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Demographic change at the Mesolithic-Neolithic transition: Evidence from Portugal

(With 2 Tables and 5 Figures)

I Introduction and background

Prehistorians have long been concerned with understanding the biological causes and effects of the adoption of Neolithic economies. In recent years, a specific question has been whether the age distribution of human populations changed before or after the economic change. Changes in age distributions would indicate changes in fertility and mortality and ultimately in population size and density.

I believe that the only reliable data for answering this question will come from the analysis of Mesolithic and Neolithic skeletal samples. But there are limits to how much reliable data we can actually obtain, and unless we can find a way to test and compare these limited data, demographic deductions will remain very tenuous. In this paper I will propose a method for estimating mortality levels in such a way that sample testing and comparison is possible.

During the 1970s, especially in North America, many osteologists believed it was possible to derive a broad range of demographic statistics from skeletal samples. In the early 1980s, one or two cautionary voices were raised, both in Europe (BOCQUET-APPEL and MASSET, 1982) and North America (HOWELL, 1982), but the North American response has been to reject these, and to defend the value of palaeodemography (BUIKSTRA and KONIGSBERG, 1985; VAN GERVEN and ARMELAGOS, 1983).

I began to question the validity of palaeodemographic studies as a result of my work on large skeletal samples from Ontario Iroquoian ossuaries and cemeteries dating to both before and after the period of Indian-French contact (JACKES, 1986). I found that adult age at death was equivalent. whether the sample came from the pre-contact period or from the period around AD 1620-50 when a whole Iroquoian nation disappeared under the onslaught of disease, war and cultural disintegration (JACKES, 1983). When adult samples were aged using the pubic symphyses, most individuals were estimated to have died between 15 and 30, and a few between 35 and 45. I have shown (JACKES, 1985) that this was due to the use of the MCKERN and STEWART mean ages for pubic symphyses and was unrelated to the biological and historical facts in Ontario between AD 1450 and AD 1650.

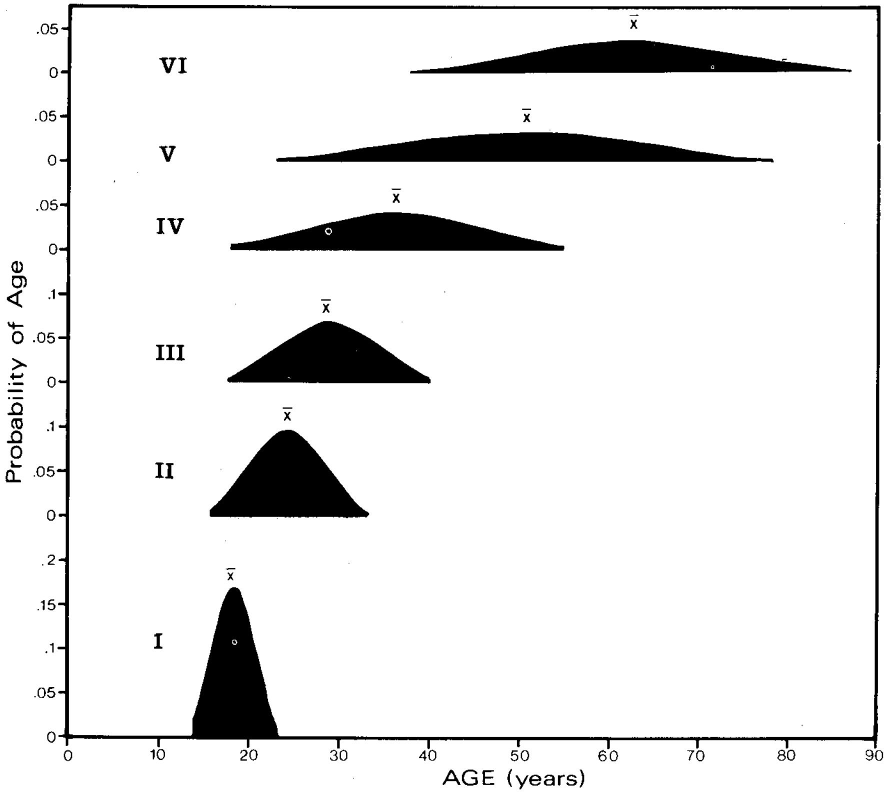


Fig. 1 — 95% probability distributions of ages for the male pubic symphysis stages of KATZ and SUCHEY (1986).

I have suggested that the 95% probability limits for distributing adult ages would assist palaeodemographic analysis (JACKES, 1985). But the basic problem remains: while pubic symphysis modification provides reasonably accurate estimates for adults up to 30 years, from age 25 on those estimates become increasingly problematic.

Figure 1 illustrates this problem using the extremely careful work of KATZ and SUCHEY (1986) who analyzed 739 male pubes, broadly distributed over a wide range of known ages. It shows the mean $\pm 2\sigma$ probability curves for each of the six TODD/BROOKS/SUCHEY pubic symphysis stages. It should be clear that while one can be reasonably sure that a stage I pubes is 15 to 20 years of age, a stage V pubes could range from 40 to 60 (with almost equal probability: .022-.029), and a stage VI pubes could be between 50 and 75 years (with a narrow probability range from .020 to .032).

Most studies of archaeological remains have emphasized the use of pubic symphyses techniques for obtaining age at death estimates. This is especially so for ossuaries in which, since whole skeletons are not available, multiple aging techniques cannot be used. Other techniques (commonly applied in forensic studies) are available, including thin sections of femoral cortex and of teeth; but these can not always be used when analyzing archaeological samples. In our work, for example, we cannot sacrifice teeth in general and so far have not found the cemental annulation technique satisfactory. In consequence we have put considerable effort into the preparation of femoral thin sections.

Unfortunately we have found that this technique may have limited value (as LAZENBY suggested in 1985). We have been unable to prepare thin sections that show the cortical microstructure with sufficient clarity to study it. This is not a matter of how the thin sections are prepared. It is a question of preservation. Our results demonstrate that cortical microstructure does not withstand long burial, whether in open-air shell middens, sandy caves, or deep limestone caves, from temperate Portugal, semi-arid North Africa and the humid coast of British Columbia. Similar, though less depressing, results were obtained by PFEIFFER (1985) for archaeological bone from a temperate environment that had only been buried for less than 400 years.

If we cannot estimate the age at death of adults reliably, it may well be best to give palaeodemography a decent burial as BOCQUET-APPEL and MASSET have suggested. Certainly the problems are even more manifold than they have indicated. But I think burial at this time would be premature. Palaeodemographic studies can be pursued if inter-sample comparison is possible. Unfortunately, many factors make comparison almost impossible. Among these are:

1 – Different methods of aging by different people (e.g. the three or four pubic symphysis methods) give different results;

2 – The methods lack true objectivity (e.g. interobserver error even on pubic symphyses);

3 – Some methods are only suited to particular sample types (e.g. ossuary vs single interments);

4 – Certain methods are based on characteristics specific to particular groups at particular times (e.g. dental attrition).

All these are factors which make comparison particularly difficult. Add to this the question of what to do with those adults who cannot be given an age, and how to assess whether the site was completely excavated, and whether the sample is biased by burial or other cultural practices, and the problems seem almost insurmountable.

II Materials and methods

Yet the question remains: can we determine if mortality levels changed over the Mesolithic-Neolithic boundary? We have good samples with which to try and answer this question – buried populations of the right time period (7000-4000 BP), in sufficient numbers (around 100 or

Table 1 — Details of sites and samples discussed.

SITES	PERIOD	CALIBRATED YRS. BP	MNI
Moita do Sebastião	Mesolithic	7929	79
Cabeço da Arruda	Mesolithic	7604	97
Casa da Moura	Neolithic	6877	214
Gruta do Caldeirão	Neolithic	6668 & 5700	19
Gruta da Feteira	Neolithic	5300 & 4600	ca. 30
Gruta da Melides	Neolithic	5100 (est.)	51

more from single sites), from a limited area (central Portugal: see Table 1 for details of the sites). How then to embark on the study, given that in these samples:

1 – almost no pubic symphyses survive;

2 – the Mesolithic burials, which were by individual, have been badly mixed since they were excavated one hundred years ago;

3 – the Neolithic burials were all secondary and therefore individual bones (even individual teeth) must be the units of study.

Our solution has been to concentrate on the proportion of those aged under 25 years, to those aged over 25. We have excluded from consideration individuals aged under 5 years, since infants are known to be underrepresented in Neolithic burial sites, and have pooled all those over age 25. We recognize that this approach ignores valuable data and we would use whatever indications we have of adult age distributions when studying, e.g. dental pathology. But for the purposes of palaeodemographic sample comparison, pooling all adults over 25 years of age, circumvents the problems we have identified.

In order to test if sample biases or age assessment techniques are interfering with our analyses of juvenile/adult ratio deaths, we have collected palaeodemographic data from nearly 60 samples, in most cases of well over 100 individuals, for which we have also recorded such information as sample size, completeness of excavation, circumstances of burial (e.g. massacres), methods of age assessment.

We then distributed the dead over 5 year age categories from 5 to 25, pooled adults into one adult age category, and calculated the probability of death. No other demographic parameters were calculated because of the uncertainties of palaeodemographic data. We believe that statistics such as mortality and birth rates should not be calculated from palaeodemographic life tables. But the age-specific probabilities of death (the q values or mortality quotients) can be used since they are no more than expressions of age distributions, derived by simple arithmetic. Furthermore, they are not biased by infant underrepresentation.

Figure 2 plots mean childhood mortality (the mean of the three mortality quotients for ages 5 to 20) against the juvenile/adult ratio of BOCQUET-APPEL and MASSET (1977: the ratio of juvenile to adult

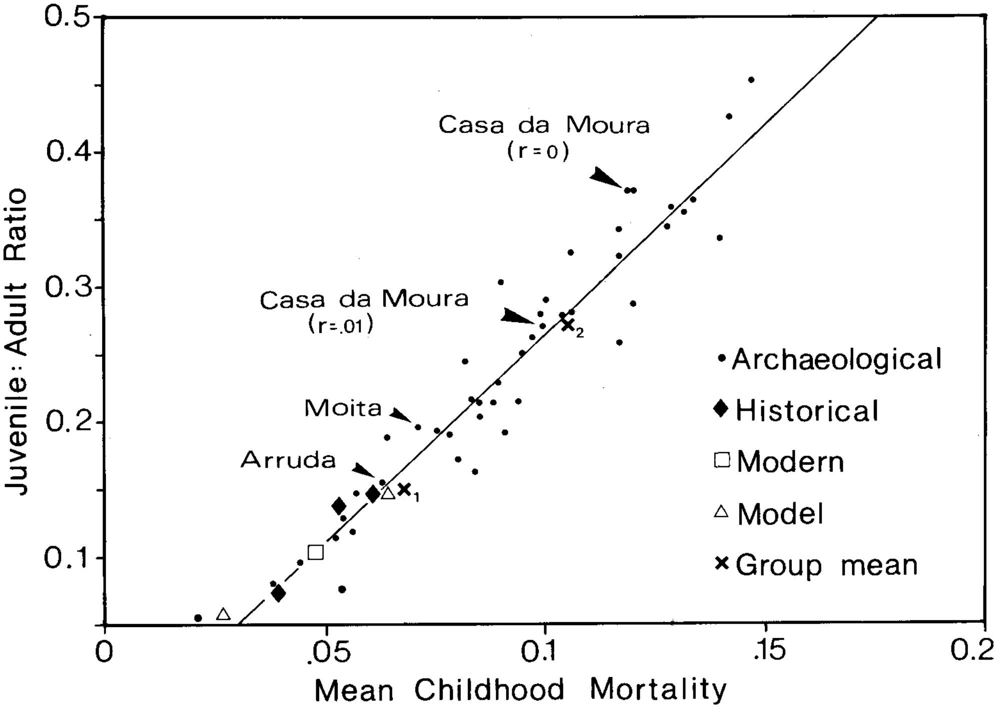


Fig. 2 — The regression of mean childhood mortality on the juvenile: adult ratio of 46 archaeological samples. The position of comparative historical, modern and model populations is shown together with that for Portuguese Mesolithic and Neolithic samples.

deaths, expressed as the number aged 5–14.9 years divided by the number aged 20 or more years). These two statistics are, of course, correlated (r = .965; y = –.04 + 3.06 [MCM]; n = 46 archaeological samples). But their distribution on a scatter diagram allows us to assess mortality levels with relation to model populations (the West model life tables of COALE and DEMENY, 1966) as well as 17th and 18th century populations from France and Canada (CHARBONNEAU, 1970, 1975; LEBRUN, 1971) and modern life tables (e.g. Greece in 1928, ANGEL, 1971; Dobe ! Kung, HOWELL, 1979). We are thus able to identify biased samples as those falling far from the line or far beyond the general upper limits of mortality and they have been excluded from the regression analysis here. Furthermore, we can see the relationship of samples to each other. We are able – for the first time – to compare samples with regard to the proportions of juvenile to adult deaths, to assess the level of mortality with reference to model tables, and to eliminate biased samples from consideration.

The shape of the distribution of juvenile and young adult (age under 25) deaths is another element in our data. Discriminant function

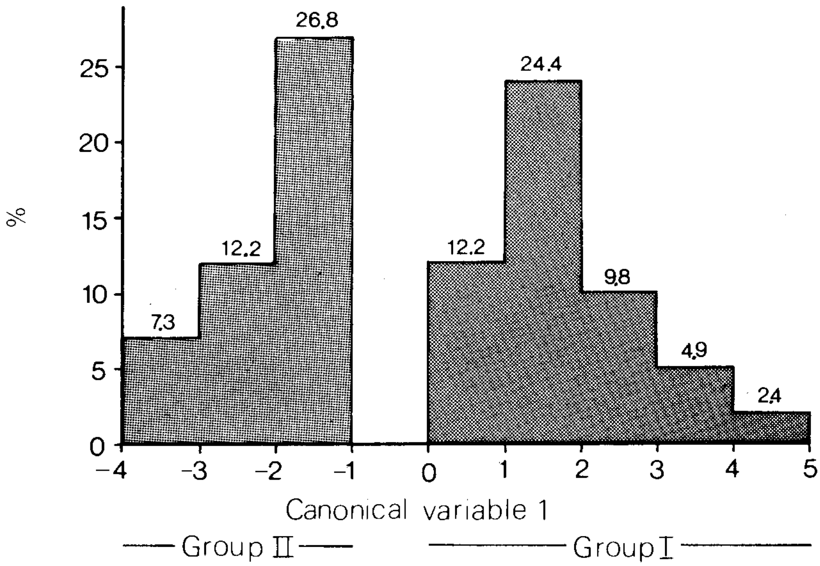


Fig. 3 — Histogram derived from stepwise discriminant analysis of 35 archaeological samples, showing the percentage distribution of the first canonical variable.

analysis of the mortality quotients allows us to see again the relation of samples to each other and to model and historical data, and we can produce a distribution of samples as they sort out along the axis of the first canonical variable (Fig. 3). Here we have a clear expression of two groupings – (1) lower juvenile mortality, and (2) higher juvenile mortality. Figure 4 shows the differences between the two groupings by plotting the mean q values of each $\pm$ 1 σ.

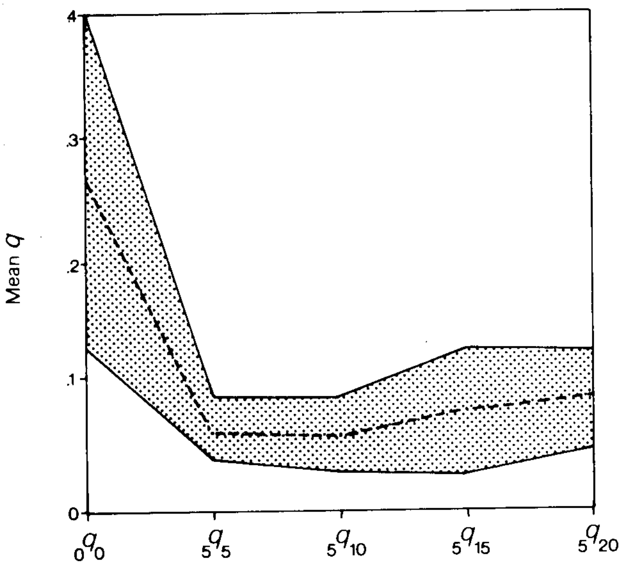
Any new sample can be classified into its mortality group by calculating a classivcation score derived from the discriminant function analysis (DIXON and BROWN, 1979, 840.2) using one of the following formulae (based on an analysis using 35 archaeological sites):

Group I: $((q5 * 146.190) + (q20 * 103.440)) + -9.649$
Group II: $((q5 * 278.935) + (q20 * 190.855)) + -32.288$

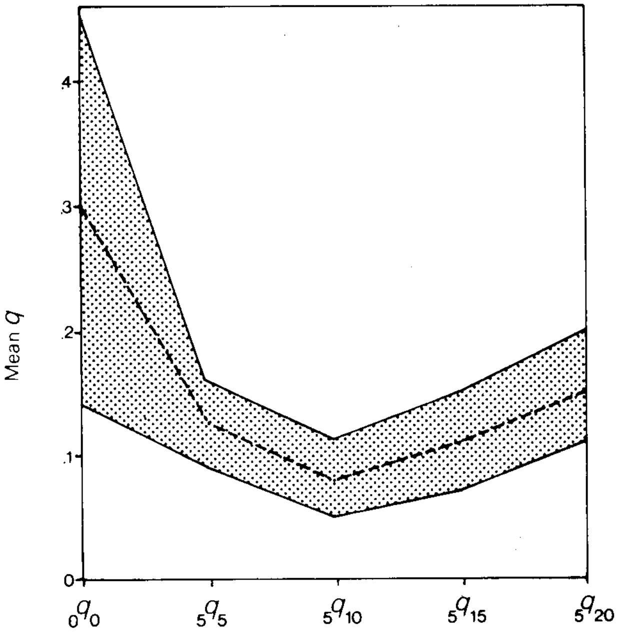
The sample is classified in the group for which the higher score is calculated

With our basic method in place, we can now attack the problem of classifying the mortality of our Portuguese samples, despite problems of excavation, preservation, burial type and lack of applicability of the osteon count method of adult age assessment.

We have based our age distributions on the seriation of mandibular dentitions together with analysis of dental attrition using a modification



a)



b)

Fig. 4 — The mean probability of subadult death curves $\pm 1\,\sigma$ for: *a)* low mortality group (n = 16) and: *b)* high mortality group (n = 19).

of SMITH's (1984) system which allowed us to identify the early stages of wear in some detail. The initial definitions of the wear stages, the seriations and the wear analysis has in each case been done separately and checked independently by two or three people. Nevertheless, we remain always aware of the extreme difficulty of using dental attrition for age assessment because of subjectivity, interference of pathology, changing rates of wear over space and time, uncertainties of rates when teeth have non-masticatory functions – to list only a few of the simplest and most obvious problems.

We have attempted to apply controls in various ways. The least successful method is the measure of the height of the cemento-enamel junction above the alveolar margin. We have carried this out, with inter- and intra-observer error checks, on five buried populations but have found that this measurement is too variable to give high correlations with wear, possibly because of measurement error and the interference of factors other than age. It has proved useful only in confirming that level 3 wear is associated with an increase of the CEJ above the alveolus to over 2 mm. Crown height and, to a lesser extent the angle of wear, are both highly correlated with the degree of wear, but the coefficients of variation are far too large (e.g. 14%) to allow us to substitute these more objective values for attrition levels.

Extreme care has been required because, while the Mesolithic samples provide teeth *in situ* in the mandible, in those Neolithic samples that have been adequately excavated, there are high frequencies of loose teeth: 81% of the first lower molars at Casa da Moura are loose; for Feteira the figure is 64%. Melides has no loose teeth preserved, perhaps indicating an imperfect excavation.

We have chosen to base our discussion on the two Mesolithic sites and on the large dated sample from Casa da Moura (see Table 1). For the latter site, the lower first molars will serve as the means of estimating the minimum number of individuals and the ages at death.

The identification of loose molars is extremely difficult. In this case, four different individuals have undertaken separate identifications. The criteria for identification have not been standardized and stress on root as against crown form varied from one researcher to the next. There was then a final check and all cases of disagreement were reassessed. Fewer than 1% of the teeth identified as M1 for this study are likely to be M2, and only four or five of those excluded as M2 could be M1.

Levels of attrition and root development (MOOREES et al., 1963) have similarly been independently checked, as well as the presence of interproximal facets. Measurements have been taken once only. The use of automatic print-out calipers reduces major sources of error in the taking and recording of measurements.

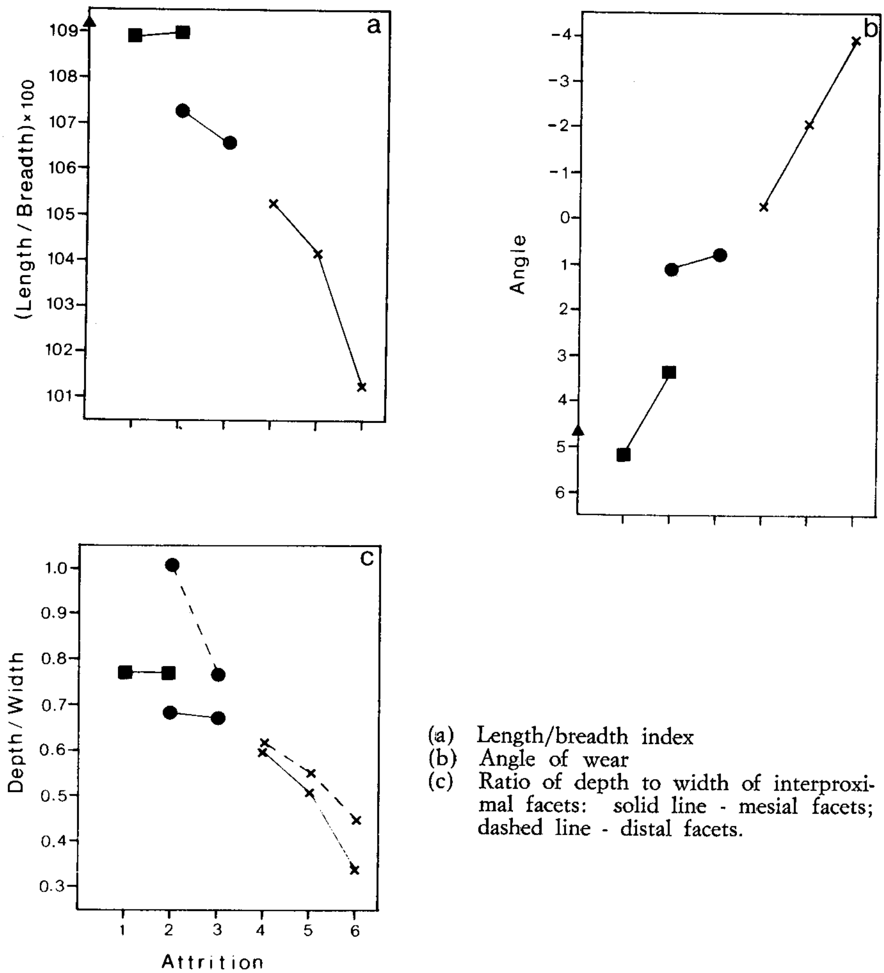
Figure 5a shows the mean length/breadth index for the Casa da Moura loose lower first molars broken down by attrition levels. The first point (triangle) represents 43 molars of young children, lacking both wear and interproximal facets. The second two points (squares) show the length/breadth indices of 45 molars in which the mesial facet has formed and occlusal and interproximal wear are minimal. Such teeth represent children over 6 years of age. The next two points (circles) represent 103 teeth with initial interstitial wear indicating that the first two molars are now in full use. These teeth represent adolescents and young adults. The final three points (crosses) indicate that, in these 104 teeth of older adults in which all three lower molars are now worn, interstitial and occlusal attrition accelerates the reduction in relative tooth length.

In Fig. 5b the mean of the angle of the occlusal surface for each attrition level, calculated by trigonometry from the buccal and lingual crown heights, confirms the sequence of attrition in the Portuguese Neolithic teeth. Using the same sample of 295 first lower molars, we find that at the age of increasing interstitial and occlusal wear, when dentin exposure is reaching the point at which coalescence begins to occurs, we have the change in the angle of the occlusal plane from buccal greater than lingual to lingual greater than buccal on the first lower molars.

Figure 5c demonstrates again the acceleration of attrition with grade 4 wear. The 295 teeth are again used in a plot of the ratio of depth to width of the mesial and distal interproximal facets. This is defined as the mid-point depth of the mesial or distal interproximal facet below the highest point on the mesial or distal occlusal margin, respectively, divided by the greatest width of the facet. The solid line plots the changes in the mesial facet depth/width ratio, giving a pattern similar to that already defined in Figs. 5a and b. The dashed line plots the rapid and marked changes associated with the early attrition of M2. This confirms that in M1s with complete roots and distal facets, wear level 2 marks the period after age 12.

A major problem lies in teeth of grade 2 wear, without a distal facet and with broken roots so that root development cannot be determined. Such teeth could be under or over 10 years of age. There were 23 such teeth in the Casa da Moura sample, and they were aged by reference to the angle of wear, the length/breadth ratio and the mesial facet form. With only three exceptions, the determinations were easily made. Fourteen were assessed as under 10 years, and their mean angle of wear was over 5 degrees. Nine were given ages of ten to twelve. Their mean wear angle was about 1.3 degrees.

In our work, we have found that wear level 2 encompasses a quite broad spectrum of changes, and thus we have included a wear level of 2.5. In this the fissure pattern is still clear and there are no more than pinpoints of dentin exposure, but there is full cusp removal of two cusps. Our analyses show that there are indeed strong differences between the two subsets of wear level 2, in terms of crown height, angle of wear, form of the mesial interproximal facet and length/breadth ratio. The form of the distal interproximal facet does not, however, differ between the two, showing that the dramatic fall in the depth/width ratio of the distal facet evident in Fig. 5c at level 3 attrition is the result of adjustment along the tooth row as the M3 comes into occlusion.



(a) Length/breadth index
(b) Angle of wear
(c) Ratio of depth to width of interproximal facets: solid line - mesial facets; dashed line - distal facets.

Fig. 5 — Casa da Moura lower first molars with attrition levels 0-6: Triangle – no interproximal facets; square – mesial facet only; circle – two interproximal facets and initial wear; cross – two interproximal facets and coalescent dentin exposures.

We therefore feel justified in suggesting that M1 wear level 2.5 indicates individuals of 15-19 years of age, while grade 2 attrition in individuals with completed roots indicates an age of 10-14.

On the basis of our work on the seriation of Mesolithic and Neolithic mandibles, in which M1 attrition of level 3 was almost always associated with M3s in initial but full occlusion, teeth of wear level 3 are given an age of 20 to 24. Our work on the loose Casa da Moura first molars, as presented in Fig. 5, supports this conclusion by showing that the form of interproximal facets and the length/breadth index change markedly during the period of wear level 3, partly, no doubt, the result of M3 coming into occlusion by around 20 years of age.

In order to calculate the minimum number of individuals (Tab. 1) for the Mesolithic samples we have used seriated mandibles with lower molars or sockets, and for the Neolithic we have chosen the first lower molars, using those still *in situ* from all five samples, as a control for the levels of attrition. The ages of juveniles with in situ teeth are estimated using radiographs (by reference to MOOREES et al., 1963; ANDERSON et al., 1976). Juvenile loose teeth are examined for root and crown development, the existence of distal facets and evidence of occlusion. The justification for the ages ascribed to loose teeth with completed or broken roots has been fully discussed above.

III Results

Figure 2 shows the positions of the means for Group I (low mortality), Group II (high mortality), three historical samples and two model populations from COALE and DEMENY, as well as Moita, Arruda and Casa da Moura, plotted along the regression line calculated for 46 archaeological samples. Our two other Portuguese Neolithic samples are not included. The Feteira sample is from a rescue excavation and represents a small portion of a large cave. The Melides sample is somewhat larger but the absence of loose teeth in the collection and the anomalous position of the site on the regression line (at the extreme upper right hand corner of the figure) confirm an already held suspicion that the material now preserved in the Geological Survey of Portugal, Lisbon, is very incomplete.

It should be noted that the West 1 model of COALE and DEMENY is an extrapolation from modern data, and that, as HOWELL (1982: 264) has stated, « no [living] population has yet been found for study with mortality as high as that in Model West 1 ». Model West 10, considered to have very high mortality by modern standards, is low in comparison with all but one of our archaeological samples. Thus, low mortality measured archaeologically is much higher than the level of mortality in most, if not all, modern populations.

Arruda, with an average calibrated date of 7604 BP (weighted average of TO-354, 355, 356, 359a, 360 = 6827.0 ± 33.8 bp: see Table 1 in LUBELL and JACKES, this volume, for all radiocarbon dates), has relatively low mortality for an archaeological sample. It is equivalent to Model West 1 and to the French historical data from Tourouvre, dated to about AD 1700, in which the expectation of life at birth was only 25 years. This is not low mortality in general demographic terms.

The sample from the neighboring site of Moita, with an average calibrated date of 7929 BP (weighted average of TO-131, 132, 133, 134, 135 = 7115.9 ± 32.1 bp), has slightly higher mortality than Arruda.

This is not unexpected. There is a slight difference in the mean stable isotope values for Arruda and Moita (LUBELL and JACKES, this volume) and we have also found differences in attrition rates, in levels and distribution of dental pathology, in disposition at burial etc. The two samples are similar but not identical.

CONSTANDSE-WESTERMANN et al. (1984: 142) argue that the skeletal samples available for the western European Mesolithic represent highly mobile populations and, as a result, cannot be considered accurate indicators of the demographic composition of the groups they represent. The regression line plotted in Fig. 2 provides some basis for checking this assertion with regard to Moita and Arruda. We can say that the proportions of people 5 years and over in each site are in line with those for model, historical and many archaeological demographic samples.

For now, Casa da Moura (6877 BP) must stand as our sole representative of the Neolithic. Despite the fact that this analysis is based on dentition, and loose dentition at that, we are fairly confident that we can at least approximate the true age distribution at death for those under 25 years.

Figure 2 demonstrates that Casa da Moura has extremely high juvenile mortality. Its position on the regression line groups the sample with an anomalous set of geographically and temporally disparate samples of suspected bias or epidemic mortality (Sudanese Nubia, the North American mid-west and other American samples from the period of major contact epidemics). It is necessary to enquire whether the apparent juvenile mortality can be regarded as an artifact of our methods.

Our techniques for arriving at the figures plotted on the regression line rely on some of the less problematic items in biological anthropology; crown and root development and evidence for eruption of the first and second molars. The main source of error would be in the identification of M1. Our final identification survey confirmed that molars with incomplete roots and without distal facets can be difficult to identify. Thus, the number of juveniles in the sample could be incorrect. Nevertheless, a complete blind reassessment of all lower molars has not resulted in significant changes in the age at death distribution for the site.

Incomplete samples may bias palaeodemographic analyses. While the 19th century excavation of Casa da Moura was virtually complete (DELGADO, 1867; STRAUS et al., n.d.), it is quite possible that recovery techniques were not up to modern standards. STRAUS examined some of DELGADO's backdirt, and 50% of the material he recovered consisted of loose human teeth (JACKES in STRAUS et al., n.d.). It is therefore possible that our sample is incomplete. In fact, we know this to be true since our best estimate for the minimum number of individuals is based on the DELGADO' collection of loose upper left canines of which 11 are deciduous and 227 permanent. However, we cannot yet use the canines in demographic analyses because canine attrition, especially in the maxilla, is very difficult to systematize. Furthermore, the Casa da Moura maxillary attrition is complicated by an apparent use of the anterior dentition for purposes other than eating. Our preliminary attempt to determine more accurate ages for canine wear categories based on cemental annulation, has not been successful. We suspect that tooth function is an important factor in determining the way in which cementum is laid down. Nevertheless, it is possible to make a rough attempt at age estimation based on root development and initial wear. The resulting canine age distribution accords well with that for the lower first molar.

The correct minimum number of individuals for Casa da Moura is probably only about 30 more than the total of 214 given in Table 2, and about half of the missing individuals are likely to be under five years of age. The mortality levels which we find to be characteristic of Casa da Moura seem to be confirmed, not only by the upper canines, but because the separate estimates based on the right and left lower first molars do not differ significantly. Thus, the results of the demographic analyses of the pooled right and left first molars also give equivalent results by our methods of analysis. For this reason, we are justified in using the right lower first molars with the addition of three extra teeth from the left in the calculation of the minimum number of individuals by age categories.

Table 2 — Standardized Life Table for Casa da Moura based on right lower M1 with three additional left M1.

$r = 0$

x	D_x	d_x	l_x	q_x	L_x	T_x	e_x	C_x
0	27	126.17	1000.00	0.13	4684.58	26121.50	26.12	179.34
5	26	121.50	873.83	0.14	4065.42	21436.92	24.53	155.64
10	20	93.46	752.34	0.12	3528.04	17371.50	23.09	135.06
15	15	70.09	658.88	0.11	3119.16	13843.46	21.01	119.41
20	38	177.57	588.79	0.30	2500.00	10724.30	18.21	95.71
25-65	88	411.21	411.21	1.00	8224.30	8224.30	20.00	314.85
	214							

The high representation of juveniles among the dead is not likely to be a simple case of differential burial. Since the Casa da Moura sample falls high and slightly off the regression line, the indications are of some sample bias, but not the extreme bias found, for example, in the Portuguese Neolithic cave of Caldeirão (JACKES and LUBELL, in press) where the few burials indicated a marked under-representation of adults.

One further possibility exists: that we should adjust the probability of death value for Casa da Moura on the assumption of a non-stable population. Our results for Casa da Moura accord with those estimated for Schild, a completely excavated large sample (449) of skeletons dated to AD 1065 and representing the Middle Mississippian component of a lower Illinois Valley site (DROESSLER, 1981; GOLDSTEIN, 1980). The Schild sample represents a puzzle, in that the mortality level exceeds that of North American sites recording the effects of contact epidemic mortality. There is, however, evidence that the groups inhabiting the Central Mississippi area were undergoing population increases during the period (MILNER, 1986). On the assumption of an increasing population we may recalculate the life table for Casa da Moura according to the formulae of CARRIER, 1958. At a .01 rate of increase, Casa da Moura shifts its position to fall on the regression line almost exactly at the mean of the higher mortality group.

Thus while the mortality for Casa da Moura is high relative to that calculated for all but a few archaeological sites with good skeletal samples, that mortality may be the expression of a slowly increasing population. In such a population, the age structure of the living is weighted in favour of younger individuals and this is reflected in the age distribution of the dead. In contrast, Mesolithic mortality is shown to have been relatively low, especially for Arruda, which we regard as the more reliable sample. We interpret our results as evidence for Mesolithic stability and low mortality followed by Neolithic population increase coupled with high mortality – an indication of increased fertility. While our interpretation is based on juvenile mortality levels, we can see no reason to assume that the juvenile mortality levels are not a valid parameter to use in archaeological sample comparisons. They are certainly the only palaeodemographic data which can be considered reliable.

We are suggesting that during the period when the Casa da Moura ossuary was in use, a higher proportion of the population was under 25 years than had been the case earlier when Arruda and Moita were occupied, and that the whole Neolithic population was under greater risk of early death than was the Mesolithic population. In other words, based on the evidence presented here, the stable Mesolithic society with low mortality was succeeded by a Neolithic society in which mortality was much higher, but there was population increase since fertility rates were also higher.

Discussion at p. 465.

Acknowledgements

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SUMMARY

Key-Words: Palaeodemography, Age at death, Mesolithic-Neolithic transition, Portugal.

Portugese human skeletal collections are some of the best in Western Europe for understanding the Mesolithic-Neolithic transition. The available samples are large, from restricted geographic areas, and have now been dated directly, using the AMS technique. Their abundance is a result both of the burial patterns practiced by prehistoric groups as well as the late 19th and early 20th century tradition in Portugal of excavation and conservation of prehistoric human skeletal collections. A large sample of these collections, much of it previously unstudied, has now been analyzed. The specific aim of the analysis has been to examine the possibility that the transition from Mesolithic to Neolithic economic practices and settlement patterns was accompanied by changes in the health and demography of the human populations involved.

The first step in anthropology is to reconstruct, as accurately as possible, the age structure of the populations. Without this, analysis of mortuary practices, mortality levels, palaeopathology, palaeonutrition and indeed all aspects of prehistoric lifeways, is impossible. In this paper we will discuss the methods of age assessment used, in the context of the particular problems presented by Portuguese prehistoric mortuary parctices and the diagenetic processes that have affected the bones in Portuguese archaeological deposits. We will emphasize the inadequacies of available techniques of age assessment, but demonstrate that the absence of reliable adult age profiles does not necessarily preclude palaeodemographic estimates. We will present a method that enables us to evaluate mortality levels for these important Mesolithic and Neolithic sites, thus testing the proposition that the relation between economic transition and demographic change in prehistory can be investigated using skeletal and archaeological data.

RIASSUNTO

Parole chiave: Paleodemografia, Età alla morte, Transizione Mesolitico-Neolitico, Portogallo.

Le collezioni scheletriche umane Portoghesi sono tra le migliori in Europa occidentale per la comprensione della transizione dal Mesolitico al Neolitico. I campioni disponibili, provenienti da aree geografiche ristrette, sono numerosi e di recente sono stati datati con l'impiego della tecnica AMS. La loro consistenza numerica è il risultato delle pratiche funerarie adottate dai gruppi preistorici unitamente alla tradizione, propria della fine del diciannovesimo secolo e dell'inizio del ventesimo in Portogallo, di scavi archeologici preistorici e di accurata conservazione delle collezioni scheletriche umane. Un campione consistente di esse, gran parte del quale inedito, è stato di recente analizzato. Lo scopo specifico dell'analisi è quello di verificare l'ipotesi che la transizione dalle pratiche economiche mesolitiche a quelle neolitiche ed i relativi modelli di insediamento, furono accompagnati da cambiamenti nello stato di salute e nel quadro demografico delle popolazioni umane coinvolte.

Scopo principale delle indagini antropologiche è la ricostruzione, più accurata possibile, della struttura per età della popolazione. Senza questa, l'analisi delle pratiche mortuarie, dei tassi di mortalità, della paleopatologia, della paleonutrizione ed inoltre di tutti gli aspetti dei modelli di vita preistorica, è impossbile. In questo articolo vengono discussi i metodi usati per la stima dell'età alla morte, nel contesto dei particolari problemi presentati dalle pratiche mortuarie preistoriche Portoghesi e dei processi di diagenesi che hanno agito sui reperti ossei nei depositi archeologici. Viene discussa l'inadeguatezza delle tecniche disponibili per la stima dell'età alla morte, ma si dimostra che l'assenza di profili attendibili per l'età adulta non necessariamente preclude stime paleodemografiche. Viene presentato un metodo che permette di valutare i livelli di mortalità per questi importanti siti mesolitici e neolitici.

RÉSUMÉ

Mots-clés: Paléodémographie, Âge à la mort, Transition Mésolithique-Néolithique, Portugal.

Les collections de squelettes humains du Portugal sont parmi les meilleures d'Europe occidentale pour aider à la compréhension de la transition du Mésolitique au Néolithique. Les échantillons disponibles sont nombreux et proviennent d'aires géographiques restreintes; ils ont récemment été datés par la méthode AMS. Leur importance numérique est la conséquence des pratiques funéraires adoptées par les groupes préhistoriques, de la tradition portugaise pour les fouilles préhistoriques depuis la fin du dixneuvième et le début du vingtième siècle, et d'une conservation méticuleuse des collections de squelettes humains. Un échantillon important de ces collections a été récemment étudié. Le but spécifique de l'analyse est de vérifier l'hypothèse que le passage des pratiques économiques mésolithiques à celles néolithiques et les modèles d'établissement relatifs, furent accompagnés de changements dans l'état de santé et dans le cadre démographique des poulations humaines concernées.

Le but principal des recherches anthropologiques est de reconstruire, le plus soigneusement possible, la structure par âge de la population. Sans cette reconstruction, l'analyse des pratiques mortuaires, des taux de mortalité, de la paléopathologie, de la paléonutrition et de tous les aspects des modèles de vie préhistorique, est impossible. Dans cet article, nous discutons des méthodes utilisées pour l'estimation de l'âge à la mort, dans le contexte des problèmes particuliers présentés par les pratiques funéraires préhistoriques au Portugal, et des processus de diagénèse qui ont agi sur les restes osseux dans les dépôts archéologiques. On discute l'insuffisance des techniques disponibles pour l'évalution de l'âge à la mort, mais on démontre que l'absence de profils dignes de foi pour l'âge adulte n'empêche pas nécessairement les estimations paléodémographiques. Enfin, nous présentons une méthode qui permet d'évaluer les niveaux de mortalité pour ces sites importants mésolithiques et néolithiques.

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