A Comparison of Slovakian Haban Populations Using Finger Ridge-Count Data

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INTRODUCTION

The Anabaptist movement began in Europe in the early 1500s as a response to what was perceived as the corruption of the church. The basic tenets of the believers include adult baptism, communal property ownership, and separation of church and state. The Hutterites began as a subset of this larger religious movement. The Hutterites originated in Switzerland and the Western Tirol region of Austria but because of religious persecution lived in several countries across Central Europe. From 1526 to 1700 the Hutterites lived in Western Slovakia and built several settlements. Following the inclusion of Slovakia into the Austrian empire and the subsequent re-Catholicization of the population, many of the Hutterites moved to Russia and later North America while those that stayed in Slovakia converted to Catholicism. In Slovakia today there are several communities that still identify themselves as the descendents of the Hutterite population, such as Sobotiste, Velke Levare, and Moravsky Jan, they are known locally as Habans. The original houses, churches, and pottery of the Hutterites can still found in these communities and until the end of World War II many of the Habans continued to speak German. The extensive population studies on American Hutterites (for example, Schmiedeleut and Dariusleut) provide a large comparative database for comparison with the Slovak Haban population. The goal of future comparisons is to document the shared history of these divergent populations that share a common origin.

This study uses data collected as part of a larger study of Slovak Haban populations. The goal of this study was to determine the level of differentiation among different Slovak Haban groups and between Habans and other Central European populations by examining the biological variation as seen in finger ridge-counts. The use of multivariate methods allows for a more thorough examination of the variation among the populations, and we therefore depend on multivariate approach to explore the population relationships (Jantz et al., 1984; Ousley, 1997; Weninger, 1983).

MATERIALS AND METHODS

Finger and palm prints were collected in three villages in northwestern Slovakia; Sobotiste, Velke Levare, and Moravsky Jan. The sample participants were chosen from individuals who self-identified as Habans and had knowledge of a maternal or paternal lineage of descent from the Habans. Control samples were also collected from Non-Haban individuals living in two of the sampled villages, Sobotiste and Velke Levare. The additional samples, Slovakia, Moravia, and Austria, used for comparison were taken from a worldwide database of dermatoglyphics collected by the late Heinz Brehme (Jantz, 1997). The radial finger ridge-counts from all ten digits were used for multivariate analyses. The counts were corrected for sex-related differences by centering each sex on a mean of zero (SAS 8.0 2000). Biological distances were evaluated for the standardized data using a modified Mahalanobis generalized distance (D^2) (Williams-Blangero and Blangero, 1989). This distance represents the minimum genetic distance derived from phenotypic variation. The distance matrix, F_{st}, and R matrix were calculated in RMet for Windows v. 4.0. A principal components analysis was performed on the R matrix resulting in a two-dimensional canonical plot of the data. Additionally, a correlation calculation between the standardized variables and the canonical scores was performed in order to evaluate which variables contributed most to the variation seen in the principal components analysis. The distance matrix was reduced to a two-dimensional dendrogram plot using the unweighted paired group method arithmetic average (UPGMA). The cophentic matrix derived from the UPGMA analysis was then compared with the original distance matrix in order to evaluate the goodness of fit of the dendrogram. The principal component

Table 1: Summary statistics for radial ridge counts

Population	*Sample Size*	*Left5*	*Left4*	*Left3*	*Left2*	*Left1*	*Right1*	*Right2*	*Right3*	*Right4*	*Right5*
Sobotiste	52	14.81	16.58	13.48	9.44	15.83	19.12	9.60	13.96	17.52	14.44
VelkeLevare	21	14.62	16.29	11.57	6.62	15.62	18.62	7.00	11.76	18.62	14.19
MoravskyJan	14	12.36	13.64	10.36	9.29	14.86	16.43	7.07	10.43	14.64	10.86
NonHaban Sobotiste	73	12.34	14.82	11.21	8.47	15.47	17.38	9.01	11.49	14.84	11.97
NonHaban VelkeLevare	89	13.56	16.39	12.44	9.53	16.46	18.02	8.73	11.98	16.31	13.69
Slovak	100	14.02	17.32	12.35	9.50	16.34	18.02	8.78	12.70	16.72	13.36
Moravian	100	13.72	16.90	12.65	8.83	16.87	18.22	9.41	12.30	16.88	13.22
Austrian	100	12.76	16.09	11.49	7.76	14.25	17.80	7.33	10.83	15.68	12.43
Total	549										

Table 2: Summed distance matrix

1. Sobotiste	0.0000							
2. VelkeLevare	0.2888	0.0000						
3. MoravskyJan	0.4959	0.7110	0.0000					
4. NonHabanSobotiste	0.3094	0.6503	0.2035	0.0000				
5. NonHabanVelkeLevare	0.2541	0.5012	0.2638	0.0766	0.0000			
6. Slovak	0.2637	0.5076	0.2884	0.1503	0.0651	0.0000		
7. Moravian	0.2626	0.4492	0.3196	0.1014	0.0474	0.0589	0.0000	
8. Austrian	0.2656	0.3795	0.3238	0.1743	0.1481	0.1685	0.1719	0.0000
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*

analysis and cluster analysis were both performed in NTSYSpc, version 2.10d (Roholf, 1993).

RESULTS

The sample sizes and mean values of radial ridges by digit are given in Table 1. The summed distance matrix is given in Table 2. There were no significant distances between any of the populations. The minimum Fst is 0.01234 +/- 0.0033 assuming a heritably of 1. The principal component analysis shows a separation between the Haban groups and the other Central European populations (Fig. 1). The first axis accounts for 49.5% of the variation and comes mainly from right digit 4. The first axis separates Velke Levare and to a lesser extent Sobotiste from the other populations. The second axis separates Moravsky Jan and Velke Levare from the other populations. The second axis accounts for 20.1% of the variation and is represented mainly by left digit 4. The dendrogram (Fig. 2) confirms these relationships. The Slovak, Moravian, Non-Haban and Austrian samples cluster together. Velke Levare shows the most distant relationship from

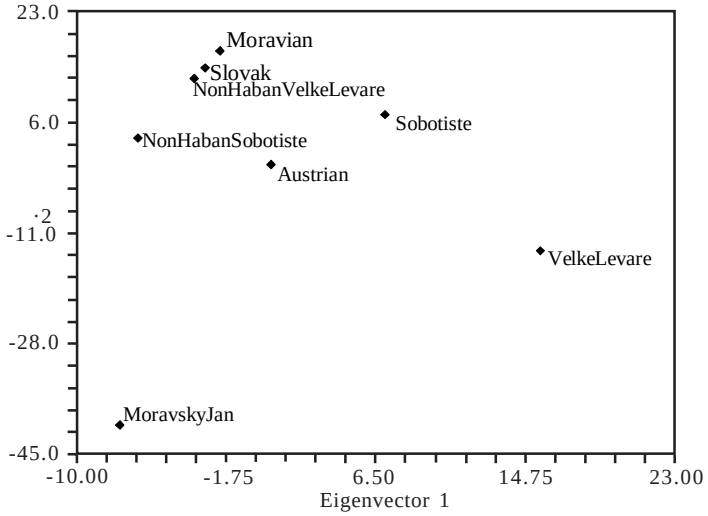

Fig. 1. Plot of the first two scaled eigenvectors.

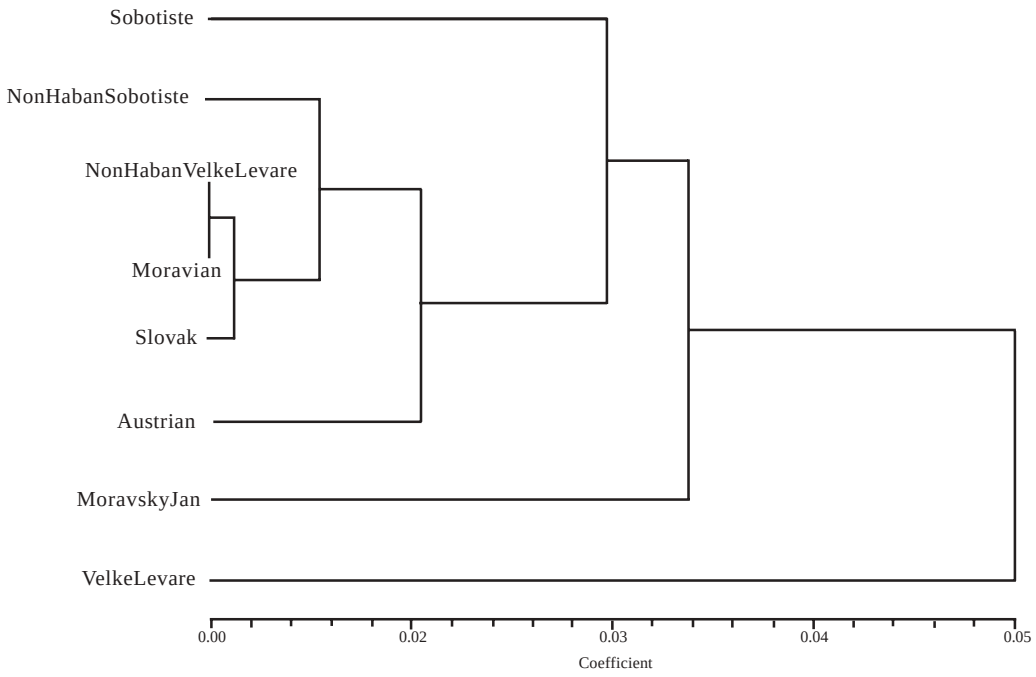

Fig. 2. Dendrogram of 8 populations based on the distance matrix (Co-phenetic correlation 0.88).

the remaining groups, followed by Moravsky Jan and Sobotiste. The co-phenetic correlation of the distance matrix is 0.882 indicating that the dendrogram provides a good representation of the genetic relationship among these populations.

DISCUSSION

The Haban samples are distinct both from the control samples and from each other. The uniqueness of the samples indicates that the Habans have remained isolated from the surrounding populations. The analysis also shows that there is no common Haban type within these samples, as they are differentiated from one another. These two observations taken together indicate that genetic drift has played a large role in the history of these populations. The relationship among the populations is different from those found in the analysis of the qualitative dermatoglyphic traits (Sivakova and Pospisil, 2001). From the qualitative traits the Sobotiste sample is the most distinct of the Haban samples and the Velke Levare sample is closest to the control samples. The genetic distances from the qualitative traits are based on a non-Euclidean matrix; therefore a matrix comparison test between the two data sets was not possible. However, we can conclude from both types of analysis that the Haban samples are distinctive from one another and that genetic drift has played an important part in the history of these populations.

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KEYWORDS Finger-ridge count; Haban; Hutterite; Anabaptist; Slovakia

ABSTRACT The present study has attempted to explore the relationship among three Slovakian Haban populations with other Central European populations using finger ridge-count data. A multivariate approach to the analysis of finger-ridge count data allows for the study of population relationships using R-matrix calculations. Historical and ethnographic evidence suggests that the Haban populations have remained somewhat isolated from the larger Slovak communities and have maintained their cultural identity as descendents of Hutterite populations. The finger-ridge analysis suggests that in fact the Habans have remained isolated from the broader Central European population. It also appears that genetic drift has played a significant role the history of these populations and that because of drift

they also differentiated from one another.

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