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Abstract

In the twentieth century Spain maintained some of the highest rates of consanguineous marriage in Europe. In many regions these rates were still high in the 1950s and 1960s, but then decreased rapidly, and by the 1970s a generalized transformation in mating patterns was underway. In the following decades the marriage of persons closely related by birth became rare. Consanguinity and inbreeding have been much studied in Spain, but almost exclusively in the central and northern regions of the country. This is the first study of a whole large diocese in the southern region of Andalusia. This paper is based on the analysis of 15,440 records of consanguineous unions registered between 1900 and 1979 in the Archbishopric of Granada in Andalusia. In this period, the rate of consanguinity up to second cousins was 5.51%, and the mean coefficient of inbreeding, α, was 2.04×10^{-3}. There is a high range of variability within the research area. Thus, the rate of consanguinity was more than three times higher in rural areas (6.74%; $\alpha = 2.44 \times 10^{-3}$) than in the capital city (2.03%; $\alpha = 0.93 \times 10^{-3}$). There was a high frequency of unions between first cousins and first cousins once removed. These amounted to 35.3% and 13% of all consanguineous marriages, respectively, and contributed to 70% of α values. Consanguinity here has been strongly related to local endogamy. Thus 76% of all consanguineous couples were born in the same locality, and 89% resided in the same locality at marriage. By the end of the 1960s premarital migration increased and local endogamy started to decrease. On the other hand, inbreeding is inversely related to spatial endogamy. The more inbred couples such as uncles-nieces (C12) or first cousins (C22) show significantly higher exogamy rates and than second cousins (C33) and third cousins (C44), and higher rates of premarital migration. Neither males nor females in intra-family unions seem to be significantly younger than those in non-consanguineous unions. Considering their temporal evolution, consanguinity rates increased in the first third of the century, reaching a maximum in the late 1920s, when over 7.4% of all marriages were

consanguineous (8.3% for the rural areas), and the resulting α value was the highest of the century ($\alpha = 2.71 \times 10^{-3}$ for the whole diocese; $\alpha = 3.00 \times 10^{-3}$ for the rural areas). Rates of inbreeding remained high until the 1950s and decreased thereafter in a period of accelerated emigration to cities, urbanization, industrialization and social modernization. Overall, levels of inbreeding are similar and sometimes larger than those found in dioceses in the Northwest of Spain, although marriages between uncle and niece were less common. Some of the counties in the diocese had very high consanguinity levels, not only the isolated area of La Alpujarra, previously studied, but also other ecological and historical micro-regions (*comarcas*). These results indicate that the widely accepted North-South divisions of the Iberian Peninsula in terms of consanguinity and inbreeding patterns require considerable re-evaluation.

The proportion and the structure of consanguineous marriages are important elements in the social, demographic and genetic configuration of human populations. Mating with a close relative by birth has been common throughout human history, and remains preferential in present-day populations across large areas of the world, most significantly in the Middle East, South and Central Asia, sub-Saharan and North Africa (Bittles 2012; Bener and Mohammad 2017). Beyond their sociocultural effects, changes in the frequency of these unions may contribute to changes in genotype frequencies and may have genetic–medical consequences. Particularly, the mating of close kin leads to increased genetic homogeneity of the groups involved. The roots of this genetic homogeneity "can be traced to the fact that the inbred individual may carry a double dose of a gene that was present in a single dose in the common ancestor" (Cavalli-Sforza and Bodmer 1971: 341–342). Hence, the genetic effects of consanguinity may result in a rise in average homozygosis over those levels expected by random mating (Cavalli-Sforza *et al.* 2004).

In the twentieth century, Spain maintained some of the highest rates of consanguineous marriage in Europe. These rates began to fall later than in other European countries (Calderón *et al.* 1993, 2009). The fall, however, was very rapid, and by the early 1970s, a generalized transformation in mating patterns was underway. In the following decades, inbreeding became a rare phenomenon (Valls 1982; Pinto Cisternas *et al.* 1979; McCullough and O'Rourke 1986; Varela *et al.* 1997; Fuster and Colantonio 2003, 2004).

The existence of detailed Catholic Church records allowed for the study of the magnitude, structure and temporal trends of consanguinity and inbreeding patterns across a wide set of populations and territories. In fact, inbreeding has been studied more extensively in Spain than in any other European country, excluding Italy (Calderón *et al.* 2009; Cavalli-Sforza *et al.* 2004). In their exhaustive review of published sources, Fuster and Colantonio found 106 scientific studies of consanguineous marriages in different regions of Spain

(2002). Most of them used data obtained from ecclesiastical records, and focused on isolated populations. There were also important recent studies of large dioceses that cover over 1.5 million marriages (see table 7). However, almost all that relevant research dealt with populations living in the center and north of the country, predominantly in rural areas within or around the large Central Meseta, and on the Cantabric coast.

In several predominantly Catholic countries of Europe such as Italy, France and Belgium, the frequency of consanguineous marriages also increased in the second half of the nineteenth century, reaching a maximum in the early decades of the twentieth century. This was followed by a quick decline in the years between the two world wars and thereafter. Thus, in the rural areas of France studied by Sutter and Tabah (1948), the frequency declined from 2.65% between 1926 and 1930 to 1.43% in the period from 1941 to 1945 (1948:624–627). In Belgium, Twiesselmann and his collaborators found a drop from the rate of 2.31% of all Catholic marriages (93% of all marriages in the country) between 1918 and 1919 to 1.31% between 1940 and 1944, and to 0.97 between 1955 and 1959 (Twiesselmann *et al.* 1962:248). In Italy, the monumental work of Moroni, who reviewed over half a million consanguineous marriages, also confirms the same trend of rising levels of consanguinity and inbreeding up to the First World War ($\alpha = 2.48 \times 10^{-3}$ in 1919), and a sustained decline thenceforth to the final documented year, 1961, when $\alpha = 0.76 \times 10^{-3}$ (Cavalli-Sforza *et al.* 2004: 211–213).

In Spain, levels of inbreeding also rose between 1880 and 1920 in parallel with the inception of the first demographic transition (Reher 1996; Reher and Iriso-Napal 1989). Thus, from 1915 to 1919, Pinto Cisternas and his collaborators found the highest rates of inbreeding for the century: 6.02% for the whole country, $\alpha = 1.91 \times 10^{-3}$. These rates did not fall in the following decades and remained high well into the 1940s and 1950s. Thus, from 1940 to 1943, the consanguinity rate up to second cousins was 4.7%, and $\alpha = 1.42 \times 10^{-3}$

(1979: 63). Rates fell rapidly in the 1960s and thereafter even in the most inbred areas (Fuster and Colantonio 2003).

Spain is a highly heterogeneous country, both in the biodiversity of its regions and in the cultural-historical variation of the respective communities. In the last two centuries there have been important regional differences concerning economic development, urbanization, migration and the process of demographic transition and the "achievement of health" (Pérez Moreda *et al.* 2015). These differences affected marriage patterns and family structures, and hence consanguinity levels and trends. Some important studies have tried to analyze patterns concerning the whole of Spain (Fuster and Colantonio, 2002, 2003, 2004; Calderón *et al.* 2009). They tend to restate the "Spanish pattern" of inbreeding, which assumes that consanguineous marriages have been more common in the center and north of the country, with maximums in isolated areas on the fringes of the Central Meseta, such as the mountainous county of La Cabrera (Blanco Villegas *et al.* 2004), and the diocese of Sigüenza–Guadalajara (Calderón *et al.* 1998). Inbreeding patterns in the south and east the country remain largely unexplored, with the exception of the studies of the mountainous region of the Alpujarras (Luna Gómez 1984; Luna Gómez *et al.* 1998, 2007), and the recent analysis of inbreeding and its geographic and demographic determinants in 49 parishes located in the Southeastern periphery of the Central Meseta (Calderón *et al.* 2018).

The present study follows this line of work in exploring areas of the South of the Iberian Peninsula. This is the first study of consanguinity and inbreeding patterns in a large diocese of the most populated region of Spain, Andalusia.

Objectives. This paper tries to establish the intensity, structure and temporal evolution of consanguinity and inbreeding in the diocese of Granada from 1900 to 1979. The paper also tries to establish the internal variation in the area studied, particularly between urban and

rural areas, and the level of local endogamy of consanguineous marriages. It also compares age at first marriage for men and women in consanguineous unions to those of the overall population. Finally, the paper situates the results from this area in the southeast of Spain within the most important studies from other Spanish regions and dioceses, questioning the assumptions of a north–south correlation or a Cantabrian exception concerning consanguinity and inbreeding in Spain.

Materials and Methods

Our study uses data from Catholic Church records found in the archives of the Archbishopric of Granada. The records concern the applications for ecclesiastical dispensation made by partners who were relatives by birth and wanted to marry by the Catholic rite. We have developed a yearly series covering the period between 1900 and 1979.

The province of Granada is divided into two dioceses: the Archdiocese of Granada and the Diocese of Guadix (see Figure 1). Here, the limits of the diocesan territory do not coincide with the administrative and political boundaries. This has generated problems concerning the values of some demographic variables that are known at the provincial level but not by locality or county. In addition, until the mid-1950s, the Archdiocese of Granada also included 39 parishes from the neighboring province of Almeria. We do not consider the data from those parishes here. This paper will focus on the 121 municipalities of the Archbishopric of Granada that belong to the province of Granada. These extend across 7,000 km^2 and include a total of 268 parishes. The population studied ranged from about 370,000 in 1900 to around 630,000 by 1980[1]. The study area is centered on the city of Granada, famous

for its historical and cultural heritage. This city was the capital of the last Muslim kingdom in the Iberian Peninsula to be integrated into the Spanish Christian monarchy in 1492.

Data Sources and Materials. Data on consanguineous marriages were gathered from Catholic ecclesiastical dispensation records in the archives of the Diocese of Granada. These archives are large and contain numerous data of interest for the study of marriage institutions. However, in the twentieth century, several unfortunate events destroyed or dispersed some of its records, and those of the affiliated parishes. For example, during the Civil War (1936–1939) various parish registers were burnt. A few civil registers were also razed. Thus, it is not possible to study those parish records directly. Moreover, the Archdiocese was divided by the front line, and some municipalities remained under Republican control during the war. Thus communication between the bishopric and the corresponding parishes was discontinued. Hence, the data on marriages from 1936 to 1939 is incomplete. In addition, the Bishop's Palace, where the oldest archives were kept, suffered a devastating fire in 1982. Some of the records were destroyed, and a large part were mixed up. This seems to have affected some marriage files and some books of summaries that we could not locate. These events have introduced some limitations to the final data sample. The data is complete for 69 of the 80 years studied, but it has some gaps in the data available for the other years, particularly for the years 1928 and 1930. Hence, these two years, as well as those of the Civil War (1936–1939), are left out of the final analysis.

The dispersion and destruction of documents also impeded us to count the total number of marriages in each parish for the whole period studied. Moreover, we were also unable to gather data for the respective municipalities concerning the yearly number of marriages. This data does not seem to exist in the available public records. Hence, the total

number of marriages in each locality was estimated from the population size and the total number of marriages in the province (see below).

We also collected data from the Diocese of Guadix (see Map 1). In Guadix, however, most diocesan records were destroyed during the Civil War. In subsequent decades, there were more losses of data concerning dispensations for consanguineous marriages. We only found complete records from the 1940s and 1950s, and then incomplete records divided by locality and sent by individual parishes. As there is no comparable data for the study period, the Diocese of Guadix is not included in this paper.

Data from Catholic dispensations is usually detailed, valid and reliable. In Roman Catholic law, consanguineous marriages are carefully described, and as Cavalli-Sforza, Moroni and Zei explained, this legislation "prescribes with great precision which marriages are completely forbidden, which ones are permitted under dispensation from a higher religious authority, and which do not require dispensation. Priests receive formal teaching about these rules in seminaries in which they also learn to evaluate accurately the degree of consanguinity of candidates for marriage" (2004: 5). Nevertheless, the assumption that the genealogical data in ecclesiastical records provides exact genetic information must be considered hypothetical.

Dispensations. We processed over 22,000 applications concerning marriage dispensations from the years 1894 to 2002. Data is more complete and exhaustive in the twentieth century. Excluding repeated applications, dispensations concerning affinal relationships, and those corresponding to the parishes located in the province of Almeria, our analysis focused on 17,056 dispensations for consanguinity from 1894 to 2002. Of these, 15,440 corresponded to the period between 1900 and 1979 (Núñez-Negrillo 2015).

We end our analysis in 1979 for several reasons. First, from 1983 onwards, ecclesiastical records do not include marriages beyond first cousins, as only first cousin unions or closer were subject to diocesan approval by the Roman Catholic Church. Moreover, before the democratic Spanish Constitution promulgated in 1978, almost all marriages followed Catholic prescriptions, but this changed from then on. Moreover, Spain has undergone a growing trend to establish sexual unions without formal marriage, and the level of non-marital childbearing has increased continuously since the 1980s (Alberdi 1999; Jurado 2005; Domínguez-Folgueras and Castro-Martín 2013). Most other studies of Spanish dioceses also stop by 1980 (see table 5).

From each dispensation, we processed the following information: place and date of dispensation, age of both partners; parish and place of birth of both partners; parish and place of residence of both partners at the time of the application; marital status; known kinship link or links between the partners; and cause or causes alleged for the dispensation. Our records were kept anonymous throughout all the processing and analyzing of data.

Types of Consanguineous Marriages. According to the number and types of relationships described in each case, we distinguished between simple consanguineous marriages (SCMs), and multiple consanguineous marriages (MCMs), where the couple have more than two sets of common ancestors or are related to the same ancestors by two or more different pathways (Calderón *et al.* 1998; 2018). In almost all simple and multiple unions, we found records of six different relationships: uncle–niece or aunt–nephew (C12), first cousins (C22), first cousins once-removed (C23), second cousins (C33), second cousins once-removed (C34) and third cousins (C44). Before 1918, there were also two cases of first cousins twice removed (C24) and three unions between an uncle and second niece (C13), these occurring in the Almeria's part of the Diocese. In 1918, the Vatican modified the norm

regulating the dispensations for consanguineous marriages. Thereafter, only marriages between up to and including second cousins required dispensation. Data on marriages of the C34 and C44 type disappeared from the archives. Hence, we have not included these types of unions in our analysis of inbreeding, although we counted them in the calculations of local endogamy.

Establishing the Total Number of Marriages. As mentioned before we could not establish the exact number of yearly marriages celebrated in each parish or municipality during the period considered. Thus we had to estimate the total number of marriages that occurred in the three main areas studied: the whole archbishopric, the city of Granada, and the rest of the diocese. For these estimations we used the data on the total number of marriages celebrated in the province, and in the city of Granada as they appeared in the historical base of INE ("Instituto Nacional de Estadística"), particularly the yearbooks (*Anuarios)* and the vital statistics (*Movimiento Natural de la Población*) annual reports (see www.ine.es/inebaseweb/hist.do). Then we estimated the yearly population of all the municipalities of the Archbishopric using the data published by IECA ("Instituto de Estadística y Cartografía de Andalucía"). This source offered data about the population of each Andalusian municipality in all the historical censuses since 1787, and for ten-years period from 1900 to 1981. Moreover, this source adapted the census data to the administrative and territorial changes experienced by Andalusian municipalities in the study period[2]. After we estimated the yearly population of all the localities of the diocese, we attributed a proportional number of yearly marriages to the diocese in the same proportion of the weight of its population to the total provincial population. Then we calculated the

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[1] See: "Población de los municipios de la provincia de Granada según los censos de 1787 a 2001", https://www.juntadeandalucia.es/institutodeestadisticaycartografia/ehpa/ehpaTablas.htm

differences between the marriages celebrated in the City of Granada and those in the whole diocese to study the "rural side" of the Archbishopric. Therefore we assumed that nuptiality rates were identical in both dioceses of the province overall. When data on the local number of marriages, particularly for the period after 1975, was available this assumption proved as accurate. Our results, however, should be read in the light of these assumptions.

Variables and Data Analysis. The coefficient of inbreeding, *F*, measures the probability that the two alleles at a locus in an individual are identical by descent from a common forebear, that is, it defines the likelihood that an individual would be homozygous (more properly, autozygous) for an ancestral gen inherited from both parents. The inbreeding coefficient of the offspring of an uncle-niece couple is 1/8, that of first cousins is 1/16, that of first cousins once removed is 1/32, and that of second cousins is 1/64. With each further degree of consanguinity, the chance is halved (Bittles 2012; Hartl and Clark 2007; Fisher 1965).

The mean inbreeding coefficient of a population, α, results from the average *F* values of all its members. We calculated it by applying the formula resulting from Wright's equation (1922): $F = \Sigma\, pi\, Fi$ where Σ is the sum of the proportion of couples (*pi*) with each type of consanguineous relationship "i", and (*Fi*) the corresponding inbreeding coefficient (Bittles 2012; Calderón *et al*. 2018). This significant parameter is commonly used for comparing populations, as it shows the probability of homozygosity by inbreeding in an individual taken at random from the population.

Moreover, in order to study the proportion of consanguineous marriages that were locally or territorially endogamous we established the municipality and the county in which the parishes of birth and residence were located. Then we calculated the percentages of local endogamy both for birth and for residence at the time of marriage both for the municipality

and the county. Then we also studied the processes of premarital migration when place of birth and place of residence did not coincide (Calderón *et al.* 2018). Information concerning the four relevant variables is very complete from 1900 to 1965. Thenceforth many cases lack some information on one or more of these four variables, particularly in the 1970s. The parish affiliation of the bride, however, was recorded in 99,7% of all cases.

Results

In the period from 1900 to 1979, our survey found 15,440 unions between persons related as second cousins or closer. Considering these unions, the estimated consanguinity rate was 5.51%, and the resulting mean coefficient of inbreeding, α, was 2.044×10^{-3}. Table 1 shows the trend followed by each of the four main types of consanguineous marriages, as well as the total rates of consanguinity and the mean inbreeding coefficients.

Examining the relationships between partners, we found eight types of single consanguineous marriages (SCM), and 29 types of multiple consanguineous marriages (MCMs). Four of the single types are found throughout the whole period studied. These were: C12 (uncle–niece; aunt–nephew), C22 (first cousins), C23 (first cousins once-removed) and C33 (second cousins).

Marriages between uncles and nieces, and between aunts and nephews (C12) are the closest unions recorded in the dispensations. There were 78 unions of this type in the sample studied. They account for 0.028% of the total number of unions estimated, and 0.51% of all consanguineous ones, which is a small proportion indeed. These unions contributed 1.7% to the total α value. There was, however, a fall in their incidence in more recent times. Almost 80% of them occurred before 1945. In Spain, the mating of uncles and nieces, or of aunts and nephews is commonly seen with ambivalence or open disapproval. The relationship seems too close for sex and reproduction, and the generational and age difference is also seen as

inadequate (see Gamella *et al.* 2010; Núñez-Negrillo 2015). However, in the dispensation procedures, these cases were not treated differently, and they were considered valid by civil and canonic laws. Moreover, in some periods they were relatively common in some areas of Northern Spain (see Calderón *et al.* 1993; Varela *et al.* 2003; Varela *et al.* 2001; Varela *et al.* 2000; Pinto Cisternas *et al.* 1979).

There are also 5,456 unions among first cousins, accounting for 1.95% of all the estimated marriages (table 1). They contributed 59.5% to the total α value. Hence, the frequency of marriages between first cousins is a key factor in the aggregated genetic effects of inbreeding. The historical trend of this type of union differs from that of unions between second cousins (C33), with the highest rate occurring in the immediate post-war period, from 1940 to 1945 (2.8%).

There were 2,003 unions among cousins once-removed (type C23), accounting for 0.72% of all marriages estimated in the studied period. These unions contributed 11% to the average inbreeding coefficient. They were especially frequent in the period from 1905 to 1930. In this type of union, a person marries the child of a cousin. As with uncle–niece and aunt–nephew marriages, these asymmetrical unions are more common in periods of high fertility, long reproductive careers and overlapping generations.

The most common type of consanguineous union was between second cousins (C33 type), in which spouses would share two great-grandparents. We found 7,137 cases of this type, accounting for 2.55% of all estimated marriages. These represent 46.2% of all consanguineous unions, although they contribute 19.5% to the total α value, about a third of the contribution of unions between first cousins.

We also found 765 multiple consanguineous marriages (MCMs), accounting for 0.27% of all marriages, and for 5% of all consanguineous marriages. These unions contributed 8.4% to the total α value. About 95% of all recorded MCMs were double

consanguineous unions, mostly of three types. The most common were double second cousins (C33 + C33). We found 309 cases of this type, accounting for around 40.4% of all MCMs. Secondly, we found 249 unions that were both first cousins and second cousins (C22 + C33) Thirdly, there are 63 double first cousins (C22 + C22), resulting in a coefficient of inbreeding as high as that of nephew with aunt ($F = 125 \times 10^{-3}$). Triple consanguineous unions accounted for 4% of all MCMs. Over one percent of MCMs were quadruple consanguineous marriages, whereby partners shared four independent kin ties. In figures 2 and 3 we show the simplified pedigrees of two of these cases of quadruple consanguinity. In the first one, the couple, who married in 1924, were cousins once-removed and triple second cousins, with a total F value of 78.125 x 10^{-3}. The second example concerned a Gitano or *Calé* couple that got married in church by 1961[3]. They were double first cousins and double second cousins. More precisely, the bride (2) was FBD (father brother's daughter), and MZD (mother sister's daughter) of the groom. Both their parents were double cousins as well, as two brothers had married two sisters. Their inbreeding coefficient would be F= 156.25 x 10^{-3}, one of the highest ever recorded in the diocese.

The Historical Evolution of Consanguineous Marriages. The temporal evolution of consanguineous marriages can be observed in Table 1. The highest rates of inbreeding are found in the second decade of the century, between 1925 and 1929, when 7.4% of all marriages were among close relatives. These rates declined slightly in the Republican period (1931 to 1936), but the Civil War drastically altered mating patterns and trends. The military front cut the province and the diocese of Granada (the object of the present study) in two, and communication and travel between both sides was severely restricted. Hence, many marriage

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[3] Consanguinity rates have been high among the Gitano or Spanish Romani minority in this region (Martín and Gamella 2005; Gamella and Martín 2007). Gitano marriages appear in dispensations, albeit irregularly. In some cases, the dispensation records include references to the minority ethnic identity of the spouses.

plans were postponed or abandoned. Besides, most able males of marriageable age were conscripted and sent away. Many of the survivors spent several years in military units or, if they were on the losing side, in jails, labor battalions or in exile. Moreover, during the war, many marriages on the Republican side did not follow the Catholic rites. In sum, these years broke the historical pattern of inbreeding and of ecclesiastical recording and are not included in our calculations.

In the immediate post-war years, from 1940 to 1944, the rate of consanguinity increased again to levels comparable to those of 1935. The α value reached a high level ($\alpha = 2.603 \times 10^{-3}$), as the proportion of marriages between first cousins increased to their highest level on the records (2.77% of all marriages). Some families left the cities for the countryside, with an apparent return to the protection of rural family networks in the terrible years of hunger, need, and reconstruction of the post-war period. Between 1945 and 1949, we find high levels resembling those found in the early years of the century, with 5.8% of marriages being consanguineous and $\alpha = 2.18 \times 10^{-3}$.

In the following two decades, from 1950 to 1969, there was a gradual decline of inbreeding in the whole region. Nevertheless, it was not until the early 1970s that these rates dropped below 4%. In Spain, the period from 1960 to 1975 was a time of profound economic, cultural and political transformation. It involved intense and rapid economic development, and a rural exodus to urban and industrial areas of Spain and other Western European countries. The isolated rural areas of Andalusia were slowly breaking their restricted marriage markets and changing their mating customs.

After 1978, with the legal changes brought about by the new democratic Constitution, an increasing number of couples contracted marriage by civil law. Thus, the Catholic ecclesiastical records increasingly lost their validity and coverage. In subsequent decades, consanguineous marriages became rare and were increasingly perceived as backward and

outdated. This was another sign of the "explosive pace of change" experienced by marriage patterns in country that was a "newcomer" to high divorce rates and out-of-wedlock births (Rutigliano and Esping-Andersen, 2018: 369).

The Structure of Consanguinity. The main data on the structure of consanguinity is shown in Table 2. Overall, the C22/C33 or "preference" ratio was 0.76, three times the level expected by conditions of panmixia or random mating. However, as Fuster and Colantonio pointed out in their meta-analysis, there are limitations in the use of this ratio when considering long and different periods (2003:712). In our case, as can be seen in Table 2 and Figure 1, this rate varied considerably throughout the 20th century. In the years of maximum inbreeding, from 1915 to 1929, this ratio remained stable around a value of 0.7. It rose by over 20% in the post-war years, reaching levels around 0.9. In subsequent years, the C22/C33 ratio decreased slowly, remaining close to the overall mean value, 0.76, for the rest of the study period. Hence, with the exception of the beginning of the twentieth century, the highest values of this ratio were found in the immediate post-war period, when marriages between first cousins increased by about 10%, accounting for about 40% of all consanguineous marriages. The increase in this type of union contributed to higher α values, even if the total rate of consanguinity was decreasing. The C22/C33 ratio decreased in the following decades, but it remained higher than average during the early 1960s. Therefore, the maximum of the *preferability* ratio was not found in Granada in the period of maximum inbreeding, as Fuster and Colantonio (2003: 712–714) established for most areas of Spain, but in the terrible postwar decade.

Rural–urban Differences: A Double Pattern of Inbreeding. There are considerable differences between the city of Granada and the rest of the diocese, particularly these areas

where population lived in smaller localities and worked mostly in agricultural activities during most of the period studied (see table 3). We also found considerable differences among the different counties or micro-regions (known as *comarcas*) that shared a common ecology and history (see Núñez-Negrillo 2015). Due to space limitations, we will not develop this issue here.

Overall, 26% of all estimated diocesan marriages were held in the city. Of these, about 2% were consanguineous. The resulting α value was 0.93×10^{-3}. In the rest of the province, where 74% of all marriages were held, the total consanguinity rate was 6.74 and the α value was 2.44×10^{-3}. Hence, inbreeding was 3.3 times more common in the countryside, and the average inbreeding coefficient was 2.6 times larger.

In the period of the highest prevalence of inbreeding, from 1925 to 1929, 8.3% of all marriages held in rural areas were consanguineous; in urban areas, this figure was about 3,3%. In the countryside, the highest point was reached in the early 1920s, and it remained over 5% until the 1970s when the downtrend accelerated. In the city, the decline started in the 1950s, dropping under 2% by the end of the decade, and continuing to decrease gradually afterward.

The structure of inbreeding was also different. Marriages between first cousins were more common in the countryside than in the city (2.3% and 1%, respectively). But their relative weight was lower, as they accounted for 33.8% of all consanguineous marriages in the countryside compared to 50% in the city. In contrast, marriages between second cousins were five times more common in the countryside. Accordingly, the C22/C33 ratio was always much higher in the city than in rural areas, often double or triple.

Local Endogamy, Consanguinity, and Inbreeding.   Our results show that most consanguineous couples mated locally. As can be seen in table 4, about 76% of all couples

were born in the same locality, and 87% in the same county. Almost 90% of all partners resided in the same locality at the time of marriage, and 94% in the same county. In large localities such as the city of Granada the trend to mate with neighbors was strong as well. At least in 80.3% of the consanguineous pairs in which both partners resided in the city of Granada they shared the same parish, so they probably lived in the same neighborhood. Hence during most of the 20th century there was a powerful pressure to marry within the local community defined by parish, municipality and *comarca*. However, premarital mobility, measured by the differences between the places of birth and residence at marriage[4], increased considerably in the 1960s for both sexes. As shown in table 4, the premarital migration of grooms went from about 23% to over 34% in that decade, and that of brides from 19% to 31%. Local endogamy was also decreasing in the second half of the 1960s as a consequence of increased mobility and migration. In the 1970s these trends increased even more, given the exodus that affected most rural areas of Spain, although our records do not cover well this period.

On the other hand, levels of inbreeding appear to be inversely related to spatial endogamy. As shown in table 5, the more inbred couples such as uncles-nieces (C12) or first cousins (C22) show significantly higher exogamy rates and higher rates of premarital migration than second cousins (C33) and third cousins (C44). First cousins once removed (C23) occupy an intermediate position in this respect (see figure 5). The differences among the different types of consanguineous marriages are statistically significant ($p<0.01$)[5]

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[4] In almost all cases marriage took place in the parish of the bride. This pattern should not be considered an index of matrilocal or uxorilocal postmarital residence (but see Calderón *et al.* 2018: 56).

[5] Values of Goodman and Kruskal's gamma tests vary from -0.188 to -0.286, for the different endogamy rates considering the different types of consanguineous marriages.

Age at Marriage. Age at marriage is a crucial variable to consider in all marriage systems, as it affects fertility, household formation patterns, the role of older generations in arranging the union, the relationship among spouses, etc. Late marriage was a crucial trait of the European marriage pattern proposed by Hajnal (1965). Moreover the postponement of marriage and reproduction is a key factor in the fertility downturn of most present-day industrial societies (Kohler, Billari and Ortega 2002), and in the influential model of the Second Demographic Transition (Van den Kaa 1987) that aims to explain the main population shifts affecting industrial societies in the last decades (Lesthaeghe 2010). Concerning our records we propose first a simple question: Do partners in consanguineous unions marry at a younger age than non-consanguineous couples? The records available allowed us to establish the age of brides and grooms for the period between 1900 and 1968. After 1968, this variable does not appear in the available records. For the whole province of Granada, comparable data on age at first marriage could only be found from the year 1921 onwards. We generated annual means of ages for both males and females and separately analyzed those who were single or widowed. According to Catholic rites, divorced people cannot marry. Besides, divorce was illegal in Spain until 1981.

In table 6, we offer a summary of the results for age at first marriage. Data concerns five-year moving averages of the yearly means of first marriages for males and females. On average, husbands in consanguineous marriages were 2.95 years older than their wives. On the other hand, in the twentieth century, there was a gradual increase in age at first marriage for both sexes. Annual means went from around 27 years of age in the 1900s to around 29 in 1975 for males, and from 24 to 26 for females. The mean age at first marriage further increased in recent decades within the general transformation in mating and household formation patterns. However, the mean ages at first marriage do not differ significantly in

consanguineous and non-consanguineous unions, neither for males (p = 0.34) nor for females (p = 0.14; two sample T hypothesis tests).

Discussion

The level of inbreeding found in the province of Granada throughout the century is high in the context of Western Europe, and even among European Catholic countries. In prior studies, the province of Granada occupied a mid to high position in the rates of consanguinity and inbreeding in Spain. The only work in which we have comparable data on all Spanish provinces was done by Pinto Cisternas, Zei and Moroni using dispensation records in the Vatican archives for the whole of Spain in the period from 1911 to 1943[6]. In this review, the province of Granada appears as the 14th highest value of α out of 47 provinces ($\alpha = 2.54 \times 10^{-3}$). Most provinces in the north and center of the country showed a higher rate of inbreeding (Pinto Cisternas *et al.* 1979; also see table 7). Much work has been done in more recent decades using detailed ecclesiastical data from whole dioceses or a large group of their parishes. In table 7, we have summarized the results obtained in some of these important studies. They concern eight major Spanish dioceses arranged from decreasing values of α. As can be seen in table 7, the total values of α found in our study (2.044×10^{-3}) are higher than those found in the Diocese of Santiago de Compostela (1.937×10^{-3}), with which the Archdiocese of Granada has considerable similitude. Both have an important administrative and political urban center, with a university and jurisdiction over a large expanse of countryside that includes some isolated rural areas. Moreover, our results (see table 3) are in accordance with comparative studies that found crucial differences between rural and urban areas both in the intensity and the structure of inbreeding (see Fuster and Colantonio 2002,

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[6] Some of these results have been questioned by authors who worked later in some of these regions, and used ecclesiastical data as well (Calderón *et al.* 1993: 764).

2003, 2004). Thus, if only the rural part of the Archdiocese of Granada is considered, the α

values (2.438×10^{-3}) are very similar to those found in Mondoñedo-Ferrol (2.4775×10^{-3}),

higher than those observed in the rural areas of Lugo (2.248×10^{-3}), but lower than those

found in the rural areas of Orense (3.006×10^{-3}), the most isolated of the Galician provinces

(Varela *et al.* 1997; 2000; 2001; 2003). Hence, in the extreme Northwest of the Peninsula, we

find very similar results to those observed in the Southeast concerning both consanguinity

and inbreeding rates. This is also confirmed by the patterns found in another recent analysis

of an area in Southeastern Spain (see Calderón *et al.* 2018, table 7).

On the other hand, for areas of similar population and number of marriages, only the

Diocese of Toledo, in central Spain, has a slightly higher coefficient of inbreeding. However,

other dioceses in the center of Spain, such as that of the rural Diocese of Sigüenza-

Guadalajara, show much higher rates of inbreeding, measured both as consanguinity rates

(16.1%) and α values ($\alpha_s = 3.48 \times 10^{-3}$) (Calderón et al. 1998[7]) Even higher rates of

inbreeding have been reported in more isolated regions, such as the mountainous *comarca* of

La Cabrera in the province of Leon, where Blanco Villegas and her collaborators found a

total of 23.1% consanguineous marriages up to third cousins in the period 1880 to 1989, and

a corresponding average inbreeding coefficient α of 6.78×10^{-3}, among the highest rates

found in any European population (2004: 197,199). However, there are isolated areas of the

Archbishopric of Granada that also show high levels of consanguinity, even discounting the

known case of Alpujarras. Among those, we found the *comarcas* of Montes Orientales,

Alhama, and Lecrin (see Núñez-Negrillo 2015).

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[7] These results are calculated from the data offered by Calderon *et al.* 1998. Data on multiple consanguineous marriages higher than double consanguineous marriages could not be disaggregated. The value 16.1% for the period 1891 to 1980 results from adding the proportion of SCM up to second cousins to the total percentage of MCM including cases of C34 and C44. For all the consanguineous marriages found in the period 1921 to 1950 the authors found a rate of consanguineous couples up to the third degree of 15.9% , resulting in a average inbredding coefficient of $\alpha_t = 5.30$. For this period, the rate of MCM up to C33 was 1.88% more comparable with Granada's results (tables 5 and 7, pags. 549 and 556).

Concerning the structure of consanguinity, the relative frequency of the main types of consanguineous unions found in Granada differs partly from that found in the central and northern regions of Spain. Noteworthy are the marriages between uncles and nieces, which have been much less common here than in the regions bordering the Cantabrian coast, such as Galicia, Asturias, and the Basque Country. In these regions, relatively high proportions of uncle–niece marriages occurred, particularly between 1880 and 1920. They were often associated with the return of wealthy Spanish migrants from Southamerica and the Caribbean, the *Indianos*. Back home, *Indianos* were usually too old to find spouses matching their age and status, and they often turned to their nieces as mates. These upper-rank marriages may have served as a model for other less fortunate bachelors. This process of migratory return did not occur in Granada in any comparable way. As Bittles concludes, "local needs, customs and circumstances also seem to have been important in Spain" (2012:19).

Nevertheless, the "preferentiality" index or C22/C33 ratio found in Granada (0.76 for the whole diocese, 0.71 for rural areas) sits within the range of values found for some of the northern Spanish regions, such as those of Orense (0.66), Santiago de Compostela (0.63), Mondoñedo-Ferrol (0.79), Lugo (0.80) and the rural side of the province of Alava (0.82) (see table 7). It is also close to the level (0.87) found in the Southeastern area recently studied by Calderón's team (2018: table 2). In contrast, the average C22/C33 ratio was lower in the dioceses of central Castile, Toledo (0.46), Sigüenza-Guadalajara (0.49), and in the isolated region of La Cabrera in the Northwest fringe of Old Castile (0.43). This may point to different systems of inbreeding in these isolated areas were geographical and demographic limitations were determinant (Blanco Villegas *et al.* 2004). Again, concerning the structure of consanguinity, results in the Southeast of Spain are more similar to those of the Cantabric North and Northwest than to those of the Central Meseta.

Moreover, the C22/C33 ratio was much higher in the city than in the countryside. This situation has also been found in other European populations (Valls 1980; Varela *et al.* 2001). In Spain, Pinto Cisternas *et al.* (1979:60–61) also reported a higher proportion of C22 marriages in the most urbanized provinces. Furthermore, the difference between urban and rural levels of α was found to be highly significant ($p < 0.001$) in the analysis of over 100 studies done by Fuster and Colantonio (2002:306; 2003:713). In rural areas, people married within "restricted local communities" (Bittles 2012:4) that limited the choice of possible partners. Small rural and dispersed localities usually offered a small and closed market for marriage, and fewer opportunities to find a suitable and accepting mate beyond the limits of the extended family. Moreover, most of the members of small communities may have been related in some way (Bittles 2012:8). In the city, there was a more socially varied and mobile population and more opportunities to meet unrelated people of adequate age and status. Here, consanguineous marriages were not as influenced by the limitations of mate choice and the restricted marriage market. In the city, therefore, inbreeding involved a higher degree of social and cultural homogamy and was most likely to happen at both ends of the socioeconomic spectrum, among groups that preferred to relate with peers. These two extremes were epitomized by the landed aristocracy, and the Gitano or *Calé* minority, historically present in some peripheral neighborhoods of the city of Granada and in many of its towns and villages (Gamella 1996, 2011; Gamella and Martín 2007; 2017).

On the other hand, in rural areas, there was less privacy, and less opportunity for impersonal relationships. Therefore, social control and the forces of conformity were stronger than in the capital. However, there was no radical difference between the values and norms in the more cosmopolitan and modern city and those in towns and villages of the countryside. In both rural and urban environments, there were also many common values and norms, corresponding to a traditionally Catholic society. The divergence in norms and practices most

likely increased until the years of the Second Republic (1931–1936), decreased in the terrible post-war decades when Spain was rather isolated internationally (1939–59), and again changed rapidly thereafter. The years of development that opened up in 1959 marked the start of rapid migration and urbanization, breaking Spain's isolation and modernizing socioeconomic structures, including the spread of higher education for both sexes, and the growth of industries, service economies, and international tourism (Shubert 2003). All these processes helped to expand the potential marriage pool for most Spanish youth.

The differences between the capital and the countryside, especially the most remote and isolated villages, may have resulted from two different patterns of intra-familial marriage. In isolated rural populations with no cultural preference for consanguineous marriages, marrying a distant relative such as a second or third cousin was a likely option when few other partners were available. They were often not part of the immediate family, but they were not strangers either. From a historical perspective, unions of second cousins would be relatively more frequent in rural areas precisely when the population increased while opportunities and means for communication, mobility, and migration remained restricted (Calderón *et al.* 1993: 761–762). This is what happened in most of the regions of Granada after the Civil War and in the post-war years, when Spain was isolated from the rest of Europe and economic recovery was slow (Shubert 2003). The age of marriage may have also contributed to inbreeding in the context studied. The postponement of marriages in a restricted marriage market with considerable control of the movements of girls may have increased the likelihood of mating with distant relatives.

Data about local endogamy confirm the differential pattern of mating close versus distant relatives. Firstly, high local endogamy found among consanguineous couples in Granada are congruent with results in other areas of Spain, such as the region of La Cabrera (Blanco Villegas et al. 2004) and, particularly, with the recent study of 49 parishes in the

southeastern side of the Diocese of Toledo. There Calderón's team also found a high incidence of spatial endogamy by parish of birth (>80%) that remained steady up to the 1960s. More interestingly, this team also found that C22 couples were more spatially exogamous than C33 marriages and showed higher rates of premarital mobility (2018: 55-56). In the diocese of Granada consanguinity and spatial endogamy also maintained a complex relationship, as marriage with closer relatives seems to result from an individual or familial preference that may sometimes overcome the geographical and demographic limitations that lead other neighbors to mate locally.

In sum, as consanguinity was always less common in the cities, the growth of urbanization has been a key element in its decline. Urbanization, in turn, was a consequence of other processes of socioeconomic and political transformation. In these processes in the southern borders of the Peninsula we find similar patterns and trends to those in the Northwest in terms of total rates of inbreeding, average F values, C22/C33 ratios, and in a differential opportunity and motivational structure for marrying close and distant relatives (Gamella et al. 2010). It seems that the historical north–south and east–west divide in terms of intra-familial marriage, including most of the "Cantabrian exception" (Calderón et al. 2009; 2018), needs to be reformulated.

Literature Cited

Alberdi, I. 1999. *La nueva familia española*. Madrid: Taurus.

Alfonso-Sánchez, M. A., U. Aresti, J. A. Peña García et al. 2005. Inbreeding levels and consanguinity structure in the Basque province of Guipúzcoa (1862–1980). *Am. J. Phys. Anthropol.* 127:240–252.

Bener, A., and R. R. Mohammad. 2017. Global distribution of consanguinity and their impact on complex diseases: Genetic disorders from an endogamous population. *Egypt. J. Med. Hum. Genet.* 18:315–320.

Bittles, A. H. 2012. *Consanguinity in Context*. Cambridge: Cambridge University Press.

Blanco Villegas, M. J., A. Boattini, H. R. Otero et al. 2004. Inbreeding patterns in La Cabrera, Spain: Dispensations, multiple consanguinity analysis, and isonymy. *Hum. Biol*. 76:191–210.

Calderón, R. 1983. Inbreeding, migration, and age at marriage in rural Toledo, Spain. *J. Biosoc. Sci.* 15:47–57.

Calderón, R. 1989. Consanguinity in the Archbishopric of Toledo, Spain, 1900–79. I. Types of consanguineous mating in relation to premarital migration and its effects on inbreeding levels. *J. Biosoc. Sci*. 21:253–266.

Calderón, R., J. A. Peña, B. Morales et al. 1993. Inbreeding patterns in the Basque Country (Alava province, 1831–1980). *Hum. Biol.* 65:743–770.

Calderón, R., J. A. Peña, J. Delgado et al. 1998. Multiple kinship in two Spanish regions: New model relating multiple and simple consanguinity. *Hum. Biol*. 70:535–561.

Calderón, R., U. Aresti, B. Ambrosio et al. 2009. Inbreeding coefficients for X-linked and autosomal genes in consanguineous marriages in Spanish populations: The case of Guipúzcoa (Basque Country). *Ann. Hum. Genet*. 73:184–195.

Calderón, R., C. L. Hernández, G. García-Varela et al. 2018. Inbreeding in Southeastern Spain. *Hum. Nat.* 29:45–64.

Cavalli-Sforza, L. L., and W. Bodmer. 1971. In *Human Population Genetics.* San Francisco, CA: W. H. Freeman.

Cavalli-Sforza, L. L., A. Moroni, and G. Zei. 2004. *Consanguinity, Inbreeding, and Genetic Drift in Italy*. Princeton, NJ: Princeton University Press.

Domínguez-Folgueras, M., and T. Castro-Martin. 2013. Cohabitation in Spain: No longer a marginal path to family formation. *J. Marriage Fam.* 75:422–437.

Fisher, R. A. 1965. *The Theory of Inbreeding*. New York: Academic Press.

Fuster, V., and S. E. Colantonio. 2002. Consanguinity in Spain: Socioeconomic, demographic, and geographic influences. *Hum. Biol.* 74:301–315.

Fuster, V., and S. E. Colantonio. 2003. Inbreeding coefficients and degree of consanguineous marriages in Spain: A review. *Am. J. Hum. Biol.* 15:709–716.

Fuster, V., and S. E. Colantonio. 2004. Socioeconomic, demographic, and geographic variables affecting the diverse degrees of consanguineous marriages in Spain. *Hum. Biol.* 76:1–14.

Gamella, J. F. 1996. *La población gitana en Andalucía: un estudio exploratorio de sus condiciones de vida.* Sevilla: Consejería de Trabajo y Asuntos Sociales.

Gamella, J. F. 2011. *Historias de éxito. Modelos para reducir el abandono escolar de la adolescencia gitana.* Madrid: Ministerio de Educación.

Gamella, J. F., and E. Martín. 2007. «Viens avec moi cousine»: le Maríage entre cousins germains chez les gitans andalous. *Études tsiganes* 30:110–151.

Gamella, J. F., and E. Martín. 2017. The decline of infant and child mortality among Spanish Gitanos or Calé (1871–2005). A microdemographic study in Andalusia. *Demogr. Res.* 36:945–988.

Gamella, J. F., A. M. Núñez-Negrillo, and E. Martín Carrasco-Muñoz. 2010. Entre marido y

    mujer. Discursos eclesiásticos en las causas de dispensa de los matrimonios

    consanguíneos celebrados en la diócesis de Granada (1892–1963). *Gazeta de*

    Antropología 26:1–39.

Hajnal, J. 1965. European marriage patterns in perspective. In *Population in History: Essays*

    in Historical Demography, D. V. Glass and D. E. Eversley, eds. Chicago, IL: Aldine

    Pub. Co., 101–143.

Hartl, D. L., and A. G. Clark. 2007. *Principles of Population Genetics,* fourth edition.

    Sunderland: Sinauer Associates.

Jurado, T. 2005. Las nuevas familias españolas. In *Tres décadas de cambio social en España*,

    J. J. González and M. Requena, eds. Madrid: Alianza, 51–80.

Kohler, H. P., F. C. Billari, and J. A. Ortega. 2002. The emergence of lowest-low fertility in

    Europe during the 1990s. *Popul. Dev. Rev*. 28:641–680.

Lesthaeghe, R. 2010. The unfolding story of the second demographic transition. *Popul. Dev.*

    Rev. 36:211–251.

Luna Gómez, F. 1984. *Demografía de la Alpujarra: estructura y biodinámica*. Granada:

    Universidad de Granada.

Luna Gómez, F., A. Valls, and A. Fernández-Santander. 1998. Inbreeding incidence on

    biological fitness in an isolated Mediterranean Population: La Alta Alpujarra Oriental

    (southeastern Spain). *Ann. Hum. Biol*. 25:589–596.

Luna Gómez, F., P. Moral, V. Alonso et al. 2007. Factors influencing pre-reproductive

    mortality in the isolated and preindustrial western Mediterranean Population of La

    Alpujarra, 1900–1950. *Hum. Biol*. 79:381–394.

Martín, E., and J. F. Gamella. 2005. Marriage practices and ethnic differentiation: The case of

    Spanish Gypsies (1870–2000). *Hist. Fam.* 10:45–63.

McCullough, J. M., and D. H. O'Rourke. 1986. Geographic distribution of consanguinity in Europe. *Ann. Hum. Biol.* 13:359–367.

Núñez-Negrillo, A. M. 2015. *Un siglo de matrimonios consanguíneos en la archidiócesis de Granada (1900–1999). Un análisis antropológico.* PhD diss., Universidad de Granada.

Pérez Moreda, V., D. Reher, and A. Sanz Gimeno. 2015. *La conquista de la salud. Mortalidad y modernización en la España contemporánea.* Madrid: Marcial Pons Historia.

Pinto Cisternas, J., G. Zei, and A. Moroni. 1979. Consanguinity in Spain, 1911–1943: General methodology, behavior of demographic variables, and regional differences. *Soc. Biol*. 26:55–71.

Reher, D. S. 1996. *La familia en España, pasado y presente*. Madrid: Alianza Editorial.

Reher, D. S., and P. L. Iriso-Napal. 1989. Marital fertility and its determinants in rural and in urban Spain, 1887–1930. *Popul. Stud.* 43:405–427.

Rutigliano, R., and G. Esping-Andersen. 2018. Partnership choice and childbearing in Norway and Spain. *Eur. J. Popul.* 34:367–386.

Shubert, A. 2003. *A Social History of Modern Spain*. London: Routledge.

Sutter, J., and L. Tabah. 1948. Fréquence et répartition des mariages consanguins en France. *Population* 3:607–630.

Twiesselmann, F., J. François, and P. Moureau. 1962. Evolution du taux de consanguinité en Belgique de 1918 à 1959. *Population* 17:241–266.

Valls, A. 1982. *Antropología de la consanguinidad*. Madrid: Ed. Universidad Complutense.

Van de Kaa, D. J. 1987. Europe's second demographic transition. *Popul. Bull.* 42:1–59.

Varela, T. A., R. L. Aínsua, and J. Fariña. 1997. Evolution of consanguinity in the Archbishopric of Santiago de Compostela (Spain) during 1900–1979. *Hum. Biol.* 69:517–531.

Varela, T. A., R. L. Aínsua, and J. Fariña. 2000. Evolución de la consanguinidad en la diócesis de Mondoñedo-Ferrol: período 1900–1979. *Revista Española de Antropología Biológica* 21:89–99.

Varela, T. A., R. L. Aínsua, and J. Fariña. 2001. Evolution of consanguinity in the Bishopric of Lugo (Spain) from 1900 to 1979. *Ann. Hum. Biol.* 28:575–588.

Varela, T. A., R. L. Aínsua, and J. Fariña. 2003. Consanguinity in the Bishopric of Ourense (Galicia, Spain) from 1900 to 1979. *Ann. Hum. Biol.* 30:419–433.

Table 1. Total marriages, main types of consanguineous marriages, and α values in the archdiocese of Granada, Spain (1900–1979). Five-year results

Period	Total marriages	Consanguineous marriages		C12		C22		C23		C33		MCM		α × 10⁻³		
	N	N	%	N	%	N	%	N	%	N	%	N	%	Simple	Multiple	Total
1900–1904	16,294	896	5.499	6	0.034	340	2.085	136	0.835	333	2.042	82	0.503	1.926	0.409	2.335
1905–1909	13,513	768	5.686	10	0.076	246	1.823	126	0.935	330	2.438	56	0.413	1.931	0.265	2.196
1910–1914	14,527	806	5.548	12	0.083	264	1.817	134	0.922	336	2.313	60	0.413	1.867	0.253	2.120
1915–1919	14,475	948	6.549	9	0.062	308	2.128	114	0.788	440	3.040	77	0.532	2.129	0.316	2.445
1920–1924	16,365	1,173	7.168	5	0.031	389	2.377	143	0.874	545	3.330	91	0.556	2.317	0.329	2.647
1925–1929	13,033	962	7.380	6	0.049	317	2.435	128	0.983	450	3.449	60	0.464	2.429	0.282	2.712
1931–1935	13,173	928	7.044	6	0.047	285	2.163	101	0.767	485	3.680	51	0.386	2.226	0.219	2.444
1940–1944	17,866	1,222	6.840	7	0.039	494	2.765	126	0.705	550	3.079	45	0.252	2.479	0.124	2.603
1945–1949	20,150	1,165	5.782	1	0.005	443	2.199	145	0.720	525	2.605	51	0.253	2.012	0.167	2.180
1950–1954	23,285	1,420	6.098	3	0.013	518	2.225	198	0.850	654	2.809	47	0.202	2.111	0.130	2.241
1955–1959	26,517	1,526	5.755	5	0.019	559	2.108	192	0.724	725	2.734	45	0.170	1.995	0.106	2.101
1960–1964	24,959	1,303	5.221	3	0.012	474	1.899	175	0.701	605	2.424	46	0.184	1.800	0.123	1.923
1965–1969	21,356	983	4.603	4	0.019	335	1.569	127	0.595	488	2.285	29	0.136	1.547	0.087	1.634
1970–7194	22,413	749	3.342	1	0.004	262	1.169	100	0.446	372	1.660	14	0.062	1.135	0.032	1.167
1975–1979	22,314	591	2.649	0	0.000	222	0.995	57	0.255	301	1.349	11	0.049	0.912	0.022	0.934
1900–1979	280,239	15,440	5.510	78	0.028	5,456	1.947	2,003	0.715	7,137	2.547	765	0.273	1.873	0.171	2.044

C12: uncle–niece or aunt–nephew unions; C22: unions of first cousins; C33: unions of second cousins (includes two C24 (cousin twice removed) unions in 1900 and 1902); C23: unions with cousin once removed; MCM: multiple consanguinity unions. The years 1928, 1930, and of the Civil War (1936 to 1939) were not included in these results as the observed records were incomplete; α × 10⁻³: average F values up and including second cousins, multiplied by thousand.

Table 2. Percentage of each type of consanguineous mating in the total of consanguineous couples, and the relation of the proportion of C22 to C33 marriages, by five-year periods

Period	C12	C22	C23	C33	MCM	C22/C33
1900–04	0.61	37.92	15.19	37.13	9.14	1.02
1905–09	1.34	32.06	16.44	42.89	7.27	0.75
1910–14	1.49	32.75	16.63	41.69	7.44	0.79
1915–19	0.95	32.49	12.03	46.41	8.12	0.70
1920–24	0.43	33.16	12.19	46.46	7.76	0.71
1925–29	0.66	33.00	13.32	46.74	6.29	0.71
1931–35	0.67	30.71	10.89	52.24	5.49	0.59
1940–44	0.57	40.43	10.31	45.01	3.68	0.90
1945–49	0.09	38.03	12.45	45.05	4.38	0.84
1950–54	0.21	36.48	13.94	46.06	3.31	0.79
1955–59	0.33	36.63	12.58	47.51	2.95	0.77
1960–64	0.23	36.38	13.43	46.43	3.53	0.78
1965–69	0.41	34.08	12.92	49.64	2.95	0.69
1970–74	0.13	34.98	13.35	49.67	1.87	0.70
1975–79	0.00	37.56	9.64	50.93	1.86	0.74
Total (1900–1979)	0.51	35.34	12.97	46.23	4.96	0.76

Note. C12: uncle–niece or aunt–nephew unions; C22: unions of first cousins; C33: unions of second cousins (includes two C24 unions, with cousin twice-removed in 1900 and 1902); C23: unions with cousin once removed; MCM: multiple consanguinity unions; C22/C33: ratio of the number of C22 to the number of C33 marriages. The years 1928, 1930, and of the Civil War (1936 to 1939) were not included in these results as the observed records were incomplete.

Table 3. The urban and rural side. Total number of marriages, rates of consanguinity, percentages of the main types of consanguineous marriages, and α values in the city of Granada and the rest of the diocese (1900–1979). Five-year values

Period	Total marriages N		Consan. Marriages %		C22 %		C23 %		C33 %		MCM %		C22/C33 %		α values × 10⁻³	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
1900–04	2,783	13,511	2.45	6.13	1.19	2.27	0.35	0.93	0.64	2.33	0.19	0.57	1.86	0.97	1.22	2.56
1905–09	2,602	10,911	3.45	6.22	1.72	1.85	0.60	1.02	0.56	2.89	0.40	0.42	3.06	0.64	1.89	2.24
1910–14	2,492	12,035	2.57	6.17	1.12	1.96	0.52	1.01	0.72	2.64	0.08	0.48	1.56	0.74	1.24	2.33
1915–19	2,484	11,991	3.14	7.26	1.49	2.26	0.28	0.89	1.13	3.44	0.16	0.61	1.32	0.66	1.40	2.66
1920–24	3,048	13,317	3.54	8.00	1.80	2.51	0.33	1.00	1.08	3.84	0.26	0.62	1.67	0.65	1.69	2.87
1925–29	2,413	10,620	3.31	8.30	1.54	2.64	0.46	1.10	1.14	3.97	0.13	0.54	1.35	0.66	1.43	3.00
1931–35	2,854	10,319	3.07	8.14	1.18	2.43	0.43	0.86	1.25	4.35	0.14	0.45	0.95	0.56	1.25	2.78
1940–44	4,545	13,321	2.62	8.28	1.34	3.25	0.31	0.84	0.84	3.84	0.04	0.32	1.61	0.85	1.20	3.08
1945–50	4,959	15,191	2.06	7.00	1.11	2.55	0.30	0.86	0.58	3.27	0.06	0.32	1.90	0.78	0.94	2.59
1950–54	5,171	18,114	2.34	7.17	1.26	2.50	0.29	1.01	0.66	3.42	0.10	0.23	1.91	0.73	1.10	2.57
1955–59	6,343	20,174	1.62	7.05	0.73	2.54	0.24	0.88	0.58	3.41	0.06	0.20	1.24	0.75	0.68	2.55
1960–64	6,827	18,132	1.86	6.49	0.98	2.24	0.26	0.87	0.47	3.16	0.13	0.20	2.09	0.71	0.89	2.31
1965–69	6,989	14,367	1.82	5.96	0.99	1.85	0.23	0.77	0.54	3.13	0.04	0.18	1.82	0.59	0.81	2.03
1970–74	9,268	13,145	1.17	4.88	0.64	1.54	0.18	0.63	0.32	2.60	0.02	0.09	1.97	0.59	0.52	1.62
1975–79	10,189	12,125	0.94	4.08	0.46	1.44	0.14	0.35	0.31	2.22	0.03	0.07	1.47	0.65	0.39	1.39
1900–79	**72,967**	**207,272**	**2.03**	**6.74**	**1.01**	**2.28**	**0.28**	**0.87**	**0.61**	**3.23**	**0.09**	**0.34**	**1.66**	**0.71**	**0.93**	**2.44**

Note. C12: uncle–niece or aunt–nephew unions; C22: unions of first cousins; C33: unions of second cousins (includes two C24 unions, with cousin twice-removed in 1900 and 1902); C23: unions with cousin once removed; MCM: multiple consanguinity unions; C22/C33: ratio of the number of C22 to the number of C33 marriages. The years 1928, 1930, and those of the Civil War (1936 to 1939) were not included in these results as the observed records were incomplete.

Table 4. Proportion of marriages that were endogamous (by municipality and county), and grooms and brides who were residing in a different locality to that of their birth at the time of their marriage. Percentages of the total number of marriages for which data is available by 5-year period of marriage (1900-1969)

Period	Both partners were born in the same locality	Both partners were born in the same county	Both partners resided in the same locality at marriage	Both partners resided in the same county at marriage	Premarital migration of groom	Premarital migration of bride	Total N (Complete data)
1900-04	83.1	91.8	90.3	96.3	11.9	8.8	645
1905-09	80.8	89.4	91.5	96.7	15.7	14.0	781
1910-14	82.5	91.1	91.3	95.3	16.9	13.1	981
1915-19	82.7	91.4	90.6	95.0	13.9	12.0	1,262
1920-24	77.9	88.2	87.8	93.5	18.4	15.5	1,129
1925-29	78.4	88.7	87.4	92.5	18.6	15.7	949
1931-34	77.1	89.0	88.2	94.4	17.7	14.6	721
1935-39	82.1	91.0	87.0	93.6	17.4	15.3	391
1940-44	73.9	86.0	85.0	92.1	18.6	16.9	1,210
1945-50	73.9	86.8	84.8	92.3	22.5	18.7	1,163
1950-54	72.6	84.4	89.2	94.4	20.8	20.8	1,418
1955-59	71.4	84.7	88.6	92.8	20.4	19.5	1,524
1960-64	72.3	84.9	83.1	90.1	22.8	19.0	1,161
1965-69	56.6	73.3	76.7	82.5	34.2	31.0	258
1900-69	**76.3**	**87.4**	**88.8**	**93.9**	**18.9**	**16.5**	**13,593**

Note. Total N (complete data): Cases in which data was available for both partners and the four variables considered.

Table 5. Proportion of unions that are endogamous by municipality and county of birth and residence at time of marriage, and percentages of grooms and brides who were residing in a different locality to that of their birth at the time of their marriage. Percentages of the total number of marriages of each kin type for which data is available (1900-1979)

Type of marriage	Both partners were born in the same locality	Both partners were born in the same county	Both partners resided in the same locality at marriage	Both partners resided in the same county at marriage	Premarital migration of groom	Premarital migration of bride	N total with data
C12	57.1	65.7	89.0	93.2	42.3	42.9	74
C22	70.4	83.4	86.3	91.9	24.1	21.7	5,419
C23	75.2	87.1	87.9	93.7	18.8	18.0	1,816
C33	79.9	90.1	90.3	95.1	15.8	13.3	6,562
C44	86.2	92.2	94.7	97.9	11.3	7.5	370
Total (Mc)	76.3	87.4	88.8	93.9	18.9	16.5	680
N (cases with data)	13,593	13,593	14,924	14,924	13,568	13,561	14,924

Note. Data about birth place and residence derived from the situation of the respective parish. **N (Cases with data)**: cases in which data was available for both partners, or for birth and residence of a partner in the respective rate.
N total with data: Maximum number of cases in which data was available for at least one of the comparisons

Table 6. Age at first marriage for single males and females in the consanguineous couples found in the ecclesiastical records of the Archbishopric of Granada, and in the official records for the Granada province, 1921–1968. Five-year averages of yearly means.

Period	Males			Females		
	Consanguineous	Total	Difference	Consanguineous	Total	Difference
1921 to 1925	27.04	27.68	0.64	23.93	24.76	0.82
1926 to 1931	26.97	27.80	0.83	24.21	24.86	0.68
1931 to 1935	26.97	27.66	0.69	24.25	24.84	0.60
1936 to 1940	28.80	28.22	−0.58	25.14	25.38	0.24
1941 to 1945	28.51	29.24	0.73	25.58	26.10	0.54
1946 to 1950	28.75	29.28	0.53	25.78	26.38	0.60
1951 to 1955	29.32	29.16	−0.16	26.55	26.48	−0.10
1956 t0 1960	28.54	28.80	0.26	25.73	25.96	0.24
1961 to 1965	28.28	28.20	−0.08	25.37	25.32	−0.04
1966 to 1968	29.25	27.70	−1.55	26.41	24.73	−1.67

Sources: EEM for Granada province: IECA (*Instituto de Estadística y Cartografía de Andalucía*). For consanguineous marriages: our database from ecclesiastical dispensations. Yearly results are available on demand for interested readers. The years 1928, 1930, and those of the Civil War (1936 to 1939) were not included in these results as the observed records were incomplete.

Table 7. Consanguineous marriages in nine Spanish Dioceses. Total and consanguineous marriages, percentages of M12, M22, M33 and multiple consanguineous marriages, and α values with or without including multiple consanguineous marriages (periods from about 1900 to 1980)

Diocese (Region)/Area	Period	Mt N	Mc N	M12 %	M22 %	M23 %	M33 %	MCM %	Mc/Mt%	αs	αt	M22/M33	Reference
Sigüenza-Guadalajara (Castile-LaMancha), whole diocese	1891-1980[1]	27,191	4384[4]	0.03	3.12	1.42	6.77	4.78[4]	16.12[4]	3.483	-	0.46	Calderón *et al.*1998
Orense (Galicia), rural side	1900-1979	110,128	9,010	0.16	2.64	0.88	4.00	0.52	8.18	2.739	3.066	0.66	Varela *et al.*2003
Lugo (Galicia), rural side	1900-1979	117,583	6,701	0.16	2.12	0.62	2.65	0.15	5.70	2.135	2.248	0.80	Varela *et al.*2001
Mondoñedo-Ferrol, (Galicia), rural side	1900-1979	92,686	5,553	0.26	2.13	0.58	2.71	0.30	5.99	2.263	2.477	0.79	Varela *et al.*2000
Toledo, (Castile-La Mancha), whole diocese	1900-1979	325,000	21,464	0.01	1.79	0.54	3.93	0.33	6.60	1.921	-	0.46	Calderón 1983; 1989
Granada (Andalusia) whole diocese	**1900-1979**	**280,239**	**15,440**	**0.03**	**1.95**	**0.72**	**2.55**	**0.27**	**5.51**	**1.870**	**2.044**	**0.76**	Present Study
Granada (Andalusia) rural side	**1900-1979**	**207,272**	**13,962**	**0.026**	**2.28**	**0.87**	**3.23**	**0.34**	**6.74**	**2.231**	**2.438**	**0.71**	Present Study
Toledo, (Castile-La Mancha), 31 parishes in its Southeastern side	1900-1969[1]	62,360	3,154	0,01	1.97	0.56	2.27	0.25	5.06	1.950	-	0.87	Calderón et al.2018 Table 2
Santiago de Compostela (Galicia), rural side[7]	1900-1979	307,094	15,739	0.16	1.62	0.57	2.56	0.21	5.13	1.794	1.937	0.63	Varela et al.1997
Alava province (Basque Country), rural side[2]	1891-1980[1]	80,667	2,424	0.08	1.05	0.28	1.17	0.42	3.00	1.024	-	0.89	Calderón *et al.*1993
Granada city (Andalusia)	**1900-1979**	**72,967**	**1,478**	**0.035**	**1.01**	**0.28**	**0.61**	**0.09**	**2.03**	**0.857**	**0.928**	**1.66**	Present Study
Guipúzcoa	1901-1980[1]	208,903	4,263	0.08	0.87	0.17	0.68	0.25	2.04	0.799	-	1.27	Alfonso-Sánchez *et al.*2005
City of Vitoria, Alava province (Basque Country)	1891-1980[1]	44,571	438	0.03	0.43	0.11	0.33	0.08	0.98	0.398	-	1.30	Calderón *et al.*1993

Mt: Total number of unions considered in the study period.

Mc: Total number of consanguineous unions up to second cousins found in the study period. M12: uncle-niece or aunt-nephew marriages. M22; M33: second cousin marriages; M23: first cousin once-removed marriages; all of these in SCM. MCM: multiple consanguinity marriages.

αs: Average inbreeding coefficients considering only simple consanguineous unions up to second cousins

αt: Average inbreeding coefficients including multiple consanguineous unions up and including second cousins

[1] These results were calculated by us with data offered in the respective papers.

[2] Does not include the capital city of Alava province, Vitoria.

[3] Data from 677 parishes (72% of all in the diocese) in 106 rural localities evenly dispensed in the diocese territory.

[4] Total MCM data includes cases up and including third cousins, as we could not disaggregate the available data on multiple consanguineous matings (Calderón *et al.* 1998: 549, table 5)
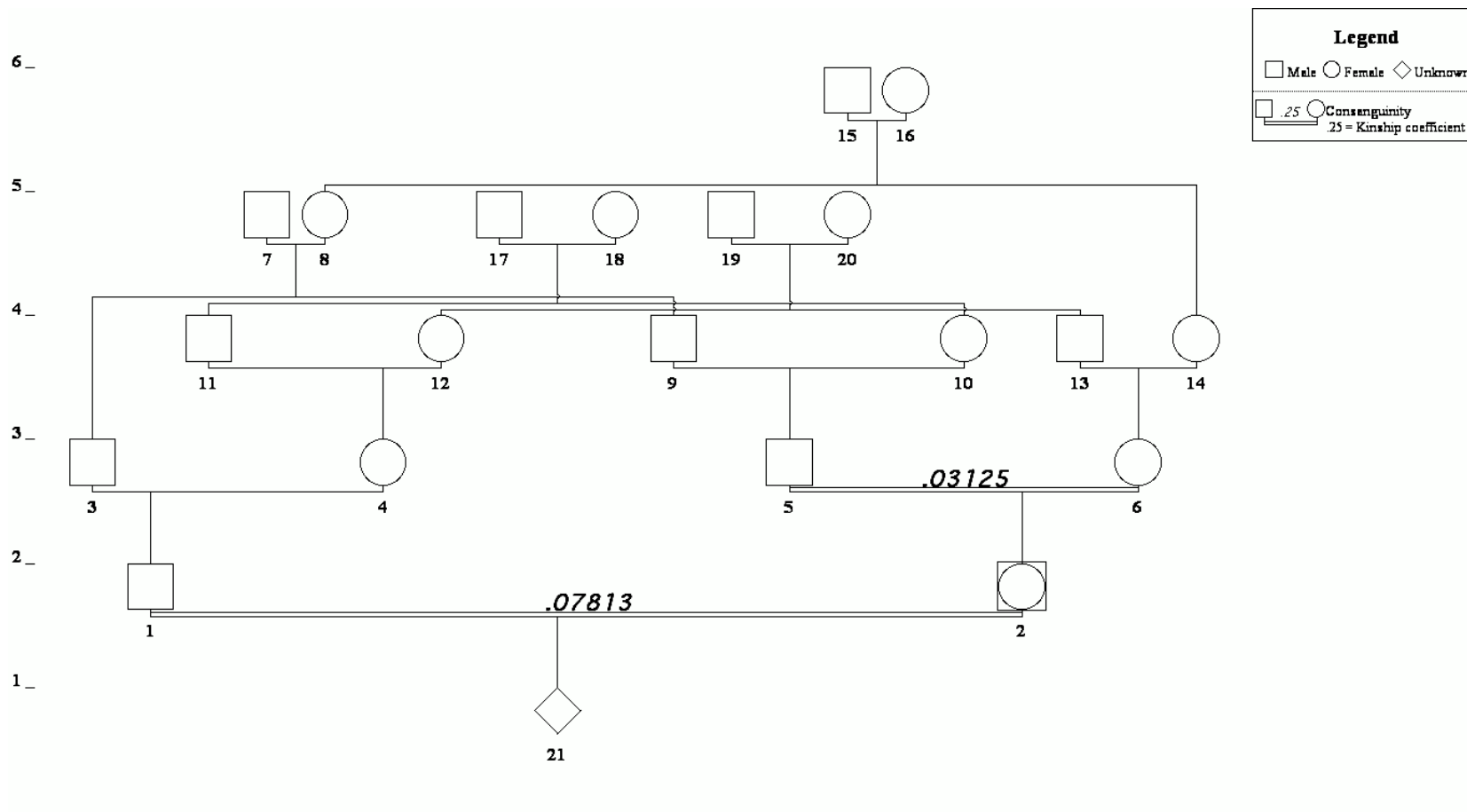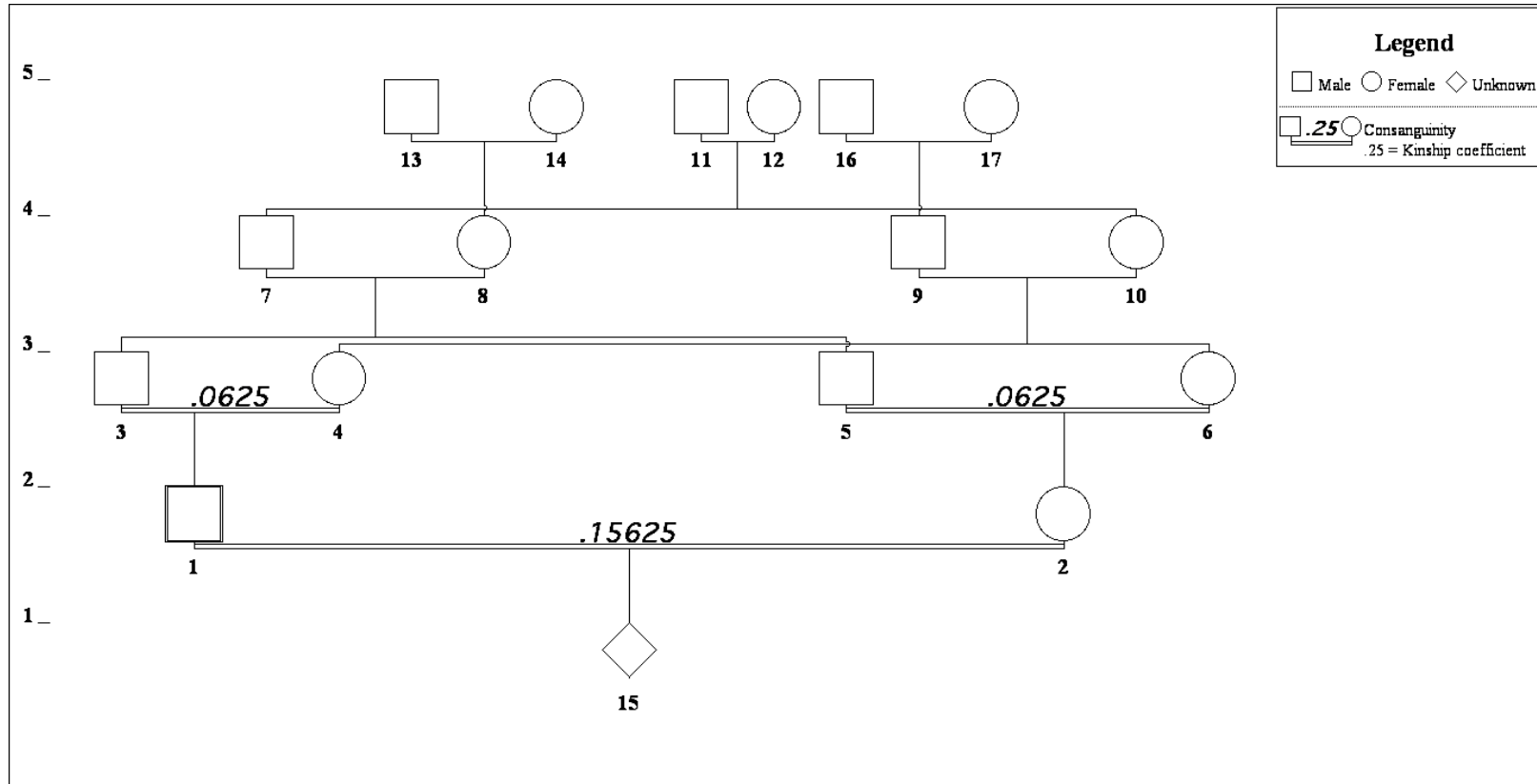
Figure 1.

Figure 2.
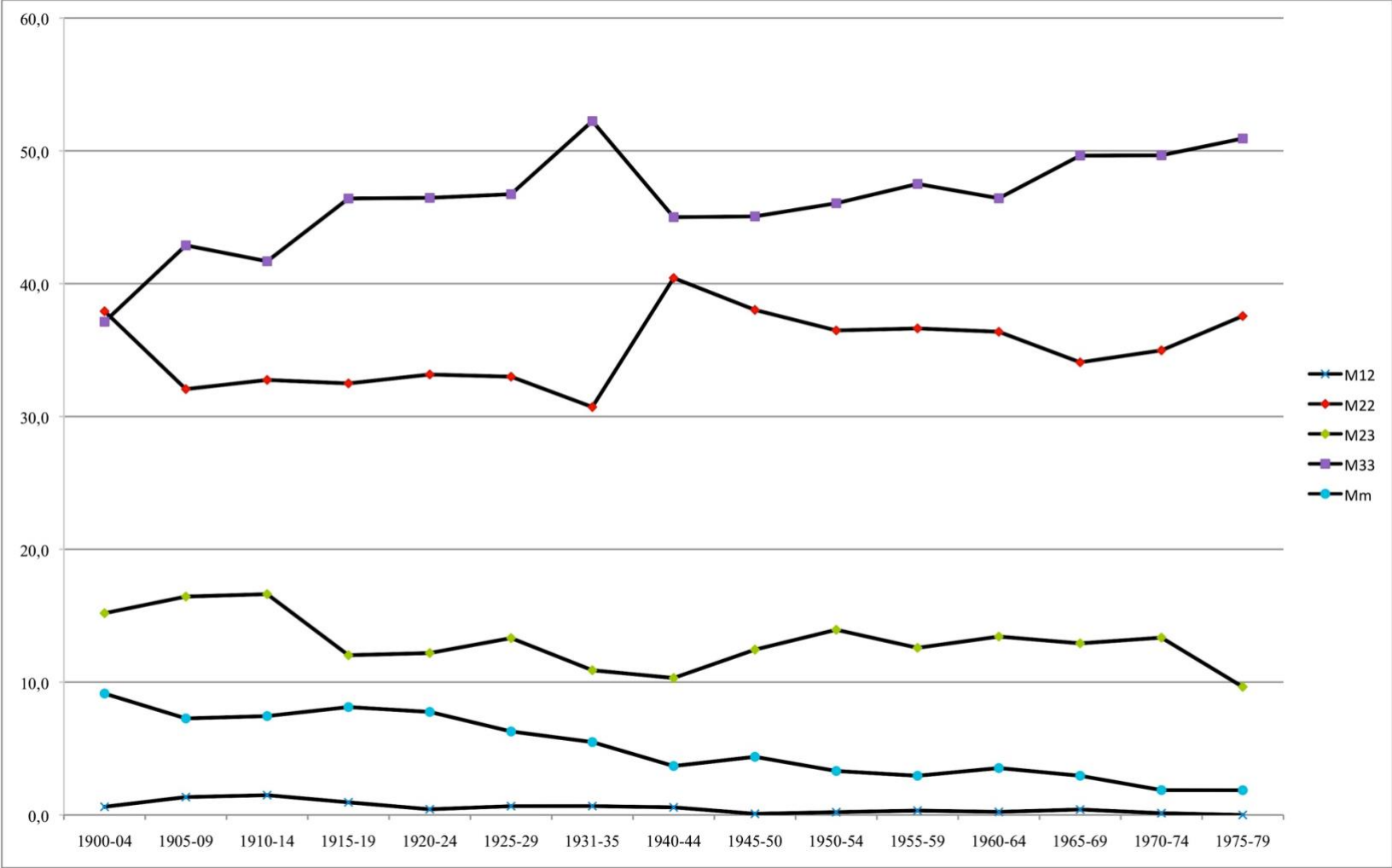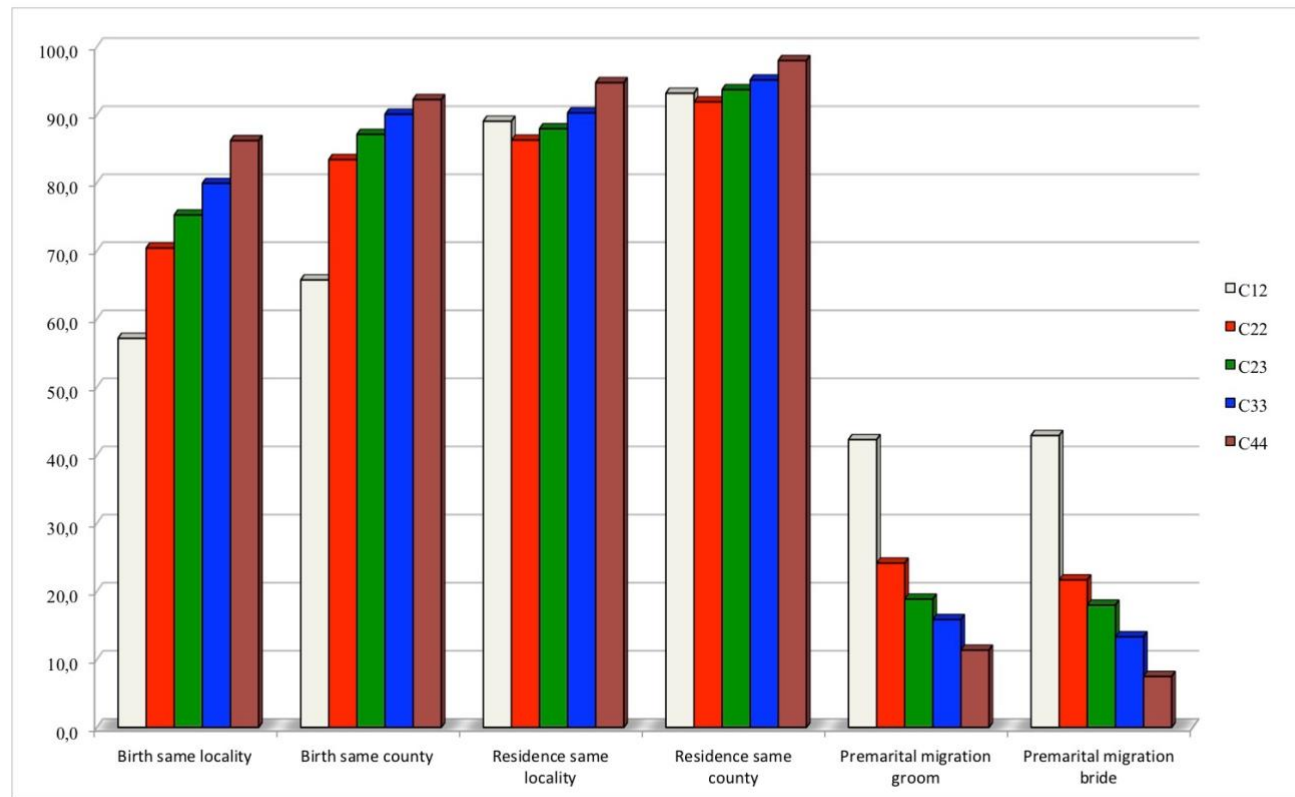
Figure 3.

Figure 4.

Figure 5.

Figure Captions

Figure 1. The study area: the Archdiocese of Granada in the province of Granada, Spain.

Figure 2. Multiple consanguineous marriage, Archbishporic of Granada, 1924. The couple (1 and 2) are cousins once removed and triple second cousins ($F = 78.125 \times 10^{-3}$).

Figure 3. Multiple consanguineous marriage, Archbishopric of Granada, 1961. The couple (1 and 2) are double first cousins and double second cousins ($F = 156.25$ x $\times 10^{-3}$).

Figure 4. Percentage of each one of the main types of consanguineous unions in the total of consanguineous unions by five-year periods.

Figure 5. Local endogamy and premarital mobility of bride and groom by type of main consanguineous relationship. Percentage of endogamous marriages on the total number of marriages of the same type. Diocese of Granada, 1900-1979 (N: 14,924).
Note: Data about birthplace and residence derived from the situation of the respective parishes.
N: Total number of cases in which data was available for both partners, or for birth and residence of a partner in the case of premarital migration.