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Population characteristics and marital patterns in the Tiétar Valley (Spain)

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Abstract

The relationship among marital movement patterns to the frequency of consanguineous marriages, village size and geographical location, as indicated by altitude and laterality respecting the valley longitudinal road, is analyzed in a rural area of the southern slope of the "Sierra de Gredos" mountain range (Tiétar Valley, Spain). Results indicate the influence of both geographical factors and village size on local endogamy and inbreeding levels. The temporal variation of the association from 1875 to 1975 is related to changes in transportation facilities. Moreover, the emigration process after the second half of this century and the derived population decrease are taken into account.

Keywords: endogamy, consanguineous marriages, village size, geography, Gredos.

Résumé

Dans ce travail on analyse la relation entre le modèle de migration maritale, la fréquence de mariages consanguins, le nombre d'habitants et les caractéristiques géographiques dans une zone rurale du côté sud de la chaîne de montagnes de «La Sierra de Gredos» (vallée du Tiétar, Espagne). Les résultats obtenus montrent l'influence des facteurs géographiques et de l'effectif de la population sur les niveaux d'endogamie locale et de consanguinité. Il est probable que, pendant cette période (de 1875 à 1975) les relations entre les variables aient connu une évolution due à l'amélioration des moyens de transport et au phénomène de l'émigration qui a eu lieu vers la moitié du XXe siècle.

Mots-clés : endogamie, consanguinité, nombre d'habitants, géographie, Gredos.

INTRODUCTION

The "Sierra de Gredos" is one of the most important mountain ranges of the Iberian Peninsula. It is part of the Central System and runs from southwest to northeast, through several Spanish regions (fig. 1). In the province of Avila there are two closed valleys in the northern part, the "Tormes" and the "Alberche", while the southern slope opens onto the Castilian Plain (Tiétar Valley). Since the "Sierra de Gredos" rises to as much as 2,600 m, and has only three natural passes, it may have been an important barrier to population movement in the past, mainly in the winter season.

If the Sierra de Gredos has influenced this movement effectively, it is possible that biological differences developed between the two slopes. As a part of a study to determine whether there are such differences, and, if so, to quantify them, population information for traits of simple genetical transmission as well as complex is available and will be related to the migration pattern in future investigations. One of the aims of the present paper is to determine which factors may have influenced the local marital pattern in the southern valley of "Sierra de Gredos".

The area considered includes 21 villages of the "Sierra de Gredos" southern slope, following the Tiétar river course for about 70 Km, the eastern villages being 90 Km distant from Madrid (fig. 1). The number of inhabitants is at present 34,465, and village sizes range between 591 and 6,901.

As with many other Spanish rural populations, an intense emigration towards industrialized regions has taken place in recent years, leading to an important population decrease since the 1960's.

In the Tiétar Valley, agricultural activities predominate. Cotton, tobacco, pepper, wine, fig, olive, and fruit are the main products, and there is a modest forest industry.

MATERIAL AND METHODS

The information here analyzed comes from parish registers and official censuses. Marriage registrations for recent times are kept in every parish and, for earlier periods, at the Avila city

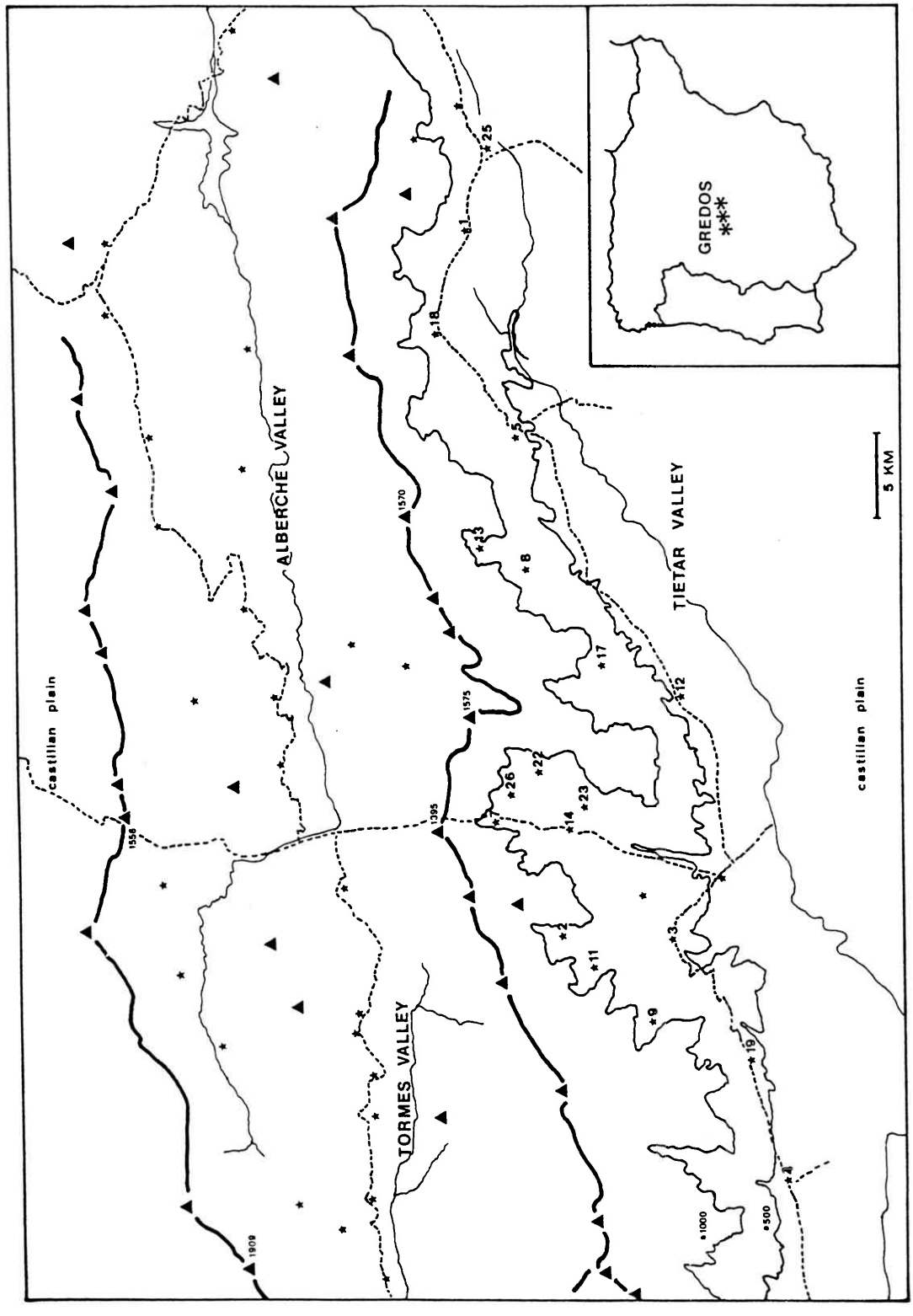

Figure 1: "Sierra de Gredos" mountain range. (▲ main mountain peaks; ▲°°° mountain pass; —— slope limits; ■°°° contour line; ——— river; ----- road; ★ village).

Bishopric library. From microfilms of marriage records sampling was carried out inversely proportional to village size, for localities larger than 1,000 inhabitants.

Data were grouped by 5 year periods except for 1970–1975. By interpolation the number of inhabitants was calculated, corresponding to the mid-point of each period, centered in 1877, 1882 and so on.

For 12,887 marriages in total, the following variables were used: wedding place, year, village-endogamous, exogamous and foreign village absolute number of marriages, the frequency of each kind of consanguineous marriages coded as 1x2, 2x2, 2x3, 3x3, 3x4 and 4x4 (uncle-niece, first cousins etc.), total number of consanguineous unions and population size. To determine inbreeding coefficients, multiple consanguineous marriages were considered as several single consanguineous unions; but they were counted only once respecting their total frequency. Inbreeding temporal variation was expressed up to the 3x3 unions (second cousins), because after 1920 more distant marriages were not the object of ecclessiastical dispensation.

Due to the fact that available census provided grouped figures for three of the 21 villages considered, results refer only to 19 localities. Excluding periods without information regarding weddings in several parishes, the total number of five-year set of data kept for analysis was 361.

BMDP Statistical Package was applied to the above file. The D series provided descriptive statistics and transformed variables for the different villages and periods, while the R programs made possible the multivariate analysis of the data.

Results and discussion

For each of the Tiétar villages the number of inhabitants from 1877 to 1981, shows a general tendency towards population increase until approximately 1950 (table 1). Afterwards, the number of inhabitants decreased as in many rural areas of Spain (fig. 2). In this general pattern, two groups of villages can be distinguished: group I where the present population exceeds that of 1877 (villages 3, 4, 18 and 25 and to a lesser degree 1 and 13); group II where the post-1960 population is similar to or lower than the XIX century censuses. It should be noted that villages with a number of inhabitants greater than average in the past century predominate in group I. In group II are included some of the villages that were initially the smallest. Touristic activities may partly explain this numerical evolution.

Village	code	1877	1900	1920	1940	1950	1960	1970	1980-1981
Adrada, La	1	1 029	1 289	1 526	1 693	1 907	1 692	1 259	1 622
Arenal, El	2	1 499	1 623	1 786	2 196	2 307	1 879	1 532	1 132
Arenas San Pedro	3	2 902	3 375	4 209	6 001	6 518	6 659	6 234	5 657
Candeleda	4	2 641	3 239	4 495	5 874	6 748	6 983	5 636	4 784
Casavieja	5	2 245	2 584	2 809	2 578	2 678	2 519	1 982	1 871
Cuevas del Valle	7	937	1 068	943	925	1 069	951	779	636
Gavilanes	8	847	885	1 003	1 247	1 371	1 382	1 164	854
Guisando	9	1 004	752	751	850	1 172	1 157	988	906
Hornillo, El	11	682	667	702	791	817	760	597	538
Lanzahita	12	817	910	1 070	1 313	1 414	1 400	1 121	789
Mijares	13	990	1 014	1 240	1 382	1 605	1 493	1 322	1 089
Mombeltrán	14	1 333	1 699	1 694	2 298	2 216	2 035	1 577	1 239
Pedro Bernardo	17	3 165	3 131	3 022	3 196	3 136	2 842	2 291	1 847
Piedralaves	18	1 600	1 864	2 105	2 128	2 265	2 184	2 133	2 096
Poyales del Hoyo	19	1 501	1 476	1 508	1 479	1 678	1 553	1 214	581
San Esteban Valle	22	1 539	1 758	1 829	1 884	2 026	1 804	1 356	1 050
Santa Cruz Valle	23	617	732	913	972	991	1 013	880	619
Sotillo Adrada	25	1 602	1 929	2 509	2 913	3 104	2 966	2 896	3 030
Villarejo Valle	26	992	1 013	900	951	923	865	672	525
	Total	27 942	31 008	35 014	40 671	43 945	42 137	35 633	31 135

Table 1: Census size by village and Tiétar Valley total.

The change of population characteristics by five year periods is shown in table 2. Intra-village endogamy rates show little change before 1945, but the consanguineous marriages up to the 3x3 level (second cousins), began to change earlier. Alfa (mean inbreeding coefficient) reduction was preceded by a low percentage of consanguineous marriages in the 1935–39 period. Because of the sampling carried out as indicated in methods, percentages and coefficients in this table cannot be interpreted as reference values: sampled villages are subestimated (approximately 2–4 points). Because associations within five-year set of data are not affected by sampling, and since the purpose of this study was not to characterize population, but to relate some biodemographic variables to time and village size variation, correction for this bias was not applied here.

For comparison purposes, the populations geographically nearest the Tiétar Valley, for which there is available information, are at the south "La Jara" ("Media-Baja" and "Cacereña") studied by Calderón (1980) and the Tormes Valley belonging to the north Gredos slope. For this valley, Fuster *et al.* (1986) described rates similar to those presented in table 2 (fig. 2). No significant decrease in intra-village endogamy was detected here prior to 1960. Percentage of 4.33 to 7.17 consanguineous marriages found by Calderón (1980) is of the same degree of magnitude as shown in table 2. Although population evolution is practically identical to the one indicated for the Tiétar Valley, inbreeding coefficient decrease took place in the "Jara Cacereña" some 15–20 years later. It is unknown whether reasons other than cultural preferences could explain the longer persistence of weddings among relatives in this area.

Table 3 expresses village values which, as previously indicated, are not affected by sampling bias. The intra-village endogamy rate range is between 47% (village 3) and 88% (village 2). Relating this table to figure 1, an interesting correspondence appears among villages with the larger endogamy rates and location. In a decreasing order, high local endogamy corresponds to villages 2, 26, 22, 17, 13, 9, 7, 11 and 8, all arranged more or less following the Gredos slope at some distance from the Tiétar river axis. On the other hand, low local endogamy is a characteristic of villages coded as 3, 1, 12, 18 and 14, situated along the main road of the valley. Village 14 can be qualified as central population of the five villages arranged perpendicularly to the mentioned valley, on the road leading to the north Gredos slope ("El Pico" mountain pass). Village 23 shows a rather reduced mean endogamy rate (62.57%), lower than expected considering its location and altitude (725 m). The straight distance to village 14 (1 km) may have been short enough to prevent elevated intra-village marriages (fig. 3). Consanguineous marriages, expressed either as percentages or as inbreeding coefficients, show a fairly good correspondence to the endogamy pattern. Village 17 presents a low number of consanguineous marriages. Some underestimation may be possible for this parish as well as for 1, 11 and 14 because data are missing for the turn of the century, a period characterized in this and other Spanish areas by high consanguinity. Thus, the village values shown in table 3 permit the inference that geography may have played a role in determining endogamy and inbreeding levels, but there may exist an association between geographical location and village size.

In a population experiencing random mating, the expected village endogamy is a function of village size and total population; but commonly observed frequencies will exceed the expected, for instance as reported by Allen and Redekop (1987). Although the relation of effective population size and frequency of consanguineous marriages has been well established (Workman and Jorde, 1980; Mielke, 1980), the relation of population size and endogamy has not been completely demonstrated (McCullough, 1989).

In order to assess the above, for each Tiétar village and considering the 1875–1975 period, multiple correlation analysis (table 4) results in significant association among the endogamy rate as dependent variable and the year and census as independent, for all villages except for those coded as 3, 7, 14, 26. From the analysis of the correlation matrix among variables, it is deduced that associations are not uniform; therefore, only significant correlations will be commented on. At local level the endogamy rate correlates mainly to year, but villages 1, 4, 12, 14, 17 and 26 do not. In all cases correlation was negative. Respecting census, only villages 3, 4, 9, 13, 17, 18, 19 and 25 show significant correlations; association is negative for villages 3, 9, 13, 18 and 25 and positive for 4, 17 and 19. Regarding the first group of villages, a part of the

Period	Total Marr.	Endogamy Rate	Total Cons.	Proportion 2x2/3x3	Percent	Alfa3 UP 3x3
1875	623	77.53	108	80.77	17.34	10.78
1880	613	77.00	113	95.00	18.43	10.45
1885	530	73.21	96	92.00	18.11	10.91
1890	565	69.03	95	80.00	16.81	13.27
1895	550	75.64	102	90.91	18.55	13.07
1900	694	75.79	122	90.91	17.58	11.26
1905	562	75.62	94	76.92	16.73	17.79
1910	582	75.77	99	85.71	17.01	15.57
1915	592	75.51	91	87.10	15.37	13.99
1920	644	72.36	35	75.00	5.43	17.47
1925	598	70.23	47	71.11	7.86	24.04
1930	592	79.39	44	82.93	7.43	19.00
1935	333	68.77	14	64.29	4.20	13.61
1940	708	74.44	47	86.05	6.64	16.55
1945	660	68.64	30	92.31	4.55	9.47
1950	803	68.49	28	88.89	3.49	8.17
1955	867	66.44	20	84.21	2.31	6.13
1960	768	61.85	19	94.74	2.47	4.48
1965	791	48.29	19	93.75	2.40	4.94
1970	812	44.09	14	69.23	1.72	5.20

Table 2: Variable values per five year periods. All villages (Alpha3 x 10,000).

Code	Total Marr.	Endogamy Rate	Total Cons.	Proportion 2x2/3x3	Percent	Alfa3 UP 3x3
1	457	50.55	6	16.67	1.31	7.18
2	798	87.59	87	93.18	10.90	12.73
3	1060	46.79	25	100.00	2.36	2.51
4	932	64.38	32	65.22	3.43	8.21
5	889	70.53	52	100.00	5.85	3.34
7	667	74.96	114	80.43	17.09	20.38
8	811	72.63	159	86.30	19.61	25.62
9	808	76.86	183	83.75	22.65	29.20
11	328	73.48	47	90.48	14.33	12.86
12	725	59.03	19	55.56	2.62	6.68
13	471	77.71	34	86.67	7.22	9.62
14	371	60.92	11	60.00	2.96	4.63
17	574	79.27	22	92.31	3.83	4.90
18	925	60.76	54	89.47	5.84	4.56
19	684	70.18	46	59.09	6.73	15.31
22	577	82.84	51	75.00	8.84	10.56
23	545	62.57	96	100.00	17.61	16.06
25	588	66.67	38	68.75	6.46	10.89
26	677	83.01	161	89.47	23.78	18.23
Total	12887		1237			

Table 3: Variable values per village, 1875–1975 (Codes are the same as in table 1; Alfa3 x 10,000).

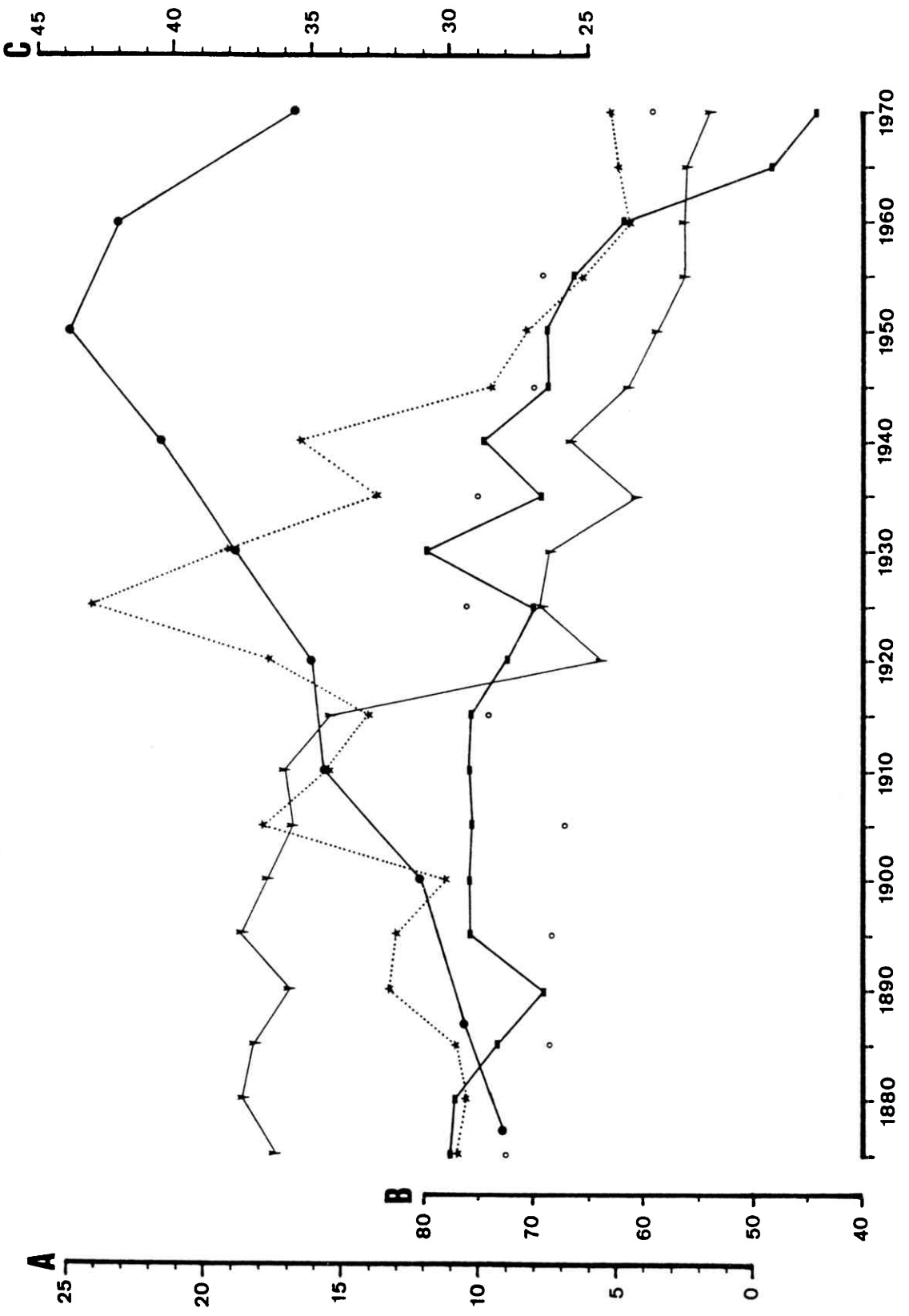

Figure 2: Tiétar Valley characteristics temporal variation (A = *alfa3 x 10,000; ▾percentage of consanguineous marriages. B = ▪percentage of intra-village endogamy; ° Tormes Valley intra-village endogamy. C = • total population size x 10^{-3}).

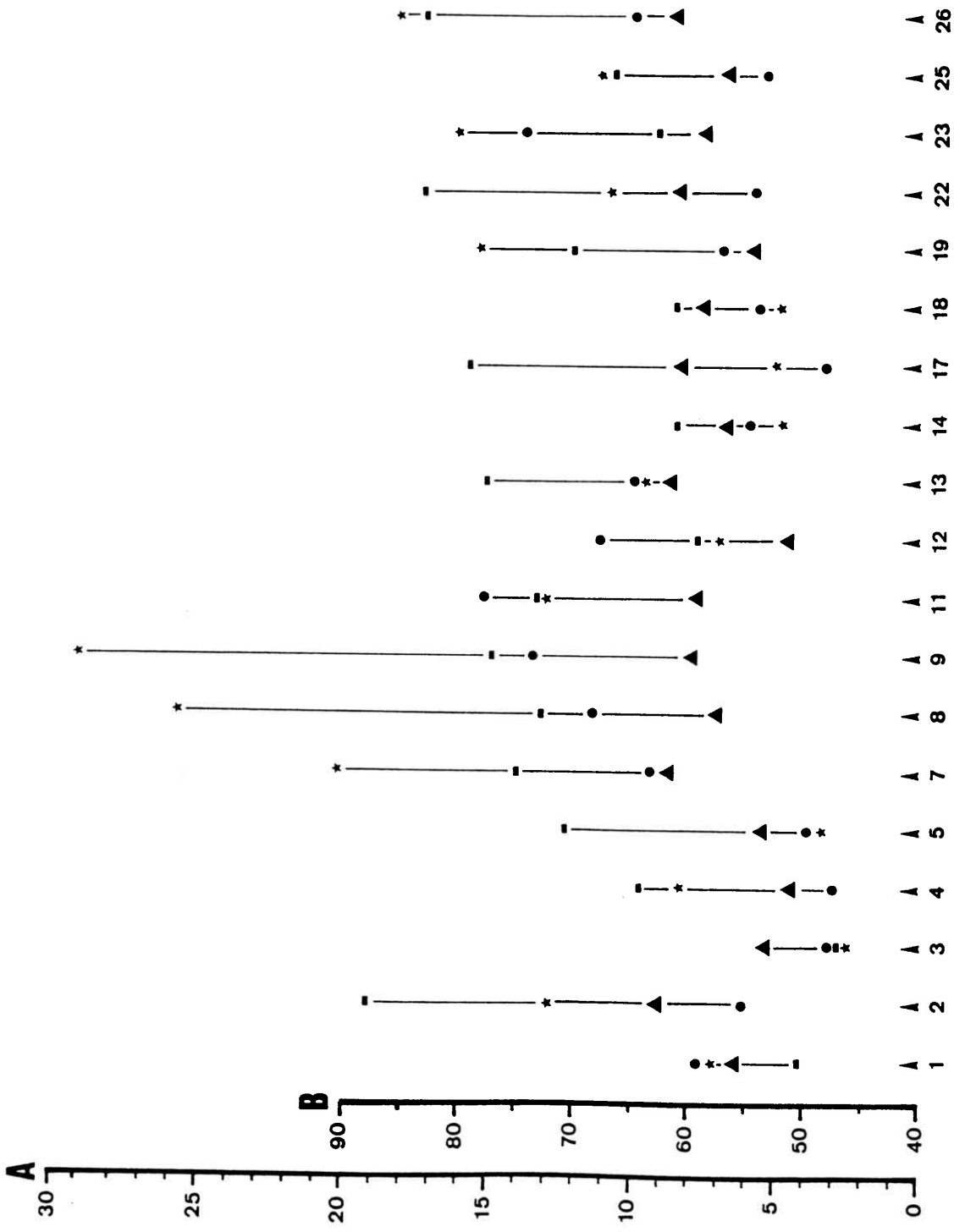

Figure 3: Tiétar Valley characteristics by village. (A = *alfa3 x 10,000; •10,000/year 1900 census; ▲ altitude x 10^{-2} metres. B = ■ percentage of average intra-village endogamy).

population increments could be attributed to immigration attracted by activities related to tourism, such as building trade; a fraction of the population growth could therefore be due to non-autochtonous individuals. On the other hand, correlation is positive in villages that were already large during the past century. Thus, at village level no general tendency can be confirmed.

In Leslie's (1985) opinion, a regular progression of endogamy suggests that community size is important in the ability to secure a mate, forcing some individuals in the smaller communities outward for marriage despite a cultural preference for endogamy. However, the association is not always regular. For example, Relethford (1986), based on Massachusetts data demonstrates that migration is highest for small and large populations, and lowest for intermediate populations. These results support the expected negative relationship between migration and population size, but only for sizes less than a certain value. In small populations the lack of suitable potential mates may lead to an increase in migration into the population. As population increases, the mobility decreases. After the population reaches a certain size, migration increases again, probably reflecting the economic pull of larger populations. This suggests that the larger a population is, the more attraction that population will have. Of course, this attraction is a reflection not only of population size, but better economic opportunities, transportation facilities, and so on.

The deviation corresponding to larger towns is discussed by McCullough (1989) regarding a Mexican community. The exceptions to a highly significant correlation between the percent of endogamy and the population size are villages that serve as administrative, religious and commercial centers, linking these localities to the outside world.

Respecting inbreeding, despite migration intensity, an increase in population size will result in a decrease in inbreeding under certain conditions, although a number of generations may be required for a substantial inbreeding change to occur. Likewise, a reduction in population size will result in an increase in inbreeding (Relethford, 1985).

In the Tiétar Valley individual villages, when the inbreeding coefficient is considered as dependent variable and the census and the endogamy rate as independent (table 4), multiple correlations are quite different from those obtained for the endogamy rate, as only villages 9 and 23 surpass the level of significance. Again, when significant, correlation between inbreeding and year and census is negative, while as expected, it is positive with respect to the percentage of consanguineous marriages. Brennan and Relethford (1983) for Sanday, Orkney Islands, attribute the temporal decrease in inbreeding to both rapidly decreasing total population size, and increasing consanguinity avoidance. Secular changes associated with modernization, such as decreased rural population size and increased spatial mobility, may reduce the chances of marriages among kin, since it becomes increasingly necessary for individuals to seek mates over wider geographic areas.

For the Tiétar Valley as a whole, stepwise regression analysis results are presented in table 5. When the endogamy rate is defined as a dependent variable of time and population size, the 1875-1975 complete set of five year blocks confirm a significant statistical association of the three variables (multiple R= 0.414). Increase in R^2 has to be mainly attributed to the temporal factor rather than to census variation, which perhaps is a reflection of changes in the mobility pattern introduced by improvement in transport facilities as well as by emigration after 1950–1960.

Somewhat similar are the results for consanguinity as dependent variable. For the 1875–1975 period, up to the third degree, inbreeding coefficients are significantly associated with the endogamy rates and with the number of inhabitants, but the increment of R^2 is more than twice for the former variable (table 5). For shorter time periods (25 year intervals) and no later than 1950, association appears only for census size. The endogamy rate is not accepted in the stepwise regression probably due to the stability of these rates within each quarter of a century. Post-1950 correlation coeficients are not sufficient to prove significant association for any of the considered variables. Although not strictly so, the above can be compared with the results obtained by Calderón (1983), who indicates a negative relationship between the average village size and the mean value of the coefficient of inbreeding in "La Jara" ($R = -0.48$; $P < 0.02$). However, Relethford (1985), fails to find a significant correlation between population size (taken as Ne) and the inverse of kinship calculated from surnames, regarding nine small populations of west Ireland.

Dependent	Endogamy rate			Alfa3		
Independent	Year, Census			Census, Endogamy		
Village Code	R	R^2	P	R	R^2	P
1	0.831	0.691	0.000	0.627	0.393	0.081
2	0.745	0.555	0.001	0.458	0.210	0.274
3	0.503	0.253	0.084	0.476	0.226	0.238
4	0.672	0.452	0.006	0.233	0.054	0.819
5	0.814	0.662	0.000	0.384	0.148	0.451
7	0.501	0.251	0.099	0.189	0.036	0.905
8	0.740	0.548	0.001	0.576	0.332	0.084
9	0.713	0.509	0.002	0.700	0.490	0.011
11	0.873	0.762	0.003	0.614	0.377	0.317
12	0.601	0.362	0.022	0.300	0.090	0.669
13	0.746	0.556	0.001	0.313	0.098	0.638
14	0.135	0.018	0.878	0.433	0.187	0.424
17	0.843	0.711	0.000	0.429	0.184	0.432
18	0.800	0.641	0.000	0.428	0.183	0.343
19	0.848	0.719	0.000	0.380	0.144	0.464
22	0.766	0.586	0.000	0.470	0.221	0.249
23	0.748	0.559	0.000	0.763	0.582	0.002
25	0.813	0.661	0.000	0.503	0.253	0.186
26	0.398	0.158	0.231	0.597	0.356	0.064

Table 4: Correlation coefficients, R^2 coefficients and significance probabilities by village (Codes are the same as in table 1).

Dependent	Endogamy rate				
Independent	Census, Year				
Period	Step	Variable	R	R^2	F
1875–1895	1				
1900–1920	1	Census	0.405	0.164	16.68
1925–1945	1	Census	0.450	0.202	22.86
1950–1970	1	Year	0.567	0.321	44.06
1875–1970	1	Year	0.370	0.137	57.10
	2	Census	0.414	0.171	36.94

Dependent	Alfa3				
Independent	Census, Endogamy rate				
Period	Step	Variable	R	R^2	F
1875–1895	1	Census	0.325	0.106	10.04
1900–1920	1	Census	0.375	0.141	13.92
1925–1945	1	Census	0.321	0.103	10.31
1950–1970	1				
1875–1970	1	Endog.	0.276	0.076	29.63
	2	Census	0.333	0.111	13.9

Table 5: Multiple stepwise regression analysis.

In conclusion, for the 1875–1975 period, the Tiétar Valley population as a whole, without regard to particular localities, shows endogamy rate variation which, as expected, is concordant with time and village size: the rate decreases as population increases or as the year progresses. Also inbreeding coefficients are positively dependent on the endogamy rate and negatively on the population census. For shorter time periods (25 years) association takes place mainly with respect to locality size. At individual village level, concordance is good for the endogamy rate, mainly regarding the temporal factor, while for census the sign of the association is variable. Results are not so clear with respect to inbreeding. Concerning geographical location (altitude and distance to the valley axis) results indicate that limitations to movement due to both factors may partially explain the endogamy and consanguinity variation. However, the present results cannot be considered as definitive until the totality of Gredos populations is included in the analysis.

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