The Gene Pool of the Belgorod Oblast Population: II. "Family Name Portraits" in Groups of Districts with Different Degrees of Subdivision and the Role of Migrations in Their Formation

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Abstract—The frequencies and spectra of surnames have been analyzed in groups of raions (districts) of the Belgorod oblast (region) with different degrees of population subdivision. The "family name portraits" of districts with low ($0.00003 < < f_r^* < 0.00022$, $\overline{f_r^*} = 0.00015$) and moderate ($0.00023 < f_r^* < 0.00042$, $\overline{f_r^*} = 0.00029$) inbreeding levels are similar both to each other and to the "family name portrait" of the Belgorod oblast as a whole. Districts with high subdivision levels ($0.00043 < f_r^* < 0.00125$, $\overline{f_r^*} = 0.00072$) had very distinctive surname spectra and the highest surname frequencies. Intense immigration to the Belgorod oblast significantly affects its population genetic structure, decreasing the population subdivision.

INTRODUCTION

Surname, the main component of threefold names accepted in Russia, is an interesting word regarded as a monument of the national cultural history, a mark of a certain epoch, and a linguistic monument reflecting events that were important at a specific historical moment [1]. In addition, surnames are traditionally used in population genetics as a quasi-genetic marker. Data on surname frequencies allow the genetic structure of a population to be described efficiently. Patroclinally inherited surnames are a good analogue of genetic markers, especially when dealing with populations that have been using surnames for at least ten generations, i.e., surnames are traditional for them [2]. Surnames are considered as alleles of a single, selectively neutral locus [3] and are used for evaluating the inbreeding and its components in a population (the Crow–Mange isonymic method [4]), estimating genetic distances between populations, calculating surname diversity parameters, etc., as well as describing genetic landscapes with the use of gene geographic technologies [5].

In the previous study [6], we described the characteristics of surname distribution in the Belgorod oblast (region) of Russia. We found a considerable geographic variation (by a factor of 40) of the subdivision level in 21 raions (districts) and found differentiation of all district populations of the Belgorod oblast with respect to the degree of subdivision (f_r) into groups I, II, and III with a low, moderate, and high inbreeding levels, respectively.

Here, we studied the "family name portraits" of groups of districts with different degrees of population subdivision and estimated the role of migrations in their formation.

MATERIALS AND METHODS

We performed a total anthroponymic analysis of the populations of all 21 raions of the Belgorod oblast.

A list of surnames "totally" covering the entire population of the oblast at an age above 18 years served as a source of information. We analyzed the data on the variation of 53 525 surnames among 885 459 people living in 21 rural districts of the Belgorod oblast. Population genetic characteristics were calculated at the level of district regarded as an elementary population.

According to the differentiation of all the 21 districts of the Belgorod oblast with respect to the degree of subdivision (f_r) into three groups [6] (group I, nine raions with a low f_r^* ($0.00003 < f_r^* < 0.00022$, $\overline{f_r^*} = 0.00015$); group II, eight raions with a moderate f_r^* ($0.00023 < f_r^* < 0.00042$, $\overline{f_r^*} = 0.00029$); and group III, four raions with a high f_r^* ($0.00043 < f_r^* < 0.00125$, $\overline{f_r^*} = 0.00072$)), we studied the surname frequency spectra ("family name portraits") in all the three groups of raions.

To determine the role of migrations in the formation of "family name portraits" in raions of the Belgorod oblast, we analyzed the relationship (Spearman's rank-order correlation coefficient) between the degree of population subdivision (f_r^*) and the migration activity of the population. For this purpose, we obtained data on the migration intensity during ten years [7]. The Statistica 6.0 software was used for mathematical treatment of the data.

RESULTS AND DISCUSSION

Surname Distributions in Groups of Raions with Different Degrees of Subdivision

We calculated the mean surname frequency for each group of raions as an unweighted average (i.e., without taking into account the population sizes) of the "district" surname frequencies in all raions of the given group, i.e., for nine raions of group I, eight raions of group II, and four raions of group III. In each group, we ranked surnames in the order of decreasing frequency and selected the 50 most frequent surnames (Table 1). This was enough to determine the main characteristics of the gene pool of each group [8]. Table 1 shows the surname frequencies (P_i) in the form $P_i \times 10^2$, each surname being assigned a number according to its place in the total list of surnames of the Belgorod oblast calculated as an unweighted average of the frequencies in the three groups of raions. This allows us to estimate the similarity of each group to the total spectrum of the 50 most frequent surnames in the Belgorod oblast and the contribution of surnames from each group to the total list of surnames, as well as to determine distinctive surnames characteristic of individual groups and common surnames. Table 1 also shows the mean surname frequencies for the Belgorod oblast calculated as unweighted averages for all the 21 raions.

Earlier [8], it was found that the Southern region (which includes the Belgorod oblast) has a very distinctive "family name portrait" compared to other regions of Russia (the Western, Central, Eastern, and Northern ones), which is reflected in both the surname spectrum and the absence of "leaders," with all frequent surnames except the most frequent one (Popov) having relatively low and approximately equal frequencies.

The most frequent surname in the Belgorod oblast, Popov, ranked first not only in the total list of surnames in the oblast, but also in each group of raions. Its frequency in the total oblast population was 0.68%. The maximum frequency of this surname (0.89%) was found in group III of raions (with a high f_r). In groups I and II, the frequency of the surname Popov was considerably lower (0.59 and 0.54%, respectively).

After that, we analyzed the 20 most frequent surnames in three groups of raions. The surname spectrum of group II (with a moderate f_r) coincided with the total spectrum of the oblast population by 70%; and the surname spectra of groups I and III (with a low and high f_r), by 65%. Note that the frequencies of 12 out of the 20 most frequent surnames in group II (with a moderate f_r) were intermediate between the frequencies of these surnames in groups I and III (with a low and high f_r).

The ranks of 7 out of 20 surnames in population groups I and III and 6 surnames in group II differed from their ranks in the total list of surnames for the Belgorod oblast. For example, the surnames Morozov, Kalashnikov, Maslov, and Bogdanov, whose ranks in the total list were 37, 42, 70, and 98, respectively, ranked 10th, 13th, 18th, and 20th, respectively, in group I. In group II, the 20 most frequent surnames included those that ranked 24th, 28th, 32nd, 33rd, 34th, and 38th in the total list (respectively, Volkov, Kovalenko, Shevtsov, Safonov, Kozlov, and Mikhailov). In group III, the 20 most frequent surnames included Ryadnov, Zubkov, Shenshin, and Ivanisov, ranking only 44th, 39th, 66th, and 76th, respectively, in the total list.

Note that group III, while insignificantly differing from the total list for the Belgorod oblast in the surname spectrum, considerably differed from the other two groups.

Because of this difference, only seven out of the 20 most diverse surnames had the same ranks in all the three groups, group III differing from both group I and group II in the ranks of the other 13 surnames. Groups I and II differed from each other in the ranks of only seven surnames. For example, Golovin was the second most frequent surname in group III, whereas it ranked only 106th in group I and 50th in group II. It is interesting that the surname Ryadnov, which ranked 6046 in group I and was even rarer (with a rank of 7051) in group II, was among the 10 most frequent (with a rank of 8) in group III.

Let us now consider the 50 most frequent surnames. When scanning these lists for surnames common for different groups of districts, we found that groups I and II had the largest number of common frequent surnames (26 out of 50). There were 16 out of 50 surnames common for groups I and III and the same number of surnames common for groups II and III.

To study the main characteristics of surname distributions in the three groups of districts, we plotted diagrams comparing the most common surnames in each of the three groups (Figs. 1–3). Figure 1 shows the diagram of 50 surnames that were the most frequent in group I (with a low f_r) listed in the order of decreasing frequency. The other two curves show the frequencies of the same 50 surnames in groups II and III (with a moderate and high f_r values, respectively). In a similar way, we plotted the diagrams of the most frequent surnames of groups II and III (Figs. 2 and 3, respectively).

The curve of the most frequent surnames of group I plateaus almost from the beginning (Fig. 1). The curves for the other two groups are markedly broken lines with drastic peaks and troughs showing the distinctive characteristics of each group. The most frequent surnames in group I were Popov, Ivanov, Goncharov, Novikov,

Table 1. Distributions of the 50 most frequent surnames in three groups of districts differing in the population subdivision level (surname frequencies, $P_i \times 10^2$)

No.	Common surname	Group I $f_r^* =$ from 0.00003 to 0.00022, $\overline{f_r^*} = 0.00015$	Group II $f_r^* =$ from 0.00023 to 0.00042, $\overline{f_r^*} = 0.00029$	Group III $f_r^* =$ from 0.00043 to 0.00125, $\overline{f_r^*} = 0.00072$	Mean frequency in the Belgorod oblast	
					calculated from the data on three groups of raions	calculated from the data on 21 raions
1	Popov	0.591	0.541	0.891	0.675	0.629
2	Kovalev	0.288	0.322	0.575	0.395	0.383
3	Shevchenko	0.299	0.478	0.380	0.386	0.356
4	Novikov	0.325	0.220	0.598	0.381	0.337
5	Tkachenko	0.240	0.270	0.421	0.311	0.321
6	Ivanov	0.377	0.319	0.198	0.298	0.289
7	Goncharov	0.328	0.242	0.293	0.288	0.286
8	Golovin	0.097	0.131	0.598	0.275	0.284
9	Kapustin	0.100	0.161	0.563	0.275	0.281
10	Kolesnikov	0.312	0.268	0.237	0.273	0.263
11	Shapovalov	0.186	0.246	0.379	0.270	0.246
12	Kuznetsov	0.244	0.274	0.287	0.268	0.231
13	Bondarenko	0.276	0.343	0.184	0.268	0.225
14	Litvinov	0.183	0.235	0.334	0.250	0.212
15	Zakharov	0.161	0.184	0.373	0.239	0.210
16	Medvedev	0.156	0.131	0.405	0.231	0.207
17	Kravchenko	0.172	0.293	0.209	0.225	0.205
18	Kravtsov	0.102	0.188	0.340	0.210	0.205
19	Cherkashin	0.205	0.211	0.193	0.203	0.195
20	Evsyukov	0.070	0.086	0.446	0.201	0.194
21	Ushakov	0.146	0.060	0.381	0.196	0.185
22	Chernykh	0.209	0.190	0.175	0.191	0.185
23	Tarasov	0.272	0.176	0.121	0.190	0.180
24	Volkov	0.171	0.196	0.192	0.186	0.175
25	Bondarev	0.144	0.182	0.226	0.184	0.174
26	Klimenko	0.100	0.146	0.304	0.183	0.167
27	Sergeev	0.202	0.050	0.284	0.179	0.164
28	Kovalenko	0.132	0.283	0.110	0.175	0.160
29	Sorokin	0.117	0.095	0.301	0.171	0.159
30	Miroshnichenko	0.135	0.154	0.215	0.168	0.158
31	Semenov	0.103	0.094	0.299	0.165	0.158
32	Shevtsov	0.130	0.208	0.152	0.163	0.156
33	Safonov	0.092	0.247	0.132	0.157	0.156
34	Kozlov	0.174	0.230	0.067	0.157	0.155
35	Dmitriev	0.126	0.075	0.265	0.156	0.148
36	Solov'ev	0.098	0.060	0.289	0.149	0.144
37	Morozov	0.260	0.109	0.077	0.148	0.143
38	Mikhailov	0.143	0.197	0.099	0.146	0.141
39	Zubkov	0.075	0.022	0.341	0.146	0.139
40	Ponomarev	0.105	0.161	0.171	0.146	0.138
41	Nikulin	0.137	0.059	0.240	0.145	0.137
42	Kalashnikov	0.224	0.102	0.109	0.145	0.137
43	Zhdanov	0.137	0.091	0.196	0.141	0.133
44	Ryadnov	0.002	0.002	0.413	0.139	0.132
45	Pereverzev	0.077	0.082	0.258	0.139	0.131
46	Sokolov	0.108	0.174	0.134	0.139	0.131
47	Vasilenko	0.060	0.070	0.275	0.135	0.129
48	Stepanov	0.108	0.120	0.177	0.135	0.128
49	Tkachev	0.144	0.176	0.076	0.132	0.128
50	Pavlov	0.121	0.142	0.131	0.131	0.127
Population over 18 years of age		594383	229441	61635	885459	885459
Number of surnames		44906	18165	6500	53525	53525

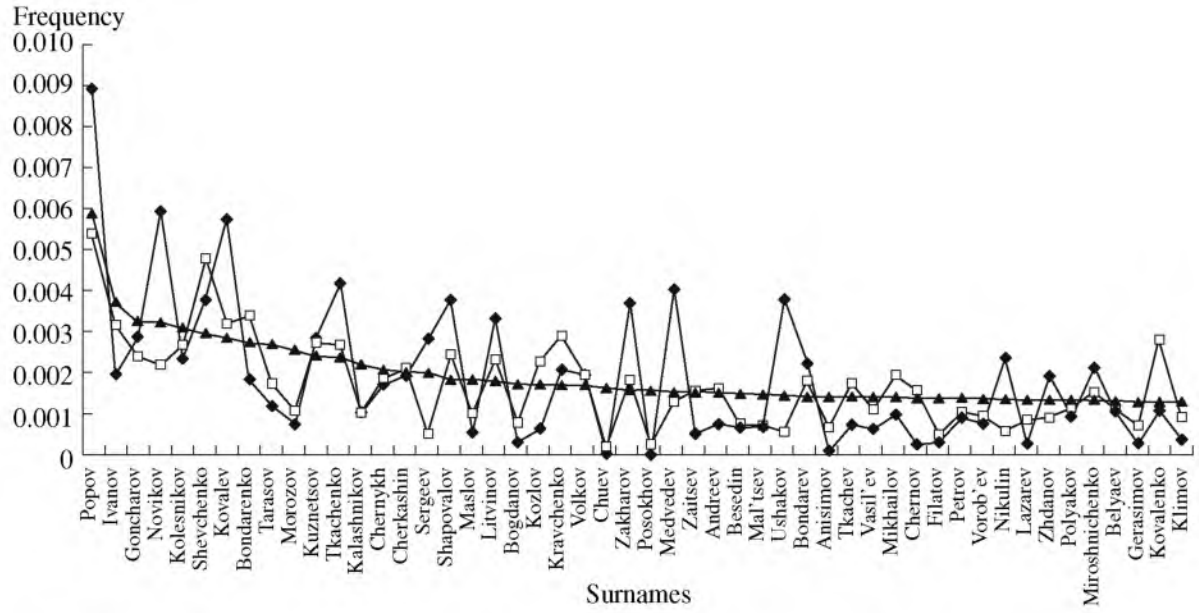

Fig. 1. Comparative analysis of the 50 most frequent surnames in group I of districts (with a low f_r) and the frequencies of these surnames in the other two groups. The 50 most frequent surnames in group I are listed in the order of decreasing frequency (–▲–). The frequencies of the same surnames in group II with a moderate f_r (–□–) and group III with a high f_r (–◆–) are shown.

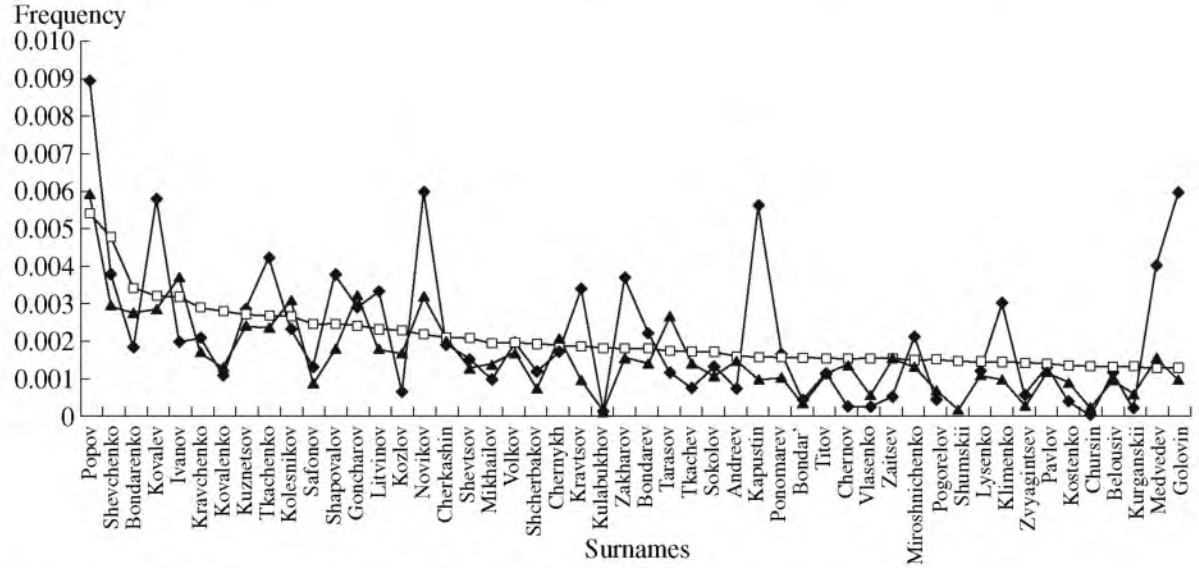

Fig. 2. Comparative analysis of the 50 most frequent surnames in group II of districts (with a moderate f_r) and the frequencies of these surnames in the other two groups. The 50 most frequent surnames in group II are listed in the order of decreasing frequency (–□–). The frequencies of the same surnames in group I with a low f_r (–▲–) and group III with a high f_r (–◆–) are shown.

Kolesnikov, Shevchenko, Kovalev, Bondarenko, Tarasov, and Morozov. The surnames Tarasov and Morozov were more frequent in group I; Shevchenko, in group II; and Popov, Novikov, and Kovalev, in group III. As can be seen in the diagram, some surnames had almost the same frequency in all the three groups. There were only 7 such families out of 50: Kolesnikov, Kuznetsov, Chernykh, Cherkashin, Volkov, Polyakov, and Belyaev.

Figure 2 shows the comparison of 50 surnames that were the most frequent in group II of districts (with a moderate f_r) with these frequencies in the other two groups. Here, the most frequent surnames were Popov, Shevchenko, Bondarenko, Kovalev, Ivanov, Kravchenko, Kovalenko, Kuznetsov, Tkachenko, and Kolesnikov. Note that, the curve of frequent surnames in group I in Fig. 1, the curve for group II in Fig. 2 pla-

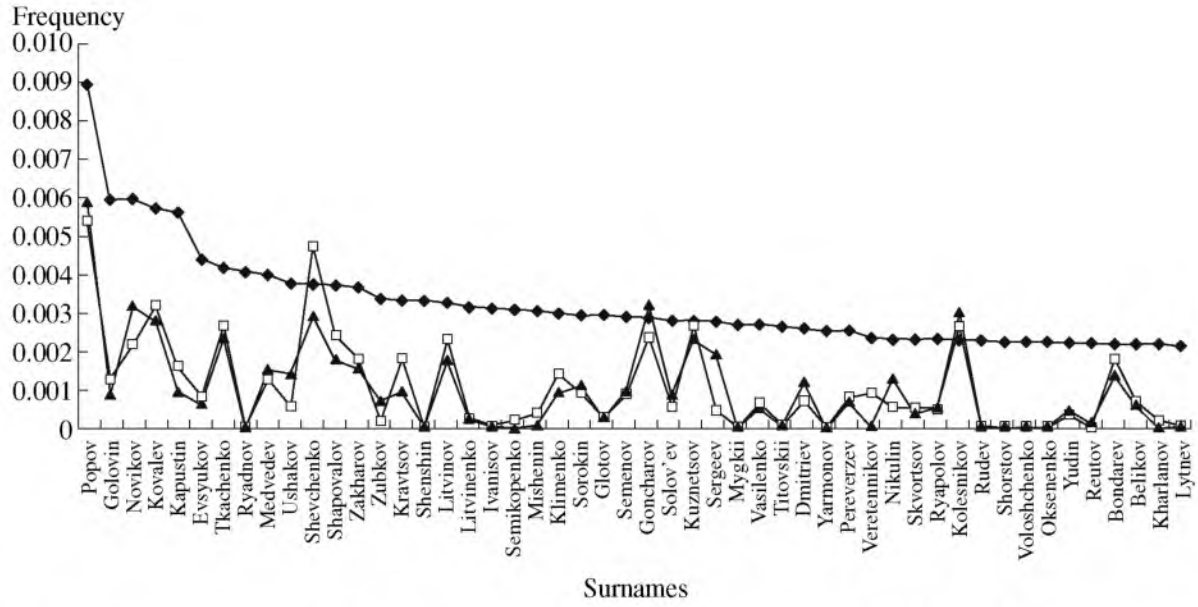

Fig. 3. Comparative analysis of the 50 most frequent surnames in group III of districts (with a high f_r) and the frequencies of these surnames in the other two groups. The 50 most frequent surnames in group III are listed in the order of decreasing frequency (–◆–). The frequencies of the same surnames in group I with a low f_r (–▲–) and group II with a moderate f_r (–□–) are shown.

teaus almost immediately, whereas the curves for the other two groups are broken lines reflecting distinctive features of each group. The surnames Shevchenko, Bondarenko, Kravchenko, and Kovalenko were more frequent in group II; and the surnames Popov, Kovalev, and Tkachenko, in group III. As with group I, 7 out of the 50 most frequent surnames of group II had close frequencies in all the three groups. Here, these were Kuznetsov, Cherkashin, Volkov, Chernykh, Lysenko, Pavlov, and Belousov.

Comparison of Figs. 1 and 2 shows that the surnames Kuznetsov, Tkachenko, Volkov, Chernykh, Zakharov, Tkachev, Andreev, Chernov, Zaitsev, Miroshnichenko, and some others were common for groups I and II and had almost equal frequencies there. The diagrams also show that there were surnames "specific" for one of the groups (i.e., relatively rare in the other two groups). There were few such "specific" surnames in groups I and II. In group I, these were Tarasov, Morozov, Kalashnikov, Maslov, Bogdanov, Chuev, Posokhov, Besedin, Mal'tsev, and Filatov (Fig. 1). The surnames "specific" for group II were Shevchenko, Kravchenko, Kovalenko, Safonov, Kulabukhov, Bondar', Vlasenko, and Chursin. The frequencies of these surnames in group II were considerably higher than in the other two groups. Note that most surnames widespread in groups I and II had approximately equal frequencies.

Group III drastically differed from the other two groups with respect to both the frequencies and spectrum of the 50 most frequent surnames. Figure 3 shows the 50 surnames most frequent in group III of districts and the frequencies of these surnames in the other two groups. In contrast to such diagrams for groups I and II (Figs. 1, 2), the curve of surname frequencies in group III has no marked peaks. Almost all surname frequencies were substantially higher than in the other two groups. This ultimately determines the higher population subdivision level in districts of this group. The 10 most frequent surnames of group III (with a high f_r) were Popov, Golovin, Novikov, Kovalev, Kapustin, Evsyukov, Tkachenko, Ryadnov, Medvedev, and Ushakov. Some of the surnames widely spread in the Belgorod oblast as a whole, including Ivanov, Bondarenko, Tarasov, Cherkashin, and Chernykh were absent in the list of the 50 most frequent surnames of group III. In contrast, "local" surnames entirely absent in the other two groups accounted for a large proportion of the most frequent surnames in group III. These were Ryadnov, Shenshin, Ivanisov, Myagkii, Titovskii, Yarmonov, Rudev, Shorstov, Voloshchenko, Oksenenko, Reutov, and Lytnev. Only 4 out of the 50 surnames (Goncharov, Kuznetsov, Kolesnikov, and Bondarev) had approximately the same frequencies in all the three groups.

Note that this diagram (Fig. 3) not only graphically illustrates the specificity of the spectrum and frequencies of surnames of group III, but also complements the pattern of surname distribution in the first two groups. A high correlation between surname frequencies in groups I and II ($\rho = 0.79$, $P < 0.001$) can be distinctly seen in Fig. 3 as coordinated increase or decrease in the frequency of almost every surname of these two groups. The correlations between the surname frequencies of each of these group and group III were weaker: Spearman's correlation coefficients (ρ) between surname fre-

Table 2. Changes in immigration flow to the Belgorod oblast in 1990–2000

Raion	Total number of immigrants per 1000 people						Population (as of 1 Jan 2000)
	1990	1995	1998	1999	2000	Average	
Alekseevka	32.3	20.9	16.6	15.4	12.8	19.6	66.0
Belgorod	60.0	53.9	52.5	56.9	59.3	56.5	80.8
Borisovka	43.8	36.1	30.3	37.1	32.7	36.0	26.1
Valuiki	44.1	35.5	33.9	36.4	29.1	35.8	74.0
Veidelevka	52.4	27.2	23.8	25.2	19.0	29.5	25.8
Volokonovka	40.2	26.5	14.0	18.3	14.1	22.6	36.6
Gaivoron	37.6	30.4	28.7	24.4	24.2	29.1	27.7
Gubkin	47.2	37.4	27.5	24.4	22.4	31.8	120.4
Ivnya	56.4	28.2	20.4	20.3	15.2	28.1	24.0
Korocha	45.6	32.3	34.8	38.3	33.6	36.9	40.1
Krasnaya Yarusa	*	26.2	27.4	28.1	27.1	27.2	15.2
Krasnogvardeiskoe	23.7	10.2	8.8	13.1	12.7	13.7	40.7
Krasnoe	*	25.7	22.6	23.9	14.9	21.8	15.5
Novyi Oskol	43.3	26.8	24.1	28.6	25.3	29.6	47.3
Prokhorovka	46.4	27.8	31.2	28.9	22.5	31.4	27.8
Rakitnoe	30.6	29.8	23.7	23.2	20.5	25.6	35.2
Roven'ki	39.5	26.0	21.7	21.7	16.1	25.0	25.5
Staryi Oskol	55.1	40.3	33.9	31.4	27.6	37.7	250.6
Chernyanka	50.4	35.4	26.0	21.5	19.7	30.6	33.9
Shebekino	39.2	38.1	35.8	37.7	32.7	36.7	93.2
Yakovlevskii	66.4	43.6	40.8	39.5	38.7	45.8	50.2
City of Belgorod	41.4	32.5	31.9	30.6	28.1	32.9	344.2
Total for the oblast	45.0	34.1	30.6	30.4	27.3	33.5	1501.5

* No data.

quencies in groups I and III and groups II and III were 0.60 and 0.57 ($P < 0.001$), respectively.

Thus, the general trend is similarity between surname frequency distributions in groups I and II of districts and considerable differences of group III from them with respect to both the spectrum and frequencies of surnames.

To estimate the contributions of surnames in different groups of district populations into the surname gene pool of the Belgorod oblast, we calculated the correlation coefficients between the frequencies of all surnames in each group and total, "regional" frequencies of all the 53 000 surnames found in the Belgorod oblast. Two estimates of regional frequencies were used in calculations: those calculated from the data on three groups of raions and directly from the data on 21 individual raions (Table 1). The surname frequencies in all the three groups of districts were strongly correlated with the regional list of surnames. However, the surnames lists of groups I and II were more similar to the regional list than that of group III was. The coefficients of correlation of the surname frequencies in groups I and II with the regional mean frequencies were $\rho = 0.89$ and $\rho = 0.84$ ($P < 0.001$), respectively, if the regional mean value was calculated from the data on three groups of districts and $\rho = 0.93$ and $\rho = 0.92$ ($P < 0.001$), respectively, if the regional mean value was calculated directly from the data on 21 raions of the Belgorod oblast. Group III stood out with respect to both the surname frequencies and the spectrum and was more different from the regional "surname portrait" of the Belgorod oblast. The correlation coefficient between surname frequencies in group III and the regional frequencies calculated from data on 21 individual raions and data on three groups of raions were $\rho = 0.79$ and $\rho = 0.78$ ($P < 0.001$), respectively.

Thus, districts with low and moderate population subdivision levels are more similar to each other with respect to surname distribution and determine the "surname portrait" of the entire region (Belgorod oblast), whereas districts with a high inbreeding levels are characterized by a distinctive surname spectrum and the highest surname frequencies.

Table 3. Endogamy index at the rural municipality level in the Belgorod raion in the 1990s

Population (municipality)	Population size	Sample size	Sources of marriage migrations		
			the same municipality	Belgorod raion	Belgorod oblast
1. Bessonovskii	4572	116	0.15	0.35	0.46
2. Veselaya Lopan'	3159	116	0.02	0.24	0.38
3. Dubovskii	2853	105	0.06	0.20	0.41
4. Komsomol'skii	1975	108	0.09	0.20	0.23
5. Streletskoe	4677	109	0.06	0.37	0.49
Average	3447	554	0.08	0.27	0.39

Note: For each rural municipality, the proportions of marriages between persons that were born in the given population (municipality, raion, and oblast) to the total number of marriages contracted in the given municipality are indicated.

Migration Activity and Population Genetic Characteristics of the Belgorod Oblast

The mean immigration flow in the Belgorod oblast during ten years (from 1990 to 2000) was 33.5 per 1000 people, varying from 13.7 in the Krasnogvardeiskoe raion to 56.5 in the Belgorod raion (Table 2). Note that the Belgorod oblast population growth rate due to migration (9.9 per 1000 people in 2000) was one of the highest in Russia (the migration population growth averaged over Russian regions was 1.9 per 1000 people in 1998 [9]), being comparable only to the immigration rates in the Orenburg oblast, Stavropol' krai, Moscow, and Moscow oblast [9]. Immigration to both towns and rural settlements (63 and 37% of immigrants, respectively) was observed. However, individual raions of the Belgorod oblast differed from one another in immigration rates. Immigration to the central, southwestern, and northwestern raions of the Belgorod oblast was the most intense. Most of them belonged to group I (with a low population subdivision). In this group, the mean immigration flow during the period from 1990 to 2000 was 38.5 per 1000 people. Districts located on the periphery of the Belgorod oblast (groups II and III with respect to the population subdivision level) were characterized by a lower (and almost equal) migration activity. The migration flows to these groups of districts were 25.3 and 25.5 per 1000 people, respectively.

As the rate of immigration to rural districts of the Belgorod oblast increases, the population subdivision and redundancy of surname distribution decrease. Spearman's coefficients of correlation of the number of migrants per 1000 people with the subdivision level (f_r^*) and surname distribution redundancy (R) were $\rho = -0.73$ ($P < 0.01$) and $\rho = -0.49$ ($P < 0.05$), respectively. The Belgorod oblast population growth due to migration during ten years (1991–2000) was 188 300 people. Note that, according to the official report *On the Main Trends of the Demographic Situation in Russia until the Year 2015*, the immigration flow, compensating for the natural population decrease of the Belgorod oblast population, will determine the a population growth by 4% during the period from 2000 to 2015 [9]. Earlier, El'chinova [10] noted an important role of migration in the formation of the population structure of the Krasnodar krai, Kirov and Kostroma oblasts, and Adygea Republic.

Thus, the obtained data allow us to conclude that a high migration flow to the Belgorod oblast considerably affects its population genetic structure by decreasing the population subdivision.

Note that the Belgorod raion, which substantially differs from other districts of the Belgorod oblast in many population genetic characteristics, is also characterized by the most intense migration in the oblast, specifically, 56.52 migrants per 1000 people (Table 2). This is considerably higher than both the mean value for the Belgorod oblast (33.5 migrants per 1000 people) and this parameter for the largest city of the region, Belgorod (32.9 migrants per 1000 people). These data indicate that the population of the Belgorod raion must not be regarded as an elementary population. To test this assumption, we estimated the sources of marriage migrations in five rural municipalities of the Belgorod raion (Table 3). On average, only 8% of marriages in rural municipalities of the Belgorod raion were contracted between their indigenous residents, 27% of marriages were contracted between persons who had been born in the Belgorod raion, and 39% of marriages, between those who had been born in the Belgorod oblast. These data indicate that the Belgorod raion is not an elementary population; indeed, less than 30% of marriages are contracted between persons that were born in the same raion, whereas the corresponding criterion for an elementary population is at least 50% of such endogamous marriages. Therefore, we excluded the Belgorod raion from subsequent population genetic analysis, i.e., the description of the "genetic landscape" of the Belgorod oblast.

Thus, analysis of the "surname portraits" of the Belgorod oblast population has shown that, first, groups I, II, and III with low, moderate, and high f_r values, respectively, differ from one another not only in the

population subdivision level estimated from surname frequencies, but also in the surname spectrum. The "surname portraits" of groups I and II of districts are similar both to each other and to the "surname portrait" of the Belgorod oblast as a whole. Group III has a very distinctive surname spectrum and the highest surname frequencies, which accounts for the high population subdivision level in this group. Second, intense immigration to the Belgorod oblast considerably affects the population genetic structure by decreasing the population subdivision.

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