



## DERMATOGLYPHIC CHARACTERIZATION OF BULGARIAN POPULATION FROM SOME REGIONS OF SOUTHEASTERN BULGARIA

Tzvetan Minkov<sup>1</sup>, Milen Boichev<sup>2</sup>, Velislav Todorov<sup>1</sup>, Nadejda  
Paraskova<sup>1</sup>, Volodia Georgiev<sup>1</sup>, Maria Boycheva<sup>2</sup>, Angel Vassilev<sup>1</sup>

<sup>1</sup> SOFIA UNIVERSITY, FACULTY OF BIOLOGY, DEPARTMENT OF ZOOLOGY AND  
ANTHROPOLOGY, 8 DRAGAN TZANKOV STR.

<sup>2</sup> KONSTANTIN PRESLAVSKY UNIVERSITY OF SHUMEN, FACULTY OF NATURAL  
SCIENCE, SHUMEN 9712, 115 UNIVERSITETSKA STR.

**ABSTRACT:** *Finger and palm patterns of Bulgarian population from the regions of Liubimets and Svilengrad were studied. The dermatoglyphic features of 102 men and 95 women from the region of Liubimets and 91 men and 105 women from the region of Svilengrad have been investigated.*

*It was established, that by the complex of dermatoglyphic features, the studied population from both regions is too homogenous and belongs to one and the same population.*

**KEY WORDS:** *ethnogenesis, whorls, loops, ares, index of Cummins*

Dermatoglyphic features are genetically determined and are used to resolve racegenetic and ethnogenetic questions in anthropological investigations of the population from different parts of the world [1...9].

This investigation is a part of one more wide and entire dermatoglyphic study of contemporary Bulgarian population of different regions of Bulgaria, according to finger and palm patterns of the hands.

### **Materials and methods:**

The dermatoglyphic features of finger and palm patterns of Bulgarian population from different regions of Southeastern Bulgaria were studied. It has been investigated 102 men and 95 women from region of Liubimets and 91 men and 105 women from the region of Svilengrad, as a whole 390 individuals of both sexes, according to a big numbers dermatoglyphic features with racediagnostical and taxonomical meaning in connection with their ethnogeneses. Dermoglyphic material is processed, analyzed and interpreted by the Cummins and Midlos method [10]. With a purpose to be established whether the differences by the dermatoglyphic features of the population from both studied regions – Liubimets and Svilengrad, are statistically significantly or no,

the received dates were worked up by the means of the method t-criterion according to formula of Weber [11].

## Results and discussion:

### *Finger prints*

The percentage distribution of the finger patterns of the hands of the studied population from Southeastern Bulgaria is presented in Table 1. It is seen from table 1, that the loops are the most frequent patterns in the men and women in both studied groups (from Liubimets and Svilengrad). The percentage frequency of the loops in the population from Liubimets (men and women taken together) is a little higher in comparison with the one from Svilengrad. In the population from Liubimets the percentage concentration of the loops is higher in men but in the population from Svilengrad - in women. The frequency of the whorls, however, is a little higher in the population from Svilengrad, in comparison with the one from Liubimets. The data index –  $DL_{10}$  is a little higher in the population from Svilengrad also, in comparison with the one from Liubimets.

Table 1. Frequency of the fingerprint of Bulgarian population from Liubimets and Svilengrad (%)

| Type of fingerprint | Liubimets |       |               | Svilengrad |       |               |
|---------------------|-----------|-------|---------------|------------|-------|---------------|
|                     | Men       | Women | Men and women | Men        | Women | Men and women |
| A+T                 | 5,30      | 8,74  | 7,02          | 4,84       | 4,19  | 4,56          |
| R                   | 2,35      | 2,32  | 2,34          | 3,96       | 3,05  | 3,50          |
| U                   | 50,06     | 50,63 | 53,35         | 49,23      | 53,24 | 51,24         |
| W                   | 40,30     | 38,32 | 39,31         | 41,98      | 39,53 | 40,76         |
| L                   | 58,41     | 52,95 | 55,69         | 53,19      | 56,29 | 54,74         |

### *Main palm lines*

The frequency of the main palm lines and their types in the population from Liubimets and Svilengrad are given in Table 2.

Table 2. Frequency of the main palm lines of Bulgarian population from Liubimets and Svilengrad (%)

| MPL | Types of MPL | Men   |       |         | Women |       |         |
|-----|--------------|-------|-------|---------|-------|-------|---------|
|     |              | left  | right | average | left  | right | average |
| A   | 1/+2/        | 13,40 | 3,61  | 8,51    | 14,36 | 4,92  | 9,64    |
|     | 3/+4/        | 70,58 | 63,30 | 66,94   | 66,12 | 68,67 | 67,40   |
|     | 5'+5"+6+7/   | 16,03 | 33,58 | 24,81   | 19,00 | 26,88 | 22,94   |
| D   | 7/+8+x+0/    | 22,40 | 17,99 | 20,20   | 27,54 | 55,86 | 21,70   |
|     | 9/+10/       | 55,77 | 31,62 | 43,70   | 54,69 | 30,75 | 42,72   |
|     | 11/+12+13/   | 30,52 | 55,71 | 43,12   | 34,46 | 58,42 | 46,44   |

| Index of Cummins |               | 7,98  | 9,00  | 8,49  | 8,13  | 8,72  | 8,43  |
|------------------|---------------|-------|-------|-------|-------|-------|-------|
| C                | 4/+5'+5"+6+7/ | 57,38 | 40,68 | 49,03 | 48,69 | 35,94 | 42,32 |
|                  | 9/+10+11+12/  | 30,64 | 51,01 | 40,83 | 29,50 | 49,08 | 39,29 |
|                  | 8/+x/         | 3,06  | 2,08  | 2,57  | 5,87  | 6,82  | 6,35  |
|                  | 0             | 8,93  | 6,24  | 7,59  | 8,17  | 8,17  | 8,17  |
| B                | 6/+7+8+9/     | 35,72 | 48,39 | 42,06 | 40,81 | 50,41 | 45,61 |
|                  | 3/+4+5'+5"/   | 64,28 | 50,52 | 57,40 | 59,20 | 49,60 | 54,40 |
|                  | 08+x/         | 0,49  | 1,59  | 1,04  | -     | -     | -     |

Type 5 of the line A is meeting more frequently in the studied population from Liubimets (men and women taken together) in comparison with the one from Svilengrad. The opposite picture is observed with respect to the types 1 (+2) and 3 (+4) in the studied population. The percentage frequency of these types of line A in the studied group from Svilengrad is higher in comparison with the one of the population from Liubimets.

The types 9 (+10) and 11 (+12+13) of line D, are with a higher frequency in the studied group from Svilengrad (men and women together) but type 7 (+8+x+0) has a higher frequency in that one from Liubimets. The index of Cummins like a sum of the finishing of the lines A and D in the studied population from Svilengrad (men and women together) is a little higher than that one of the studied group from Liubimets.

The ulnar type of line C meets more frequently in the studied group from Liubimets (men and women together) but the radial type is with higher concentration in the studied population from Svilengrad.

The distal type of line B (men and women together) in the population from Svilengrad has an equal frequency like the studied population from Liubimets. The ulnar type of line B is with a higher concentration in the studied group from Liubimets.

### ***Palm patterns***

The palm patterns in the studied population from both regions meet with the high concentration on Hy in men and in women – Table 3. On the Hy their frequency is a little higher in the studied population from the region of Liubimets in comparison with the one from Svilengrad. On Th/I interdigital pad, the palm patterns are more frequently in the Svilengrad population than in the studied group from Liubimets.

Table 3. Comparison of the traits by t-criterion in the studied population from Liubimets and Svilengrad (%)

| Comparece traits | Men and women from Liubimets | Men and women from Svilengrad | Men from Liubimets and Svilengrad | Women from Liubimets and Svilengrad |
|------------------|------------------------------|-------------------------------|-----------------------------------|-------------------------------------|
| DL <sub>10</sub> | 0,05                         | 0,04                          | 0,11                              | 0,12                                |
| T                | 1,31                         | 0,35                          | 1,51                              | 0,16                                |
| Hy               | 0,21                         | 0,21                          | 0,05                              | 0,65                                |
| Th/I             | 0,02                         | 0,70                          | 0,89                              | 0,21                                |
| II               | -                            | -                             | -                                 | -                                   |
| III              | 0,05                         | 0,27                          | 0,24                              | 0,13                                |
| IV               | 1,39                         | 1,26                          | 2,28                              | 0,44                                |
| ΔMT              | 0,83                         | 0,57                          | 0,94                              | 0,46                                |

It must be noted that the palm patterns meet more frequently on IV interdigital pad than on interdigital pad III in the studied groups from Svilengrad and Liubimets.

According to Gladkova (1966) in all people of the world, as a rule, with a higher frequency of palm patterns differs IV interdigital pad than III, and too seldom is observed the opposite – Table 3.

By means of the method t-criterion was made a comparison by eight dermatoglyphic traits of the studied population from Liubimets – commonly four excerpts – comparison of left and right hands of men, left and right hands of women, left hands of men and women, right hands of men and women. The purpose was to be established if there are significant differences according to the dermatoglyphic traits – Table 4.

Table 4. Comparison of the traits by t-criterion in the population from Liubimets (%)

| Scars            | Men – left and right hands | Women – left and right hands | Left hands of men and women | Right hands of men and women |
|------------------|----------------------------|------------------------------|-----------------------------|------------------------------|
| DL <sub>10</sub> | 0,04                       | 0,02                         | 0,02                        | 0,04                         |
| T                | 0,07                       | 0,44                         | 1,58                        | 1,03                         |
| Hy               | <b>2,15</b>                | 0,27                         | 0,95                        | 0,70                         |
| Th/I             | 1,08                       | 0,86                         | 0,10                        | 0,08                         |
| II               | -                          | -                            | -                           | -                            |
| III              | <b>3,31</b>                | <b>3,25</b>                  | 0,10                        | 0,02                         |
| IV               | 0,45                       | 0,35                         | 1,00                        | 1,80                         |
| ΔMT              | 0,17                       | 1,10                         | 0,04                        | 1,48                         |

From Table 4 is seen that statistically significant difference between left and right hands in men exists only by the trait Hy, degree of significance 0.05 and by the feature III interdigital pad, degree of significance 0.01. In women is seen that a significant difference between left and right hands exists only by the trait III interdigital pad, degree of significance 0.01. Besides that, it is seen, a significant difference between both sexes by the left and right hands is not observed according to no one of the dermatoglyphic features.

By means of the method t-criterion was made the same comparison by the indicated dermatoglyphic traits in the population from Svilengrad – Table 5.

It was established that between left and right hands in men and women significant differences are watched only by the trait III interdigital pad, degree of significance 0.01 in men and 0.05 in women. By the rest dermatoglyphic features the differences are insignificant. In case of comparison of left hands in men and women and of right hands in both sexes were not established significant differences by no one from the dermatoglyphic traits in the investigated population of Svilengrad.

By means of the method t-criterion was made another comparison. The population from Liubimets was compared with the one from Svilengrad. They were compared men and women from Liubimets, men and women from Svilengrad, men from Liubimets and Svilengrad and women from Liubimets and Svilengrad by the indicated dermatoglyphic traits – Table 6.

It was established that there is not statistically significant difference according to no one of the dermatoglyphic traits between the men and women from Liubimets and between both sexes of Svilengrad.

Table 5. Comparison of the traits by t-criterion in the population from Svilengrad (%)

| Scars            | Men – left and right hands | Women – left and right hands | Left hands of men and women | Right hands of men and women |
|------------------|----------------------------|------------------------------|-----------------------------|------------------------------|
| DL <sub>10</sub> | 0,05                       | 0,06                         | 0,01                        | 0,04                         |
| T                | 1,47                       | 0,83                         | 0,83                        | 1,53                         |
| Hy               | 0,16                       | 0,30                         | 0,44                        | 0,03                         |
| Th/I             | 1,21                       | 0,51                         | 1,06                        | 0,28                         |
| II               | -                          | -                            | -                           | -                            |
| III              | <b>3,67</b>                | <b>2,15</b>                  | 1,68                        | 0,24                         |
| IV               | 0,59                       | 1,13                         | 1,01                        | 1,49                         |
| DMT              | 0,70                       | 1,19                         | 0,34                        | 0,15                         |

Table 6. Comparison of the traits by t-criterion in the population from Liubimets and Svilengrad (%)

| Scars            | Men – left and right hands | Women – left and right hands | Left hands of men and women | Right hands of men and women |
|------------------|----------------------------|------------------------------|-----------------------------|------------------------------|
| DL <sub>10</sub> | 0,05                       | 0,04                         | 0,11                        | 0,12                         |
| T                | 1,31                       | 0,35                         | 1,51                        | 0,16                         |
| Hy               | 0,21                       | 0,21                         | 0,05                        | 0,65                         |
| Th/I             | 0,02                       | 0,70                         | 0,89                        | 0,21                         |
| II               | -                          | -                            | -                           | -                            |
| III              | 0,05                       | 0,27                         | 0,24                        | 0,13                         |
| IV               | 1,39                       | 1,26                         | <b>2,28</b>                 | 0,44                         |
| ΔMT              | 0,83                       | 0,57                         | 0,94                        | 0,46                         |

In case of comparison of men from Liubimets with men from Svilengrad it was established a significant difference only by one trait - IV interdigital pad, degree of significance 0.05. In case of comparison of women from both regions (Liubimets and Svilengrad) it was not established a significant difference by no one of the dermatoglyphic traits.

This shows that the studied population from both regions is too homogenous according to the dermatoglyphic traits.

### Conclusions:

1. It was established a slight expressed bimanual asymmetry: in men from Liubimets only by the traits Hy and III interdigital pad, and in women - III interdigital pad. In the population from Svilengrad a bimanual asymmetry was established only by the trait III interdigital pad.

2. In the studied population from Liubimets and Svilengrad was not established a sexual dimorphism according to the dermatoglyphic features.

3. On the basis of the mathematical-statistical analysis by the method t-criterion was established that in men from both regions there is a significant frequency only by one trait - IV interdigital pad. In women there is no difference.

This fact give a reason to accept that the studied population from the indicated regions of Southeastern Bulgaria is too homogenous by the dermatoglyphic features.

### References:

- [1]. Gladkova, T. D. Materials on the dermatoglyphics of the Tartars, Issues in Anthropology, 1964, 16, p. 77-86.
- [2]. Gladkova, T. D., T. Toth. New materials on dermatoglyphics of the Uzbeks, Issues in Anthropology, 1970, 36, p. 77-86.

- [3]. Gladkova, T. D., T. Toth. On the distribution of skin patterns in Hungary (new data from Kortsag), 1977, 69, p. 361-371.
- [4]. Hit, G, L. Materials on the dermatoglyphics of the Russians from Siberia. Ethnography, 1969, 3, p. 65-73.
- [5]. Hit, G. L. Dermatoglyphics of the peoples in the USSR, Moscow, Science, 1983, 280 p.
- [6]. Pons, I. Dermatoglyphic configuration of proximal and middle phalanges in spaniards, *Anthrop. Ans.*, 1985, 43 (1), p. 69-74.
- [7]. Shamla, M. La repartition géographique des crêtes papillaires digitales dans le monde: nouvel essai des synthèses, I, II – *Anthropologie*, 1962-1963, 66, p. 526-541.
- [8]. Karev, G. Normal dermatoglyphic status of the Bulgarians from the North-East of Bulgaria, Doctoral thesis, Sofia, 1979, 216 p.
- [9]. Kaleva, A. S. Studies of papillary fingerprints images of Bulgarian citizens of different ethnic and national origin, Doctoral thesis, Plovdiv, 1971, 142.
- [10]. Cummins, H., C. Midlo. Fingerprints, palms and soles. An introduction to dermatoglyphics, New York, Dover Publication, 1961, 319 p.
- [11]. Weber, E. Grundriß der Biologischen Statistik von Erna Weber, Urban & Fischer in Elsevier Verlag, 1991, 652 p.
- [12]. The present study is conducted with the financial help of Project № ПД-08-266/10.03.2015, fund “Scientifically studies” of the University of Shumen “Bishop Konstantin Preslavski”.