CARRERAS MONFORT C. A new perspective for the demographic study of Roman Spain. *Revista de Historia da Arte e Arqueologia n.2,* 1995-1996; pp. 59-82.

# A NEW PERSPECTIVE FOR THE DEMOGRAPHIC STUDY OF ROMAN SPAIN

César Carreras Monfort*

* Universitat Oberta de Catalunya
*e-mail: ccarreras@campus.uoc.es*

In the last years, there has been an increase in the number of demographic studies of ancient societies, with the main aim to recognize the internal organization of the populations and, to some extent, how the resources of a territory determined patterns of distribution [Gallo, 1984; Parkin, 1992]. Actually, within the limits of the Roman society, these studies allowed us to revise again basic concepts such as the relationship between the urban and rural world [López Paz, 1994], or even, to discuss about the degree of urbanism that supposedly it is accepted for the Graeco-Roman world. The demographic analyses on the Roman period were recently favoured by a better knowledge now, of the urban perimeters of ancient Roman cities, and the patterns of rural distribution; thanks to the contribution of either the urban archaeology and the rural field-surveys [Barker, 1991] and cadastres studies [Chouquer and Favory, 1991]. Furthermore, the important contribution of papyrology also stands out, since they supply information on demography, which despite being basically about Roman Egypt, it can be extrapolated to other provinces [Hombert and Preaux, 1952; Bagnall and Frier, 1994].

These new documental evidences allow us to carry out a new estimate, from another viewpoint, of the population in a very particular province such as Roman Spain, and also they become a headway in the detailed study of population patterns. Although sometime it may not be obvious, demographic data is relevant when other economic, political or social phenomena in history must be interpreted [Beloch, 1886; Cipolla, 1969; Lo Cascio, 1994], so that the study of populations becomes necessary for their understanding. Methodological difficulties for the demographic analysis in the antiquity on the basis of ancient texts, epigraphy and archaeology have been already pointed out by most authors in the past [Beloch, 1909; Lot, 1945; Lézine, 1969; Palol, 1966; Forni, 1966; Lo Cascio, 1994], however new evidences permit to take up this subject again.

First of all, within the demographic studies, the work by Beloch [1886] is quite relevant, which was performed on the basis of quotes from ancient texts over the number of recipient of the *annona, frumentationes, caro porcina* or census [Wiseman, 1969], chiefly military [Forni, 1966], and that still constitute the foundations for the calculations undertaken by most later scholars

[Warden and Bagnall, 1988; Lo Cascio, 1994]. On the other hand, the size of amphitheatres and aqueducts capacity allowed us alternative estimates based on archaeology, although their results are considered today unreliable [Lloyd and Lewis, 1976; Duncan-Jones, 1977; Gallo, 1981]. Another aspect is the qualitative, and sometimes, quantitative study of the populations from necropolis [Palol, 1966], which presents its own difficulties. Finally, the epigraphy is a particular source of difficult interpretation, since it only identifies a limited portion of the population that could afford the expenses of an inscription to perpetuate their memory [García Merino, 1975].

With all this data, approximate demographic estimates have been undertaken in most provinces of the Roman Empire [Lot, 1945; Lézine, 1969; Suder, 1990; Parkin, 1992], which are closed to the calculations put forward by Beloch [1886], almost a century ago. In the case of Roman Spain, its population is estimated, as a maximum value, around 6 [Beloch, 1909; Vilà, 1989, 223], 7 [Blázquez, 1985, 477] or 9 millions of inhabitants [Beloch, 1909], though other authors fix this figure around 4 millions [Vives, 1956; Russell, 1958]. All those estimates are based on a quote by *Plinius the Elder* [Taracena, 1949, 428] and comparisons to later historic period, when there reliable census. The first of this census was carried out by the count Aranda (1768-9) who registered a population in Spain of 9.3 millions; this figure reached 10.4 millions, in the census by Floridablanca (1787). For earlier historic periods, the sources do not have minimum guarantees, however there are some approximated estimates, among which, the ones by Domínguez [1950] and Nadal [1984] stand out. The estimate by Nadal [1984] is the most accepted one. Nadal [1984] proposes a population near 4.6 millions of inhabitants in the late XVth century, that reached 6.7 millions in the late XVIth century and 7.5 millions in 1717.

Comparing this figure for the late XV century with the estimates offered in the Roman period, one may question some of them, since even in the best of the cases (4 millions in the Roman period) this would mean that the population was stagnant at least 10 centuries (A.D. V-XV). Due to the problems that these estimates arise, an alternative calculation of the population in Roman Spain is suggested here, combining information supplied by ancient texts, papyrology and archaeology. Similar demographic studies have been already undertaken in other provinces such as Britannia [Millett, 1990, 185] or Egypt [Bagnall and Frier, 1994, 56], though the methodology employed was rather different.

In the present work, it was considered convenient, at the start, to explain and justify the use of particular formulae and constants for the general calculation of a historic population. Afterwards, the particular case of Roman Spain is introduced, with its inherent problems of documentation, proposing a population estimate, as well as some partial values corresponding to urban and rural populations. Finally, in the last section, it is attempted to analyze its distribution pattern in the Iberian Peninsula, aim already suggested by Palol [1966, 223], and which constitutes a new original perspective of Roman Spain[1].

[1] Only the work by Almagro [1988] about the Iberian world is a reference point suitable for the analysis of population pattern.

## 1. A theoretical model on archaeological testimonies

A similar model to the ones defined for other provinces of the Roman Empire has been developed for the calculation of the population in Roman Spain. Due to the scarce written documentation, which is basically a quote by *Pliny the Elder*, and also it is quite partial, the model is in fact based on archaeological testimonies.

The use of archaeological data implies a series of problems that must be underlined from the beginning. First, the archaeological documentation improves every day since new projects and excavations are carried out, so that calculations in the future will be more accurate than the present ones. This means that one is limited by the current data, which is far from suitable.

In a historical population estimate, one must distinguish between two parts, the first relates to the urban habitat and the second refers to the rural demography. The archaeological testimonies of an urban population are, obviously, the remains of the area occupied by it, and normally, they are identified by the intramural zone, which is the area defined by the wall perimeter [Taracena, 1949; Février, 1974; Barral, 1982]. An initial difficulty appears at the start since perimeters are only known for a limited number of Romano-hispanic towns, where numerous archaeological interventions have been undertaken in the past. Moreover, sometimes, the proposed perimeter is simply an hypothesis that must be tested by future excavations. Another added problem is the chronology of the towns wall construction, as they may identify the town extension at an specific moment in time. Extramural quarters have been documented in towns such as *Caesaraugusta, Emerita, Barcino* [Barral, 1982, 111] or *Asturica Augusta* [García Marcos and Vidal, 1993], which reveals that these centres increased their population after the wall construction.

These particular cases bring other inconveniences to the population estimate that is its evolution over the time. When using the quote by *Pliny the Elder,* we are taken to the Principate, in Flavian times; whereas, most walls surrounding the urban areas were built in the IIIrd century A.D. [Barral, 1982, 109]. Such variability in dates becomes a real handicap, since the archaeological record evidences numerous and important transformations in the towns of the Roman period, such as abandonments and later occupations[2]. These changes were used as evidences to put forward some hypothesis on the possible urban crisis in the Late Empire [Barral, 1982; Arce, 1993]. Hopefully, in the future, it will be possible to reconstruct the urban perimeters for different chronological periods (e.g. Republican period, Early Empire and Late Empire), allowing us to observe the evolution of the Romano-hispanic towns. However, now one must accept the current data available.

Another chronological problem lies on the fact that *Plinius the Elder* (NH III.3.7-17; IV.4.18-30; IV.35.113-118) lists a number of cities in Hispania at a particular date. Obviously the number of urban centres and their statute changed over the time, from the foundation of Roman colonies in the Republican period to August [García Bellido, 1959] and the settlement of native tribes (Dio Cassius LIV.11). Furthermore, the shift of a city statute may be linked to an increase in population and expansion of its territorial boundaries (e.g. *Cisismbrium*: AE 1981, 496; *Ipolcobulcola*: Cano, 1978, 347) [Stylow, 1986; Guichard, 1993]. The need of more land for a

[2] Sillières [1993, 151-2] compares those changes affecting cities such as Belo, Munigua and Ampurias, in the IIIrd century and their later occupation in the IV century A.D.

community after the increase in population provoke, often, conflicts between neighbouring communities so as to define again their territories, also known as *controversia* of *iure territori* (*Higinius*, De Contr. Agr. 114, 11-15; *Frontinus*, De Contr. Agr. 52-53) [López Paz, 1994, 17-19]. In this context, the grant of *ius Latii* by Vespasian became an increase in the number of cities, and probably changes in their territories [Cortijo, 1993]. The ancient texts document the urban evolution in the Peninsula, since *Plinius the Elder* (circa A.D. 72-74) documented 179 *civitates* and 114 *populi* in the *Tarraconensis*, that varied in the time of *Ptolomeus* (circa A.D. 150) who in his *Geographías Hyphégesis* included 248 *civitates* and 27 *populi*. In other words, the number of *civitates* increased in 69, while the number of *populi* went down in 83. It becomes rather difficult to demonstrate how the change in statutes affected the demography, however the totals by *Plinius the Elder* (293) and by *Ptolomeus* (275), adding *civitates* and *populi*, do not suggest any radical variation.

So far, only the problems related to the urban habitat have been introduced, and now it is time to present the ones related to the rural population. Actually, little is known today about the rural world in Roman Spain. The research has been focused, almost excusively, on the study of *villae*, as production and residence centres of wealthy landlords [Gorges, 1979], disregarding smaller establishments such as farms or factories[3], which may have been common in the rural landscape. Likewise, few details are known on minor centres such as *vici* or *pagi* [Palol, 1966; Chouquer and Favory, 1991, 191-2].

A second focus of interest in the rural world in Roman Spain are the cadastres, in other words, the division of land or *centuriatio*, normally carried out when colonies *ex novo* were founded and whose study is developed from the photointerpretation [Roselló, 1974; Ariño, 1990]. In fact, this was the territory exploded by a city or its inhabitants. Therefore, the cadastres do not show any pattern of rural settlement, but the organization and exploitation of the territory by an urban community [López Paz, 1994, 330-332]. In the research of cadastres there is a speciality called analysis of plots limited by stones or *maceriae*, which are typical in particular rural landscapes such as Salento [Compatangelo, 1989] or Saint-Germain-le-Rodreux [Chouquer and Favory, 1991, 193]. This speciality has been hardly developed in the Iberian Peninsula.

Finally, a third aspect in the research of the Roman rural world is the field survey, whose results are not specially valued in this country. The potential of field survey is enormous, since it allows us to differentiate among diverse types of habitat, their dates, their material and makes easy the choice of a site to excavate [Vallat, 1991; Chouquer and Favory, 1991, 191; Lloyd, 1991; Barker, 1991; Alcock, 1993]. For demographic studies, the occupation density of a territory according to a survey is basic for the estimates of the rural population; however, its employment also presents some inconveniences. The first inconvenient is the identification of a series of superficial remains (e.g. pottery, mosaics) as a particular type of habitat[4], as each of them identifies a different number of dwellers, so there is not a settlement unit, though an average is used for the sake of calculations. Moreover, there is a relative margin of error in archaeological inferences

[3] Establishments of this kind are widely documented archaeologically in other provinces such as Italy or Greece [Misurare la terra, 1984, 159-160], and were probably widely distributed in Hispania; although, they have not been recognized or studied yet. The research in *Britannia* [Hingley, 1989] revealed, however, the existence of other settlements in the Roman period apart from farms and factories.

[4] Potter [1979] distinguishes 4 types of rural habitat according to the scatter of artifacts (a: 300 m²; b: 1200 m²; c: 2200 m²; d: 4700 m²) and their wealth; this classification is also employed by Leveau et alii [1993] and Fernández Corrales [1988].

defined from archaeological surveys, since none knows the proportion of sites recognized with regards to the total number that one day existed in a region [Bintliff, 1985; Shennan, 1985]. The anthropic and meteorological action in later periods may have destroyed signs of earlier occupations.

In the Peninsula, the situation is even worse because there is no standard methodology in archaeological surveys, making quite difficult any comparison of results. Sometimes, the surveyors do not even date the Roman sites, so it is impossible to analyze their evolution. Until a methodological framework is set up to control surveys as well as the way to classify sites and fix chronologies, any result will bring too many doubts[5]. Despite all these determining factors, it was believed to be convenient the use of the results from the 45 field surveys undertaken in the Iberian Peninsula as a first approach to the Roman rural settlement.

## 2. Methodology for the calculation of populations

First of all, it must be distinguished between the methodology employed to calculate the urban and rural population respectively. In the case of urban populations, this is estimated on the basis of the extension occupied by the ancient city and a density previously defined, according to ethnographic, literary data and historical census [Lot, 1945; Lézine, 1969; Brunt, 1971; Hassan, 1981, 39-40; De Roche, 1983; Bagnall and Frier, 1994, 54-55]. On the other hand, the rural population is calculated according to the density of sites recorded in a territory (per $Km^2$ or hectare), multiplied by a mean of the number of inhabitants for each rural site, and finally for the total extension of the territory. Thus, the formula for the calculation of urban populations can be reduced to:

$$P = k \times A$$

where (P) is the population, (k) is a density of population per unit and (A) is the area occupied by the site. Whereas the formula for the calculation of rural populations would be:

$$P = d \times k \times S$$

where (P) is population, (d) is a density of sites per unit, (k) is the number of people per site and (S) is the total area of the territory studied. Both formulae are straight forward, though some problems arise to get a suitable k for each case, as well as to document densities (d) and areas (A) of the settlements.

The density of urban population varied according to the average size of households, number of dwellers per household and the public areas. A first source, Mols [1955], pointed that cities in Europe from XIVth to XVIIIth century had densities between 100 to 500 inhabitants per hectare. On the other hand, Frankfort [1950] defined a mean between 297 to 494 inhabitants for the ancient Mesopotamia, whereas Adams [1965] calculated an average around 200 inhabitants, on the basis of modern densities in Baghdad (216 people), and towns (233 people) and villages (137

[5] Today in Spain only the survey in the *ager Tarraconensis* [Keay, 1991] has the minimal guarantees for the use of its results.

people) in the Susa plain and the Kur valley. Finally, the proposal by Russell [1958] stands out. He defined a density between 100 to 200 inhabitants for Medieval Europe. The lowest density is the one applied by Boon [1974] to estimate the population of the Roman city of *Calleva* (Silchester).

From these evidences, all the authors appear to agree that a range of 150 to 350 inhabitants is a reasonable density for pre-industrial towns. However, there are some shades, since it has been observed that the major political, economic and administrative centres increased their population, which is also reflected in a larger territory with regards to secondary centres. That is why two densities were selected, one for the primary centres and another for minor ones, although both are within the same range of 150 to 350 inhabitants.

The density for primary centres was taken from a quote by *Diodorus Siculus* (17.52.6), who recorded that the free population of Alexandria (*eleutheroi*) was 300.000 citizens. The city covered approximately an area of 920 hectares [Engels, 1991, 80 and 220]. This value represents a density of 326 inhabitants per hectare. Nevertheless, Delia [1989] suggests a total of 400 inhabitants including the possible female population and the *chora* of the city, which summed 1250 hectares, but her evidences are weak. Therefore, we have chosen the density of 326 people per Ha. as it is quite a reasonable estimate that may be compared to the one from the XVIth century Venice (327 people) or the one given for Pompei on the basis of the capacity of its amphitheatre (312 people) [Grant, 1971, 45].

With regards to the secondary centres, the census from the egyptian city of Hermopolis (SPP V.101) was used. The city occupied an extension of 120 Ha. and it is known that two of its four quarters had 4.200 houses (*oikiai*). Moreover, we establish an average of 4 people per household or family, instead of 5.3, which was the figure employed by the authors [Bagnall and Frier, 1994, 67], who obtained with this estimate a density of 300 inhabitants per Ha. Actually, they also admit that the arithmetic average size of a family in Roman Egypt was 4 members, according to the 136 complete censuses recovered so far. If the 41 partial censuses also known were included, the mean would increase to 4.3 members per household. Other estimates on the average size of a family in Roman Egypt are 5.8 [Hombert and Préaux, 1952, 154-155], 5.1 [Hopkins, 1980, 329] or 7.3 members [Hobson, 1985]. However, a mean between 4 to 5 people per household is the most accepted for Rome [Saller and Shaw, 1984], which agrees with the ethnographic parallels employed for demographic calculations in archaeology [Hassan, 1981, 73; De Roche, 1983]. Thus, it was believed that a coefficient of 4 members for family was appropriate for a new calculation of the population of Hermopolis, providing in this way, a density of 233 inhabitants per hectare. This estimate is closed to the one provided by Lézine for the Northafrican centres (250 people) [Lézine, 1969], as well as the density used to calculate the population of the Asturian castros in the I century B.C. (200-250 people) [Sánchez Palencia and Fernández Posse, 1986-7, 378] and the modern densities of Mesopotamia (216-233 people) [Adams, 1950], so it is considered a suitable value as density for secondary urban centres.

For the choice of these coefficients, extreme values have been rejected such as the one put forward by Packer [1967], who suggested a density of 390 inhabitants per Ha. for Ostia arguing that most buildings were 4 storeys houses. Also the density of 160 inhabitants suggested for Pompei [Russell, 1958, 64] was rejected since it identifies low-rank settlements, and which was

wrongly used by Engels [1990, 52] to calculate the total population of Corinth [Whittaker, 1993, ix:5].

Summing up, two densities (k) were selected to calculate the urban population. The first is 326 inhabitants per Ha. for primary centres, while the second is 233 inhabitants per Ha. for secondary centres. Apart from these urban densities, it was distinguish another one of 250 people per Ha. for military camps, bearing in mind that every legion of 5.000 men occupied approximately an extension of 20 Ha. (e.g. camps of Haltern, Inchtuthill, Folleville) [Keppie, 1984].

The calculation of rural populations is quite different, as it is necessary to define the number of inhabitants per rural site or, in other words, or the average size of scattered habitat. The choice of this value is not easy, for instance Millett [1990, 185] establishes his estimate around 4-5 or 30 people, on the basis of medieval analogies, which provide an average of 20 inhabitants per rural site. Notwithstanding that he provides another top value of 50 people, he does not justify why, and therefore it was rejected here. Therefore, 20 inhabitants (k) was chosen as a reasonable average size for a rural site.

As was already said, there were two additional difficulties in demographic calculations, also related to the nature of the archaeological record, which are the urban areas and the densities of rural sites. With reference to the urban areas, rescue excavations have improved substantially our knowledge about the extension of the most important sites in the Iberian Peninsula. This new data, together with the specialized works by other authors [Taracena, 1949; García Bellido, 1966; Balil, 1971; Fernández Ochoa and Morillo, 1991; 1992] produced an increasing number of known urban perimeters, which reach now 106 sites (see table 1). Of course, this is a limited number considering that *Pliny the Elder* (circa A.D. 72-74) recorded 399 cities in Hispania (NH III.3.7-17; IV.4.18-30; IV.35.113-118), information which may have probably stemmed from one of the censuses that he had access, perhaps the one by *M.Agripa*. Despite this, the current sample is representative enough to undertake calculations, since it includes the most important centres.

A possible area was provided for the remaining centres mentioned by *Pliny* (293 cities), according to their rank, following the principles of modern geography [Carrera et alii, 1988, 212; Capel, 1989]. 93 out of 293 centres would occupy 10 Ha., while the remaining ones, 200, would have an average size of 5 Ha.

With reference to the density of rural settlements, there are two different documental sources. The first one, the quotes by *Pliny the Elder* (NH III.4.28) on the population of three *conventus iuridici* (*Braccarum*: 285.000; *Lucensis*: 166.000; *Asturum*: 240.000), probably obtained from a census. To obtain the rural population, the urban population must be subtracted to these total populations. The second source are the field surveys carried out in the last years in the Iberian Peninsula [Ruiz Zapatero, 1988]. Despite their lack of method and intensity, they provide an alternative view of the rural world in Roman Spain.

First of all, an average density of rural settlements was estimated from the values obtained in the 45 surveys documented (see table 2). This density of sites was multiplied by 20 inhabitants per settlement, which is a relatively high mean selected consciously to offset the limited number of sites documented by a field survey [Bintliff, 1985]. Another experimental calculation, however, was

undertaken for every *conventus*, on the basis of the surveys carried out in each of them, with a final one obtained from all the partial results. This second estimate shows differences in the fieldwork of diverse research teams and in different regions, so the conclusions drawn are prone to error.

So far, we have justified the reasons behind the use of particular methodology and values in the calculation of populations. Below, the detail of the results obtained in the global estimate of the Roman population in Hispania are fully explained, including some specific problems related to the quality of the data.

**3. The total population in Hispania**

For the calculation of the urban population, the 14 capitals of *conventus iuridici* were distinguished as the main centres in Hispania, which are also the cities occupying larger areas (*Braccara Augusta, Lucus Augustus, Asturica Augusta, Cartago Nova, Clunia, Caesaraugusta, Tarraco, Gades, Hispalis, Astigi, Corduba, Pax Iulia, Scallabis, Emerita Augusta*). The area of all those centres is known with the only exception of *Scallabis*, to which a possible area of 30 Ha. was given, which is an intermediate size among the known areas of other capitals of *conventus iuridici*. Furthermore, the area for *Clunia* was corrected, since before it was fixed in 130 Ha. [Palol, 1966], which is the total extension of the plain where it lies and none knows the portion of plain urbanized. As the limits of this city are still unknown, a provisional area of 70 Ha. has been supplied, similarly to other urban centres with identical rank (e.g. *Tarraco, Corduba*)[6].

[6] Nowadays Palol [1994, 20] suggests a maximum extension of 100 Ha. for the city including extramural areas. This estimate is still to high, compared to the rest of hispanic centres, taking into account that the urban limits are still unknown.

Multiplying the extension of these 14 urban nuclei by the density defined for primary centres (326 people per Ha.), the final result is 208.640 inhabitants for all the capitals of *conventus iuridici*. Secondly, the known area of 90 minor centres (see table 1) was multiplied by a density (233 people per Ha.), whereas the two military camps in the list were multiplied by a density of 250 people per Ha. The sum of all these partials accounted for 343.908 inhabitants. Finally, to the last 293 remaining centres, mentioned by *Pliny*, areas of 10 hectares (93 cities) and 5 (200 cities) respectively, were assigned; and these were multiplied by the appropriate density (233 people per Ha.), reaching a total of 449.690 inhabitants. Summing up, all these steps provide the following urban population for Hispania, which can be divided into three blocks:

| | Urban population |
|---|---|
| *Conventus iuridici* (14) | 208.640 inhab. |
| Secondary centres (table 1: 92) | 343.908 inhab. |
| Other secondary centres (293) | 449.690 inhab. |
| Total urban population | 1.002.238 inhab. |

A little bit more than a million urban inhabitants for Roman Spain is comparable to the figure of 1.75 millions calculated for a society so urbanised as the egyptian [Gerenek, 1969; Goldsmith, 1984; Rathbone, 1990; Bagnall and Frier, 1994, 56]. On the contrary, the comparisons with *Britannia* are more difficult, since Millett [1990, 183] only includes 62 urban centres, to which he assigns densities between 137 and 216 inhabitants per Ha. Of course, this estimate is rather low, not only in the number of settlements but also the densities selected.

In the section of rural population, the first calculation implies the use of figures from the censuses documented by *Pliny the Elder* (NH III.4.28). Subtracting the urban populations to the totals referred by this author, the following figures are obtained:

| | |
|---|---|
| *Conventus Asturum* | 240.000 - 38.604 = 201.395 inhab. |
| *Conventus Lucensis* | 166.000 - 24.310 = 141.690 inhab. |
| *Conventus Braccarum* | 285.000 - 40.078 = 244.922 inhab. |

Although these numbers, according to *Pliny the Elder*, only represented the free population, the slave population was never relevant in the *conventus*, with the only exception of the mines. The second step requires to divide those partials of rural population of each *conventus*, into their territories, which brings the following densities:

| | |
|---|---|
| *Conventus Asturum* | 5.1 inhab. per Ha. |
| *Conventus Lucensis* | 6.3 inhab. per Ha. |
| *Conventus Braccarum* | 12.2 inhab. per Ha. |

Without any doubt, the rural density in the *conventus Braccarum* seems astonishing, which does not have any clear explanation when comparing the archaeological evidence from the three *conventus*. To make easy the comparisons of this data with the results of the field survey (see table

2), they were divided into 20, which was the number of inhabitants assigned to each rural site, obtaining the following potential densities of settlements.

| | |
|---|---|
| *Conventus Asturum* | 0.25 sites per Km² |
| *Conventus Lucensis* | 0.31 sites per Km² |
| *Conventus Braccarum* | 0.61 sites per Km² |

The average of these three densities, added to the 45 gathered from the field surveys (see table 2), is 0.27 sites per Km², which multiplied by the total extension of the Iberian Peninsula (580.160 Km²), and a mean of 20 inhabitants per rural unit, accounts for a total of 3.132.864 inhabitants. Bearing in mind that most the field surveys do not possess the ideal conditions, since only one of them (the *Ager Tarraconensis*) [Keay, 1991] is intensive and systematic, the result must be considered provisional. We hope that the number of surveys and their quality will increase in the future, so that these figures will be more reliable. With all the inconveniences, at least there is a final figure for the population of Roman Spain.

Total population

| | |
|---|---|
| Urban population (24.23%) | 1.002.238 inhab. |
| Rural population (75.77%) | 3.132.864 inhab. |
| Total | 4.135.102 inhab. |

This total is not far from the one suggested by Vives [1956], and even the proportion of urban populations (24.23%) is close to the range of 30-40% defended by Leveau et alii [1992, 119] for the Mediterranean provinces in the Roman Empire. Against the opinion of Taracena [1949, 429], the Romano-hispanic population was chiefly settled in the countryside instead of the city, it appears that the degree of *urbanitas* was less developed than other Western provinces such as Gallia [Lot, 1945; Clavel and Levêque, 1971; Février, 1990]. It is also significant that only the city of *Emerita* in Hispania went beyond 100 Ha., while in Gallia, there were more centres that went beyond 100 Ha., and even some cities more than 200 Ha. such as *Vienne, Nimes* or *Trier* [Lot, 1945]. The same phenomena was already documented in the Iron Age and the Iberian period, when the Peninsula urban settlements were comparatively smaller in size than the ones from most regions in Western Europe [Almagro, 1988]. In fact, in 1820 only the 14% of the Spanish population (approximately 1.5 millions) lived in cities, and it was in 1900 when it reached a 32% [Capel, 1989, 293]. The figure of the total population of Spain results similar to the one estimated for Roman Egypt (4.75 millions) by Bagnall and Frier [1994, 56], though this fact is surprising[7].

Due to the irregular pattern of distribution observed in the countryside by the field survey and also documented in the modern censuses [Tamames, 1980, 67; Bolós, 1989, 281-290; Del

[7] There are two estimates that fix the egyptian population over 5 millions [Rathbone, 1990, 123-124], but without reaching the extreme values contained in the literary sources such as *Diodorus Siculus* (I.31.6-9) who mentions 3 millions or *Flavius Josephus* (BJ 2.385) who suggested 7 millions [Salmon, 1974, 35-36].

Campo and Navarro, 1992, 13], another calculation was carried out adding the partial results for each *conventus*, according to the administrative division defined by Keay [1988, 61]. The total of this second estimate is one million of rural inhabitants less (2.309.333 inhab.), in which the figures of the *conventus cluniense* (circa 44.000 inhab.), *carthaginensis* (circa 287.279 inhab.), *scallibitanus* (circa 24.800 inhab.) and *emeritense* (circa 134.00 inhab.) were underrated. The problem of quality in the archaeological surveys seems even more accute in this regional study, so that the average for all of them is the best solution, for the time being.

Nevertheless, it seems evident that the population in Roman Spain was distributed irregularly in its geography, according to the economic resources of each territory. This total population around 4.135.102 people, which provides a global density of 7.12 inhabitants per Km², once rural and urban populations are added. This population was grouped in a different way in its urban and rural settlement. The territorial occupation is mirrored in the archaeological distributions of artifacts that were part of the commercial circuits in this province. The population distribution is a key issue to understand trade in the Roman period, since it was the main pole of attraction in the movement of articles at either provincial and interprovincial level. Therefore, the study of this possible distribution facilitates the comprehension of other phenomena intimately related to the population.

The next section attempts to analyze this distribution on the basis of the location of the urban population and the data provided by the fields survey for the rural world. Both sides are studied separately to observe the possible coincidences and, of course, divergences.

## 4. Population distribution in Roman Spain

The population in the Roman Peninsula has been always irregularly distributed, as can be observed in modern times when higher densities are recorded in the periphery and lower in the centre, including the castilian meseta, with the only exception of the city of Madrid. For instance, the census of 1900 revealed that the lowest densities were documented in Aragón, the two Castillas and Extremadura; whereas, apart from the case of Madrid, the highest densities were registered in Valencia, Galicia, País Vasco and Catalonia [Del Campo and Navarro, 1992, 13]. But this pattern was not always that way, in the XVth and XVIth centuries, the highest density was documented in the country's centre and the lowest ones in the periphery. That is why, people talk about an inversion of densities in modern times [Vilà, 1989, 227]. However, distribution patterns for earlier periods than the Middle Ages have been never studied. Therefore, it is quite interesting the analysis of the population distribution in Roman Spain, according to the archaeological evidences, either urban and rural. This study was developed on the basis of computer interpolations with a geographical information system known as IDRISI 4.1 [Allen et alii, 1990; Kvamme, 1989]. The first interpolation uses absolute populations calculated from the perimeter of the 106 Romano-hispanic sites listed in the table 1, whose location appears in figure 1. On the other hand, the second interpolation is based on the 45 densities obtained in the surveys documented in the Peninsula (see table 2), which appears in the figure 2.

First of all, the towns distribution in figure 1 shows that there are regions with a lack of representation such as the *conventus Carthaginensis*, where perimeters of towns such as *Oretum*,

*Libisosa, Basti* or *Acci* are missing. Moreover, there is a scarce representation in zones of the *conventus cluniensis*, where cities such as *Cauca, Septimanca, Ocelum Duri* (Zamora) or *Pallantia* do not appear. The limited knowledge of the urban perimeter of these cities affects the representativity of the sample in some regions, thus the interpolation is partial. Nevertheless, a sample of 106 cities seems to be consistent enough to provide an orientative view of the possible distribution of the Roman population. With reference to the surveys, their representativity can be questioned, as was said, due to the methodology employed. Also their location is not appropriate, as appears in figure 2, since there is a high concentration in the Guadalquivir valley, thanks to the work by Ponsich [1974; 1979; 1991][8], while only a few have been undertaken in the rest of the Peninsula, so that the sample affects the final results. On the contrary, there are regions such as Meseta, País Valenciano, NW Peninsula or North Catalonia, with no documented surveys.

Despite all these obstacles, it was thought convenient to carry out interpolations and to comment the results, as they constitute the first image of the possible pattern of population distribution in Roman Spain, which can be compared to other evidences. The figure 3 reveals the interpolation map created from the perimeter of the cities, which should also reflect to some extent, the rural habitat if a correlation between country and city exist. Actually, most geographical and archaeological models of central markets presuppose this relationship [Dicken and Lloyd, 1990; Hodder and Orton, 1976]. According to the size of the Romano-hispanic towns, it is obvious that the population was concentrated in middle and low-rank centres, similarly to the pattern recorded in the province of *Africa Proconsularis*, and opposite to the one from *Gallia*, where so many large settlements exist (more than 100 Ha) [Février, 1974; 1990; Lepelley, 1993]. This pattern of distribution becomes above all evident in the Guadalquivir valley, where there are many small urban centres close to each other, whose territories never covered more than 200 or 300 Km² [Guichard, 1993,68].

The map of figure 3 presents high densities of population at centres such as *Emerita Augusta, Clunia* and *Augustobriga*, which constitute isolated nuclei located in areas of low degree of urbanism defined by scattered habitats. The case of *Emerita Augusta* is quite significant since it suggests that the city controlled a large territory without competition by any other urban centre. in fact, we know from *Frontinus* (*De controversis*, 9) that when colony was founded (25 B.C.) the surrounding land was distributed amongst its inhabitants and there was still some land left. The division was undertaken in plots of 400 *iugerum*, based on units of 20x40 *actus* (*Higinius, De cond. agr.*, 135.15), and the remaining land was reserved for public use, as either grassland or woods (*Frontinus, De controversis*, 37; 44.5; 46.16). The information of all these texts is confirmed by the signs of *centuriatio* discovered by the aerial photography [Corzo, 1977; López Paz, 1994, 103-105], as well as the presence of milestones (*termini Augustales*) at Valdecaballeros (CIL II.656) [Stylow, 1986, 307], what demonstrates that the territory of the colony was immense, reaching over 14.400 Km² [Wiegels, 1976; Canto, 1989]. Actually, *Emerita* had even land in neighbouring territories, known as *praefecturae,* and recorded in the communities of Muliacenses and Turgalienses (*Higinius, De Lim. Contr.* 171, 6-10).

The large size of *Emerita* (120 Ha) suggest that most its inhabitants fixed their residence in the city, instead of living near their properties, though some of them were almost 50 Km away. Of

[8] Only the Junta de Andalucía, as part of its research policy, has given priority to landscape studies based on field surveys and it is the example to follow by the rest of autonomous communities.

course, there were rural settlements (*villae*, farms) in this territory, as the surveys of Salor river [Fernández Corrales, 1983] and the South of Trujillo [Cerrillo and Fernández Corrales, 1980] reveal, but their densities were rather low (0.07 and 0.05 sites per Km² respectively). This concentration in urban centres of large size in regions of low density of population is also represented by the cases of *Clunia, Avilam, Complutum* and *Augustobriga*. It would be interesting to test whether this pattern is common in the centre of the Peninsula (Castilia, León and Extremadura) or it is exceptional. The population pattern inland may indicate a continuity in the pre-roman traditions. In the Celtiberian area, there were large urban centres defined as *civitas* or *oppidum*, among which Fosos de Bayona (45 Ha.) or *Numantia* (20 Ha.) stood out [Bendala *et alii*, 1988], with a preferential defensive function for the inhabitants of their adjacent territory [Balil, 1971, 19].

The case of *Emerita* is also an exceptional example due to the extension of land that could be cultivated by the inhabitants of an urban centre. In the Roman world, most urban populations were still involved in agricultural activities, so the current contrast between country and city did not exist. The direct dependence on the countryside becomes evident through the *lex Irnitana* (chapter 76) [González, 1986] where it says that the *duumviros* monitored every year the city territory to evaluate the possible harvests, and the base for taxing. Actually, the division of the territory with the foundation of a colony indicates that an important part of the initial population was dedicated to agriculture. For the study of territories exploded by each urban centre, in relation to the number of inhabitants, there are some examples of milestones (*termini augustales*) in the Iberian Peninsula[9].

In general terms, the regions more densely populated were the Guadalquivir valley, the Ebro valley and the Levante coast, where there are numerous cities of middles and large size that covered in an organized way the whole territory. All these areas in antiquity had enough natural resources so as to endure high densities of population. In these regions, the urban centres of *Tarraco, Caesaraugusta, Corduba, Hispalis* and *Cartago Nova* stood out, which are the largest concentrations. In this context, the description by *Pomponius Mela* (*De chorographia*, III.5.88-94) illustrates which were the main urban centres in Roman Spain in the Claudian period. He stood out *Cartago Nova, Tarraco, Caesaraugusta, Emerita, Astigi, Hispal* and *Corduba*. Only in the case of *Astigi*, the archaeological evidence does not suggest that it was a populated town, though it was an important administrative centre, capital of *conventus*. The same author pointed out that other cities such as *Pallantia* and *Numantia* had lost ascendency (*Pomponius Mela, De chorographia*, III.5.88). The degree of urbanism has been linked to the presence of italics [Rodríguez Neila, 1981, 25], and following this argument, it appears that the Guadalquivir valley, the Ebro valley and the Levante coast received most of these immigrants. Although this correlation may look oversimplistic, in regions such as NW Spain it is observed that the newcomers settled almost exclusively in cities [Fabré, 1970]. The development of the urbanism implies, according to the

[9] Apart from the examples of *Emerita*, two milestones are documented limiting three communities such as *Bletisa, Mirobriga* and *Salmantica* (CIL II.859/ ILS 5970); and, *Sacilernusum, Idia* and *Solia* (CIL II.2349/ ILS 5973). There are *termini augustales* between only two communities such as the case of Lancienses and Igaeditanos (AE.1976, 273), *Ucubi* and *Lacimurga* [Stylow, 1986, 308], *Cisimbrium* and *Ipolcobulcula* (AE.1977.440), los *Coilarni* and *Arabrigenses* [López Paz, 1994, 16], *Talabriga* and *Langobriga* [López Paz, 1994, 15], other found at Guardao (AE.1954, 88) without the name of the communities involved, as the case of the one found at *Mirobriga* (CIL II.5033). Besides, there are two examples of milestones indicating the boundary of legionary territory, in this case *Legio IIII Macedonica*, and cities such as *Iuliobriga* (CIL II.2916; II.2454) or *Segisamo* (CIL II.5807; II.2455). The last case is a milestone that indicates the limits of the territory of *municipium Ostippo* (CIL II.1438/ ILS 5971) [Chouquer y Favory, 1992, 97].

ancient authors (*Strabo* III.5.26; *Cicero, De Rep*. 1.13; *Livi* VII.4.4; VII.39.12) a higher degree of civilization and it was the opposite to the idea of *rusticitas* or predominance of rural settlement.

Also in this case, it is important to take into account the pre-roman precedents, and above all the territory ruled by the iberians. The Guadalquivir valley, the Ebro valley and the Levante coast documented a high development of the urbanism before the Roman conquest. The main difference is in size, since only 6 centres reached an area larger than 40 Ha. (*Gadir, Corduba, Cartago Nova, Carmo, Castulo, Hasta Regia*), and the majority hardly reached 10 Ha. [Almagro, 1988, 30]. Therefore, the romans settled in regions with strong urban tradition, even though they found cities *ex novo* themselves. Their most important contribution was a population increase, as it is observed that most indigenous centres were enlarged in the Roman period.

With regards to the rural areas, the figure 3 reveals the Nw sector was less urbanised, what was already stated by *Strabo* (III.1.2) and chiefly by *Pliny the Elder*. Only the capitals of *conventus* (*Lucus, Asturica* and *Braccara*) together with *Uxama Barca*, look as the only urban oases in a territory with a low density of rural population. Other regions scarcely populated were the South Meseta, Sistema Ibérico (Teruel, Cuenca), the South of Portugal and the central Catalonia. In this last region, there is the evidence of numerous coastal urban centres of small dimensions such as *Barcino, Baetulo, Ilduro* or *Blandae*; but few urban centres inland, where there are numerous rural establishments.

According to the size, the population pattern seems to follow the rivers axes (Guadalquivir, Ebro), which is confirmed by the urban concentrations in the Duero and Tajo valleys, where it is also observed a more organized occupation of the territory on the basis of lower rank urban centres. The population distribution following the river axes responds to basically economic reasons, and mainly commercial, since these axes favoured the trade contacts. This settlement pattern is generalized in the Roman world, and above all, in provinces with a relief so pronounced as Hispania [Sillières, 1990; Carreras, 1994]. In this sense, the location of the *Terra Sigillata Hispana* workshops (Tricio, Andújar) on the Guadalquivir and Ebro riversides, confirms the need to access the major number of potential customers along the rivers [Juan, 1990]. Not only the river routes appear to determine the land occupation, but also the roads infrastructure seem to be cause or consequence of the high concentrations of population. In the case of Hispania, the Roman crossroads coincide with the larger urban centres. The centres crossed by a major number of roads such as *Caesaraugusta, Hispalis, Corduba, Emerita, Anticaria* or *Acci*, were important nuclei of population. In the case of the last two centres, they were junctions of minor roads, thus they were less relevant. Besides, comparing the importance of the main roads crossing the Peninsula [Roldán, 1975; *Simposio*, 1990], according to the number of primary and secondary roads ending at each of them, as Dicks [1972] did for *Britannia*, it appears that the principal axes were the ones connecting *Barcino* or *Tarraco* to *Olisipo*, and *Iaca* to *Gades*. The figure 3 illustrates that these two routes concentrated along them, most the Romano-hispanic population.

Although the interpolation of the cities size provides a general view of the possible distribution of population either rural or urban, the interpolation based on the surveys results is not a great help. The high densities recorded at *Baetulo* and, to less extent, in Tarragona, Huescar, Lora del Río, Carmona, Campana, Posadas and Bujalance, altered this image in which there are only concentrations in NE Spain and the Guadalquivir valley. The only conclusion that can be

drawn from this application is that more systematic surveys are required and with some common ground in order to analyze the distribution of the rural population with some guarantees. Therefore, the current data notwithstanding their use to define an average for the estimate of rural population, is not good enough to document the occupation of the Roman countryside. Only the inferences obtained from the cities size are, so far, the unique approach to a possible pattern of rural settlement.

As was indicated from the start, these results about the population in Roman Spain do not correspond a particular moment, but they include data from a long time span. If the distinction of phases in the occupation of cities were possible as well as shifts in the rural settlement over the time, this would allow us to understand many other socioeconomic aspects which cannot be explained today. Among those aspects, the external and internal mobility of populations, evident through the epigraphy [D'Ors, 1953; Fabré, 1970; García Merino, 1975; Haley, 1989; Magallón and Navarro, 1991-2], but they are simply outlined. It still required a more complete documentation, either the urban evolution and the rural occupation, to establish a more accurate image of the Roman population in Hispania. At least, the present work is a first start.

## 5. Conclusions

The present paper pretends to analyze the population of Roman Spain in absolute terms, as well as its distribution in the geography of the Iberian Peninsula. Although its calculation presents many problems and the methodology can be always questioned, the quantity obtained allows us to establish comparisons with other historic periods and interpret the occupation of the territory. At the beginning, the region resources may have determined the maximum density of population in a territory. Nevertheless, the complexity of the Roman economic structure, in which the exchange played a significant role, may have limited the direct dependence on the near environment and favoured the settlement in areas of easy access, complementing local resources with others coming from outside. To some extent, the populations clusters following the main communication axes indicate the important external influence.

The value of the pattern of Roman population, as was said, is due to the fact it explains numerous economic phenomena recorded only by archaeological testimonies. The distribution of many archaeological artifacts (e.g. coins, fine ware, amphorae, lamps) was determined by the potential demand of each place, defined by its number of inhabitants and their purchase power. If the transport cost are added, these are the minimal variables to interpret an archaeological distribution. These variables are the ones affecting the quantities of archaeological artifacts recorded at each site, and thus, they provide their economic logic. As can be observed, the irregular distribution of population in Roman Spain cannot be questioned and therefore, affected either the administration and the economy of these Western provinces. The more we improve the knowledge of this population pattern, the easier the understanding of other aspects of everyday life will be. So far, it is still difficult to interpret the provisional results, although some tendencies appear in the population distribution, which with no doubt, will facilitate the comprehension of many other phenomena.

**Tabla 1: Extensión de las principales ciudades hispano-romanas (hect.) [número en figura 1]**

| | | |
|---|---|---|
| Aguilar-Inestrillas (*Contrebia Leukade*) | 12.00 | [72] |
| Alcalá de Henares (*Complutum*) | 40.00 | [63] |
| Alcalá del Río (*Ilipa Magna*) | 12.60 | [10] |
| Alcoçer do Sal (*Salacia*) | 10.00 | [66] |
| Almaden (*Sisapo*) | 12.00 | [71] |
| Ampurias (*Emporion*) | 21.00 | [21] |
| Armeá | 4.20 | [101] |
| Astorga (*Asturica Augusta*) | 16.00 | [35] |
| Avila (*Avilam*) | 31.50 | [17] |
| Azaila (*Beligiom*) | 1.50 | [89] |
| Badalona (*Baetulo*) | 10.00 | [34] |
| Baena (*Ipponuba*) | 4.00 | [96] |
| Barcelona (*Barcino*) | 12.00 | [8] |
| Beja (*Pax Iulia*) | 18.00 | [42] |
| Belmonte del Perejil (*Segeda*) | 15.00 | [86] |
| Blanes (*Blendium*) | 10.00 | [32] |
| Bolonia (*Belo*) | 11.50 | [11] |
| Botorrita (*Contrebia*) | 12.00 | [87] |
| Braga (*Braccara Augusta*) | 33.00 | [43] |
| Cabezo del Griego (*Segobriga*) | 12.50 | [57] |
| Cádiz (*Gades*) | 40.00 | [31] |
| Calahorra (*Calagurris Iulia*) | 16.00 | [5] |
| Calatayud (*Bilbilis*) | 20.00 | [20] |
| Cañaveruelas (*Ercavica*) | 19.00 | [76] |
| Carmona (*Carmo*) | 42.40 | [16] |
| Cartagena (*Cartago Nova*) | 52.00 | [19] |
| Casar de Cáceres (*Castra Caecilia*) | 24.00 | [61] |
| Casares (*Lacipo*) | 3.00 | [59] |
| Castillo de Mulva (*Munigua*) | 6.00 | [39] |
| Castrocalbón | 4.00 | [30] |
| Castromao | 1.60 | [99] |
| Cazorla (*Castulo*) | 40.00 | [60] |
| Citânia de Briteiros (Guimaraes) | 3.75 | [82] |
| Ciudad Rodrigo (*Augustobriga*, Vetones) | 49.00 | [55] |
| Coimbra (Condeixa-a-Velha) | 9.00 | [12] |
| Córdoba (*Corduba*) | 70.00 | [27] |
| Coria (*Caurium*) | 6.50 | [54] |
| Coruña del Conde (*Clunia*) | 70.00 | [3] |
| Ecija (*Astigi*) | 20.00 | [51] |
| Chaves (*Aqua Flavia*) | 4.50 | [49] |
| Elche (*Ilici*) | 9.80 | [93] |
| El Rocadillo (*Carteia*) | 17.50 | [56] |
| Evora (*Liberitas Iulia*) | 8.00 | [22] |
| Faro (*Ossonoba*) | 30.00 | [65] |
| Galera (*Tutugi*) | 6.50 | [94] |
| Gerena | 2.90 | [15] |
| Gerona (Gerunda) | 6.00 | [9] |
| Gijón (*Gigia*) | 16.00 | [44] |
| Guissona (*Iesso*) | 10.60 | [67] |
| Huelva (*Onuba*) | 14.00 | [92] |
| Huesca (*Osca*) | 16.50 | [75] |
| Iruña (*Veleia*) | 12.00 | [68] |
| Isona (*Aeso*) | 4.00 | [41] |
| Játiva (*Saetabis*) | 10.00 | [106] |
| Jerez (*Hasta Regia*) | 42.00 | [90] |
| La Coruña (*Brigantium*) | 12.00 | [38] |
| La Moncloa (*Obulculo*) | 3.30 | [97] |
| León (*Legio*) | 19.00 | [24] |
| Lisboa (*Olissipo*) | 48.00 | [64] |
| Lugo (*Lucus Augustus*) | 34.00 | [26] |
| Mahón (*Iamon*) | 5.00 | [48] |
| Málaga (*Malaca*) | 25.00 | [91] |
| Martos (*Tucci*) | 5.60 | [14] |
| Mataró (*Iluro*) | 10.00 | [33] |
| Medinaceli (*Ocilis*) | 20.00 | [98] |
| Mérida (*Emerita Augusta*) | 120.00 | [1] |

| | | |
|---|---|---|
| Monte Cantabria | 1.60 | [73] |
| Monte Mozinho (Penafiel) | 20.00 | [84] |
| Muro de Agreda (*Augustobriga*, Pelendones) | 49.00 | [53] |
| Niebla (*Ilipa Minor*) | 15.70 | [58] |
| Numancia (*Numantia*) | 12.00 | [36] |
| Olleros de Pisuerga (Monte Cilda) | 13.00 | [74] |
| Osma (*Uxama Argaela*, Soria) | 28.00 | [7] |
| Osma (*Uxama Barca*, Vitoria) | 28.00 | [62] |
| Osuna (*Urso*) | 17.50 | [77] |
| Palma | 6.00 | [46] |
| Pamplona (*Pompaelo*) | 15.00 | [23] |
| Peñaflor (*Celti*) | 28.00 | [69] |
| Pollensa (*Pollentia*) | 12.00 | [47] |
| Ronda la Vieja (*Acinipo*) | 50.00 | [88] |
| Rosinos (*Pentavonium*) | 5.00 | [29] |
| Sabroso | 1.80 | [105] |
| Sagunto (*Saguntum*) | 27.00 | [37] |
| San Cibrán de Lás | 9.00 | [102] |
| Sanfins (Paços de Ferreiro) | 15.00 | [83] |
| Santa Luzía | 6.00 | [104] |
| Santa Maria de Castelo (Troia) | 2.00 | [81] |
| Santa Pola (*Portus Illicitanus*) | 24.00 | [50] |
| Santarem (*Scallabis*) | 30.00 | |
| Santa Tegra | 20.00 | [103] |
| Santiago de Cacem (*Mirobriga*) | 4.00 | [80] |
| Santiponce (*Italica*) | 41.50 | [13] |
| Sasamón (*Segisamo*) | 3.50 | [45] |
| Sevilla (*Hispalis*) | 12.00 | [40] |
| Tarragona (*Tarraco*) | 70.00 | [2] |
| Tejada la Vieja (*Iptuci*) | 10.40 | [95] |
| Tiermes (*Termantia*) | 20.00 | [52] |
| Toledo (*Toletum*) | 5.00 | [25] |
| Tossal de Manises (*Lucentum*) | 3.00 | [70] |
| Troña | 2.00 | [100] |
| Valencia (*Valentia*) | 37.00 | [18] |
| Valença (*Valentia*) | 12.00 | [28] |
| Valera Vieja (*Valeria*) | 14.00 | [79] |
| Velilla del Ebro (*Celsa*) | 6.00 | [78] |
| Ventas de Caparra (*Capera*) | 16.00 | [6] |
| Viseu | 30.00 | [85] |
| Zaragora (*Caesaraugusta*) | 55.00 | [4] |

**Tabla 2: Prospecciones en las Hispanias (yacimientos rurales por Km²)**

| | Area (Km²) | Yacimientos | Densidad |
|---|---|---|---|
| 1. Sierra de Yeguas (Málaga) [Recio y Ruiz, 1989-90] | 64 | 13 | 0.2 |
| 2. Baetulo (Barcelona) [Prevosti, 1981] | 210 | 41 | 1.62 |
| 3. Tarragona (Tarragona) [Keay, 1991] | 46.5 | 42 | 0.90 |
| 4. Alto Guadalquivir (Jaén) [Ruiz et alii, 1991] | 147 | 50 | 0.34 |
| 5. Cuenca del Nava (Palencia) [Rojo, 1985] | 875 | 50 | 0.05 |
| 6. Elvas-Monforte (Algarve) [Judice, 1988] | 10 | 3 | 0.3 |
| 7. Val do Cavado (Braga) [Martins, 1988] | 418 | 26 | 0.06 |
| 8. Pinoso (Murcia) [Seva, 1991] | 126 | 4 | 0.03 |
| 9. Lerín (Navarra) [Ona, 1984] | 100 | 20 | 0.2 |
| 10. Altiplanicie soriana [Borobio y Morales, 1984] | 750 | 26 | 0.03 |
| 11. Los Velez (Almería) [Martínez y Muñoz, 1984] | 568 | 14 | 0.02 |
| 12. Sevilla [Ponsich, 1974] | 454 | 145 | 0.31 |
| 13. Alcalá del Río [Ponsich, 1974] | 454 | 154 | 0.33 |
| 14. Lora del Río [Ponsich, 1974] | 454 | 222 | 0.48 |
| 15. Carmona [Ponsich, 1974] | 454 | 287 | 0.63 |
| 16. Palmar del Río [Ponsich, 1979] | 454 | 167 | 0.36 |
| 17. La Campana [Ponsich, 1979] | 454 | 199 | 0.43 |
| 18. Posadas [Ponsich, 1979] | 454 | 254 | 0.55 |
| 19. Bujalance [Ponsich, 1987] | 454 | 214 | 0.47 |
| 20. Montoro [Ponsich, 1987] | 454 | 63 | 0.13 |
| 21. Andujar [Ponsich, 1987] | 454 | 128 | 0.28 |
| 22. Sevilla [Ruiz Delgado, 1985] | 304 | 93 | 0.3 |
| 23. Sur de Trujillo [Cerillo y Fdez. Corrales, 1980] | 400 | 22 | 0.05 |
| 24. Río Salor [Fdez. Corrales, 1983] | 625 | 46 | 0.07 |
| 25. Penedés [Miret et alii, 1987] | 450 | 29 | 0.06 |
| 26. Alange [Calero y Márquez, 1991] | 60 | 20 | 0.33 |
| 27. Sao Cucufate [Alarçao et alii, 1988] | 20 | 8 | 0.4 |
| 28. Monegros [Badía et alii, 1990] | 60 | 20 | 0.33 |
| 29. Escatrón [Zapater y Navarro, 1990] | 144 | 9 | 0.06 |
| 30. Cuencas mineras turolesas [Herrero et alii, 1990] | 21 | 1 | 0.04 |
| 31. Arba de Biel [Peña, 1990] | 72 | 19 | 0.26 |
| 32. Taramundi (Asturias) [Arnau y Noval, 1990] | 81 | 3 | 0.03 |
| 33. Oscos (Asturias) [Villa, 1990] | 343 | 15 | 0.04 |
| 34. Conimbriga [Pesoa, 1986] | 600 | 24 | 0.04 |
| 35. Yecla [Ruiz, 1990] | 660 | 9 | 0.01 |
| 36. Alcores [Amores, 1982] | 400 | 209 | 0.52 |
| 37. Hispalis [Escacena y Padilla, 1992] | 420 | 81 | 0.19 |
| 38. El Bujón [González et alii, 1991] | 60 | 29 | 0.48 |
| 39. Huescar [Fresnedo et alii, 1991] | 45 | 31 | 0.68 |
| 40. Guadalimar [López Rozas et alii, 1991] | 35 | 2 | 0.05 |
| 41. Trasdeza [Carballo, 1986] | 170 | 8 | 0.04 |
| 42. Tajuña [Almagro Gorbea y Benito, 1993] | 216 | 29 | 0.13 |
| 43. Sierra de Ujué [Beguiristain y Jusué, 1986] | 120 | 6 | 0.05 |
| 44. Javea [Ivars et alii, 1994] | 266 | 10 | 0.03 |
| 45. Priego-Alcaudete [Vaquerizo et alii, 1991] | 386 | 46 | 0.11 |

## *Bibliografía*


Abascal J.M. y U.Espinosa [1989] *La ciudad hispano-romana. Privilegio y poder*. Logroño.

Adams RM. [1965] *Land behind Bagdad: a history of settlement on the Diyale Plain*. Chicago.

Alarçao J., R.Etienne y F.Mayet [1988] Sao Cucufate. *Universalia*, pp.526-531.

Alcock S.E. [1993] *Graecia Capta. The landscapes of Roman Greece*. Cambridge.

Almagro Gorbea M. [1988] El área superficial de las poblaciones ibéricas. En *Coloquio sobre Los asentamientos ibéricos ante la Romanización*. Madrid (1986), pp.35-42.

Almagro Gorbea M. y JE.Benito [1993] La prospección arqueológica del valle del Tajuña (Madrid). *Complutum* 4, pp.297-310.

Allen KM., SW.Green y EBW.Zubrow (eds) [1990] *Interpreting space: GIS and archaeology*. Londres.

Amores F. [1982] *Carta arqueológica de los Alcores (Sevilla)*. Sevilla.

Arce J. [1993] La ciudad en la España tardorromana: ¿continuidad o discontinuidad?. En *Ciudad y Comunidad cívica en Hispania*. Madrid (1990), Madrid, pp.177-184.

Ariño E. [1990] *Catastros romanos en el convento jurídico Caesaraugustano. La región aragonesa*. Zaragoza.

Arnau E. y M.Noval [1990] Inventario arqueológico del concejo de Taramundi (Asturias). En *Excavaciones Arqueológicas en Asturias 1987-1990*. Oviedo, pp.219-221.

Badía M. et alii [1990] Avance de los resultados de una prospección en los Monegros. En *Estado actual de la Arqueología en Aragón (Ponencias)*, pp.21-32.

Bagnall RS. y BW.Frier [1994] *The demography of Roman Egypt*. Cambridge.

Balil A. [1963] Urbanismo romano en la España céltica. *Celticum* XII (65), pp.275-288.

Balil A. [1971] Casa y urbanismo en la España antigua. *BSAA* XXXVII, pp.5-75.

Barker G. [1991] Approaches to archaeological survey. En G.Barker y J.Lloyd (eds), pp.1-9.

Barker G. y J.Lloyd (eds) [1991] *Roman landscapes*. Archaeological Monographs British School of Rome 2, Londres.

Barral X. [1982] Transformacions de la topografia urbana a la Hispània Cristiana durant l'antiguitat tardana. En *II Reunió d'Arqueologia Paleocristiana Hispànica (Montserrat, 1978)*. Barcelona, pp.105-132.

Beguiristain MA. y C.Jusué [1986] Prospecciones arqueológicas en el reborde occidental de la Sierra de Ujué (Navarra). *Trab. de Arqu. Navarra* 5, pp.77-109.

Beloch KJ. [1886] *Bevölkerung der griechisch-römischen Welt*. Leipzig.

Beloch KJ. [1909] La popolazione del mondo greco-romano. En V.Pareto (ed) *Biblioteca di studi economico*. Milan, pp.340ss

Bendala M., C.Fernández Ochoa, A.Fuentes y L.Abad [1988] Aproximación al urbanismo prerromano y a los fenómenos de transición y de potenciación tras la conquista. *En Coloquio sobre Los asentamientos ibéricos ante la romanización*. Madrid (1986), pp.121-128.

Bintliff J. [1985] The Boetia survey. En S.MacReady y FH.Thompson (eds) *Archaeological field survey in Britain and abroad*. Londres, pp.196-216.

Blázquez JM. [1985] Economía y sociedad durante la dinastía Julio-Claudia y Flavia. En *Historia de España Antigua*. vol. ii, *Hispania Romana*. Madrid, pp.379-436.

Bolós M. [1989] La población rural. En M.de Terán et alii (eds), pp.269-292.

Boon GC. [1974] *Silchester: the Roman town of Calleva*. Newton Abbott.

Borobio J. y F.Morales [1984] Distribución del poblamiento de época romana Imperial en una zona de la provincia de Soria. *Arqueología Espacial* 5, pp.41-56.

Brunt P. [1971] *Italian manpower 225 BC-AD 14*. Oxford.

Calero JA. y A.Márquez [1991] Prospecciones, sondeos y excavaciones en Alange. *Extremadura Arqueológica* II, pp.579-597.

Cano M.L. [1978] Inscripción romana inédita en la provincia de Córdova. *Actas del I Congreso de Historia de Andalucía*, (Córdova, 1976), p.347.

Canto A.M. [1989] Colonia Iulia Augusta Emerita: consideraciones en torno a su fundación y territorio. *Gerión* 7, pp.149-205.

Capel H. [1989] El poblamiento urbano. En M.de Terán et alii (eds), pp.293-302.

Carballo LX. [1986] *Povoamento castrexo e romano de terra de Trasdeza*. Arqueoloxia/Investigación 2.

Carrera C. et alii [1988] *Trabajos prácticos de Geografía Humana*. Madrid.

Carreras C. [1994] *Una reconstrucción del comercio en cerámicas: la red de trasnportes en Britannia*. Cuadernos de Arqueología 7, Barcelona.

Castro M. [1984] Una aportación al estudio del poblamiento romano de la campiña del Alto Guadalquivir. *Arqueología Espacial* 5, pp.115-128.

Cerillo E. y JM.Fernández Corrales [1980] Contribución al estudio del asentamiento romano en Extremadura. Análisis espacial aplicado al Sur de Trujillo. *Norba* 1, pp.157-175.

Cipolla CM. [1969] *The economic history of world population*. Londres.

Clavel M. y P.Levêque [1971] *Villes et structures urbaines dans l'Occident romain*. Paris.

Compatangelo R. [1989] *Un cadastre de pierre. Le Salento romaine*. Bari.

Cortijo M.L. [1993] *La administración territorial de la Bética romana*. Córdoba.

Corzo R. [1977] In finibus Emeritensim. En *Augusta Emérita: Actas del Bimilenario de Mérida*. Mérida, pp.217-233.

Chevalier R. [1974] Cité et territoire. *ANRW* II.1, pp.649-784.

Chouquer G. y F.Favory [1991] *Les paysages de l'antiquité*. Paris.

Chouquer G. y F.Favory [1992] *Les arpenteurs romains*. Paris.

Del Campo S. y M.Navarro [1992] *Nuevo análisis de la población española*. Barcelona.

Delia D. [1989] The population of Roman Alexandria. *TAPHA* 118, pp.275-292.

De Roche CD. [1983] Population estimates from settlement areas and number of residences. *J.Field Archaeology* 10, pp.187-192.

Dicken P. y PE.Lloyd [1990] *Location in Space*. New York.

Dicks TRB. [1972] Network analysis and historical geography. *Area* 4, pp.4-9.

Domínguez Ortíz A. [1950] La población española a lo largo de nuestra historia. *Boletín de la Real Sociedad Geográfica* lxxxvi, pp.250-285.

D'Ors A. [1953] *Epigrafía jurídica de la España romana*. Madrid.

Duncan-Jones RP. [1977] Aqueduct capacity and city population. *Society for Lybian Studies* 9, pp.51.

Engels D. [1990] *Roman Corinth*. Chicago.

Escacena JL. y A.Padilla [1992] *El poblamiento romano en las márgenes del antiguo estuario del Guadalquivir*. Ecija.

Fabre G. [1970] Le tissu urbain dans le N.W. de la péninsule ibérique. *Latomus* XXIX, pp.314-339.

Fernández Corrales JM. [1983] El asentamiento rural romano en torno a los cursos altos y medio del Salor: su marco geográfico y distribución. *Norba* 4, pp.207-222.

Fernández Corrales JM. [1988] *El asentamiento romano en Extremadura y su análisis espacial*. Cáceres.

Fernández Ochoa C. y A.Morillo [1991] Fortificaciones urbanas de época Bajo Imperial I. Una aproximación crítica. *CnPAUAM* 18, pp.227-261.

Fernández Ochoa C. y A.Morillo [1992] Fortificaciones urbanas de época Bajo Imperial II. Una aproximación crítica. *CnPAUAM* 19, pp.319-360.

Féuvrier P.A. [1974] Permanence et héritages de l'Antiquité dans le topographie des villes de l'Occident durant le Haut Moyen Age. En *Topografia urbana e vitta cittadina sull'alto medioevo in Occidente (Spoleto, 1973)*, pp.41-284.

Forni G. [1975] Osservazioni critiche e metodologiche nello studio della demografia antica. *Actas de las I Jornadas de Metodología aplicada a las ciencias históricas*. Univ. Santiago, pp.225-232.

Frankfort H. [1950] Town planning in ancient Mesopotamia. *Town planning review* 21, pp.98-115.

Fresnedo E., MªO. Rodríguez, JMª Peña, M.López, I.Alemán y A.Rodríguez [1991] Prospección arqueológica superficial del río Huescar, desde Huescar a Galera. Campaña de 1991. *Anuario Arqueológico de Andalucía 1991*. Sevilla, pp.185-190.

Gallo L. [1981] La capienza dei teatri e il calcolo della popolazione: il caso di Atene. En *Studi Salernitani in memoria di Raffaele Cantarella*, pp.271-289.

Gallo L. [1984] *Alimentazione e demografia della Grecia antica*. Salerno.

Gallo L. [1990] Beloch e la demografia antica. En L.Polverini (ed) *Aspetti della storiografia di Giulio Beloch*, pp.115-158.

García Bellido A. [1959] *Las colonias romanas de Hispania*. Madrid.

García Bellido A. [1966] *Urbanística de las grandes ciudades del mundo antiguo*. Madrid.

García Bellido A., L.Torres, L.Cervera, F.Chueca y P.Bidagor [1968] *Resumen histórico del urbanismo en España*. Madrid.

García Marcos V. y J.M.Vidal [1993] Recent archaeological research at Asturica Augusta. *Proceedings of the British Academy* 86.

García Merino C. [1975] *Población y poblamiento en la Hispania Romana*. Valladolid.

Gerenek H. [1969] *Karanis: communanté de l'Egypte romaine au II-IIIe siècle de notre ère*. Paris.

Goldsmith RW. [1984] An estimate of the size and structure of the National Product of the Early Roman Empire. *Review of Income and Wealth* 30, pp.263-288.

González J. [1986] The lex Irnitana: a new copy of the Flavian Municipal law. *JRS* 76, pp.147-243.

González R., D.Ruiz Mata y L.Aguilar [1991] Prospección arqueológica superficial en la margen izquierda de la Marisma de "El Bujón" (T.M. de Jerez de la Frontera, Cádiz). *Anuario Arqueológico de Andalucía 1991*. Sevilla, pp.83-92.

Gorges J.G. [1979] *Les villes hispano-romaines*. Paris.

Grant M. [1971] *Cities of Vesubius: Pompeii and Herculaneum*. New York.

Guichard P. [1993] Les effet des mesures flaviennes sur la hiérarchie existant entre les cités de la Péninsule ibérique. En *Ciudad y Comunidad cívica en Hispania*. Madrid (1990), Madrid, pp.67-84.

Haley E.W. [1989] *Foreigners in Roman Imperial Spain. Investigations of Geographical mobility in the Spanish provinces of the Roman Empire, 30 B.C. - A.D. 284*. Chicago.

Hassan FA. [1981] *Demographic archaeology*. Cambridge.

Herrero MA. et alii [1990] Resultados de las prospecciones 87 en cuencas mineras turolenses. En *Estado actual de la Arqueología en Aragón (Ponencias)*, pp.63-82.

Hingley, R. [1989] *Rural settlement in Roman Britain*. Londres.

Hobson DW. [1985] House and household in Roman Egypt. *YCIS* 28, pp.211-229.

Hodder IR. y C.Orton [1976] *Spatial analysis in Archaeology*. Cambridge.

Hombert M. y C.Préaux [1952] *Recherches sur le recensement dans l'Egypte romaine (P.Bruxelles inv. E.7616)*. Bruselas.

Hopkins K. [1980] Brother-sister marriage in Roman Egypt. *Comparative Studies in Society and History* 22, pp.303-354.

Ivars JA., J.Molina, JM.Mora y O.Vicent [1994] El poblamiento de época romana en Javea. *Xabiga* 7, pp.19-64.

Juan Tovar L.C. [1990] Alfares y vías de comunicación en la Hispania Romana. Acercamiento a una relación. En *Simposio de la red viaria* (Zaragoza), pp.293-300.

Judice T. [1988] Arqueologia Espacial en Portugal. Algunos exemplos. *Arqueologia Espacial* 12, pp.17-32.

Keay SJ. [1988] *Roman Spain*. Londres.

Keay SJ. [1991] The Ager Tarraconensis in the Late Empire: a model for the economic realtionship of town and country in Eastern Spain ?. En G.Barker y J.Lloyd (eds), pp.79-87.

Kvamme KL. [1989] Geographic Information Systems in Regional Archaeological Research and data management. En MB.Schiffer (ed), pp.139-203.

*La ciudad hispanorromana* [1993] Barcelona

Lepelley C. [1993] Universalité et permanence du modèle de la cité dans le monde romain. En *Ciudad y Comunidad cívica en Hispania*. Madrid (1990), Madrid, pp.13-26.

Leveau Ph., P.Sillières y J.P.Vallat [1993] *Campagnes de la Méditerranée romaine*. Paris.

Lézine A. [1969] Sur le population des villes africaines. *Anti.Africaines* III, pp.69ss

Lo Cascio E. [1994] The size of the Roman population: Beloch and the meaning of the Augustan Census figures. *JRS* 84, pp.23-40.

López Paz L. [1994] *La ciudad romana ideal. 1. El Territorio*. Santiago de Compostela.

López Rozas J., JMª Crespo y N.Zafra [1991] Prospección arqueológica superficial en la cuenca del Guadalquivir, valle del Guadalimar. Provincia de Jaén. Campaña de 1991. *Anuario Arqueológico de Andalucía 1991*. Sevilla, pp.279-282.

Lot F. [1945] *Recherches sur la population et la superficie des cités rémontant à la période gallo-romaine*. Paris.

Lloyd A. y PR.Lewis [1976] Water supply and urban population in Roman Cyrenaica. *Society for Lybian Studies* 8, pp.35-40.

Lloyd J. [1991] Forms of rural settlement in the early Roman Empire. En G.Barker y J.Lloyd (eds), pp.233-240.

Magallón Mª A. y Mª M.Navarro [1991-2] Los desplazamientos humanos en el "Conventus Caesaraugustanus" según la epigrafía. *Zephyrus* XLIV-XLV, pp.405-422.

Martínez López C. y FA.Muñoz [1984] Sobre el poblamiento romano de la comarca de los Velez (Almería). *Arqueología Espacial* 5, pp.129-146.

Martins M. [1988] Experiencias de arqueologia espacial no norte de Portugal. O val de Cavado - Ier milenio a.C. e romanizaçao. *Arqueologia Espacial* 12, pp.141-156.

Millett M. [1990] *The Romanization of Britain*. Cambridge.

Millett M. y D.Graham [1986] *Excavations on the Romano-British Small town at Neatham, Hampshire 1969-1979*. Winchester.

Miret M. et alii [1987] La evolución y el cambio del modelo de poblamiento ibérico ante la romanización. En *Los Asentamientos Ibéricos ante la Romanización*. Madrid, pp.79-88.

*Misurare la Terra* [1994]. Roma.

Mols RJ. [1955] *Introduction à la démographie historique des villes d'Europe du XIV au XVIII siècle*. vol.2. Louvain.

Nadal J. [1984] *La población española. Siglos XVI a XX*. Barcelona.

Ona JL. [1984] El poblamiento rural de época romana en una zona de la ribera de Navarra. *Arqueología Espacial* 5, pp.71-94.

Packer JE. [1967] Housing and population in Imperial Ostia and Rome. *JRS* 57, pp.80-95.

Palol P. de [1966] La demografía histórica para el mundo antiguo. *Actas de las I Jornadas de Metodología aplicada a las ciencias históricas*. Univ. Santiago (1975), pp.217-224.

Palol P. de [1994] *Clunia. Historia de la ciudad y guia de las excavaciones*. Burgos.

Parkin TG. [1992] *Demography and Roman society*. Baltimore.

Peña Mº de la [1990] Nuevos yacimientos romanos en las cinco villas: el río Arba de Biel. En *Estado actual de la Arqueología en Aragón (Ponencias)*, pp. 198.

Pesoa M. [1986] Subsídios para a carta arqueológica do período romano na área de Conímbriga. *Conimbriga* xxv, pp.53-74.

Ponsich M. [1974] *Implantation rurale antique sur le Bas-Guadalquivir*, vol.i, Madrid; [1979], vol.ii, Paris; [1987], vol.iv, Paris.

Potter T.W. [1979] *The changing landscapes of South Etruria*. Londres.

Prevosti M. [1981] *Cronologia i poblament a l'àrea rural de Baetulo*. Badalona.

Rathbone DW. [1990] *Villages, land and population in Graeco-Roman Egypt*. PCPhS 216, pp.103-142.

Recio A. y I.Ruiz Sonovilla [1989-90] Prospecciones arqueológicas en el TM de Sierra de Yeguas (Málaga). *Mainake* xi-xii, pp.9-110.

Ringrose DR. [1970] *Transportation and economic stagnation in Spain 1750-1850*. Duke UP.

Ringrose DR. [1985] *Madrid y la economía española, 1560-1850*. Madrid.

Rodríguez Neila, J. [1981] *Sociedad y administración local en la Bética romana*. Córdoba.

Rojo M. [1985] *Edad del Bronce y Primer Hierro en la tierra de Campos palentina: antigua cuenca del Nava*. Tesis de Licenciatura inédita. Univ. de Valladolid

Roldán J.M. [1975] *Itineraria Hispana*. Madrid.

Roselló V.M. (ed) [1974] *Estudios sobre centuriación romana en España*. Universidad Autónoma de Madrid.

Ruíz Delgado M. [1985] *Carta arqueológica de la campiña sevillana. Zona Sureste I*. Sevilla.

Ruíz Molina [1990] El poblamiento romano de Yecla (Murcia). *Antigüedad y Cristianismo* 5, pp.565-598.

Ruíz Rodríguez A. et alii [1991] Settlement and continuity in the territory of the Guadalquivir valley (6th century BC- 1st century AD). En G.Baker y J.Lloyd (eds), pp.29-36.

Ruíz Zapatero G. [1988] La prospección arqueológica en Eapaña: pasado, presente y futuro. *Arqueología Espacial* 12, pp. 33-48.

Russell JC. [1958] *Late Ancient and Medieval Population*. Philadelphia. TAPHA vol.48.3.

Salmon P. [1974] *Population et dépopulation dans l'Empire romain*. Coll. Latomus 137. Bruselas.

Saller R.P. y B.D.Shaw [1984] Close-kin marriage in Roman society. *MAN* 19, pp.432-444.

Sánchez Palencia FJ. y MªD.Fernández Posse [1986-7] Vivienda y urbanismo en la Asturias interior: la Corona de Corporales. *Zephyrus* XXXIX-XL, pp.375-386.

Schiffer MB. (eds) [1989] *Archaeological method and theory*, vol.ii.Tucson.

Seva R. [1991] *Arqueología en Pinoso*. Alicante.

Shennan S. [1985] *Experiments in the collection and analysis of archaeological survey data: the East Hampshire survey*. Sheffield.

Sillières P. [1990] Voies de communication et réseau urbain en Aquitaine romaine. En *Villes et agglomérations urbaines antiques du Sud-ouest de la Gaule*, pp.431-438.

Sillières P. [1993] Vivait-on dans des ruines au IIè siècle ap.J-C ? Approche du paysage urbain de l'Hispanie d'Après quelques grandes fouilles récentes. En *Ciudad y Comunidad cívica en Hispania*. Madrid (1990), Madrid, pp.147-152.

*Simposio sobre la red viaria en la Hispania Romana* [1990] Zaragoza

Stylow A.U. [1986] Apuntes sobre la epigrafía de época flavia en Hispania. *Gerión* 4, pp.285-311.

Suder W. [1990] *A study of the age and sex structure of population in the Western provinces of the Roman Empire*. Londres.

Tamames R. [1980] *Estructura económica de España*. Madrid.

Taracena B. [1949] Las fortificaciones y la población de la España romana. En *IV Congreso Arqueológico del Sudeste Español*. Cartagena (1948), pp.421-442.

Terán M. de, L.Solé y J.Vilà (eds.) [1989] *Geografía general de España*. Barcelona.

Tranoy A. [1993] Communantés indigènes et promotion juridique dans le nord-ouest ibérique. En *Ciudad y Comunidad cívica en Hispania*. Madrid (1990), Madrid, pp.27-36.

Vallat JP. [1991] Survey archaeology and rural history - a difficult but productive relationship. En G.Barker y J.Lloyd (eds), pp.10-17.

Vaquerizo D., JF.Murillo Y F.Quesada [1991] Avance a la prospección arqueológica de la subbética cordobesa: la depresión Priego-Alcaudete. *Anales de Arqueología Cordobesa* 2, pp.117-170.

Vicens Vives J. [1956] *Historia económica de España*. Barcelona.

Vilà J. [1989] La población. En M.de Terán et alii (eds), pp.219-268.

Villa A. [1990] Breve resumen de los inventarios arqueológicos Grandes de Salina, S.Martin de Oscos, Sta.Eulalia de Oscos y Villanueva de Oscos. En *Excavaciones Arqueológicas en Asturias 1987-1990*. Oviedo, pp.223-225.

Warden PD. y RS.Bagnall [1988] The forty thousand citizens of Ephesus. *Classical Philology* 83, pp.220-223.

Whittaker CR. [1993] *Land, city and trade in the Roman Empire*. Cambridge.

Wiegels R. [1976] Zum territorium der augusteischen Kolonia Emerita. *Madrider Mitteilungen* XVII, pp.258-284.

Wiseman TP. [1969] The census in the first century B.C. *JRS* 59, pp.59-75.

Zapater MA. y FJ.Navarro [1990] Prospecciones arqueológicas en el término municipal de Escatrón. En *Estado actual de la Arqueología en Aragón (Ponencias)*, pp.33-46.

Figure 1. Location of the main Roman sites in Spain (reference in table 1)

Figure 2. Location of the main field surveys carried out in Spain (reference table 2)

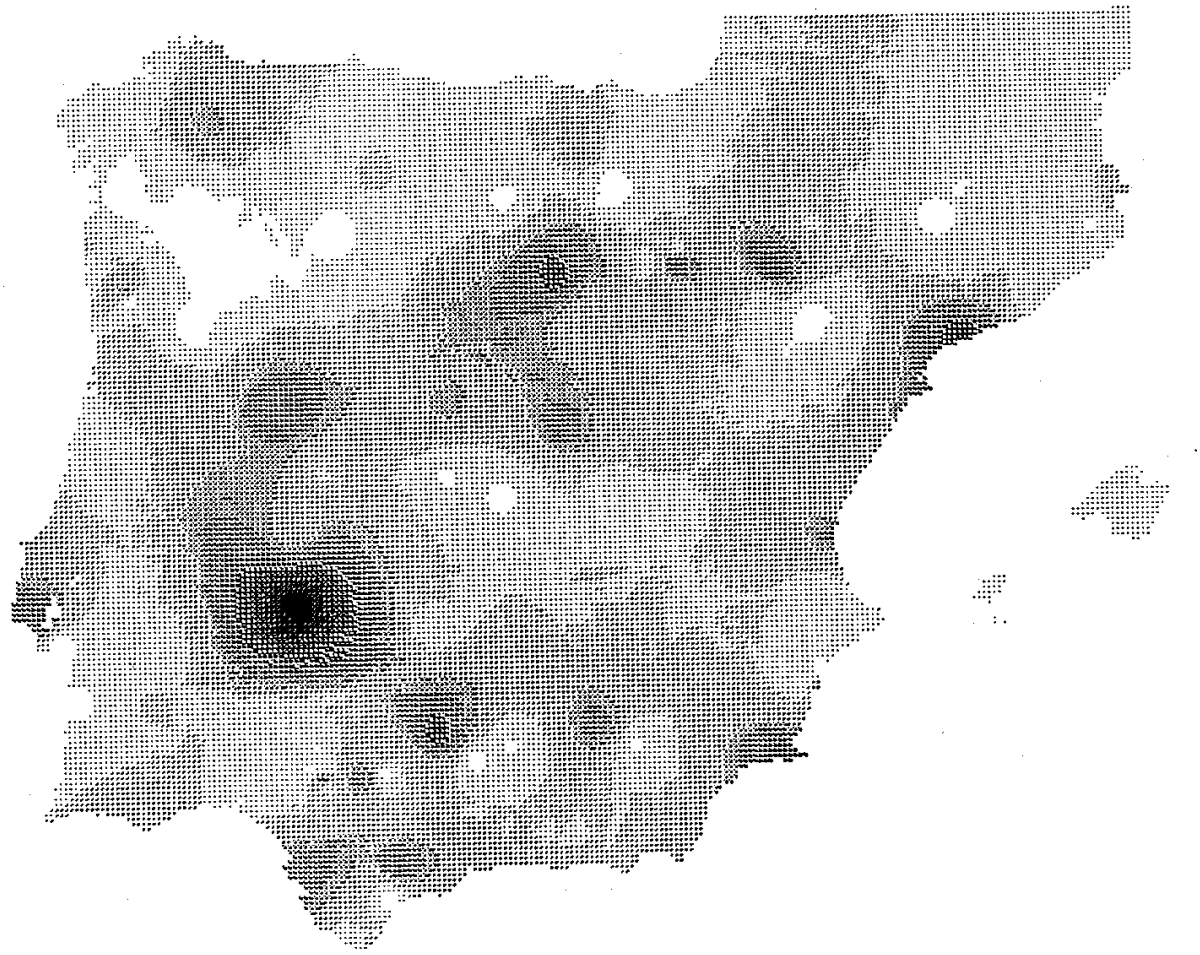

Figure 3. Interpolation map of cities size

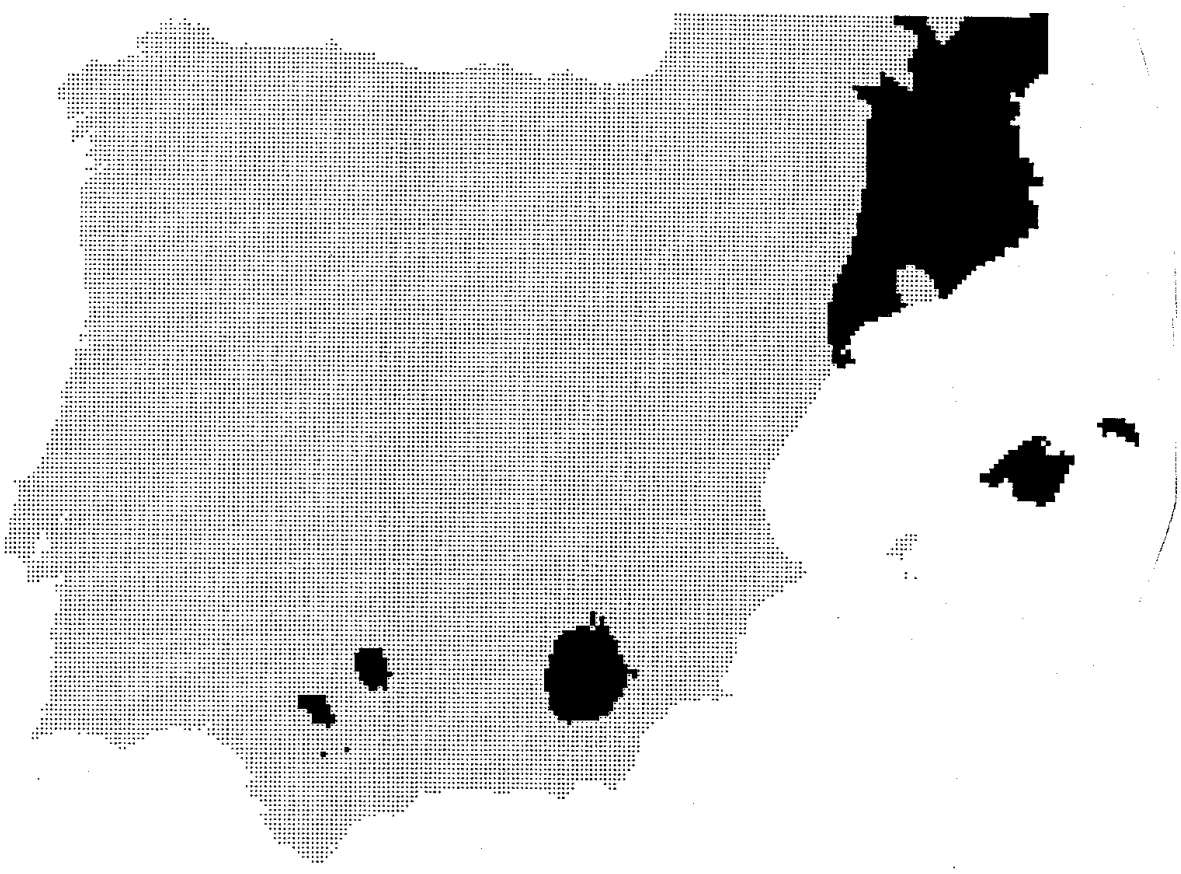

Figure 4. Interpolation map for densities of rural sites obtained from field surveys.