

# FINGER DERMATOGLYPHICS OF THE CZECHS FROM SOUTH MORAVIA (CZECHOSLOVAKIA)

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Although dermatoglyphics of the Moravian population have been studied by several investigators (Holomek 1948, 1950, Dokládál 1952, 1953*ab*, Jurášek 1948, 1949, Jurášek, Pospíšilová—Zuzáková 1962, Crhák 1958, 1965, 1966 *ab*, 1968, Pospíšil 1957, 1959, 1960 *ab*, 1962, Němec 1967), the obtained data yielded only a partial notion on dermatoglyphical relations in this population. Especially the data concerning dermatoglyphical characteristics of the people living in the southern part of Moravia were not complete. For this reason the analysis of dermatoglyphics of the Czechs from South Moravia was carried out.

The present paper deals with the finger dermatoglyphics of the Czechs from South Moravia, while the characteristics of the palm will be reported in a later study.

## MATERIAL AND METHODS

Finger prints were obtained from 966 unrelated persons (478 males, 488 females) coming from South Moravia. The finger prints were classified by the usual scheme suggested by Cummins and Midlo (1961) and Penrose (1968). Ridges were counted by the Cummins method. In case of whorls, where two triradii are present, two counts were made and the largest accepted as representative of the pattern.

## RESULTS

Percentile occurrences of pattern types on the individual digits in right and left hands of 478 males and 488 females are presented in Tables 1 and 2. It is observed that the patterns are distributed much the

TAB. 1  
Distribution of finger pattern types in 478 Czech males from South Moravia

Digit	Side	Whorls			Loops			Arches		
		Whorls	Lateral pockets and Twin loops	Total	Ulnar	Radial	Total	Tented	Others	Total
I	R	33.8	16.1	49.9	49.8	—	49.8	—	0.3	0.3
	L	19.6	16.8	36.4	62.6	—	62.6	—	1.0	1.0
	R + L	26.5	16.8	43.7	55.9	—	55.9	—	0.6	0.6
II	R	38.7	5.1	40.5	26.8	20.8	47.6	2.9	9.0	11.9
	L	34.1	9.2	43.3	34.6	12.9	47.5	1.6	7.6	9.2
	R + L	35.0	7.1	42.1	29.7	16.7	47.5	2.2	8.4	10.4
III	R	21.5	5.5	27.0	66.2	1.6	67.8	0.3	4.9	5.2
	L	17.8	4.2	22.0	71.4	—	71.4	0.7	5.9	6.6
	R + L	19.7	4.8	24.5	68.9	0.8	69.6	0.5	5.4	5.9
IV	R	58.4	3.9	62.3	35.0	0.7	35.7	—	2.0	2.0
	L	41.8	4.6	46.4	52.3	—	52.3	—	1.3	1.3
	R + L	50.1	4.2	54.3	43.9	0.3	44.0	—	1.6	1.7
V	R	20.2	0.6	20.8	78.5	—	78.5	—	0.7	0.7
	L	11.9	0.7	12.6	86.7	—	86.7	—	0.7	0.7
	R + L	16.1	0.6	16.7	82.7	—	82.6	—	0.7	0.7
All digits	R	34.1	6.2	40.3	51.0	4.6	55.6	0.7	3.4	4.1
	L	24.9	7.0	31.9	61.8	2.6	64.4	0.5	3.2	3.7
	R + L	29.6	6.7	36.3	56.2	3.6	59.8	0.6	3.3	3.9

TAB. 2  
Distribution of finger pattern types in 488 Czech females from South Moravia

Digit	Side	Whorls			Loops			Arches		
		Whorl	Lateral pockets and Twin loops	Total	Ulnar	Radial	Total	Tented	Others	Total
I	R	25.8	13.2	39.0	56.4	—	56.4	—	4.6	4.6
	L	14.2	16.8	31.0	63.8	0.3	64.1	—	6.9	6.9
	R + L	19.9	15.1	35.0	60.1	0.1	59.5	—	5.8	5.5
II	R	27.7	5.3	33.0	34.7	12.5	47.2	1.6	18.2	19.8
	L	27.3	2.9	30.2	40.1	10.9	51.0	2.3	16.5	18.8
	R + L	27.5	4.1	31.6	37.5	11.7	49.0	1.9	17.4	19.4
III	R	12.3	1.6	13.9	72.3	2.0	74.3	0.3	11.5	11.8
	L	13.5	3.9	17.4	66.5	0.3	66.8	0.3	15.5	15.8
	R + L	12.8	2.7	15.7	69.5	1.2	70.7	0.3	13.5	13.8
IV	R	51.4	0.6	52.0	44.3	0.7	45.0	—	3.0	3.0
	L	40.6	2.3	42.9	53.1	—	53.1	—	4.0	4.0
	R + L	46.1	1.4	47.5	48.7	0.3	49.0	—	3.5	3.5
V	R	12.8	0.6	13.4	84.7	0.3	85.0	—	1.6	1.6
	L	8.0	3.0	11.0	83.7	—	83.7	—	5.3	5.3
	R + L	10.4	1.8	12.2	84.4	0.1	84.3	—	3.4	3.5
All digits	R	25.8	4.2	30.0	58.8	3.1	61.9	0.3	7.0	8.1
	L	20.6	5.7	26.3	61.4	2.3	63.7	0.5	9.5	10.0
	R + L	23.3	4.9	28.2	60.0	2.7	62.7	0.4	8.7	9.1

same way in both hands. The loops are more numerous than the whorls and arches. Ulnar loops are found to be most frequent in the fifth finger, while radial loops in the second finger in both sexes. True whorls (concentric and spiral types) are most frequent of all the different types of whorls, its frequency being highest in the fourth finger in both sexes. Lateral pockets and twin loops are found to be more frequent in the thumb. Arches are concentrated on the second and third digit of both hands; simple arches are more frequent than tented ones.

The three principle indices\* — index of pattern intensity, Dankmeijer's index and Furu-hata's index — for the male and female are given in Table 3.

TAB. 3

Values of the three principle indices in Czech (478 males, 488 females) from South Moravia

Sample	Index of pattern intensity	DANK-MEIJER's index	FURU-HATA's index
Males	13.2	11.8	62.2
Females	11.9	30.9	44.4

\* Index of pattern intensity =  $\frac{2x \% \text{ whorls} + 1x \% \text{ loops}}{10}$

DANKMEIJER's index =  $(\% \text{ arches} : \% \text{ whorls}) \times 100$ ,  
FURUHATA's index =  $(\% \text{ whorls} : \% \text{ loops}) \times 100$ .

*Sexual variation.* It is found that whorls are more frequent in males than females, while loops and arches occur more often in females. This clear sexual dimorphism is especially evident in Dankmeijer's and Furu-hata's index, while pattern intensity index does not show much variation between the two sexes.

*Bimanual differences.* As shown on tables 1 and 2, whorls and radial loops are more frequent in the right hand than in the left one, while ulnar loops occur more often in the left hand. The differences are significant only in males.

Table 4 *ab* presents the distribution of ridge counts on each digit for males and females. The greatest number of ridges occurs in digit I, followed by IV, V, III or II. This is the common pattern.

TAB. 4a

Mean ridge counts and R—L differences for individual digits in 478 Czech males

Digit	Right	Left	Value of "t" for R—L difference	Difference
I	18.5 ± 0.32	17.0 ± 0.28	3.57	Significant at 0.01 level
II	14.2 ± 0.33	13.0 ± 0.32	2.66	Non-significant
III	13.6 ± 0.30	13.5 ± 0.30	0.24	Non-significant
IV	16.9 ± 0.31	16.5 ± 0.31	0.95	Non-significant
V	14.1 ± 0.30	13.8 ± 0.24	0.79	Non-significant
	TRC = 145,2 ± 3,2			

Bilateral differences are significant only in case of the first and second digits — the right hand shows the larger count than the left one. It is evident from the table 4 *ab* that there is clear sexual dimorphism, males showing higher mean ridge counts than females on each digit. With regard to total ridge count (TRC) males show significantly higher value than females (see Table 4 *ab*).

TAB. 4b  
Mean ridge counts and R-L differences for individual digits in 488 Czech females

Digit	Right	Left	Value of 't' for R-L difference	Difference
I	17.1 ± 0.32	14.8 ± 0.40	4.51	Significant at 0.01 level Non-significant Non-significant Non-significant
II	10.4 ± 0.38	10.0 ± 0.43	0.70	
III	10.6 ± 0.36	10.5 ± 0.32	0.22	
IV	15.7 ± 0.35	15.0 ± 0.43	1.27	
V	12.4 ± 0.30	12.0 ± 0.31	0.95	
	TRC = 127.2 ± 3.3			

#### DISCUSSION

The present data provide measures of finger print patterns for an area still poorly known. There

are, of course, some dermatoglyphical data from Moravia but mostly from the northern part (see Table 5). The data, however, were mostly obtained with regard to genetically isolated groups (the Silesians and the Hannaks — the inhabitants of Haná). With exception of two dermatoglyphical probes (Holomek 1950, Dokládál 1952) there is no study where the dermatoglyphical data characterize larger population in Moravia.

According to the data which we have on hand the Czechs living in Moravia show a great uniformity in frequency of finger print patterns (Table 5). Nevertheless there are two samples in Moravia expressing certain features of genetical isolation. Thus the Hannaks living in villages of Náměšť n/H. and Senica n/H. and the Silesians living in Opava show evidently higher value of arches than the other samples. It is especially well shown in case of value of Dankmeijer's index in both sexes. These findings may be explained by genetical isolation of these inhabitants in the past. At this time random and cultural factors may have played a large role in their gene dynamics.

Table 5 also emphasizes that the frequency of finger print patterns of the Czechs living in Moravia is almost the same as that of the Czechs living in both countries — Bohemia and Moravia (Malá 1961). Thus, with respect to dactyloscopy the Czechs seem to be a relatively homogeneous population.

TAB. 5  
Percent distribution of finger pattern types and values of the three principle indices in samples of Czech population

Sample	Author	Males				Females				Index of pattern intensity		Dankmeijer's index		Furu-hata's index	
		No.	Whorls	Loops	Arches	No.	Whorls	Loops	Arches	Males	Females	Males	Females	Males	Females
North Moravia	Czechs — Silesians Hlučín	181	33.2	62.8	3.9	138	33.4	63.6	3.0	12.93	13.03	11.80	9.14	53.05	52.46
	Czechs — Silesians (Opava)	254	35.5	56.7	7.8	264	27.6	61.1	11.3	12.77	11.63	21.97	40.94	62.60	45.17
	Czechs — Hannaks (Náměšť, Senice)	180	35.9	58.0	6.6	174	32.9	56.9	10.1	12.98	12.27	18.41	30.60	61.80	57.80
South Moravia	Czechs — (Brno)	152	33.3	59.5	7.2	73	25.6	58.2	6.2	12.51	11.94	21.62	25.20	56.92	37.53
	Czechs — all districts of the South Moravia region	478	36.3	59.8	3.9	488	28.1	62.7	9.1	13.20	11.90	11.80	30.91	62.22	44.46
	Czechs — Moravia (the both region)	163	31.5	61.9	6.6	70	24.8	66.4	8.8	12.49	11.63	20.95	35.48	50.88	37.18
Czechs — Moravia and Bohemia	Malá 1961	1000	31.3	63.6	5.1	1000	25.6	67.7	6.7	15.77	11.89	16.29	26.17	49.00	37.80
Czechs and Slovaks (ČSSR)	Němec 1967	147800	35.6	60.9	3.4	32500	30.2	62.9	6.8	13.21	12.33	9.55	22.51	58.45	48.01
Slovaks — Horehronie	Pospíšil 1963	150	34.9	62.8	2.3	136	28.8	66.8	4.3	13.26	12.45	6.56	14.97	55.48	43.18
Slovaks — all regions of Slovakia	Pospíšil 1970	200	36.7	60.5	2.7	200	31.4	63.3	5.2	13.40	12.61	7.38	16.74	60.65	49.62

In comparison with the Czechs' data with both those bordering and distant countries (see Table 5 and Schwidetzky 1962, Table 3) it could be seen that the Czechs are not only the geographic centre but also the dactyloscopic one in Europe as suggested by Malá (1961). Their dactyloscopic findings are in conformity with the well known trends of whorls, loops and arches in Europe.

The data concerning the ridge count of Czechs are very scanty. The only data available to the authors are from Pospíšil (1957) and Crhák (1966). The males and females of Hlučín (Silesia) present the highest value of mean ridge count ( $15.59 \pm 0.12$  ridges), the inhabitants of Haná the lowest ( $12.20 \pm 0.11$  ridges); the obtained data fall in the middle of this range. As the data concerning the ridge count are not complete not only in Czechoslovakia but also in the bordering countries, no conclusions can be drawn. Further study will be necessary to complete these gaps and to ascertain the reasons for these differences.

### CONCLUSIONS

Finger print set of 966 Czechs from South Moravia (Czechoslovakia) has been analysed. The following frequencies of the Galton's pattern types were observed: Whorls — males 36.7%, females 28.1%, loops — males 59%, females 63.2%, arches — males 4.3%, females 8.7%. The values of the three principal indices were as follows: index of pattern intensity — males 13.2, females 11.9, Dankmeijer's index — males 11.8, females 30.9, Furuhata's index — males 62.2, females 44.4. The total ridge count was found by males  $145.2 \pm 3.2$  ridges, by females  $127.2 \pm 3.3$  ridges.

Sexual variations were marked not only in the distribution of the finger pattern types but also in the ridge count. Whorls were more frequent in males, while loops and arches occurred more often in females. The value of TRC was higher in males than in females.

Bimanual differences are statistically significant only in males. Whorls were more frequent in the right hand than in the left one, while loops occurred more often in the left hand. Right hand showed a larger ridge count than the left one.

The comparison of the data obtained with those concerning Czechs' samples showed that there was similarity in the frequency of the three pattern types in the Czech population. As for the ridge count, however, there were differences within the Czech population, the reasons of which not being quite clear.

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