contains the processing of dermatoglyphic patterns on the fingers and palms of Gipsies from Šarovce. The material covers 93 males and 88 females. Besides processing the material proper, comparisons with the all-Slovakian population, Gipsy populations from various regions, with samples of several Indian regions, and with the occurrence of the Simian crease in the Hungarian population were realized. On the basis of the present study I have arrived to the following conclusions:

In Gipsies from Šarovce the following frequencies of the basic types of patterns have been found:  $L = 56.44 \pm 1.6\%$   $W = 39.91 \pm 1.15\%$   $A = 3.65 \pm 0.57\%$ . The value of Voločki's index is  $13.63$ . The total quantitative value in males  $= 130.90 \pm 3.91$ , in females  $133.34 \pm 3.94$ , and in the material as a whole  $132.12 \pm 2.78$  lines. In the termination of main lines no significant differences were found, as compared with other populations. Among interdigital areas most patterns appear in the IVth inter-

digital field. On thenar/I the value is  $11.04 \pm 1.64$ , on hypothenar the occurrence is more frequent (the occurrence of the Lr pattern — 1.380.61) than is the case with other populations. From palmar triradii most frequent is the carpal t —  $63.54 \pm 2.53$ . Compared with the all-Slovakian population there appeared as significant the differences in L and W. In arches the differences between the two populations are of intersexual character. Significantly higher is the mean number of lines in the males of the all-Slovakian population, as compared with males of the Gipsy population from Šárovec. Statistically significant have been also the differences in the MLI, in the number of real patterns in interdigital area II on the hypothenar and in the occurrence of Lr pattern on the hypothenar. On comparing the data of Gipsies from other regions, closest to the studied population are the results of the study by Beneš (1965, 1967). The biggest differences appeared in comparison with the work by Štampach (1929). The results obtained from the study of Gipsies from Šárovec are closest to the results obtained by Chamla (Punjab, India), and by Chakrawartti (nothern India). On comparing the occurrence of Simian crease with various Hungarian populations closest to Šárovec have been the results obtained in the villages of Katymár and Pereg (central Hungary). I have decided to make these comparisons with Hungarian populations in order to facilitate further research into the problem.

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