GENE FREQUENCIES OF HUMAN POPULATIONS ALONG PYRENEAN CHAIN

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INTRODUCTION

The Pyrenees are an important range of mountains which have been a significant geographical barrier for the expansion of living species and, have more concretely played a great role in the establishment and differentiation of human cultures and populations.

Clines E-W are classically described for some blood group frequencies (ABO, for example) along the Pyrenees, and these clines extend from the Basque pole (wich represents an isolation area) to the Mediterranean zone wich constitutes an area of cultural and populational crossbreeding.

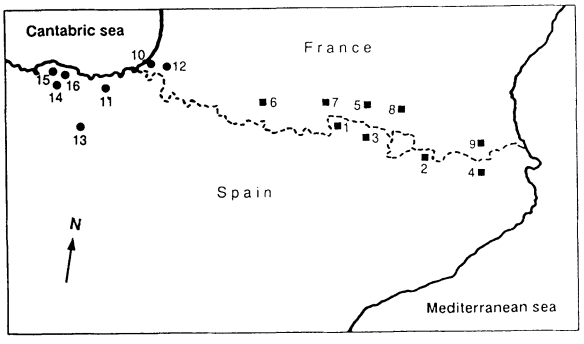
In spite of this, the existence of complex orographie with many N-S pointed valleys, surrounded by high peaks around 3,000 m., enhance the interest to establish if the isolation of valleys could vary or interrupt the regularity of cline. In fact, the isonimic studies show that the Pyrenean valleys reveal noteworthy individuality.

This short paper provides a brief discussion to establish the relationship between the different frequencies of blood markers and the variations of Pyrenaic geography.

MATERIALS AND METHOD

We have closely studied the hemotypology, internal mobility, migrations and isonimy of some characteristic valleys -La Cerdanya, Val d´Aran and Andorra- (1,2,3,4). Considering the genetic results we obtained, together with other Pyrenean populational data (5,6,7,8,9), we have drawn a genetic map which can show both the general cline of the mountain range and the peculiarities of its valleys.

The present analysis has been carried out for five groups (ABO, Rh, Fy, Kell, MN) on both sides of the Pyrenees. We have considered the 16 populations which have been reported for these markers (Fig. 1).



1: Val d'Aran
2: La Cerdanya
3: Pallars Sobirà
4: Garrotxa/Ripoll.
5: Bassin du Salat
6: Bigorre
7: Comminges
8: Pays de Foix
9: Eastern Pyrenees
10: French Basques
11: Spanish Basques
12: Macaya
13: Araba
14: Bizkaia
15: Arratia
16: Bizkaia

Fig.1: Geographical situation of Pyrenean populations considered.

Fig. 2

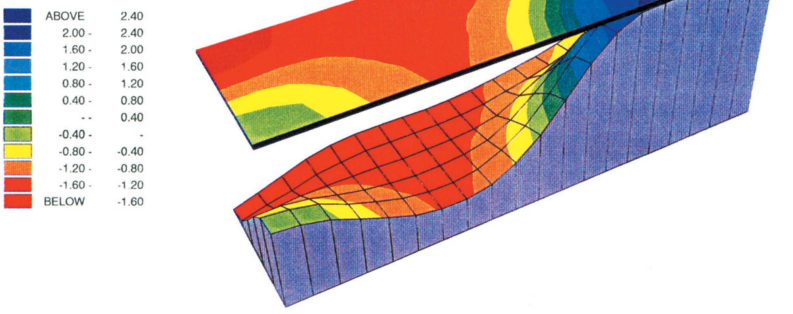


Fig. 3

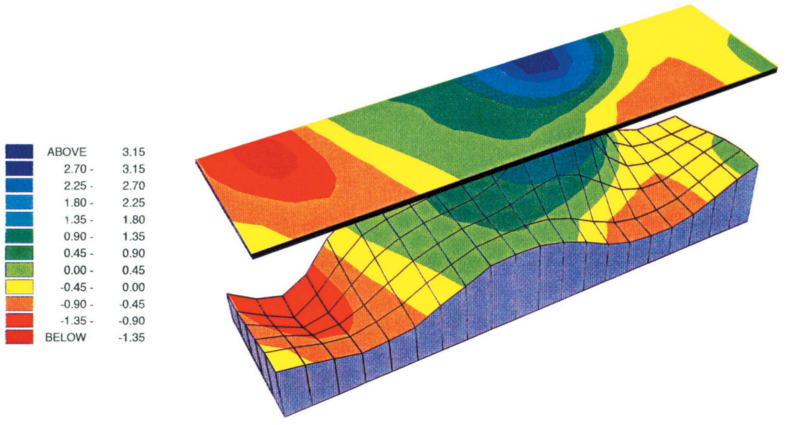


Fig. 2 and Fig. 3: Three-dimensional colour diagram of axes 1 and 2 of Principal Componen Analysis.

Fig. 4

Fig. 5

Fig. 6

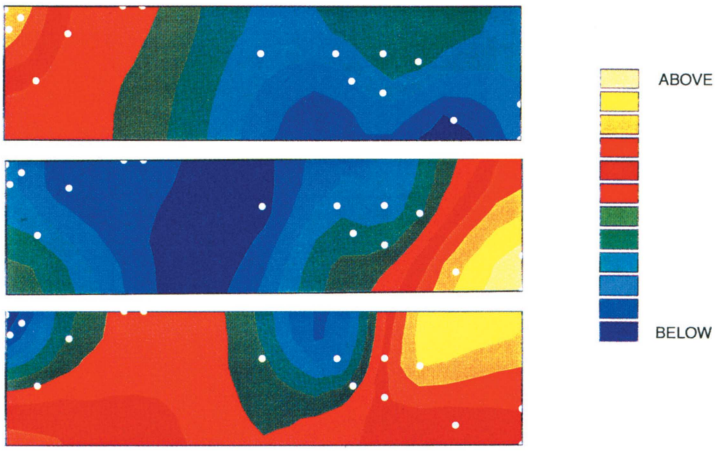


Fig. 4, Fig. 5 and Fig. 6: Rh(d), ABO (p) and Fy^{a} gene frequencies on geographical map.

We have analised many genetical markers but in this study we only consider 5 blood groups (ABO, Rh, Fy, MN and Kell) in 16 autochthonous populations on both slopes of Pyrenees whose genetical results are published. So we have always worked on definite date avoiding extrapolations.

RESULTS AND DISCUSSION

Fig. 2 is a three dimensional colour diagram of axe 1 for the PCA on all the considered blood groups. The cline E-W is clearly visible along the diagonal of the above rectangle. Fig. 3, shows the axe 2 of the PCA. In this graphic more influenced by Fy^a, the cline no longer appears. Considering the graphics wich correspond to each system one by one, we can apreciate some interesting peculiarities. For example, the allelic frequency of d on the geographical map (Fig. 4) also shows a clear cline from the Basque to Mediterranean populations, whereas the frequency of ABOp (Fig. 5) does not show it, but reveals a minimal value near the Central Pyrenees. The frequency of Fy^a (Fig. 6), on the other hand, also presents some characteristics like the isopleth (line of equal value) between Barèges and Comminges, and the Basque populations. This could be a reminiscence of an ancient Basque occupation since up to the VIth. century Basque was spoken in the area. Similar conclusions can be inferred from the PCA analysis of allelic frequencies for the locus A, the locus B and both A and B of the HLA system, and also from the analysis of genetic distances for the considered markers.

From the expounded data it can be deduced that although for the ABO system exists a clear continuity in the distribution of the frequencies between the North and the South slopes of the Pyrenees, this is not so clear for the Duffy and Rhesus Systems. These partially show clines N-S (and no E-W like in the case of ABO) as can be deduced from Fig. 4 and Fig. 6. We could consider that the E-W clines are reflection of the Neolithic migrations, while the N-S clines reveal the Indoeuropean population movements.

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