The archaeology of pig domestication and husbandry: approaches and case studies

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THE ARCHAEOLOGY OF PIG DOMESTICATION AND HUSBANDRY: APPROACHES AND CASE STUDIES

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TABLE CAPTIONS

Table 2.1

List of the measurements taken, according to von den Driesch (1976)(vdD) or Payne & Bull (1988)(P&B). An asterisk indicates that the measurement is either taken in a slightly different way from its original definition or is completely new. Lengths and widths of the first two deciduous premolars and of the fourth permanent premolar are not among the measurements suggested by Payne & Bull (1988) but were taken consistently with their recommendations for the measurement of the fourth deciduous premolar. Atlas H: this is the greatest height, but is not taken in a measuring box as suggested by von den Driesch, but using callipers as the maximum distance between the most ventral and dorsal points of the atlas. Femur SD: this has been taken as the smallest width of shaft, regardless of orientation. Tibia SDap: smallest antero-posterior width of shaft. Tibia SDml: smallest medio-lateral width of shaft. Calcaneum GD: greatest depth. This is perpendicular to von den Driesch's GB.

Table 2.2

Durrington Walls pigs: summary of dental measurements. Number of specimens (n), range, mean, coefficient of variation (V), coefficient of non-parametric variation (NPV) and significance of the difference from the normal distribution (Lilliefors test = L). One asterisk indicates that the difference from the normal distribution is significant (probability < 5% that the difference is due to chance), and two asterisks that it is highly significant (probability < 1% that the difference is due to chance). NPV, the coefficient of non parametric variation, is calculated as the interquartile range expressed as a percentage of the median, i.e. $NPV=(Q_3 - Q_1)x100/Q_2$. The coefficient of variation is presented in brackets for measurements that differ significantly from the normal distribution.

Table 2.3

Durrington Walls pigs: summary of post-cranial bone measurements. Unfused, fusing and fused bones are all included. See caption of Table 2.2 for explanation of columns.

Table 2.4

Durrington Walls pigs: summary of post-cranial bone measurements. Only fully fused specimens (for shaft measurements only specimens in which earlier fusing epiphysis is fused) are included. For radius BpP and Tibia BdP, the effect of excluding large outliers is also shown (in italics). See caption of Table 2.2 for explanation of columns.

Table 2.5

Durrington Walls pigs: significance of measurement differences between different age groups, using t-tests. P=proximal D=distal; U=unfused G=fusing F=fused. E.g. PF = prox. fused. wb = exposed dentine of buccal and lingual cusps have joined. See caption Table 2.2.

Table 2.6

Durrington Walls pigs: selected coefficients of correlation (r) between measurements.

Table 2.7

Standard pig values (in mm) from Durrington Walls proposed for comparison with other archaeological assemblages. The standard is the mean of each measurement; it has only been calculated when n > 30. Only measurements of fully fused bones have been included (for shafts, all in which the earlier fusing epiphysis is fused). Very worn first and second molars and large outliers for radius and tibia – possibly from wild boars - have been excluded.

Table 3.1

Number of mandibles recorded for different countries/geographic areas. All recorded by the author (but see text for details) with the exception of 18 from Turkey (Payne & Bull 1988), 11 from Syria and 63 from Israel (Simon Davis pers. comm.), 5 from Spain, 18 from the Netherlands, 1 from Hungary, 4 from Romania, 1 from Slovakia, 5 from Tunisia, 2 from Iran and 5 from central Asian Russia (Kuşatman 1991). Corsica and Sardinia - despite belonging respectively to France and Italy - are treated separately. Russia is split into four different regions, India into two. Four specimens could only be attributed to the former Soviet Union (USSR) but they could still be assigned to one of the broad geographic areas. For the European dataset numbers in brackets indicate the total, minus the German specimens from the Institute for Forest Ecology and Forest Inventory in Eberswalde.

Table 3.2

Number, Mean, Standard Deviation (SD) and Pearson's Coefficient of Variation (V) in measurements of wild boar (*Sus scrofa*) second and third lower molars from different geographic areas. Europe (without islands) = Corsica and Sardinia excluded. Far East (without islands) = Ryukyu and Taiwan excluded.

Table 3.3

Significance of the difference of the mean, as calculated through a Student's t-test, in measurements of wild boar (*Sus scrofa*) second and third lower molars from different geographic areas; ** highly significant; * significant; t-test = two-tailed, no equal variance.

Table 4.1

Results of the interviews with pig breeders carried out in July 2002 by Umberto Albarella and Filippo Manconi.

Table 5.1

Number of Identified Specimens (NISP) of pig and sheep/goat at various multi-period Saxon and medieval sites in England. The pig % is calculated out of the total of pig and sheep/goat NISP. The following references have been used (in the order presented in the table): Cartledge 1985; Grant 1979; Noddle 1985; Davis 1992; Albarella *et al.* 1997; Luff 1993; Locker 1992; O'Connor 1982; Noddle 1977; Albarella & Davis 1996; Dobney *et al.* Undated; Grant 1975; Grant 1988; Harman 1996; Gidney 1991a; Gidney 1991b; Jones 1993; Noddle 1976; Albarella & Davis 1994.

Table 5.2

Number of pigs and sheep+goats as recorded in a number of entries in the Domesday Book (Little Domesday).

Table 6.1

Summary statistics for pig tooth measurements from Zambujal and Leceia. V = coefficient of variation (cf. Simpson *et al.* 1960).

Table 6.2

Summary statistics for pig bone measurements from Zambujal and Leceia. V = coefficient of variation (cf. Simpson *et al.* 1960).

Table 7.1

Significance of the difference of the mean, as calculated through a Student's t-test, in measurements of pigs (using log ratios) from different prehistoric sites in Italy; ** highly significant; * significant; t-test = two-tailed, no equal variance. The standard from which the log ratios are calculated derives from the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2). UP=Upper Palaeolithic, Mes=Mesolithic, Trans=Mesolithic/Neolithic transition, EN=early Neolithic, MN=mid Neolithic, N=Neolithic, MB=mid Bronze Age, LB=late Bronze Age.

FIGURE CAPTIONS

Figure 2.1

Durrington Walls: age distribution of pig mandibles and maxillae. Top: Mandibular wear stages (MWS) following Grant (1982). Bottom: Age stages following O'Connor (1988). Only jaws where the first molar is present are included. Number of mandibles = 112, number of maxillae = 74.

Figure 2.2

Durrington Walls: Variation in pig tooth measurements compared with a standard derived from Turkish wild boars (Payne & Bull 1988), using the log ratio technique (Simpson *et al.* 1960). The mean is indicated by a black dot.

Figure 2.3

Durrington Walls: Variation in pig bone measurements compared with a standard derived from Turkish wild boars (Payne & Bull 1988), using the log ratio technique (Simpson *et al.* 1960). Only fully fused bones are included. The mean is indicated by a black dot.

Figure 2.4

Durrington Walls: Comparison between the lengths of less worn pig lower first molars (top: anterior half of tooth less worn that stage 'wb') and more worn pig lower first molars (bottom: anterior half of tooth more worn than stage 'wb'). wb = exposed dentine of buccal and lingual cusps have joined.

Figure 2.5

Durrington Walls: Percentage increase between measurements of unfused, fusing and fully fused pig bones.

Figure 2.6

Durrington Walls: Comparison of distally fused pig tibia distal widths (BdP) in tibiae with fused/fusing proximal end (top) and unfused proximal end (bottom).

Figure 3.1

Pearson's Coefficient of Variation (V) in measurements of wild boar (*Sus scrofa*) second and third lower molars from different geographic areas. Europe (without islands) = Corsica and Sardinia excluded. Far East (without islands) = Ryukyu and Taiwan excluded.

Figure 3.2

Distribution of measurements of wild boar (*Sus scrofa*) third lower molar from different geographic areas.

Figure 3.3

Distribution of measurements of wild boar (*Sus scrofa*) second lower molar from different geographic areas.

Figure 3.4

Measurements of wild boar (*Sus scrofa*) post-cranial bones and teeth from different geographic areas compared using a log ratio technique (Simpson *et al.* 1960). The standards (0.00) are those of a Turkish wild boar population provided by Payne & Bull (1988). Only tooth measurements from specimens that also provided post-cranial bones have been included. Bone measurements include: greatest width of the distal humerus trochlea (BT), smallest diameter of distal humerus trochlea (HTC), diameter of femur caput (DC), greatest width of the distal tibia (BdP), greatest length of the calcaneum (GL) and greatest length of the astragalus (GLl). Tooth measurements include: posterior width of lower deciduous fourth premolar (dP_4WP), anterior and posterior width of lower first and second molar (M_1WA, M_1WP, M_2WA, M_2WP) and anterior width of the lower third molar (M_3WA). The scale of the vertical axis is fixed to emphasize differences in sample sizes.

Figure 3.5

Size of lower third (5a) and second (5b) molars in wild boars from different geographic areas in Europe and North Africa. Central = Austria, Czech Rep, France, Germany, Netherlands, Switzerland; Eastern = Belarus, Bosnia, Hungary, Macedonia, Poland, Romania, Russia, Slovakia, Ukraine; Southern = Italy, Portugal, Spain; Islands = Corsica, Sardinia; North Africa = Morocco, Algeria, Tunisia, Egypt.

Figure 3.6

Size of lower third (6a) and second (6b) molars in wild boars from different geographic areas in the Middle East. Levant = Palestine/Israel, Jordan and Syria.

Figure 3.7

Size of lower third (7a) and second (7b) molars in wild boars from different geographic areas in the Caucasus and Central Asia. Central Asia Republics = Kazakhstan, Turkmenistan, Kyrgyzstan and Uzbekistan. Most of the specimens from Russia derive from the Volga delta/Caspian area, with some also from western Siberia.

Figure 3.8

Size of lower third (8a) and second (8b) molars in wild boars from different geographic areas in the Far East.

Figure 3.9

Size of lower third (9a) and second (9b) molars in wild boars from different geographic areas in South-Asia, South-East Asia and Oceania. Indochina = Burma, Thailand & Vietnam; Island South-East Asia = Malaysia, Indonesia, Andaman & Nicobar islands; Oceanic Islands = Marquesas, Mariana, New Guinea & Vanuatu.

Figure 3.10

Size of distal humerus from different geographic areas in Europe.

Figure 3.11

Size of distal humerus from different geographic areas in the Caucasus and Middle East.

Figure 3.12

Size of distal humerus from different geographic areas in central and eastern Asia.

Figure 3.13

Ratio between width and length of the lower third molar in various geographic areas. WA is the greatest width of the anterior cusp, whereas WC is the greatest width of the central cusp.

Figure 3.14

Ratio between height of the mandible (in front of the first molar) and third molar length and width in Europe and other geographic areas.

Figure 3.15

Ratio between height of the mandible (in front of the first molar) and third molar length and width in various geographic areas.

Figure 3.16

Size of lower third molar in modern and archaeological European wild boars (archaeological specimens from central and northern Europe). Island populations are excluded.

Figure 3.17

Size of lower third molar in modern and archaeological European wild boars (archaeological specimens from southern Europe). Island populations are excluded.

Figure 3.18

Size of lower second molar in modern and archaeological European wild boars (archaeological specimens from central and northern Europe). Island populations are excluded.

Figure 3.19

Size of lower second molar in modern and archaeological European wild boars (archaeological specimens from southern Europe). Island populations are excluded.

Changes in pig frequency over time. The comparison is carried out between different phases of the same sites; therefore only multi-period sites could be used.

Top diagram: A=Castle Mall; B=Berrington Street; C=The Green; D=Lincoln; E=St.Martin-at-Palace Plain; F=Friar St; G=Walton; H=Flaxengate; I=Burystead; J=Portchester Castle; K=St.Peter's St.

Bottom diagram: A=Colchester; B=West Cotton (early to mid medieval); C=West Cotton (mid to late medieval); D=The Shires St.Peters Ln (mid to late medieval); E=The Shire Little Ln (mid to late medieval); F=Launceston Castle; G=Castle Mall; H=Alms Lane; I=Bedford Castle; J=The Shires St.Peters Ln (early to mid medieval); K=Friar St.; L=The Shires Little Ln (early to mid medieval); M=The Green.

See Table 5.1 for more details about the sites.

Figure 5.3

Frequency of pig and sheep/goat bones from archaeological sites in central England. This is the average NISP (Number of Identified Specimens) of the percentage of the two taxa out of the three main species (cattle, sheep/goat and pig) per site. Only sites where the total NISP for the three taxa was > 300 have been considered. Number of sites per period: Saxon=33; Early med.=12; Mid med.=19; Late med.=14. The Saxon phase also includes some Norman elements ("Saxo-Norman"). Early med.=11th-13th cent.; Mid med.=12th-14th cent.; Late med.=14th-early 16th cent.

Figure 5.4

Frequency of pig bones from Saxon and medieval sites in central England This is the average NISP (Number of Identified Specimens) of the percentage of pigs out of the three main species (cattle, sheep/goat and pig) per site. Only sites where the total NISP for the three taxa was > 300 have been considered. The following counties are included:

West Midlands: Herefordshire, West Midlands, Warwickshire and Worcestershire (13 sites)

East Midlands: Leicestershire and Northamptonshire (33 sites)

East Anglia: Essex, Norfolk and Suffolk (41 sites).

Figure 6.1

Location of the main sites from Portugal mentioned in the text.

Figure 6.2

Wear stages of lower first (top) and second (bottom) molars at Zambujal and Leceia. Only teeth in jaws are included for Zambujal, whereas Leceia also includes isolated teeth. Wear stages follow Grant (1982); nye = not yet erupted; U = unworn.

Figure 6.3

Size of lower deciduous fourth premolar (dP4) and third molar (M3) at Zambujal. L = length; WA = anterior width; WC = central width; WP = posterior width.

Figure 6.4

Size of lower first (M1) and second (M2) molars at Zambujal. M1/2s are isolated first or second molars. L = length; WA = anterior width; WP = posterior width.

Figure 6.5

Size of lower deciduous fourth premolar (dP4) and third molar (M3) at Leceia. L = length; WA = anterior width; WC = central width; WP = posterior width.

Figure 6.6

Size of lower first (M1) and second (M2) molars at Leceia. M1/2s are isolated first or second molars. L = length; WA = anterior width; WP = posterior width.

Figure 6.7

Coefficient of variation of various measurements from Zambujal, Leceia and modern wild boar populations from Turkey (Payne and Bull 1988) and Israeli/Syria (Simon Davis pers. data).

Figure 6.8

Size of distal humerus (top) and distal tibia (bottom) at Zambujal. BT = width of the distal trochlea; HTC = minimum height of the trochlea; BdP = distal width; Dd = distal depth.

Figure 6.9

Size of distal humerus (top) and distal tibia (bottom) at Leceia. BT = width of the distal trochlea; HTC = minimum height of the trochlea; BdP = distal width; Dd = distal depth.

Figure 6.10

Size of the astragalus at Zambujal (left) and Leceia (right). GLl = greatest length. Light specimens are porous and likely to belong to juvenile animals.

Figure 6.11

Size of the scapula at Zambujal (left) and Leceia (right). SLC = Length of the collum.

Figure 6.12

Size of lower deciduous fourth premolar (dP4) and third molar (M3) at Leceia in different periods.

Figure 6.13

Size of lower first (M1) and second (M2) molars at Leceia in different periods.

Figure 6.14

Size of distal humerus (top) and distal tibia (bottom) at Leceia in different periods.

Figure 6.15

Size of the astragalus at Leceia in different periods. Light specimens have been excluded.

Figure 6.16

Size of lower third molar (top), lower second molar (centre) and deciduous fourth premolar (bottom) at Zambujal compared with three Portuguese Mesolithic sites and modern wild boars from Portugal and France.

Figure 6.17

Size of lower third molar (top), lower second molar (centre) and deciduous fourth premolar (bottom) at Leceia (only Chalcolithic levels) compared with three Portuguese Mesolithic sites and modern wild boars from Portugal and France.

Figure 6.18

Size of the distal humerus at Zambujal (top) and Leceia (bottom) compared with three Portuguese Mesolithic sites and modern wild boars from Portugal and France.

Figure 6.19

Comparison of pig lower tooth widths from Mesolithic and Chalcolithic sites and modern Portuguese wild boars. The widths of the anterior deciduous fourth premolar, the anterior and posterior first molar, the anterior and posterior second molar and the anterior second molar are combined using a log ratio technique (see text). The star indicates the mean, whereas the standard ('0') is expressed by a vertical line and is calculated from the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2).

Figure 6.20

Comparison of pig post-cranial bone measurements from Mesolithic and Chalcolithic sites and modern Portuguese wild boars. Humerus BT and HTC, Tibia BdP, Astragalus GLl and Calcaneum GL are combined using a log ratio technique (see text). The star indicates the mean, whereas the standard ('0') is expressed by a vertical line and is calculated from the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2). No unfused specimens are included and for humerus fusing specimens have also been excluded.

Figure 6.21

Comparison of tooth widths and post-cranial bone measurements in Mesolithic Portugal and Switzerland. See captions of Figures 6.19 and 6.20 for further details.

Figure 6.22

Comparison of tooth widths and post-cranial bone measurements in Mesolithic Portugal and Denmark. See captions of Figures 6.19 and 6.20 for further details.

Figure 6.23

Comparison of pig lower tooth widths from Zambujal and Santarém. See caption of Figure 6.19 for further details.

Figure 6.24

Comparison of pig post-cranial bone measurements from Zambujal and Santarém. See caption of Figure 6.20 for further details.

Figure 6.25

Sus lower third molar tooth – size versus shape of pigs from Medieval and post-Medieval Launceston Castle, England (Albarella & Davis 1996) and modern wild boars from Syria and Israel (specimens in the Zoology Museum, Tel Aviv University and Zoology department of the Hebrew University, Jerusalem). The M_3 length (y axis) is plotted against (x axis) an index of M_3 width of the anterior pillar (WA) divided by the width of the central pillar (WC). The resulting plots are therefore size (length M_3) versus shape (WA/WC or the degree to which the tooth is parallel sided when viewed occlusally). In other words M_3s with more or less parallel sides or where WA more or less = WC have a shape index of around 100 while "compressed" teeth with triangular outlines have index values slightly > 100. Note that besides being larger, the wild boar M_3s have parallel sides with WA more or less = WC. However, the pigs are not only smaller but are tri-angular in shape when viewed occlusally with WA > WC

Figure 6.26

The same plot as Figure 6.25 for *Sus* M_3s from Alcaçova de Santarém. Note there is a tendency for many of the *Sus* in the Moslem period at this site, unlike say the Roman ones, to be both large and have values of WA/WC around 100 – *i.e.* by analogy with Figure 6.25 they are more likely to have belonged to wild boars.

Figure 7.1

Location of the main sites from Italy mentioned in the text.

Figure 7.2

Comparison of pig lower tooth widths from the sites of Palidoro and Grotta della Madonna and modern Italian wild boars (data from Kuşatman 1991). The posterior width and length of the anterior deciduous fourth premolar, the anterior and posterior widths and length of the first and second molars and the anterior width and length of the lower third molar are combined using a log ratio technique (see text). First and second molars were only used when they could be identified with certainly (i.e. they were embedded in a jaw). Lengths of the molars where only used when the wear stage was no higher than 'g' (*sensu* Grant 1982). The standard ('0') is expressed by a vertical line and is calculated from the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2), whereas a star indicates the position of the mean value for a modern population of Turkish wild boars (Payne & Bull 1988).

Figure 7.3

Comparison of pig lower tooth widths from the site of Grotta dell'Uzzo and modern Italian wild boars (data from Kuşatman 1991). For details see Fig.7.2

Figure 7.4

Comparison of pig lower tooth widths from the sites of La Marmotta, Masseria Candelaro, La Starza, Torre Mordillo and modern Italian wild boars (data from Kuşatman 1991). For details see Fig.7.2, but for the site of La Starza measurements of the upper molars (equivalent to those described for the lower molars, see Chapter 2) have also been included.

Figure 7.5

Comparison of pig lower tooth widths from the sites of Arene Candide (data from Rowley-Conwy (1997), Rivoli, Conelle (data from Wilkens 1999), Concordia Sagittaria Concordia Sagittaria, and modern Italian wild boars (data from Kuşatman 1991). For details see Fig.7.2, but for the site of Arene Candide and Conelle only measurements of the third molar were available.

Figure 7.6

Comparison of pig post-cranial bone measurements from the sites of Palidoro, Grotta della Madonna and Grotta dell'Uzzo. The greatest width of the distal humerus trochlea (BT), smallest diameter of distal humerus trochlea (HTC), greatest width of the distal tibia (BdP), greatest length of the calcaneum (GL) and greatest length of the astragalus (GLl) (following Payne & Bull 1988) are combined using a log ratio technique (see text). The humerus measurements only include fully fused specimens whereas fusing tibiae and calcanei have also been used. Measurements of astragali that were recorded as 'light' and 'porous' were excluded. The standard ('0') is expressed by a vertical line and is calculated from the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2), whereas a star indicates the position of the mean value for a modern population of Turkish wild boars (Payne & Bull 1988).

Figure 7.7

Comparison of pig post-cranial bone measurements from the sites of La Marmotta, Conelle (data from Wilkens 1999), La Starza, Concordia Sagittaria and Torre Mordillo. For details see Fig.7.6. Note the slightly different scale used for Conelle. No humerus measurements were used for Conelle as no distinction between fused and fusing distal epiphyses was made in the original report.

Figure 7.8

Comparison of pig post-cranial bone measurements from the sites of Arene Candide (data from Rowley-Conwy 1997), Rivoli (data from Piper 2001) and Cornuda (data from Riedel 1988). For details see Fig.7.6.

Figure 7.9

Ranges and means of lengths (top) and widths (bottom) of lower third molars from prehistoric sites from northern Italy. Site abbreviations: AC=Arene Candide (Liguria) (from Cassoli & Tagliacozzo 1994 & Rowley-Conwy 1997), Riv=Rivoli (Veneto) (from Piper 2001), Mol=Molino Casarotto (Veneto) (from Jarman 1975), Cov=Monte Covolo (Lombardy) (from Barker 1981), Bar=Barche di Solferino (Lombardy) (from Riedel 1976b), Led=Ledro (Trentino) (from Riedel 1976a), Fia=Fiave' (Trentino) (from Jarman 1975), Iso=Isolone della Prevaldesca (Lombardy) (from Riedel 1976c), Concordia Sagittaria (Veneto) (pers. data); Mod

WB=Modern Italian wild boar (from Kuşatman 1991). Period abbreviations: M=Mesolithic, MN=mid Neolithic, LN=late Neolithic, LEEB=late Eneolithic/early Bronze Age, EN=Eneolithic, EMB=early/mid Bronze Age, BA=Bronze Age, LB=late Bronze Age. For Barche di Solferino values for specimens identified as domestic ('d') or wild ('w') are presented separately.

Figure 7.10

Analysis of the shape of lower third molars in pre-Neolithic, Neolithic and Bronze Age times in Italy. L=length; WA=width of anterior cusp; WC=width of central cusp. The following sites are included: Fossellone (upper Palaeolithic, n=1), Palidoro (upper Palaeolithic, n=4), Grotta Romanelli (upper Palaeolithic, n=1), Grotta della Madonna (upper Palaeolithic, n=2; Mesolithic, n=3). Grotta dell'Uzzo (Mesolithic, n=5; Mesolithic-Neolithic transition, n=5; early Neolithic, n=5), La Marmotta (early Neolithic, n=2), Masseria Candelaro (mid Neolithic, n=2), Torre Mordillo (late Bronze Age, n=4), Concordia Sagittaria (late Bronze Age, n=24). The data from the Turkish site of Erbaba (6^{th} millennium) are included as a comparison.

Figure 7.11

Summary statistics for combined pig bone measurements (using a log ratio technique) from a number of Italian prehistoric sites. The standard ('0') is expressed by a horizontal solid line and is calculated from the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2) whereas a horizontal dotted line indicates the position of the mean value for a modern population of Turkish wild boars (Payne & Bull 1988). The boxplots show extreme values, median and quartiles, whereas the small squares represent outliers. Site abbreviations: Pal=Palidoro, Mad=Grotta della Madonna, Uzzo=Grotta dell'Uzzo, Mar=La Marmotta, AC=Arene Candide, Riv=Rivoli, Mas=Masseria Candelaro, Cone=Conelle, LS=La Starza, Con=Concordia Sagittaria, Mor=Torre Mordillo. Mod WB=Modern Italian wild boar. Period abbreviations: UP=upper Palaeolithic, M=Mesolithic, M-N=Mesolithic/Neolithic transition, EN=early Neolithic, N=Neolithic, MN=mid Neolithic, LN=late Neolithic, Eneo=Eneolithic, MB=mid Bronze Age, LB=late Bronze Age.

Figure 7.12

Difference in the relative size of pig tooth and post-cranial bone measurements from a number of Italian prehistoric sites. Two Middle Eastern sites (Erbaba, Turkey and Sabi Abyad, Syria are included for comparison) are included for comparison. For abbreviations see Fig.7.11. Positive values indicate that bone measurements are relatively larger than teeth in comparison to the late Neolithic assemblage of Durrington Walls (England) (see Chapter 2), used as a standard. Values on the '0' line indicate that the relatively proportion of teeth and bones is identical to Durrington Walls, whereas a relatively smaller size of post-cranial bones results in negative values. The separate values for wild and domestic pigs at Conelle are estimated.

Figure 7.13

Estimate of general trends in size evolution of pigs from prehistoric Italy. Dotted lines indicate that, due to the lack of data in a specific period, the passage from one period to another must be regarded as tentative. In Bronze Age sites, where no wild boar teeth could be found, their size is estimated on the basis of post-cranial bone size, assuming that the ratio between teeth and bones was the same as at Conelle.

Figure 7.14

Comparison of pig lower tooth widths from Middle Eastern and Italian sites. For details see Fig.7.2.

Figure 7.15

Comparison of pig post-cranial bone measurements from Middle Eastern and Italian sites. For details see Fig.7.6.

Figure 8.1

General outline of the various types of pig exploitation discussed in this thesis.

PLATE CAPTIONS

Plate 3.1

Lateral view of the skulls of two wild boars from Sardinia and Russian Far East (Ussuriland). Specimens from the Natural History Museum in Berlin. Photograph by Umberto Albarella 2002.

Plate 3.2

Ventral view of the same specimens as in Plate 3.1. It shows that the size variation is not due to sex or age differences, as the two specimens are both males and have similar levels of tooth wear, which indicates that they are if similar age. Photograph by Umberto Albarella 2002.

Plate 4.1

Pig from of the traditional Sardinian breed from the region of Ogliastra (Sardinia). Photo by Umberto Albarella 1986.

Plate 4.2

Typical landscape in Supramonte (Sardinia), where many free-range pigs were found in the woodland area. Photo by Umberto Albarella 2002.

Plate 4.3

A young Sardinian pig from the area photographed in Plate 4.2 tries to find some shade in a very hot June day as it eats some poor and short grass. Photo by Umberto Albarella 2002.

Plate 4.4

Free-range pigs from Castagniccia (Corsica). Note the very straight snout. Photo by Umberto Albarella 2000.

Plate 4.5

Pig from the Limbara area (Sardinia) belonging to the breeder Sebastiano Carta. Note the pronounced concavity of the snout and the heavy build indicating that the animal belongs to an improved breed. Photo by Umberto Albarella 2002.

Plate 4.6

Pig belonging to the traditional Corsican breed from Orone near Levie (Corsica). Photo by Umberto Albarella 2002.

Plate 4.7

The Bavella mountains in Corsica, where pigs of the traditional breed survive without almost any support. Photo by Umberto Albarella 2000.

Plate 4.8

Abandoned enclosure in the Levie area (Corsica), which was probably used for pigs. Photo by Umberto Albarella 2002.

Plate 4.9

Pig snout with the typical iron wire, inserted to avoid rooting damage, from Bavella (Corsica). Photo by Umberto Albarella 2002.

Plate 4.10

Small cattle of the traditional Corsican breed from Perfugas (Sardinia). Photo by Filippo Manconi 2003.

Plate 5.1

Pig feeding on acorns, from the early 14^{th} manuscript *The Luttrell Psalter*, Add.42130 f.59, by permission of the British Library.

Plate 5.2

Unimproved domestic boar, from the early 14^{th} manuscript *The Luttrell Psalter*, Add.42130 f.19, by permission of the British Library.

Teeth	**P_4**	W	crown width	*
	dP^2,dP^3	L	crown length	*
		WP	posterior crown width	*
	dP_2,dP_3	L	crown length	*
		W	crown width	*
	dP^4,dP_4,M^1,M_1,M^2,M_2	L	crown length	P&B
		WA	anterior crown width	P&B
		WP	posterior crown width	P&B
	M^3,M_3	L	crown length	P&B
		WA	anterior crown width	P&B
Bones	**Atlas**	H*	height	VdD*
		BFcr	width of cranial articular surface	VdD
	Scapula	GLP	length of articular end	VdD
		SLC	width of neck	VdD
	Humerus	Bd	distal width	P&B
		BT	width of trochlea	P&B
		HTC	mimimum diameter of trochlea	P&B
		SD	smallest width of shaft	VdD
	Radius	BpP	proximal width	P&B
		Bd	distal width	VdD
		SD	smallest width of shaft	VdD
	Ulna	DPA	depth at the processus anconaeus	VdD
		BPC	width across coronoid process	VdD
	Pelvis	LAR	diameter of acetabulum	VdD
	Femur	DCP	diameter of caput	P&B
		SD*	smallest width of shaft	VdD*
	Tibia	BdP	distal width	P&B
		SDap	smallest antero-posterior width of shaft	*
		SDml	smallest medio-lateral width of shaft	*
	Astragalus	GLl	lateral length	VdD
		GLm	medial length	VdD
	Calcaneum	GL	greatest length	VdD
		GD	greatest depth	*
	Metapodials	GL	length	VdD

Table 2.1

Maxilla

Meas.	**n**	**Min**	**Max**	**Mean**	**V**	**L**	**NPV**
dP2L	9	10.0	11.1	10.4	(3.7)	0.036 *	5.8
dP2WP	9	5.1	5.9	5.5	(5.1)	0.029 *	9.3
dP3L	13	10.9	13.5	12.6	5.2	> 0.2	5.9
dP3WP	14	7.5	8.6	8.1	4.2	> 0.2	6.1
dP4L	23	12.8	15.7	14.0	4.6	0.138	5.0
dP4WA	22	10.2	11.8	11.0	3.7	> 0.2	4.8
dP4WP	23	9.7	11.5	10.7	4.8	> 0.2	8.3
M1L	82	14.4	19.5	17.1	5.8	> 0.2	7.2
M1WA	84	12.6	15.2	13.7	4.0	0.065	5.7
M1WP	86	12.5	14.7	13.5	(3.9)	0.044 *	4.4
M2L	82	19.5	25.1	22.1	4.6	> 0.2	5.0
M2WA	77	15.3	19.0	17.0	4.6	> 0.2	5.9
M2WP	71	14.6	18.5	16.5	5.7	0.184	8.5
M3L	39	28.6	37.1	32.9	6.3	> 0.2	9.2
M3WA	44	17.1	20.0	18.5	4.4	> 0.2	6.5

Mandible

Meas.	**N**	**Min**	**Max**	**Mean**	**V**	**L**	**NPV**
P4W	36	7.6	9.1	8.4	3.8	> 0.2	4.8
dP2L	9	7.3	8.9	8.2	6.2	> 0.2	9.6
dP2W	10	3.0	3.7	3.4	6.1	> 0.2	7.2
dP3L	41	8.5	11.5	10.1	5.1	> 0.2	7.4
dP3W	48	4.3	5.4	4.8	5.0	0.07	8.3
dP4L	74	16.4	20.8	18.9	(4.8)	0.036 *	8.0
dP4WA	69	5.7	7.1	6.3	4.3	0.181	6.3
dP4WP	73	7.7	9.5	8.6	4.5	> 0.2	5.8
M1L	128	14.7	19.1	17.3	5.2	> 0.2	6.8
M1WA	127	9.1	11.6	10.3	(4.5)	0.029 *	5.8
M1WP	125	9.8	12.4	10.9	(5.0)	0.000 **	7.4
M2L	81	19.6	24.7	21.8	4.6	> 0.2	5.7
M2WA	74	12.5	15.2	13.7	4.3	> 0.2	6.6
M2WP	68	12.5	15.9	14.2	4.5	> 0.2	5.7
M3L	39	31.3	39.3	34.5	(5.5)	0.008 **	7.4
M3WA	42	13.9	17.5	15.7	6.0	> 0.2	9.0

Table 2.2

Meas.	n	Min	Max	Mean	V	L	NPV
Atlas H	74	39.3	54.8	46.7	6.9	> 0.2	9.7
Atlas BFcr	59	51.8	61.2	56.7	4.1	> 0.2	5.1
Scapula GLP	98	29.4	42.7	36.7	7.2	> 0.2	10.7
Scapula SLC	216	14.3	28.5	22.2	(14.6)	0.002 **	24.3
Humerus Bd	165	34.6	47.4	40.3	5.7	0.006 **	7.0
Humerus BT	117	25.4	36.0	30.6	6.2	> 0.2	8.3
Humerus HTC	190	16.7	22.2	19.4	5.8	> 0.2	7.7
Humerus SD	299	7.7	20.2	14.8	14.4	> 0.2	22.1
Radius BpP	190	24.3	37.1	29.4	(6.2)	0.003 **	6.2
Radius Bd	24	25.4	36.9	32.7	8.4	> 0.2	9.6
Radius SD	258	11.8	22.2	16.2	(12.7)	0.026 *	20.3
Ulna DPA	155	26.1	41.5	33.7	10.9	> 0.2	17.5
Ulna BPC	208	16.9	25.0	21.0	8.7	> 0.2	11.8
MTC III GL	39	63.4	80.7	74.0	5.0	> 0.2	7.3
MTC IV GL	35	68.2	82.5	75.9	4.6	> 0.2	6.1
Pelvis LAR	101	29.5	37.6	33.4	4.8	0.097	5.3
Femur DCP	13	25.4	29.1	27.6	4.4	> 0.2	7.8
Femur SD	98	7.4	22.2	16.0	(17.6)	0.001 **	29.0
Tibia BdP	192	27.2	36.0	30.5	4.8	> 0.2	6.5
Tibia SDap	381	8.6	17.3	13.9	(9.9)	0.000 **	13.5
Tibia SDml	373	11.7	24.4	18.4	(12.2)	0.000 **	18.2
Astragalus GLl	160	28.4	46.8	40.8	6.0	0.080	6.6
Astragalus GLm	156	26.6	42.2	37.9	6.1	> 0.2	7.8
Calcaneum GL	44	70.4	88.5	79.1	5.3	> 0.2	5.4
Calcaneum GD	181	23.9	34.6	29.2	7.3	> 0.2	9.6
MTT III GL	6	77.8	86.9	82.7		> 0.2	
MTT IV GL	5	84.5	93.6	88.2		> 0.2	

Table 2.3

Meas.	**n**	**Min**	**Max**	**Mean**	**V**	**L**	**NPV**
Atlas H	68	41.1	54.8	46.9	6.7	> 0.2	9.6
Atlas BFcr	52	51.8	61.2	56.8	4.2	> 0.2	5.5
Scapula GLP	96	29.4	42.7	36.7	7.1	> 0.2	10.5
Scapula SLC	115	18.0	28.5	23.8	10.6	> 0.2	16.2
Humerus Bd	102	36.2	47.4	41.1	5.0	0.054	5.4
Humerus BT	67	26.3	36.0	31.3	5.7	> 0.2	5.7
Humerus HTC	110	17.3	22.2	19.7	5.4	> 0.2	7.8
Humerus SD	96	14.0	20.2	16.7	8.3	> 0.2	11.2
Radius BpP	172	24.3	37.1	29.6	(5.8)	0.002 **	5.8
Radius BpP	*171*	*24.3*	*33.8*	*29.5*	*(5.5)*	*0.012* *	5.8
Radius Bd	5	31.9	35.7	34.0			
Radius SD	139	14.1	22.2	17.6	8.6	> 0.2	11.9
Ulna DPA	5	35.8	41.5	38.6			
Ulna BPC	4	19.7	23.5	22.0			
MTC III GL	33	63.4	80.7	73.9	5.1	> 0.2	6.8
MTC IV GL	33	68.2	82.5	75.7	4.7	> 0.2	6.5
Pelvis LAR	97	29.5	37.6	33.3	4.9	0.091	5.4
Femur DCP	11	29.4	29.1	27.5	4.5	> 0.2	7.6
Femur SD (p.fused)	4	20.0	22.2	20.6			
Femur SD (d.fused)	5	19.0	22.2	20.6			
Tibia BdP	116	27.4	35.4	30.8	4.5	> 0.2	5.9
Tibia BdP	*115*	*27.4*	*33.9*	*30.7*	*4.4*	*> 0.2*	5.9
Tibia SDap	113	12.6	16.9	14.9	5.4	> 0.2	6.3
Tibia SDml	107	17.0	24.4	20.4	5.3	> 0.2	6.4
Calcaneum GL	40	70.4	88.5	79.3	5.2	0.187	5.2
Calcaneum GD	48	27.9	34.6	31.1	4.7	> 0.2	5.8
MTT III GL	5	77.8	86.9	83.0			
MTT IV GL	4	84.5	89.4	86.8			

Table 2.4

Measurement	Groups compared		Significance
M_1WP	Ant. half wear before 'wb' n=103 mean=10.9	Ant. half wear = 'wb' n=22 mean=11.0	0.346
M_1L	Ant. half wear before 'wb' n=107 mean=17.5	Ant. half wear = 'wb' n=21 mean=16.2	0.000**
M_2WP	Ant. half wear before 'wb' n=57 mean=14.1	Ant. half wear = 'wb' n=11 mean=14.3	0.409
M_2L	Ant. half wear before 'wb' n=69 mean=22.0	Ant. half wear = 'wb' n=12 mean=20.6	0.000**
SD Humerus	PF or PG n=10 mean=17.9	PU + DF n=14 mean=16.7	0.009**
SD Humerus	PU + DF n=14 mean=16.7	PU + DG n=19 mean=14.9	0.000**
SD Humerus	PU + DG n=19 mean=14.9	DU n=90 mean=12.7	0.000**
SDap Tibia	PF or PG n=35 mean=14.9	PU +(DF or DG) n=58 mean=14.7	0.345
SDap Tibia	PU + (DU or DG) n=58 mean=14.7	DU n=193 mean=13.0	0.000**
SDml Tibia	PF or PG n=35 mean=20.2	PU + (DF or DG) n=58 mean=20.0	0.347
SDml Tibia	PU + (DU or DG) n=58 mean=20.0	DU n=188 mean=16.9	0.000**

Table 2.5

Teeth			Bones (all)			Bones (fused only)		
Element	Meas.	r	Element r	Meas.		Element	Meas.	r
M^2	WA:WP	0.885	Astragalus	GLl:GLlm	0.961	Calcaneum	GL:GD	0.814
M^1	WA:WP	0.819	Tibia	SDap:SDml	0.913	Radius	BpP:SD	0.793
M_1	WA:WP	0.784	Radius	BpP:SD	0.822	Tibia	SDap:SDml	0.723
dP_4	WA:WP	0.755	Calcaneum	GL:GD	0.822	Humerus	Bd:SD	0.684
dP_4	L:WP	0.700	Scapula	GLP:SLC	0.811	Tibia	BdP:SDmm	0.678
M_2	WA:WP	0.693	Ulna	DPA:BPC	0.786	Humerus	Bd:BT	0.675
dP_4	L:WA	0.650	Humerus	Bd:SD	0.781	Tibia	BdP:SDap	0.637
M^2	L:WP	0.638	Humerus	Bd:BT	0.769	Humerus	BT:SD	0.630
M_3	L:WA	0.634	Tibia	BdP:SDml	0.707	Humerus	Bd:HTC	0.614
M^2	L:WA	0.616	Humerus	BT:SD	0.702	Humerus	BT:HTC	0.562
M^3	L:WA	0.524	Humerus	Bd:HTC	0.699	Humerus	HTC:SD	0.524
M_1	L:WA	0.438	Humerus	BT:HTC	0.689			
M_1	L:WP	0.416	Tibia	Bd:SDap	0.672			
M_2	L:WP	0.302	Humerus	HTC:SD	0.649			
M^1	L:WA	0.299	Atlas	H:BFcr	0.487			
M^1	L:WP	0.283						
M_2	L:WA	0.271						

Table 2.6

Teeth		Bones	
M^1L	17.6	Atlas H	46.9
M^1WA	13.7	Atlas BFcr	56.8
M^1WP	13.5	Scapula GLP	36.7
M^2L	23.6	Scapula SLC	23.8
M^2WA	17.0	Humerus Bd	41.1
M^2WP	16.5	Humerus BT	31.3
M^3L	32.9	Humerus HTC	19.7
M^3WA	18.5	Humerus SD	16.7
P_4W	8.4	Radius BpP	29.6
dP_3L	10.1	Radius SD	17.6
dP_3W	4.8	MTC III GL	73.9
dP_4L	18.9	MTC IV GL	75.7
dP_4WA	6.3	Pelvis LAR	33.3
dP_4WP	8.6	Tibia BdP	30.7
M_1L	17.5	Tibia SDap	14.9
M_1WA	10.3	Tibia SDml	20.4
M_1WP	10.9	Astragalus GLl	40.8
M_2L	21.8	Astragalus GLm	37.9
M_2WA	13.7	Calcaneum GL	79.3
M_2WP	14.2	Calcaneum GD	31.1
M_3L	34.5		
M_3WA	15.7		

Table 2.7

Europe	**n**	**North Africa**	**n**	**Middle East**	**n**	**Caucasus**	**n**	**Central Asia**	**n**	**South and South-East Asia**	**n**	**Far East**	**n**	**Oceania**	**n**
Austria	1	Algeria	1	Iran	25	Armenia	8	Afghanistan	1	Burma	12	China	43	Australia	1
Byelorussia	23	Egypt	1	Iraq	13	Azerbajan	4	India (Kashmir)	4	Cambodia	1	Japan	60	French Polynesia	21
Bosnia	1	Morocco	2	Jordan	1	Georgia	5	Kazakhstan	7	India	37	Korea	1	Marianne	2
Czech Rep	20	Tunisia	7	Palestine/Israel	64	Russia	40	Kyrgyzstan	3	Indonesia	58	Mongolia	3	Papua New Guinea	7
France	62	TOTAL	11	Syria	16	URSS	1	Pakistan	3	Laos	1	Russia	6	New Zealand	1
Corsica	7	*Females*	*3*	Turkey	35	TOTAL	58	Russia	30	Malaysia	8	Taiwan	12	Vanuatu	4
Germany	524 (107)	*Males*	*6*	TOTAL	154	*Females*	*15*	Turkmenistan	5	Nepal	6	TOTAL	125	TOTAL	36
Greece	1	*Unknown*	*2*	*Females*	*70*	*Males*	*40*	URSS	3	Philippines	5	*Females*	*43*	*Females*	*4*
Holland	20			*Males*	*69*	*Unknown*	*3*	Uzbekistan	5	Sri Lanka	4	*Males*	*46*	*Males*	*28*
Hungary	3			*Unknown*	*15*			TOTAL	61	Thailand	10	*Unknown*	*36*	*Unknown*	*4*
Italy	11							*Females*	*21*	Vietnam	3				
Sardinia	18							*Males*	*29*	TOTAL	145				
Macedonia	1							*Unknown*	*11*	*Females*	*45*				
Poland	77									*Males*	*66*				
Portugal	18									*Unknown*	*34*				
Romania	4														
Russia	33														
Slovakia	1														
Spain	8														
Switzerland	57														
Ukraine	3														
TOTAL	893 (476)														
Females	*275 (150)*														
Males	*315 (181)*														
Unknown	*303 (145)*														

Table 3.1

	M3WA				M3L				M2WA				M2WP			
	n	Mean	SD	V	n	Mean	SD	V	n	Mean	SD	V	n	Mean	SD	V
Europe	179	16.9	1.8	10.7	129	38.2	5.2	13.6	297	14.4	1.2	8.3	294	15.1	1.3	8.6
Europe (without islands)	158	17.3	1.3	7.5	109	39.8	3.6	9.0	277	14.6	0.9	6.2	273	15.3	1	6.5
North Africa	8	16.4	1	6.1	7	38.1	3.8	10.0	11	13.6	0.8	5.9	11	14.5	1	6.9
Middle East	84	18.1	1	5.5	78	41.3	3.4	8.2	125	15.1	0.8	5.3	117	15.9	0.9	5.7
Caucasus	37	18.7	1	5.3	29	43	2.9	6.7	55	15.5	0.8	5.2	55	16.4	0.8	4.9
Central Asia	49	18.7	1.6	8.6	39	43.7	3.8	8.7	49	15.7	1.3	8.3	46	16.5	1.1	6.7
South and South-East Asia	92	17.1	1.9	11.1	65	37.1	6.3	17.0	118	14.4	1.6	11.1	106	15	1.5	10.0
Far East	69	16.5	3.1	18.8	51	38.1	7.6	19.9	89	13.7	2.5	18.2	84	14.1	2.4	17.0
Far East (without islands)	50	17.8	2.4	13.5	39	41.1	5.8	14.1	63	14.9	1.9	12.8	59	15.2	1.8	11.8
Oceania	24	14.8	1.3	8.8	21	30.4	3.7	12.2	33	13	1	7.7	30	13.4	1	7.5

Table 3.2

	M3WA		M3L		M2WA		M2WP	
Central Asia/Caucasus	0.958		0.392		0.432		0.716	
Central Asia/Middle East	0.009	**	0.001	**	0.005	**	0.004	**
Central Asia/Far East	0.000	**	0.000	**	0.000	**	0.000	**
Central Asia/Europe	0.000	**	0.000	**	0.000	**	0.000	**
Central Asia/ S and SE Asia	0.000	**	0.000	**	0.000	**	0.000	**
Caucasus/Middle East	0.000	**	0.015	*	0.002	**	0.001	**
Caucasus/Far East	0.000	**	0.000	**	0.000	**	0.000	**
Caucasus/Europe	0.000	**	0.000	**	0.000	**	0.000	**
Caucasus/S and SE Asia	0.000	**	0.000	**	0.000	**	0.000	**
Middle East/Far East	0.000	**	0.007	**	0.000	**	0.000	**
Middle East/Europe	0.000	**	0.000	**	0.000	**	0.000	**
Middle East/S and SE Asia	0.000	**	0.000	**	0.001	**	0.000	**
Far East/Europe	0.371		0.938		0.016	*	0.000	**
Far East/S and SE Asia	0.116		0.422		0.020	*	0.005	**
Europe/S and SE Asia	0.242		0.208		0.693		0.348	
Central Asia/Far East (no islands)	0.029	*	0.022	*	0.006	**	0.000	**
Central Asia/Europe (no islands)	0.000	**	0.000	**	0.000	**	0.000	**
Caucasus/Far East (no islands)	0.017	*	0.083		0.011	*	0.000	**
Caucasus/Europe (no islands)	0.000	**	0.000	**	0.000	**	0.000	**
Middle East/Far East (no islands)	0.680		0.982		0.291		0.006	**
Middle East/Europe (no islands)	0.000	**	0.006	**	0.000	**	0.000	**
Far East/Europe (no islands)	0.039	*	0.160		0.002	**	0.000	**
Europe/Far East (no islands)	0.000	**	0.000	**	0.059		0.652	
Europe (no islands)/Far East (no islands)	0.120		0.142		0.248		0.643	
S and SE Asia/Far East (no islands)	0.051		0.001	**	0.178		0.341	
S and SE Asia/Europe (no islands)	0.412		0.002	**	0.529		0.017	*

Table 3.3

Region	*North Sardinia*	*North Sardinia*	*North Sardinia*	*North Sardinia*	*South Corsica*	*South Corsica*	*South Corsica*	*South Corsica*
Locality	*Scupetu*	*Perfugas*	*Limbara*	*Limbara*	*Levie*	*Mela*	*Orone and Incudine mountains*	*Levie*
Breeder	*Pala*	*Spezzigu*	*Carta*	*Alias*	*Ricci*	*Mattei*	*A.L.*	*Fondansaes*
Herd	c.20 adult animals (but in the past up to 100); 2 males, the rest females	two adult sows; sire borrowed	3 adults (1 male, 2 females) plus piglets	6 adults(1 male, 5 females), 8 piglets	1male, 3 females, and c.10 piglets	5 adults (1 male, 4 females) and c.35 young animals kept for slaughter	c.50 animals (50% adults and 50% juveniles); male % varies between 25% and 50%	2 females for reproduction and about 10 young pigs for slaughter; male is borrowed for reproduction
Breed	mixed	mixed; but he used to have the traditional breed that was black and occasionally striped even when no cross breeding with wild boars had occurred	mixed	mixed	undefined breed of English origins	unimproved traditional French breed	enclosed: Belgian breed Pietrain and a few of the traditional Corsican breed; in the mountains: traditional Corsican breed, as other pigs would not survive in that environment	traditional Corsican breed
Any wild boars?	only in the past	no	no, but they live in the area	in the past a wild boar	no	no	no	no
Any wild/domestic crosses?	yes, commonly, wild male x domestic female	not in his case but he knows it is common	yes, but when it happens they are slaughtered immediately because they do not grow enough	they often happen, but when the animals are kept free-range	yes, but when it happens they are slaughtered immediately because they do not grow enough	yes, but in such cases those animal that have straight ears are slaughtered immediately	yes, but when it happens they are slaughtered immediately because they do not grow enough	yes, but when it happens they are slaughtered immeditaley because they do not grow further than 60-70Kg

(continues)

Region	*North Sardinia*	*North Sardinia*	*North Sardinia*	*North Sardinia*	*South Corsica*	*South Corsica*	*South Corsica*	*South Corsica*
Locality	*Scupetu*	*Perfugas*	*Limbara*	*Limbara*	*Levie*	*Mela*	*Orone and Incudine mountains*	*Levie*
Breeder	*Pala*	*Spezzigu*	*Carta*	*Alias*	*Ricci*	*Mattei*	*A.L.*	*Fondansaes*
Castration	all males are castrated, except those kept for reproduction	most males are castrated, when no older than 1 month	yes, from 3/4 months onwards	most castrated when a few months old	in autumn at 3-4 months, but only those pigs that will be slaughtered young	in winter from a few months to 1 year of age	occurs at 3 months before weaning	both males and females are castrated, generally at 2 months, but the females even at 3
Birth season	twice a year at any time	any time of the year	any time of the year	even three times a year, at any time of the year	twice a year, at any time of the year	twice a year, any time of the year	any time of the year	twice a year at any time of the year
Where are the litters born?	in the sty, particularly in winter	in the past in a nest that the sow prepared before birh, but due to fox predation now mainly in sties	in the sty due to fox predation	In the sty to avoid fox predation	they are bom in the sty, which they leave after a month, weaning occurs at two months	they are born in the wild and sometimes they are predated by foxes	in the sty due to fox predation	generally in the sty to avoid fox predation
Purchase of animals	boars for reproduction to avoid excessive inbreeding	no	occasionally some piglets	yes, to avoid inbreeding	yes, to avoid inbreeding	occasionaly a boar	occasionally boars to avoid inbreeding	occasionally
Age at slaughter	generally between 2 and 3 years	piglets: 2-3 months (but nowadays at 25 days); males: 2-3 years; females: 4-5 years; castrates: less than two years	between one and one and half year, occasionaly at 4-5 months	males: c.3years; female: 3-4 years; castrates: 2-3 years	10-12 months	18 months	those free in the mountains at 2 years, those which are enclosed at about 1 year as they eat better and grow faster	13-15 months

(continues)

Region	*North Sardinia*	*North Sardinia*	*North Sardinia*	*North Sardinia*	*South Corsica*	*South Corsica*	*South Corsica*	*South Corsica*
Locality	*Scupetu*	*Perfugas*	*Limbara*	*Limbara*	*Levie*	*Mela*	*Orone and Incudine mountains*	*Levie*
Breeder	*Pala*	*Spezzigu*	*Carta*	*Alias*	*Ricci*	*Mattei*	*A.L.*	*Fondansaes*
Slaughter season	winter	winter	winter/spring	November to March	December to February	November (if it is cold) otherwise December	winter	late autumn, which is why the favourite birth season is in September
Home range	30ha, but in summer they tend to trespass	6ha, they rarely go further because the area is enclosed by stone walls	a few hectares but the males tend to roam freely in a larger area	12ha, as they cannot trespass as the area is enclosed	50ha	the larger ones in 50ha, the smaller in 7ha	those in the mountains are totally free; the enclosed area is of 1ha	completely free, the area is c.50ha
Daily movements	in winter they go back to the sty for the night, in summer they stay outside	at night they find shelter in an abandoned bulding	at night they go back to the sty	in winter they go back to the sty for the night, in summer they stay outside	they go back to the sty at night but it is their choice as they are not closed	they stay away also at night	those enclosed spend the night in the sty but those living in the mountains find shelter in the scrubs	they stay away also at night
Level of control	generally they are totally free but they can be enlosed if they trespass or cause damage	free, they only come back to feed	free, they only come back to feed	they are free but come back in the evenings to feed	they tend to live near water sources, and only come back to feed	they are completely free	those living in the mountains are totally free and independent, they are visited by the breeder only twice or three times a year	completely free
Capture for slaughter	attracted by food	attracted by food	attracted by food	they answer the call	they are shot with a rifle, in this way the quality of the meat is better	they are driven to an enclosure	attracted by food, even those in the mountains	they are attracted to an enclosure with food; shooting spoils the meat

(continues)

Region	*North Sardinia*	*North Sardinia*	*North Sardinia*	*North Sardinia*	*South Corsica*	*South Corsica*	*South Corsica*	*South Corsica*
Locality	*Scupetu*	*Perfugas*	*Limbara*	*Limbara*	*Levie*	*Mela*	*Orone and Incudine mountains*	*Levie*
Breeder	*Pala*	*Spezzigu*	*Carta*	*Alias*	*Ricci*	*Mattei*	*A.L.*	*Fondansaes*
Diet	natural diet (acorns, grass, roots), integrated with barley, maize and corn	natural diet integrated with barley and in the past also chickpeas and broad beans	natural diet integrated with barley, bran and food scraps	natural diet (grass, worms, pears, acorns) integrated with barley, bran, bread, and foodscraps	natural diet (acorns, chestnuts, roots, berries) with a small integration of corn	in winter acorns and chestnuts, barley as an integration	those in the mountains have a fully natural diet; those enclosed eat acorns and chestnuts integrated with corn and barley	for most of the year fully natural diet, with only a little integration to make sure that they can eventually be captured; in August corn and barley
Adult Weight	c.200-250Kg	in the past 80-100Kg now up to 150-200Kg	max 300Kg, but the traditional breed did not reach 150Kg	generally 180-220kg but they can reach 300kg; the traditional breed could at the most reach 130Kg	90-120Kg when slaughtered, but they can reach 200Kg. Tradional breeed max 70Kg	slughtered at 90-120Kg, but they can reach 140-150Kgs	in the mountains: max 80Kg at two years (even if fed properly they would not grow more than 90Kg); enclosed: max 200-220 kg at two years	max 120kg , but if enclosed and well fed they can also reach 150kg
Losses	10 piglets disappeared in the last year	never, if they abandon the enclosed area they then come back	never	never	it happens	occasionally in summer	they are occasionally stolen	it happens but rarely

(continues)

Region	*North Sardinia*	*North Sardinia*	*North Sardinia*	*North Sardinia*	*South Corsica*	*South Corsica*	*South Corsica*	*South Corsica*
Locality	*Scupetu*	*Perfugas*	*Limbara*	*Limbara*	*Levie*	*Mela*	*Orone and Incudine mountains*	*Levie*
Breeder	*Pala*	*Spezzigu*	*Carta*	*Alias*	*Ricci*	*Mattei*	*A.L.*	*Fondansaes*
Agricultural damage	occasionally, sometimes to vegetable gardens	not in his area, but an iron wire is sometimes inserted in their snout to avoid the possibility of rooting damage	it happens but not in his case	no, because the area is enclosed but it could happen	no, due to iron wire inserted in the snout	no, due to iron wire inserted in the snout	no, due to iron wire inserted in the snout	no, due to iron wire inserted in the snout; then they browse like a sheep
Products	meat (also dried), lard, head	just meat, for home use	just meat	just meat	everything is used, bones are used to make jelly	all meat used to make ham and salami	only meat	meat used to make ham and salami; occasionally the piglets are sold alive

Table 4.1

Site	Period	Pig n	Sheep/Goat n	% Pig
Alms Lane (Norwich)	Mid medieval	159	482	*25*
	Late medieval	113	376	*23*
Bedford Castle	Early medieval	294	589	*33*
	Mid medieval	77	152	*34*
Berrington St (Hereford)	Saxon	492	496	*50*
	Early medieval	185	387	*32*
Burystead (Northamptonshire)	Late Saxon	171	365	*32*
	Medieval	79	199	*28*
Castle Mall (Norwich)	Late Saxon	277	236	*54*
	Saxo-Norman	216	208	*51*
	Mid medieval	62	133	*32*
	Late medieval	122	308	*28*
Colchester	Early medieval	188	178	*51*
	Late med/early pmed	264	1042	*20*
Friar St (Droitwich)	Saxo-Norman	93	103	*47*
	Early medieval	110	159	*41*
	Mid medieval	292	367	*44*
Flaxengate (Lincoln)	Late Saxon	2174	6106	*26*
	Saxo-Norman	2268	8406	*21*
	Mid medieval	177	856	*17*
King's Lynn	Early medieval	350	811	*30*
	Mid medieval	764	1861	*29*
	Late medieval	209	473	*31*
Launceston Castle (Cornwall)	Mid medieval	464	427	*52*
	Late medieval	765	855	*47*
Lincoln (various sites)	Late Saxon	203	449	*31*
	Mid medieval	42	143	*23*
Lyvedon (Northamptonshire)	Mid medieval	35	175	*17*
	Late medieval	121	291	*29*
Portchester Castle (inner bailey)	Late Saxon	185	267	*41*
	Mid medieval	220	202	*52*
St Martin-at-Palace Plain (Norwich)	Saxo-Norman	1140	1102	*51*
	Early medieval	1433	1801	*44*
	Mid/late medieval	312	310	*50*
St.Peters St (Northampton)	Mid Saxon	88	228	*28*
	Late Saxon	377	2006	*16*
	Mid medieval	417	965	*30*
	Late medieval	107	784	*12*
The Green (Northampton)	Late Saxon	137	452	*23*
	Mid medieval	309	2661	*10*
	Late med	133	679	*16*
The Shires St.Peters Lane (Leicester)	Early medieval	232	661	*26*
	Mid medieval	256	607	*30*
	Late medieval	215	728	*23*
The Shires Little Lane (Leicester)	Early medieval	77	223	*26*
	Mid medieval	72	193	*27*
	Late medieval	87	304	*22*
Thetford	Late Saxon	483	1045	*32*
	Saxo-Norman	687	1574	*30*
Walton (Aylesbury)	Saxon	331	511	*39*
	Saxo-Norman	396	883	*31*
	Medieval	292	847	*26*
West Cotton (Northamptonshire)	Early medieval	318	531	*37*
	Mid medieval	230	826	*22*
	Late medieval	35	309	*10*

Table 5.1

ESSEX	Pig	Sheep+Goat	NORFOLK	Pig	Sheep+Goat	SUFFOLK	Pig	Sheep+Goat
Barstable	30	70	Docking	3	87	Stow	12	30
Whitam	136	101	Wayland	20	100	Hartismere	5	9
Harlow	195	193	Gallow	20	200	Wangford (the King)	5	46
Becontree	160	269	Holt	2	24	Lothing	30	210
Uttlesford	61	168	North Greenhoe	20	180	Lothingland	10	160
Hinkford (the King)	118	92	Eynsford	50	110	Parham	30	24
Lexden	59	260	East Flegg	6	381	Blackbourn	50	130
Chelmsford	172	318	South Greenhoe (Sporle)	60	180	Risbridge	36	79
Tendring	62	166	South Greenhoe (Pickenham)	12	40	Samford (the King)	7	12
Witham (Coggeshall)	7	20	Launditch (Horningtoft)	20	180	Blything (the King)	2	12
Witham (Bocking)	54	100	Launditch (Rougham)	12	30	Lackford	60	1000
Witham (Stisted)	77	120	Mitford	15	70	Loose (Count Alan)	30	32
Dengie (Lawling)	60	218	Brother Cross	14	63	Bosmere	27	36
Dengie (Latchingdon)	16	60	Henstead	41	80	Claydon (Count Alan)	20	100
Rochford (Milton)	25	124	Guiltcross	6	16	Samford (Count Alan)	35	71
Rochford (Southchurch)	13	166	Gallow	40	600	Claydon (Earl Hugh)	31	100
Rochford (Stambridge)	10	58	Walsham	20	120	Bradmere	14	120
Barstable (Laindon)	10	97	Eynesford	30	30	Blything (Earl Hugh)	10	18
Barstable (Orsett)	40	115	Happing	18	200	Loose (Earl Hugh)	16	31
Hinkford (the Bishop)	24	45	Grimshoe	84	800	Wangford (Earl Hugh)	12	100
TOT	**1329**	**2760**	**TOT**	**493**	**3491**	**TOT**	**442**	**2320**
%	***33***	***67***	*%*	***12***	***88***	*%*	***16***	***84***

Table 5.2

Zambujal

	N	Minimum	Maximum	Mean	St. Dev.	V
dP4W	100	7.4	10.3	8.6	0.5	6.3
dP4L	63	17.8	22.1	19.3	0.9	4.5
M1WA	44	9.1	12.6	10.2	0.7	6.7
M1WP	42	9.4	13.2	10.8	0.7	6.2
M1L	35	14.3	20.1	16.9	1.0	6.1
M2WA	43	11.3	15.4	13.5	1.0	7.8
M2WP	41	11.7	16.5	13.7	1.1	8.3
M2L	36	19	25.1	21.3	1.3	5.9
M3WA	121	13.6	20.5	15.4	1.1	7.4
M3WC	175	12.4	18.1	14.8	1.0	7.0
M3WP	157	8.9	15.5	11.8	1.2	9.9
M3L	112	28	44.7	34.3	3.4	10.0
HTMAND	18	17.8	44.9	25.0	7.3	29.2

Leceia

	N	Minimum	Maximum	Mean	St. Dev.	V
dP4W	49	7.4	9.6	8.5	0.5	5.7
dP4L	47	17.3	20.9	19.0	0.8	4.2
M1WA	47	9.1	12.7	10.1	0.7	7.0
M1WP	45	9.5	13.6	10.7	0.8	7.6
M1L	46	14.7	21.2	16.8	1.2	7.4
M2WA	31	12	14.8	13.2	0.8	5.7
M2WP	28	12.1	15.5	13.4	0.9	6.9
M2L	27	18.6	24.1	21.0	1.2	5.7
M3WA	52	13	18.4	15.3	1.0	6.3
M3WC	55	11.6	17.5	14.5	1.0	6.8
M3WP	49	10	15.3	11.6	1.0	9.0
M3L	50	25.2	40.8	33.5	2.8	8.4
HTMAND	11	17.8	26	21.8	2.4	11.2

Table 6.1

Zambujal

	N	Minimum	Maximum	Mean	St. Dev.	V	
Astragalus GLl	114	34.3	51.1	40.7	3.2	7.8	no light
Humerus BT	74	25.6	38.2	29.4	2.7	9.2	only fused
Humerus HTC	101	16.1	24.7	18.9	2.0	10.4	only fused
Tibia BdP	72	25.3	41.5	29.6	3.5	12.0	no unfused
Tibia Dd	72	21.8	34.1	25.9	2.6	10.2	no unfused
Scapula SLC	73	16.7	32.3	22.3	2.2	9.9	only fused
Calcaneum GD	11	25.9	37.1	30.0	3.7	12.3	no unfused
Calcaneum GLl	9	70.2	94.6	78.3	6.9	8.8	no unfused

Leceia

	N	Minimum	Maximum	Mean	St. Dev.	V	
Astragalus GLl	134	33.9	46.4	39.5	2.1	5.4	no light
Humerus BT	93	23.8	39.2	28.4	2.4	8.4	only fused
Humerus HTC	110	16.1	25	18.1	1.4	7.8	only fused
Tibia BdP	80	24.6	33.1	28.4	1.7	5.9	no unfused
Tibia Dd	75	22.5	29.5	24.8	1.4	5.7	no unfused
Scapula SLC	148	18	30.1	21.9	1.8	8.1	only fused
Calcaneum GD	14	26.1	36.8	29.4	3.0	10.1	no unfused
Calcaneum GLl	13	67.3	98.9	78.2	8.6	11.0	no unfused

Table 6.2

	Log ratio (teeth)	Log ratio (bones)
Palidoro UP/Grotta della Madonna UP	0.089	
Palidoro UP/Grotta della Madonna Mes	0.000 **	
Palidoro UP/Grotta della Madonna UP+Mes		0.300
Grotta della Madonna UP/Mes	0.043 *	
Grotta della Madonna Mes/MB	0.000 **	
Grotta della Madonna UP+Mes/MB		0.000 **
Grotta della Madonna Mes/Grotta dell'Uzzo Mes	0.000 **	
Grotta della Madonna UP+Mes/Grotta dell'Uzzo Mes+Trans		0.003 **
Grotta dell'Uzzo Mes/Trans	0.706	
Grotta dell'Uzzo Mes/EN	0.242	
Grotta dell'Uzzo Mes/N	0.901	
Grotta dell'Uzzo Mes+Trans/N		0.008 **
La Marmotta EN/La Starza MB	0.000 **	0.000 **
La Starza MB/Torre Mordillo LB	0.011 *	0.017 *
Arene Candide MN/LN		0.039 *
Rivoli MN/Concordia Sagittaria LB	0.000 **	0.001 **

Table 7.1

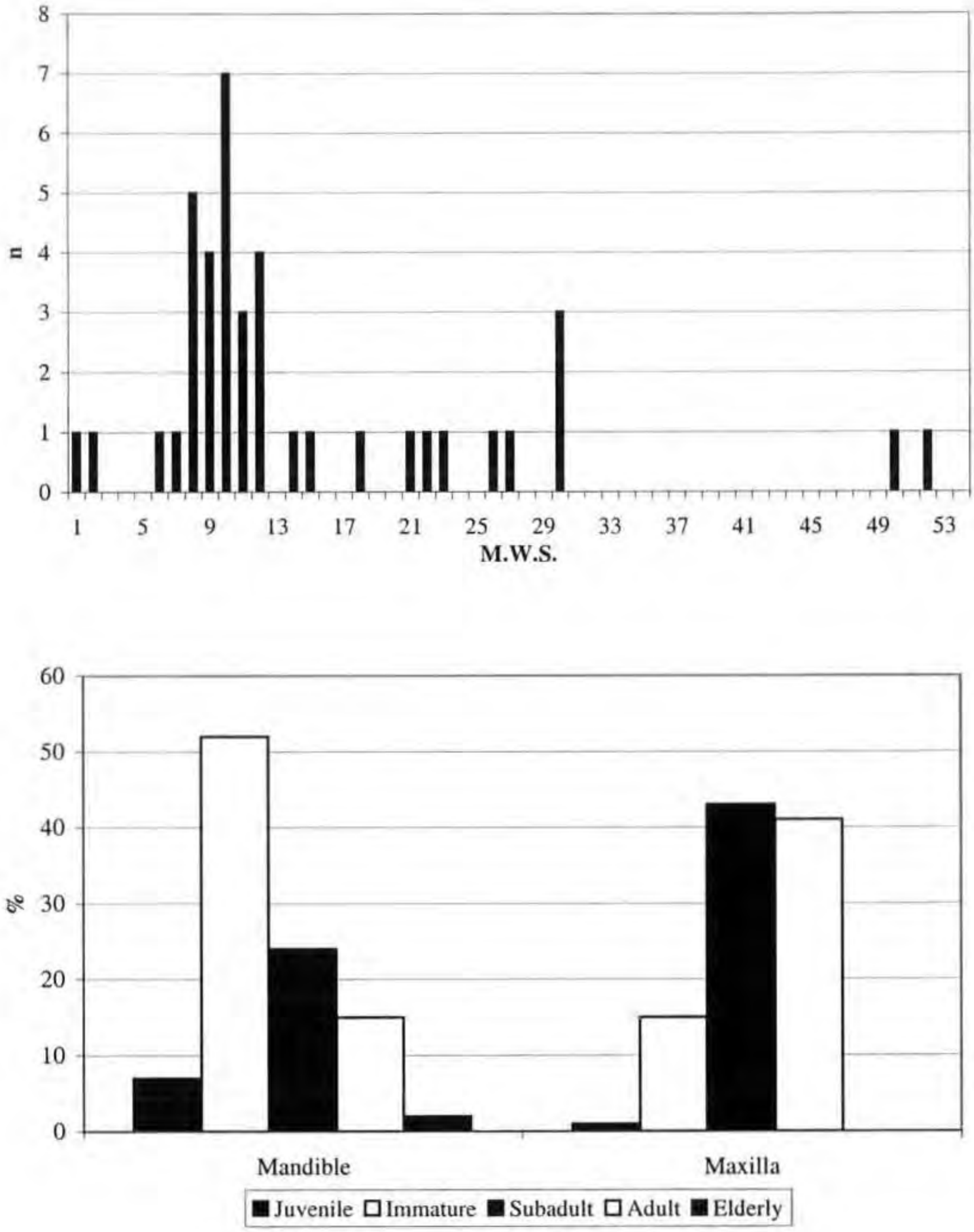
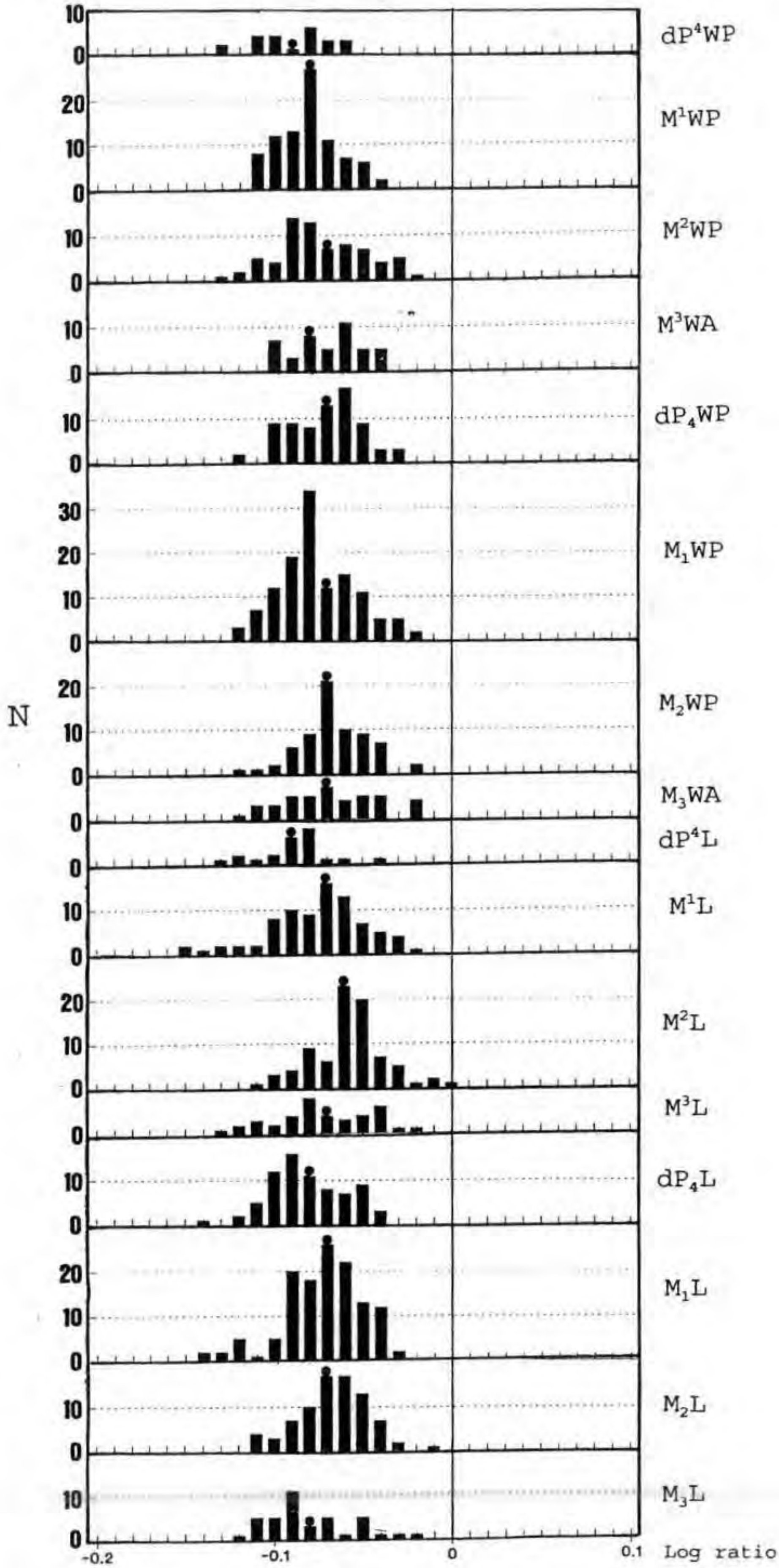

n
M.W.S.
%
Mandible
Maxilla
Juvenile
Immature
Subadult
Adult
Elderly

Figure 2.1



N
dP4WP
M1WP
M2WP
M3WA
dP4WP
M1WP
M2WP
M3WA
dP4L
M1L
M2L
M3L
dP4L
M1L
M2L
M3L
-0.2
-0.1
0
0.1
Log ratio

Figure 2.2

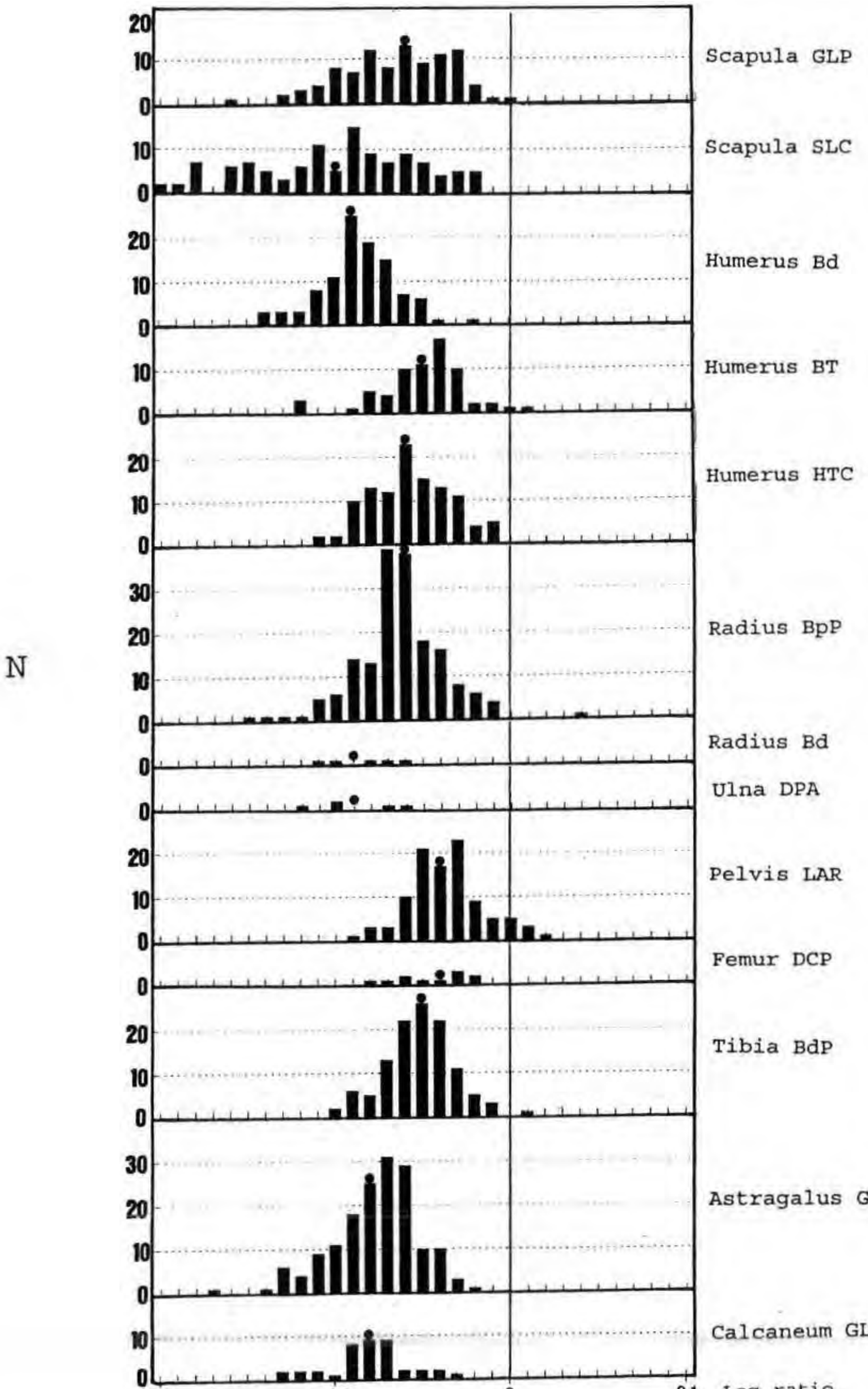

N
Scapula GLP
Scapula SLC
Humerus Bd
Humerus BT
Humerus HTC
Radius BpP
Radius Bd
Ulna DPA
Pelvis LAR
Femur DCP
Tibia BdP
Astragalus GLl
Calcaneum GL
Log ratio
-0.2
-0.1
0
0.1

Figure 2.3

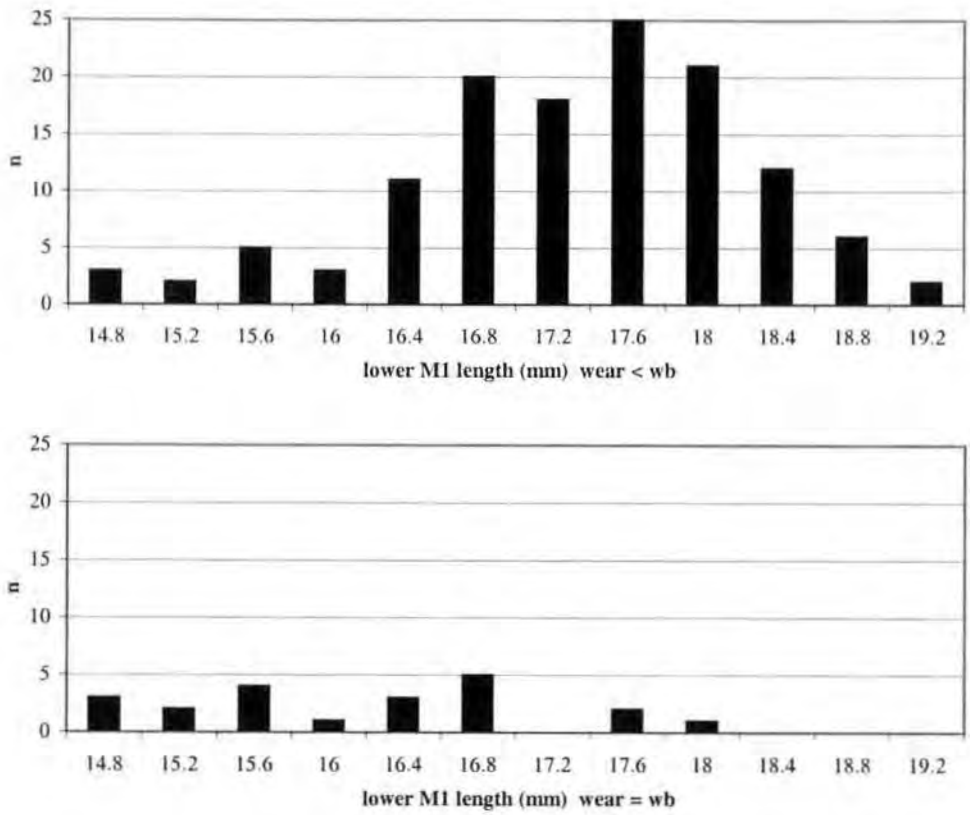
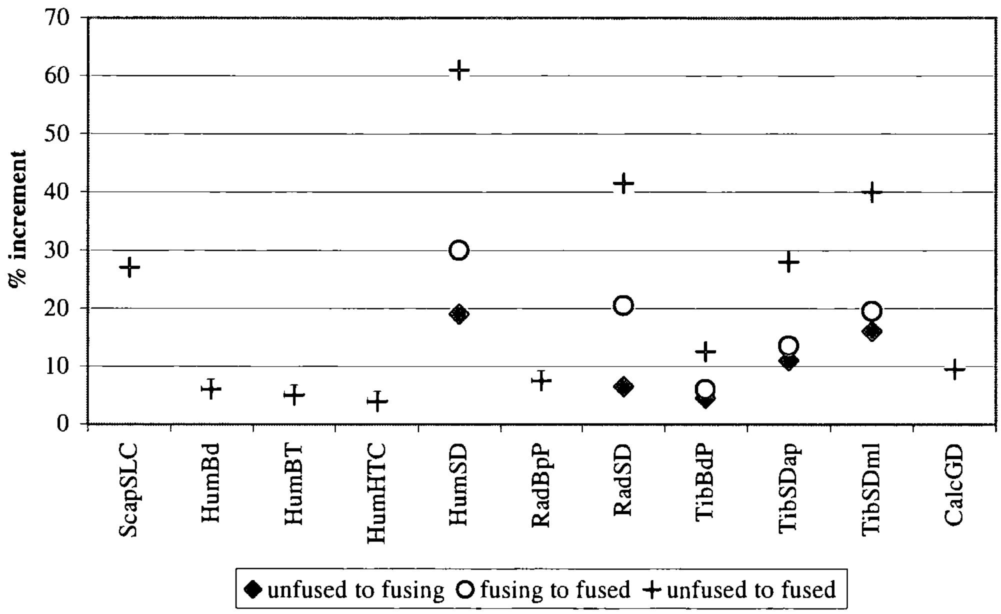

25
20
15
n
10
5
0
14.8
15.2
15.6
16
16.4
16.8
17.2
17.6
18
18.4
18.8
19.2
lower M1 length (mm) wear < wb
25
20
15
n
10
5
0
14.8
15.2
15.6
16
16.4
16.8
17.2
17.6
18
18.4
18.8
19.2
lower M1 length (mm) wear = wb

Figure 2.4



70
60
50
40
30
20
10
0
% increment
ScapSLC
HumBd
HumBT
HumHTC
HumSD
RadBpP
RadSD
TibBdP
TibSDap
TibSDml
CalcGD
◆ unfused to fusing O fusing to fused + unfused to fused

Figure 2.5

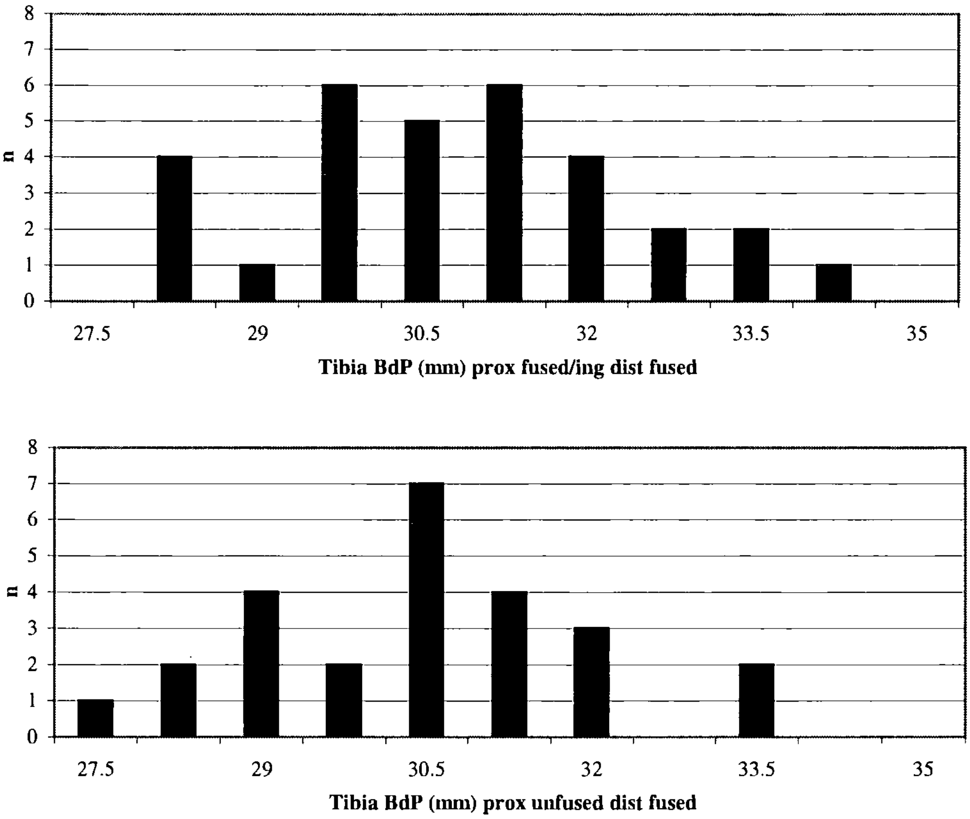

8
7
6
5
n 4
3
2
1
0
27.5
29
30.5
32
33.5
35
Tibia BdP (mm) prox fused/ing dist fused
8
7
6
5
n 4
3
2
1
0
27.5
29
30.5
32
33.5
35
Tibia BdP (mm) prox unfused dist fused

Figure 2.6

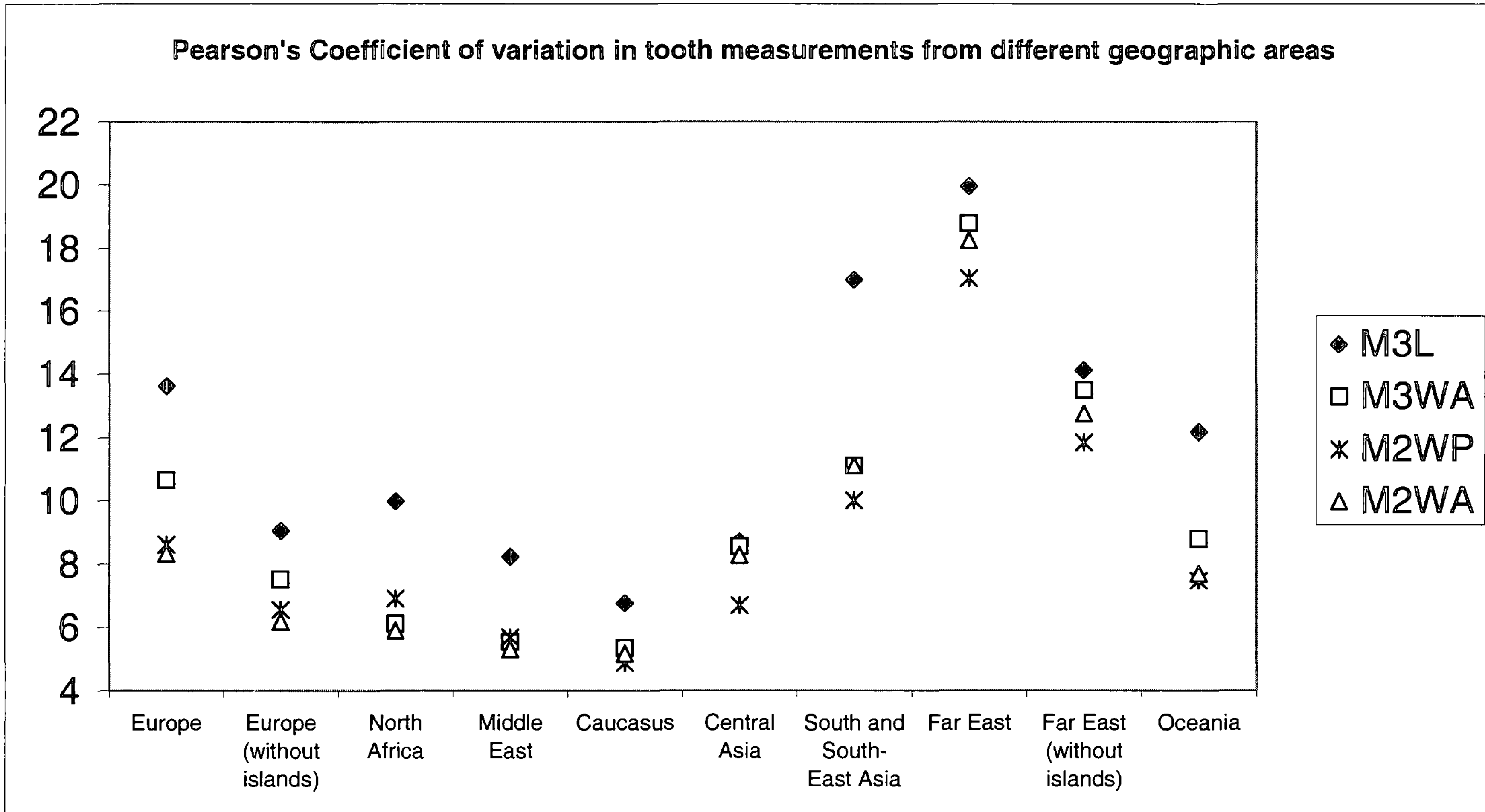

Pearson's Coefficient of variation in tooth measurements from different geographic areas
22
20
18
16
14
12
10
8
6
4
Europe
Europe (without islands)
North Africa
Middle East
Caucasus
Central Asia
South and South-East Asia
Far East
Far East (without islands)
Oceania
M3L
M3WA
M2WP
M2WA

Figure 3.1

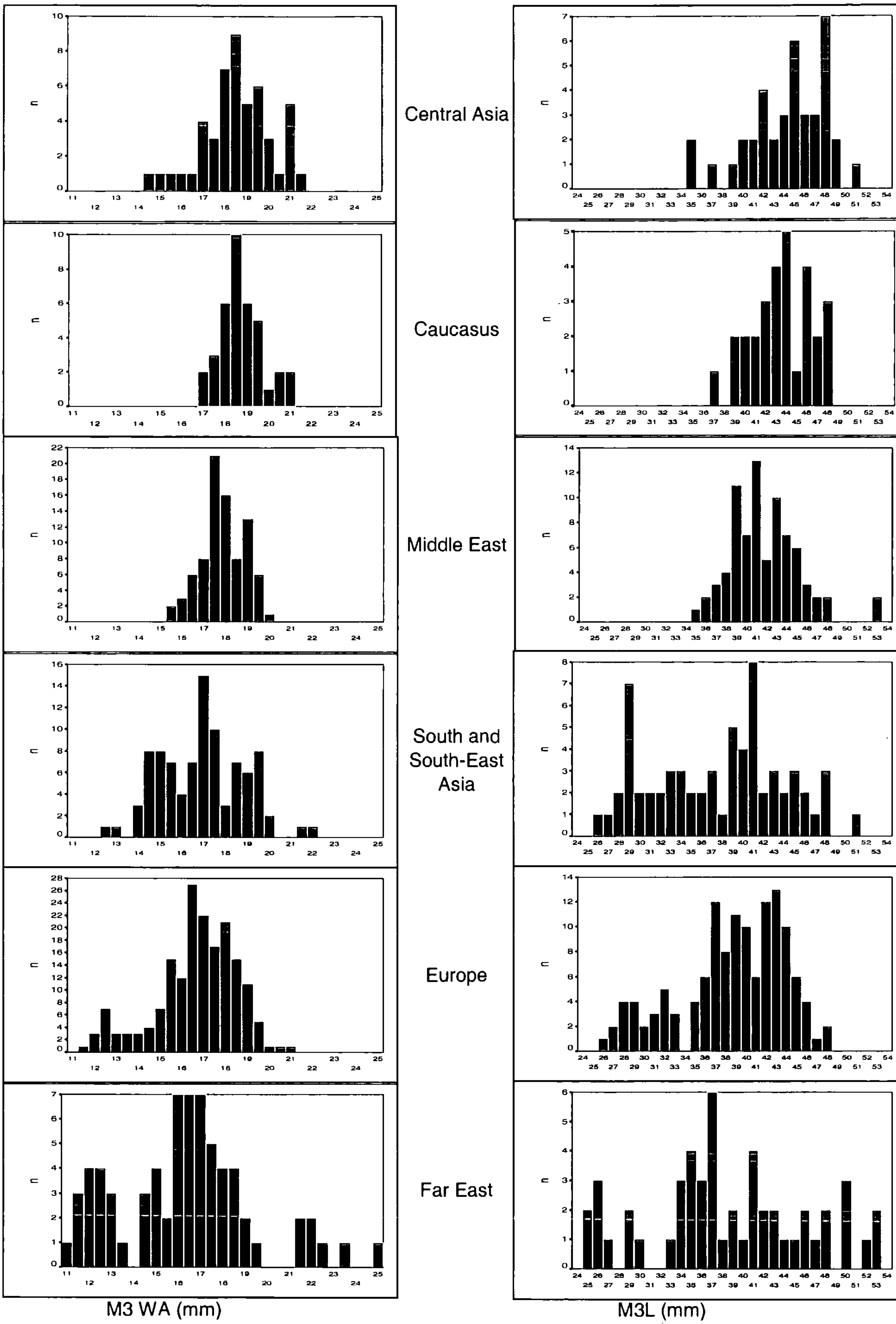

Central Asia
Caucasus
Middle East
South and South-East Asia
Europe
Far East
n
M3 WA (mm)
M3L (mm)

Figure 3.2

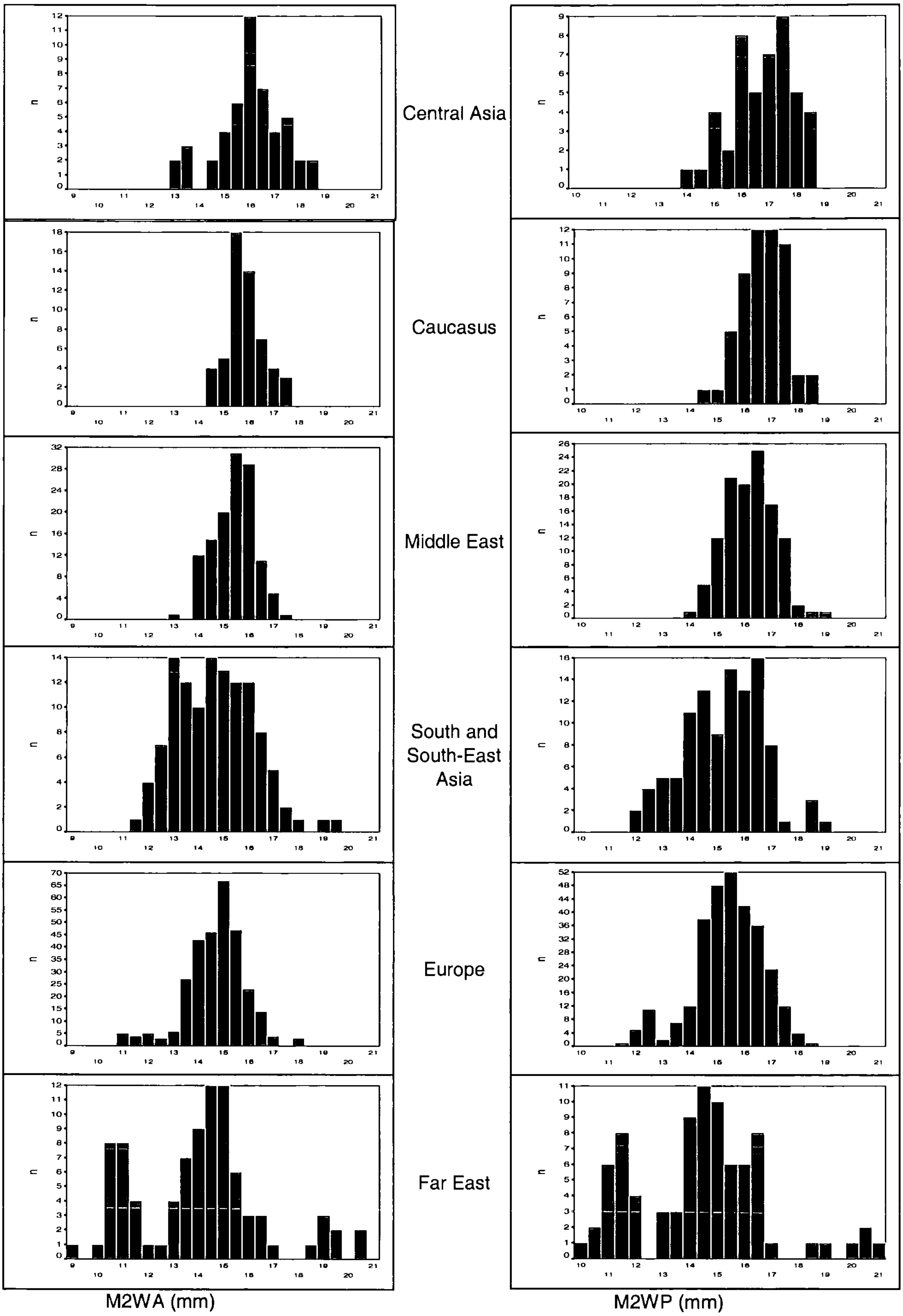

Central Asia
Caucasus
Middle East
South and South-East Asia
Europe
Far East
n
M2WA (mm)
M2WP (mm)

Figure 3.3

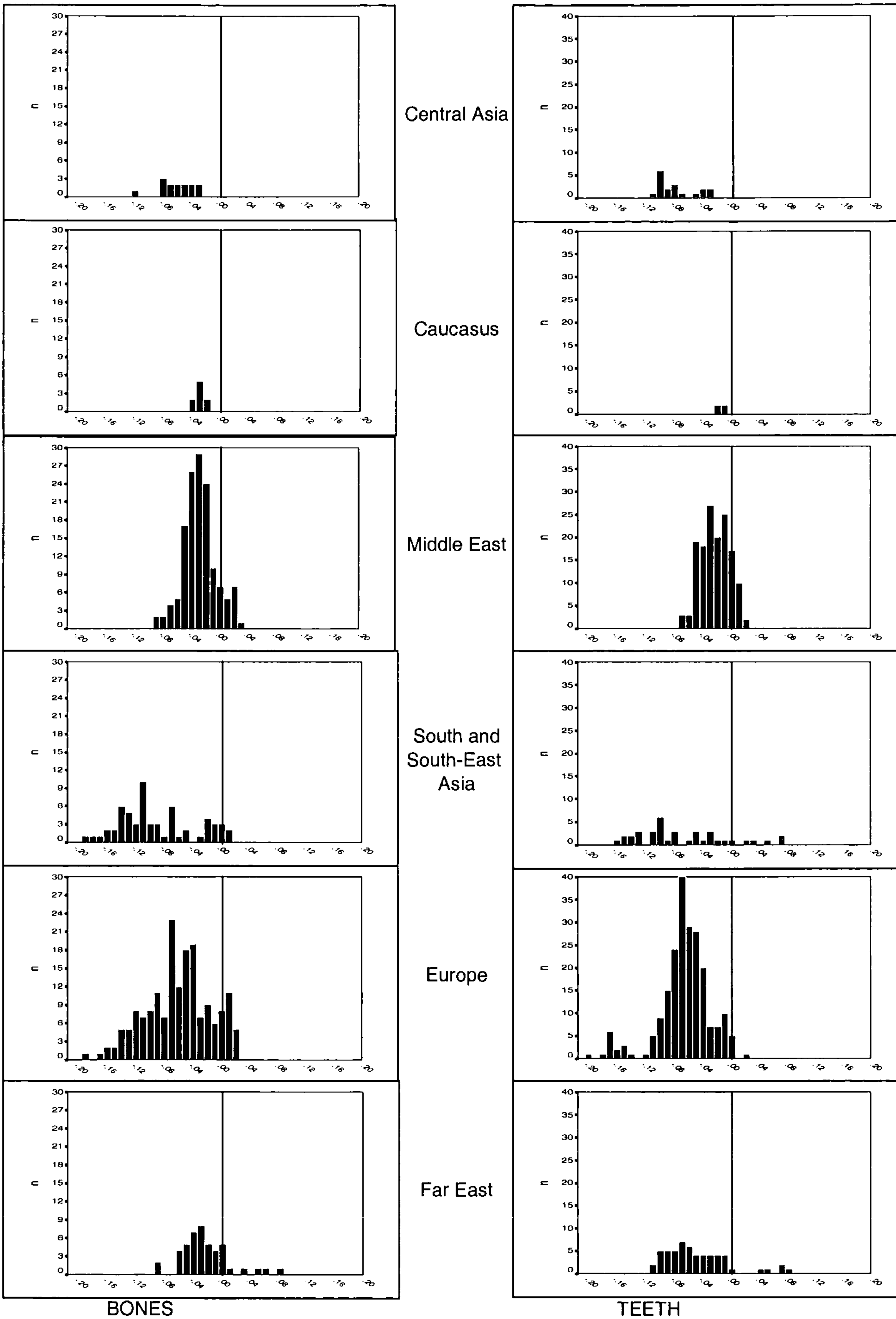

Central Asia
Caucasus
Middle East
South and South-East Asia
Europe
Far East
n
BONES
TEETH

Figure 3.4

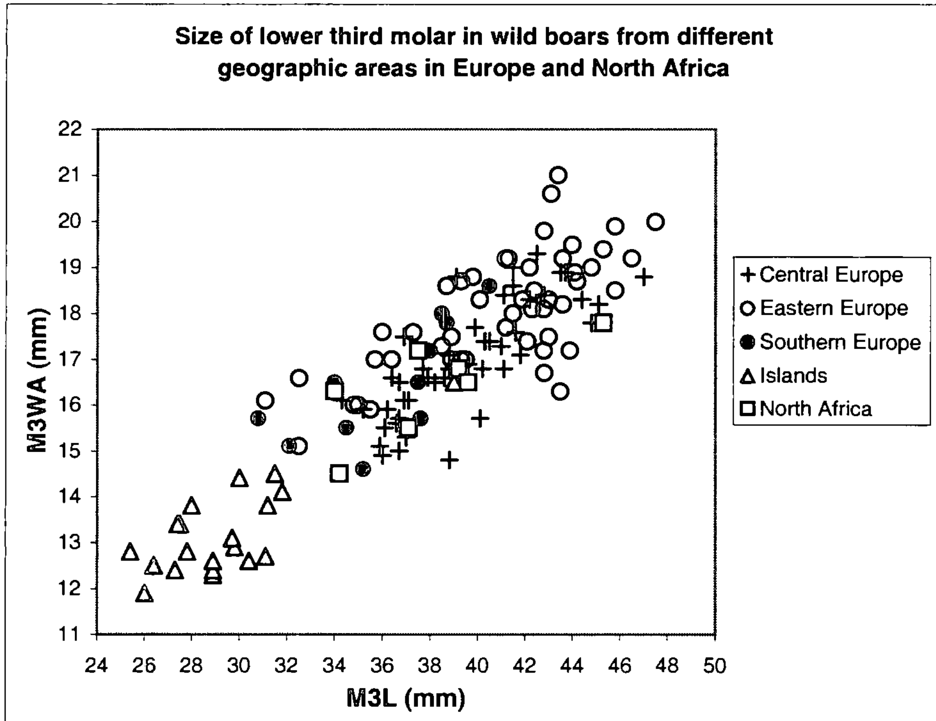


Figure 3.5a

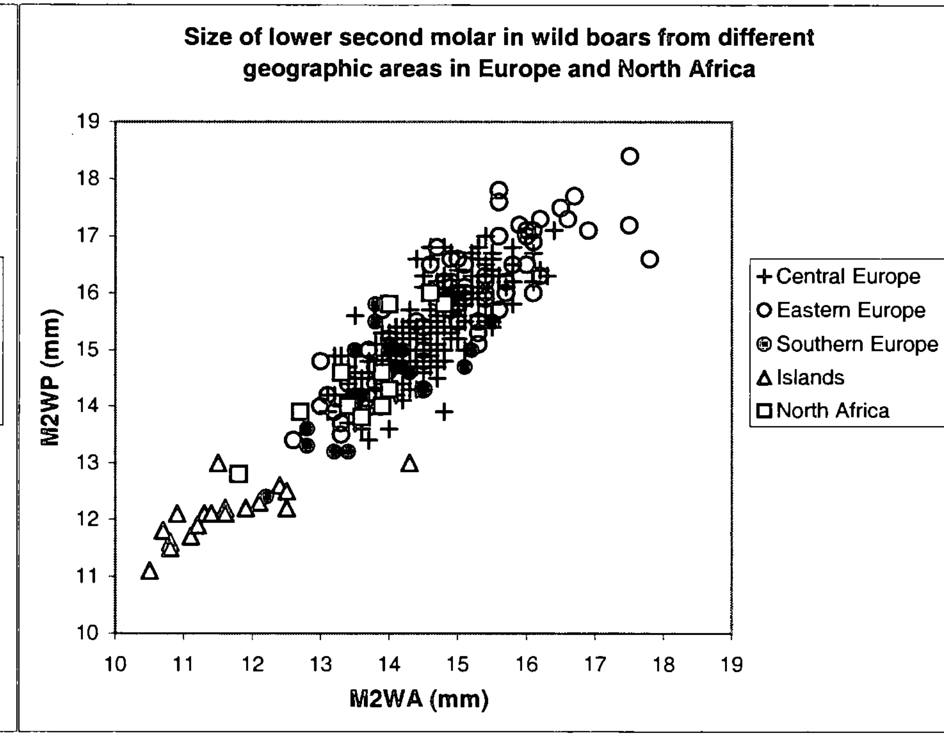


Figure 3.5b

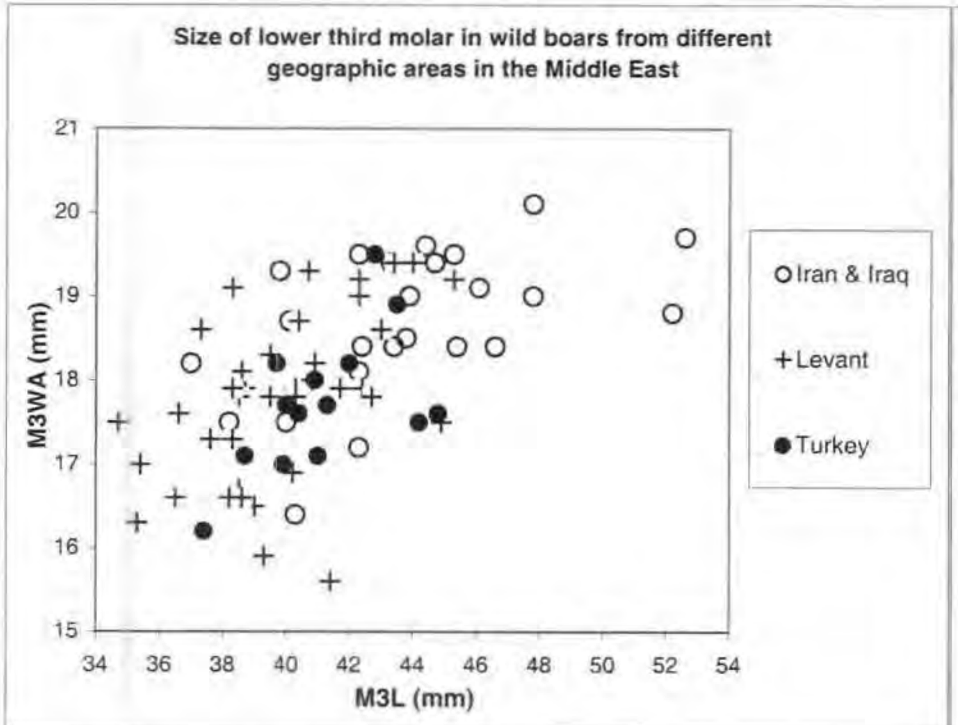


Figure 3.6a

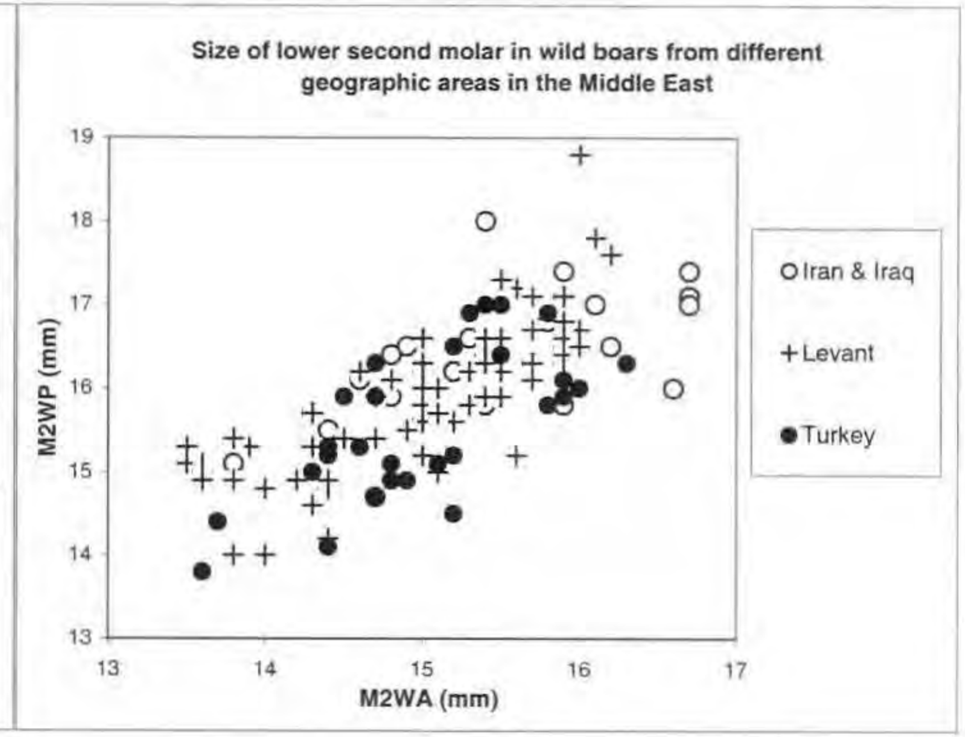


Figure 3.6b

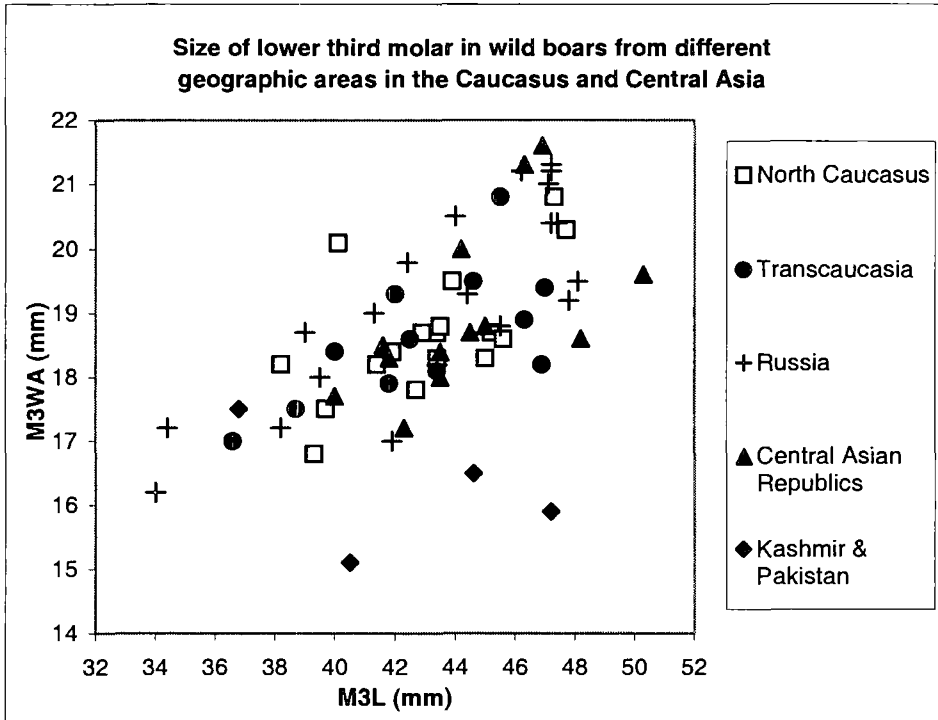


Figure 3.7a

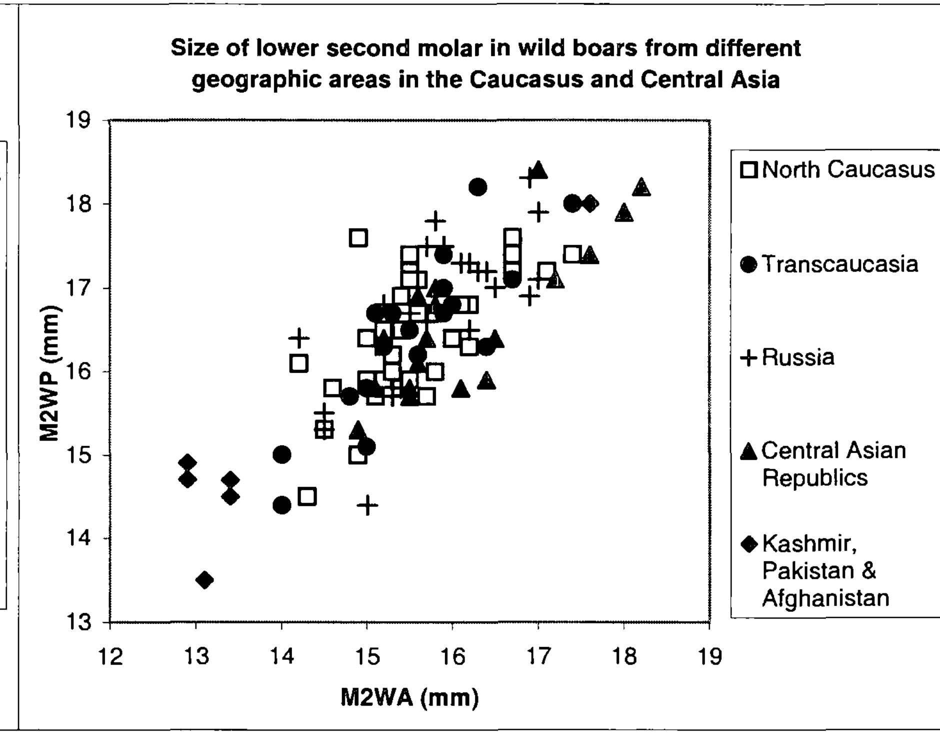


Figure 3.7b

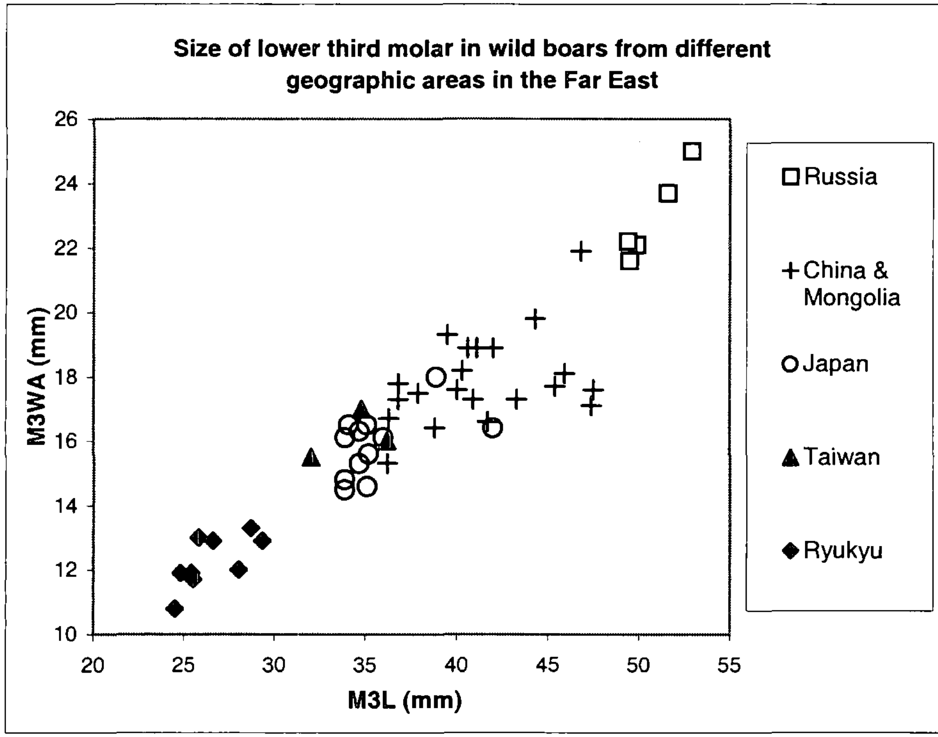


Figure 3.8a

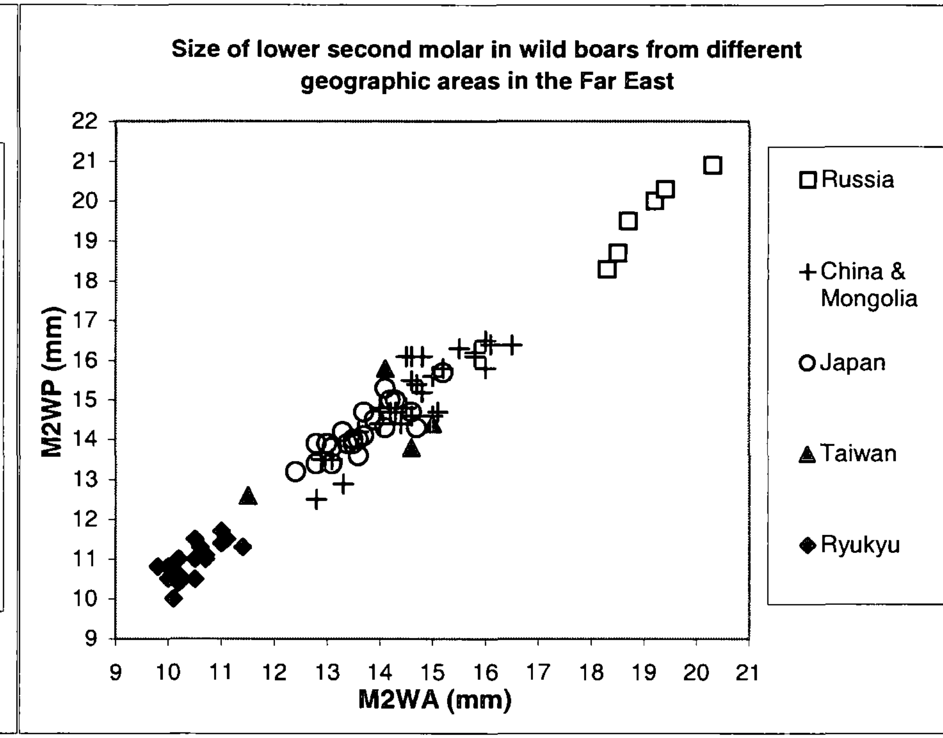


Figure 3.8b

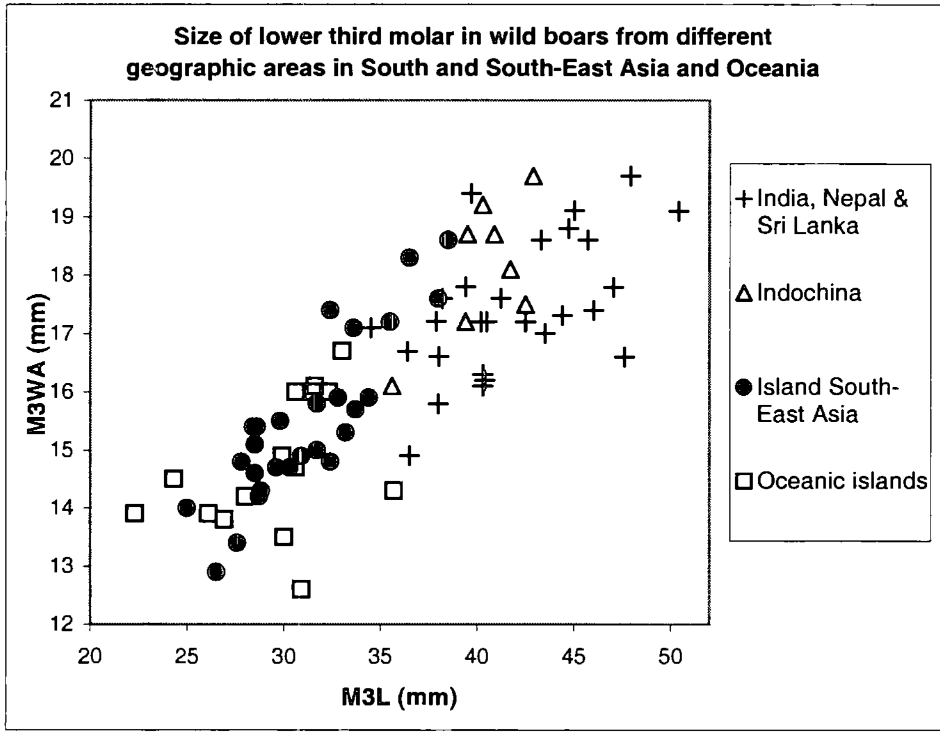


Figure 3.9a

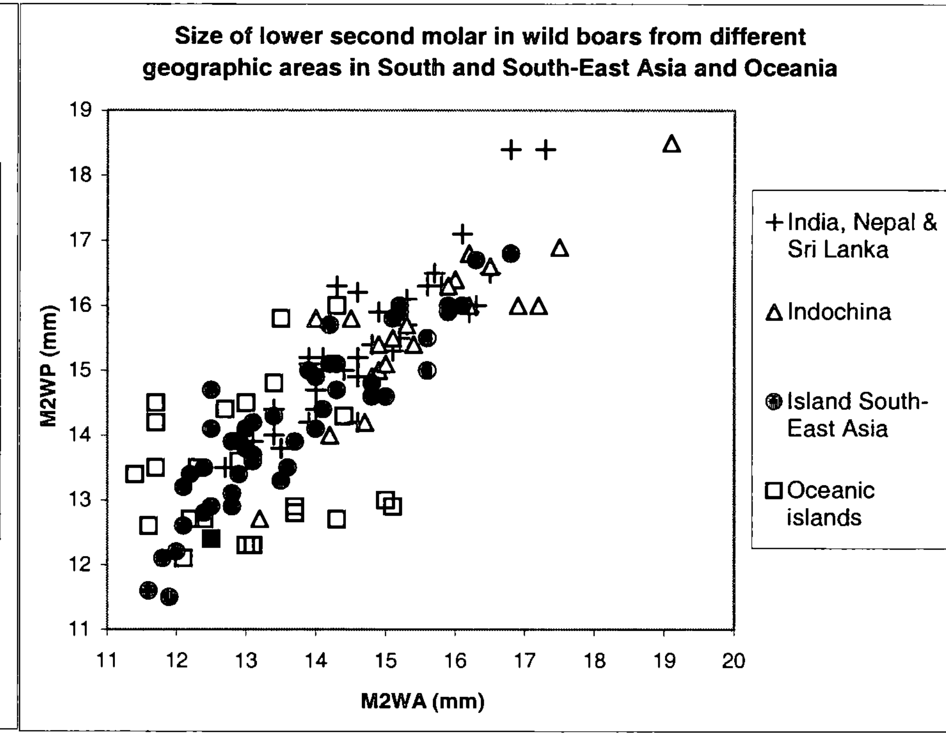


Figure 3.9b

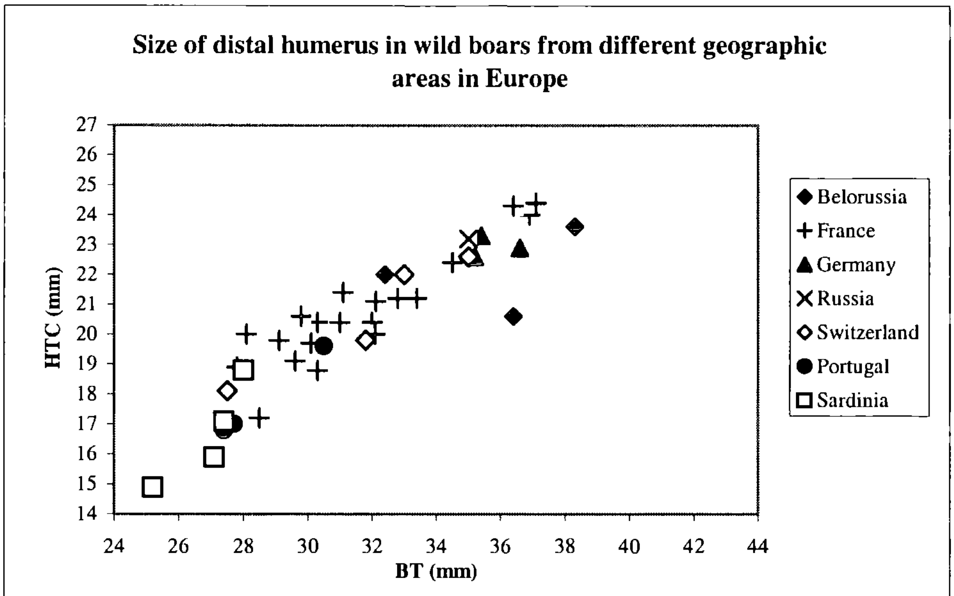


Figure 3.10

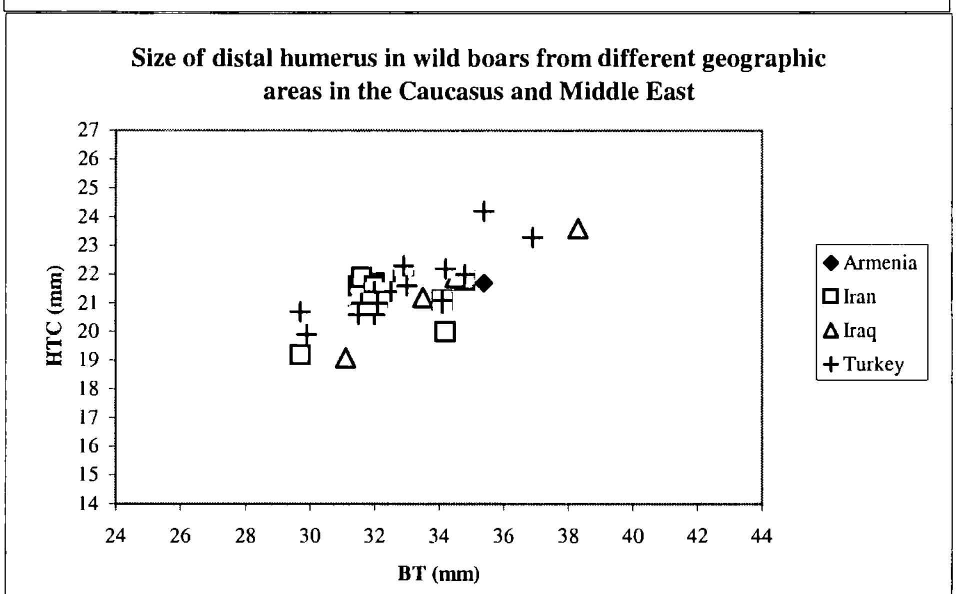


Figure 3.11

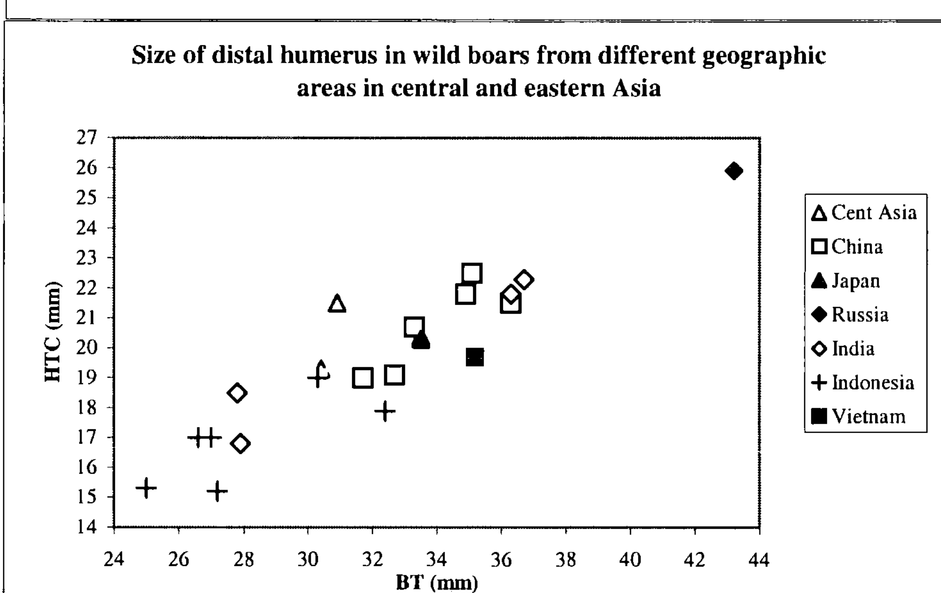


Figure 3.12

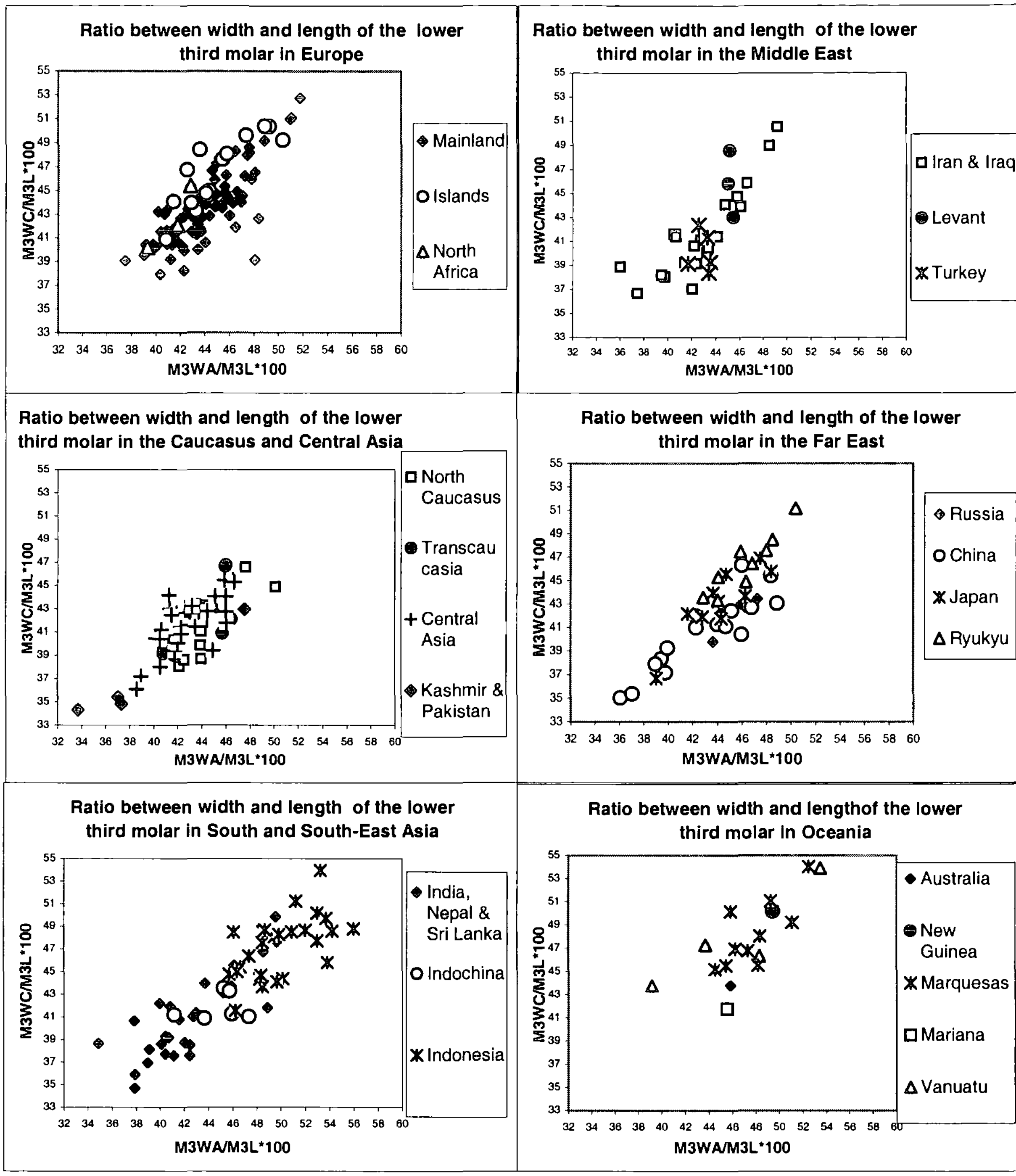

Ratio between width and length of the lower third molar in Europe
Mainland
Islands
North Africa
Ratio between width and length of the lower third molar in the Middle East
Iran & Iraq
Levant
Turkey
Ratio between width and length of the lower third molar in the Caucasus and Central Asia
North Caucasus
Transcaucasia
Central Asia
Kashmir & Pakistan
Ratio between width and length of the lower third molar in the Far East
Russia
China
Japan
Ryukyu
Ratio between width and length of the lower third molar in South and South-East Asia
India, Nepal & Sri Lanka
Indochina
Indonesia
Ratio between width and lengthof the lower third molar in Oceania
Australia
New Guinea
Marquesas
Mariana
Vanuatu
M3WC/M3L*100
M3WA/M3L*100

Figure 3.13

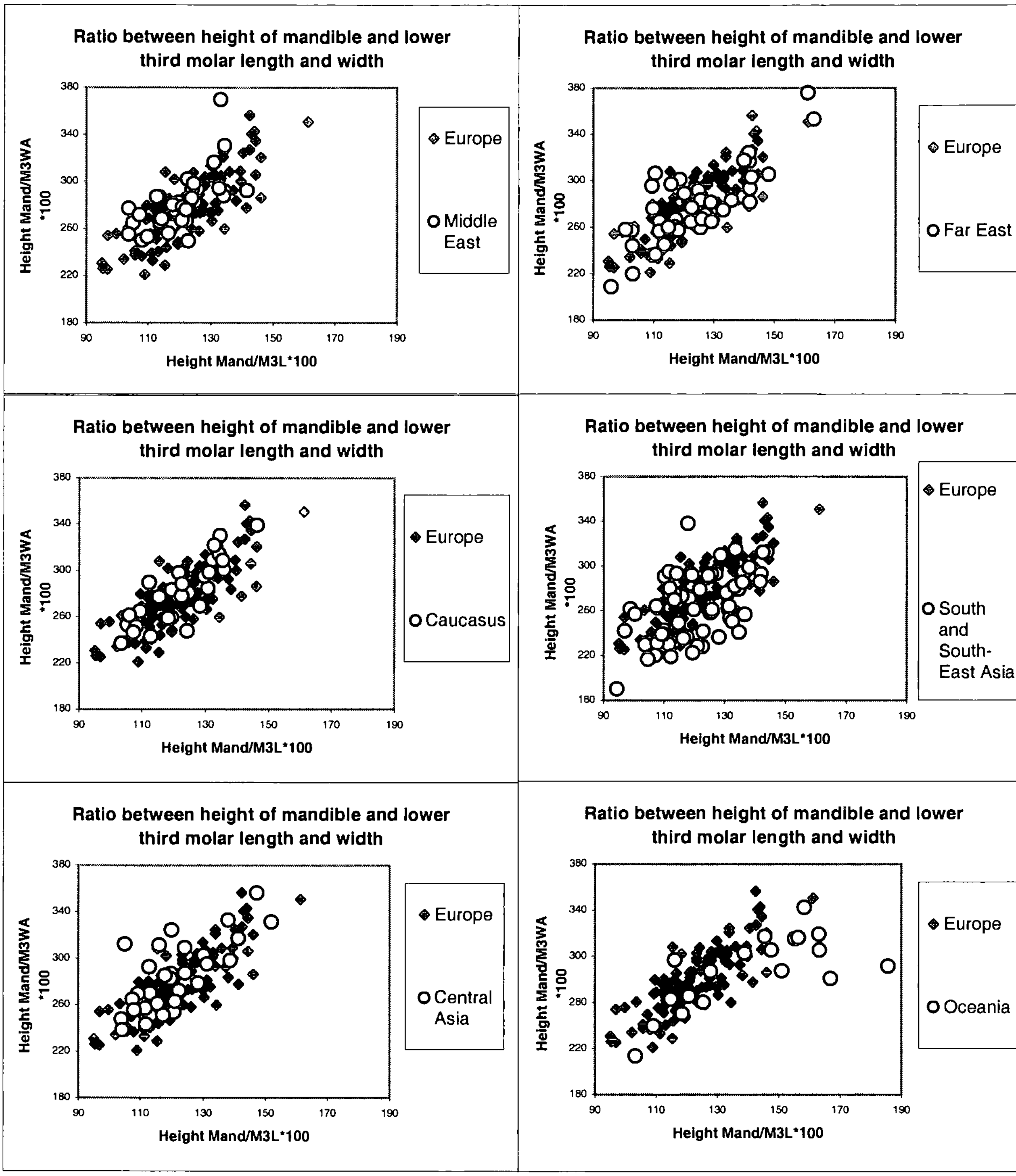
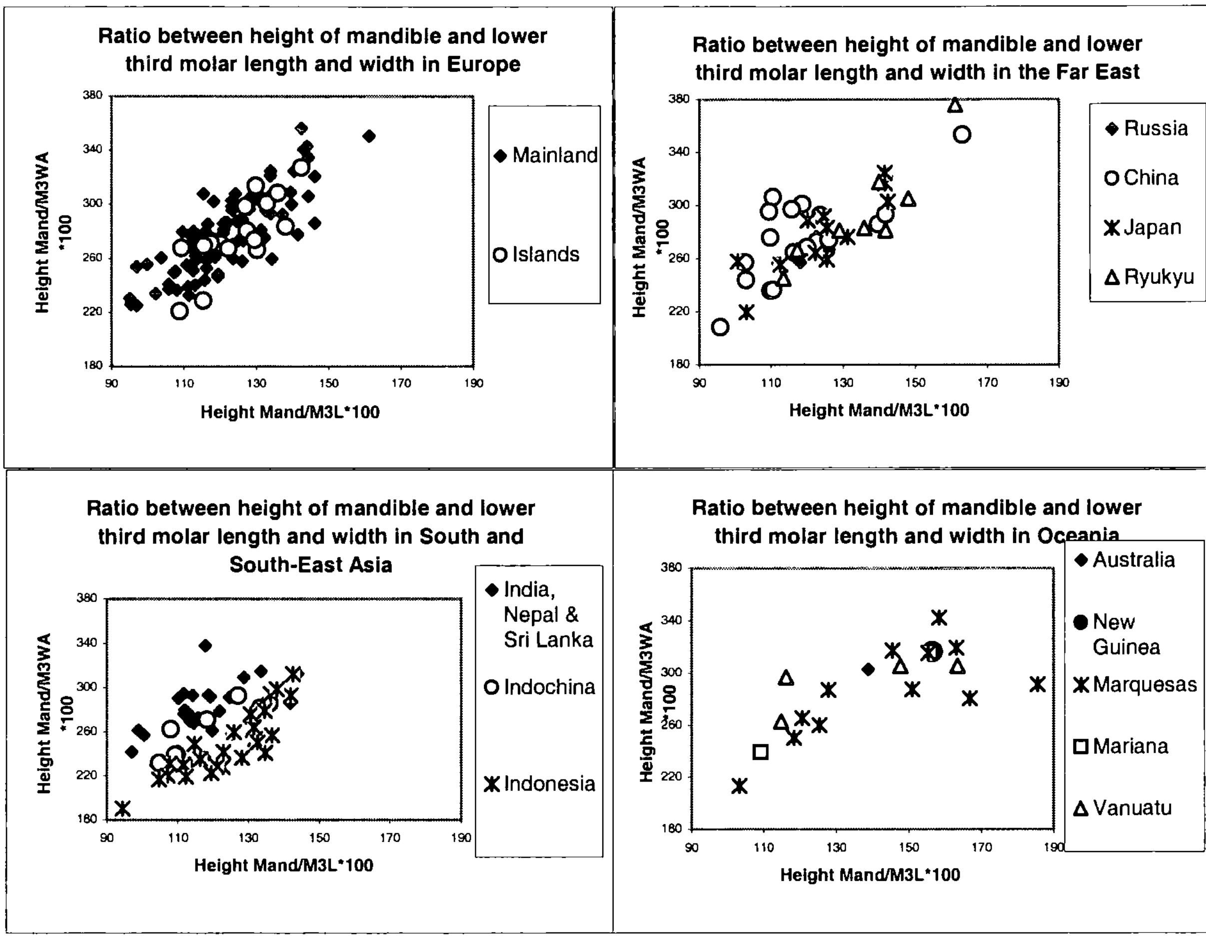

Ratio between height of mandible and lower third molar length and width
Height Mand/M3WA *100
Height Mand/M3L*100
380
340
300
260
220
180
90
110
130
150
170
190
Europe
Middle East
Far East
Caucasus
South and South-East Asia
Central Asia
Oceania

Figure 3.14



Ratio between height of mandible and lower third molar length and width in Europe
Height Mand/M3WA *100
Height Mand/M3L*100
Mainland
Islands
Ratio between height of mandible and lower third molar length and width in the Far East
Russia
China
Japan
Ryukyu
Ratio between height of mandible and lower third molar length and width in South and South-East Asia
India, Nepal & Sri Lanka
Indochina
Indonesia
Ratio between height of mandible and lower third molar length and width in Oceania
Australia
New Guinea
Marquesas
Mariana
Vanuatu
380
340
300
260
220
180
90
110
130
150
170
190

Figure 3.15

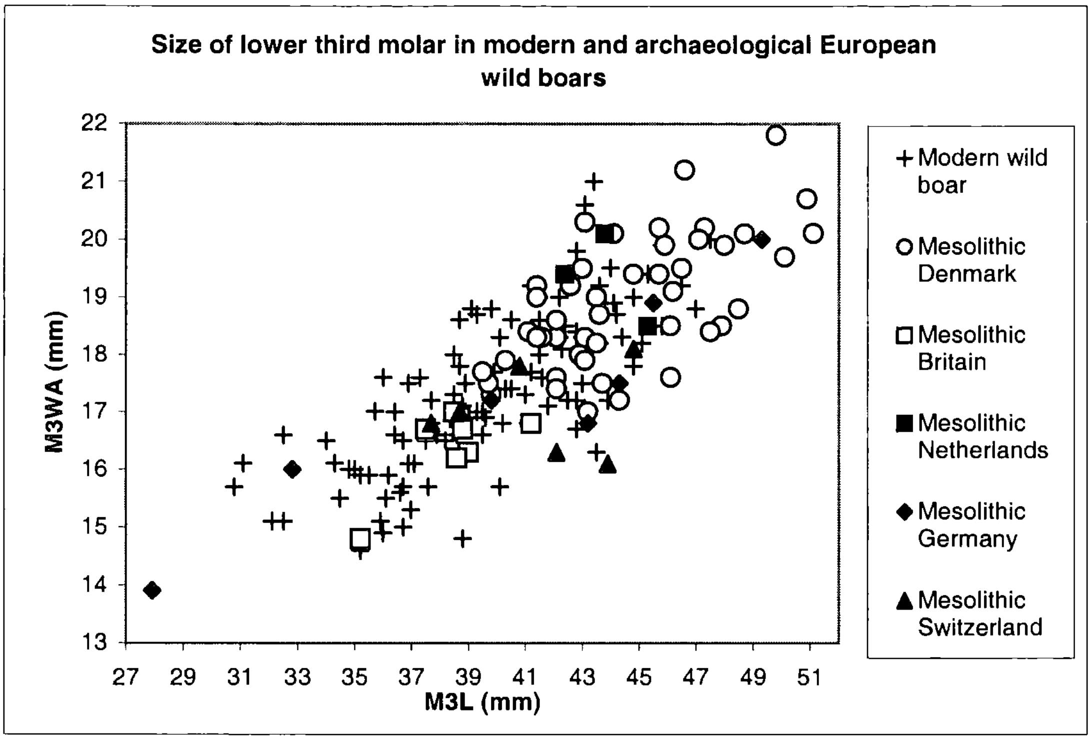


Figure 3.16

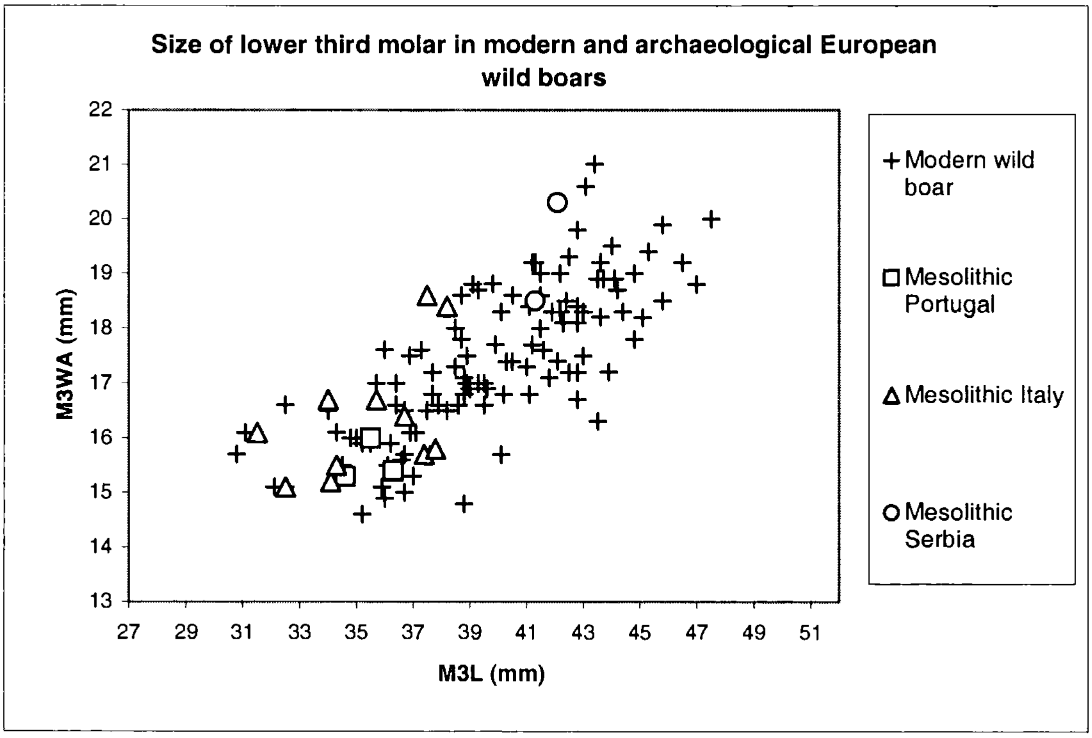


Figure 3.17

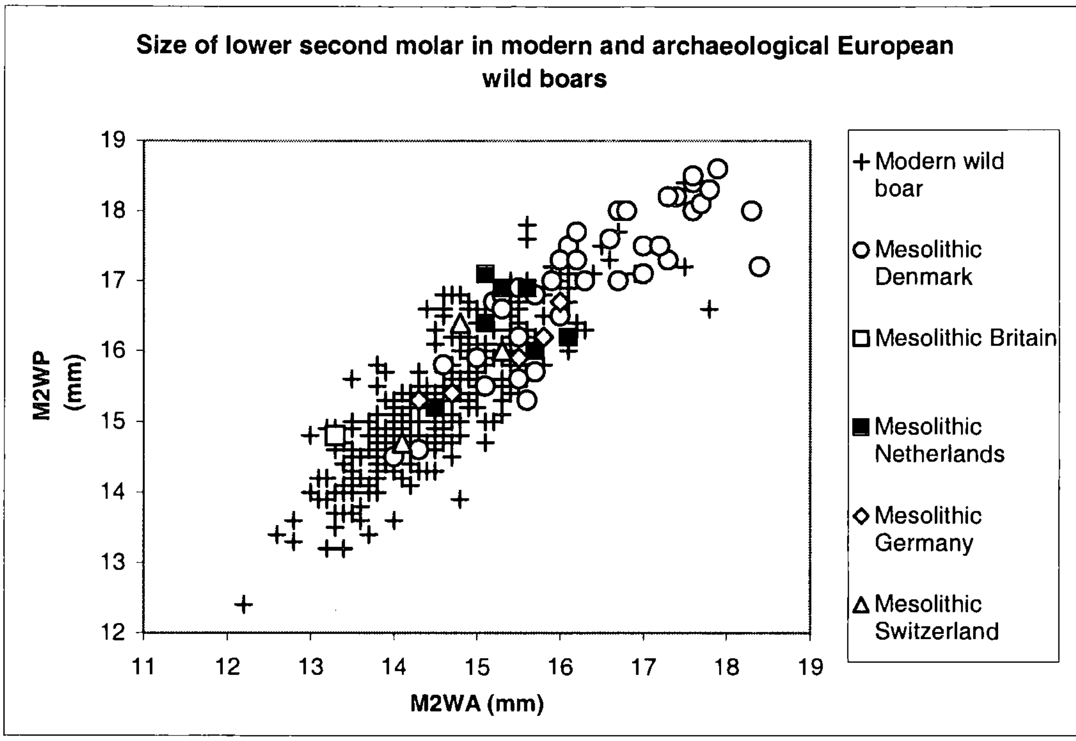


Figure 3.18

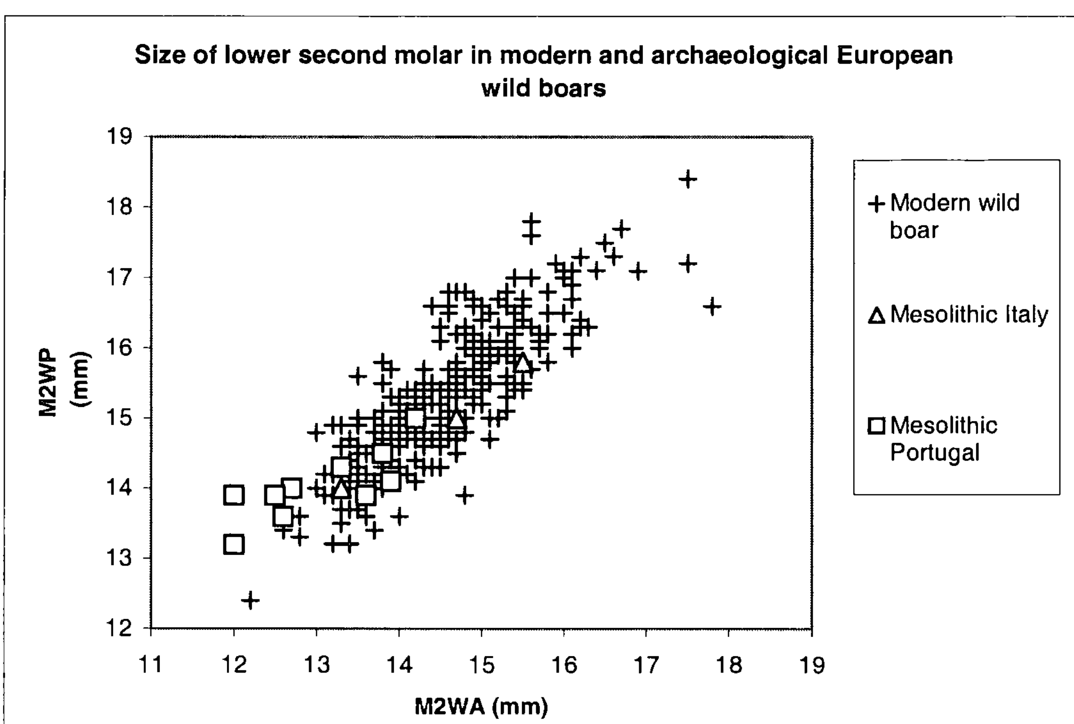


Figure 3.19

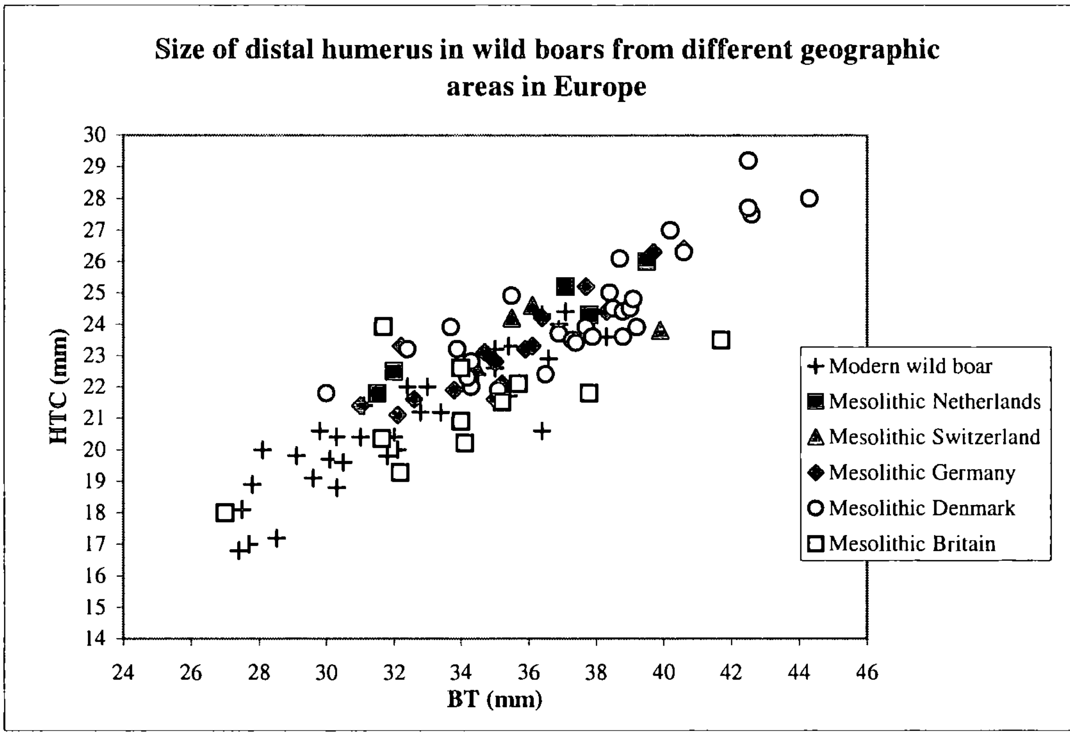


Figure 3.20

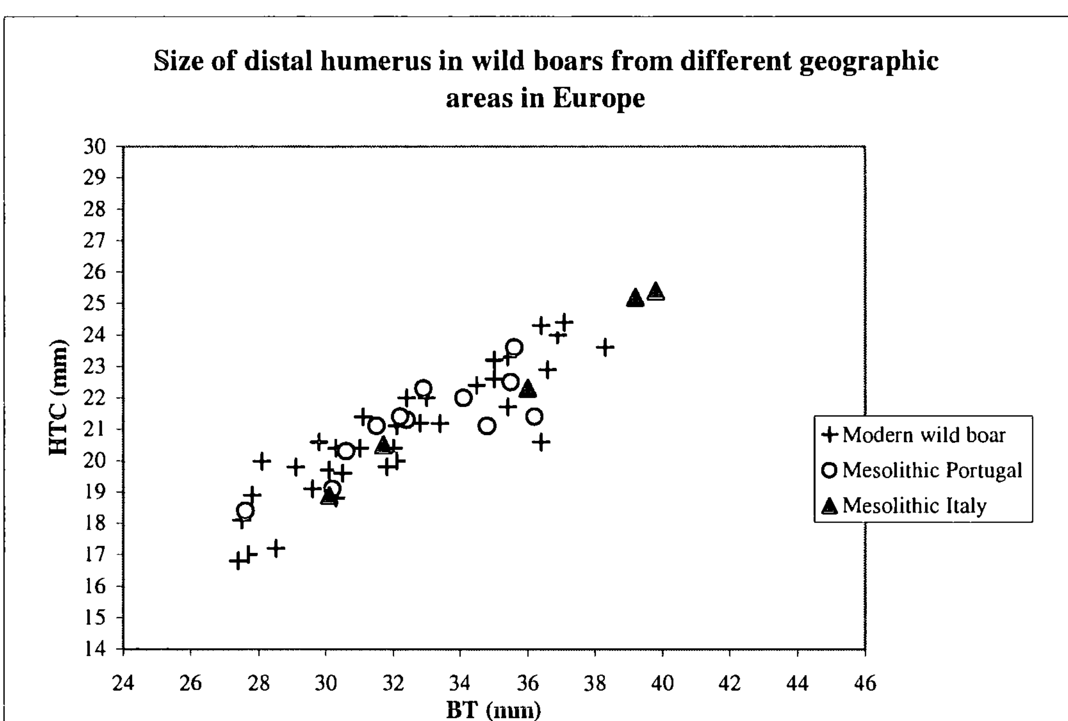


Figure 3.21

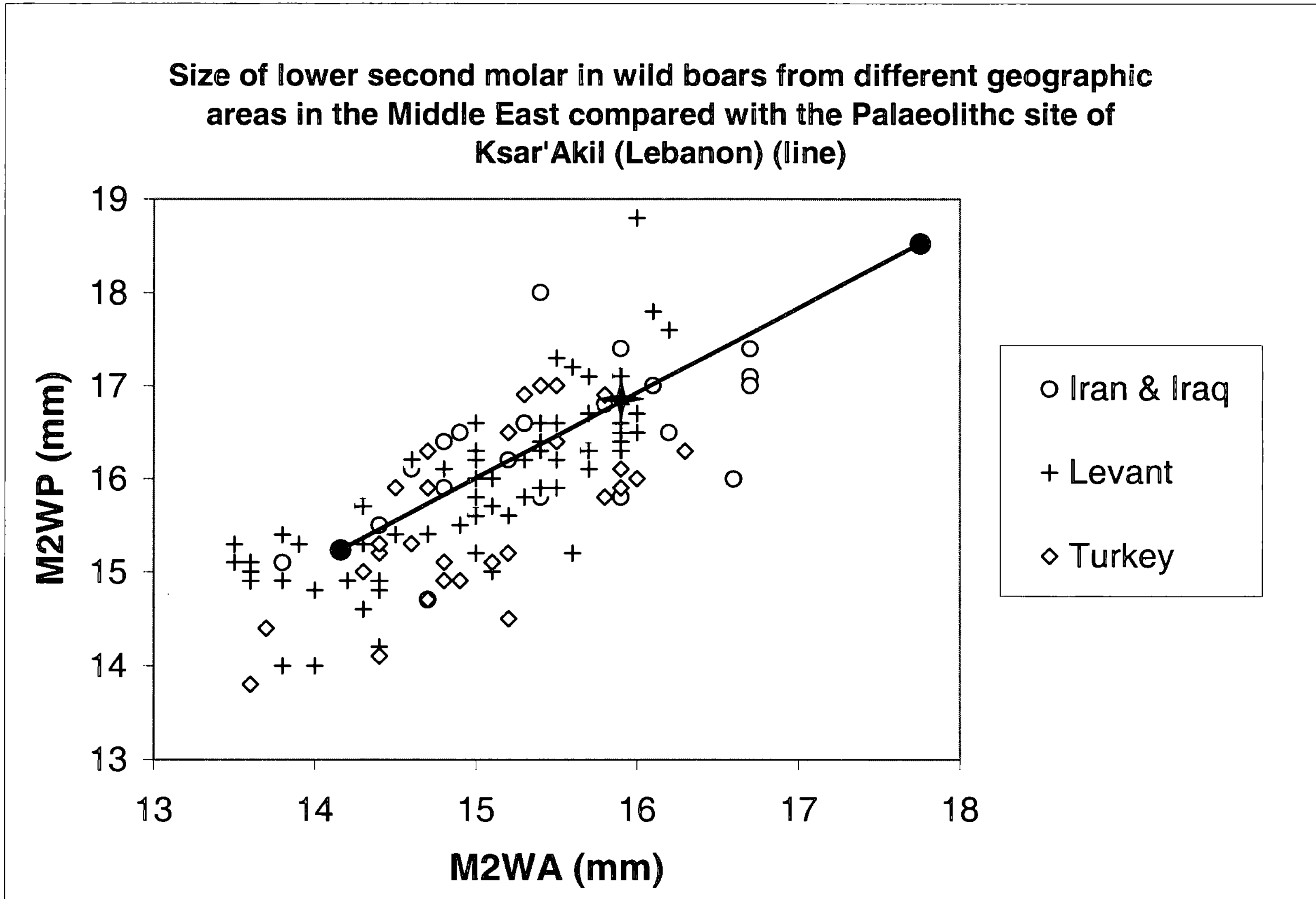

Size of lower second molar in wild boars from different geographic areas in the Middle East compared with the Palaeolithc site of Ksar'Akil (Lebanon) (line)
19
18
17
16
15
14
13
M2WP (mm)
13
14
15
16
17
18
M2WA (mm)
Iran & Iraq
Levant
Turkey

Figure 3.22

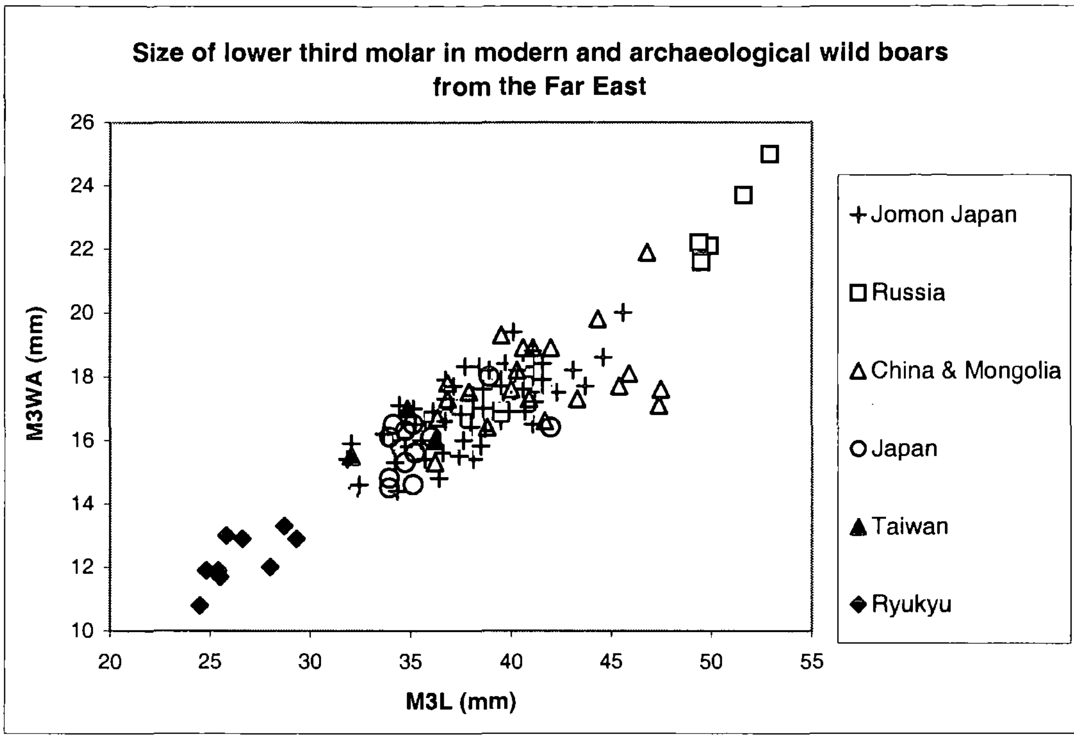

Size of lower third molar in modern and archaeological wild boars from the Far East
M3WA (mm)
26
24
22
20
18
16
14
12
10
20
25
30
35
40
45
50
55
M3L (mm)
Jomon Japan
Russia
China & Mongolia
Japan
Taiwan
Ryukyu

Figure 3.23

Figure 4.1

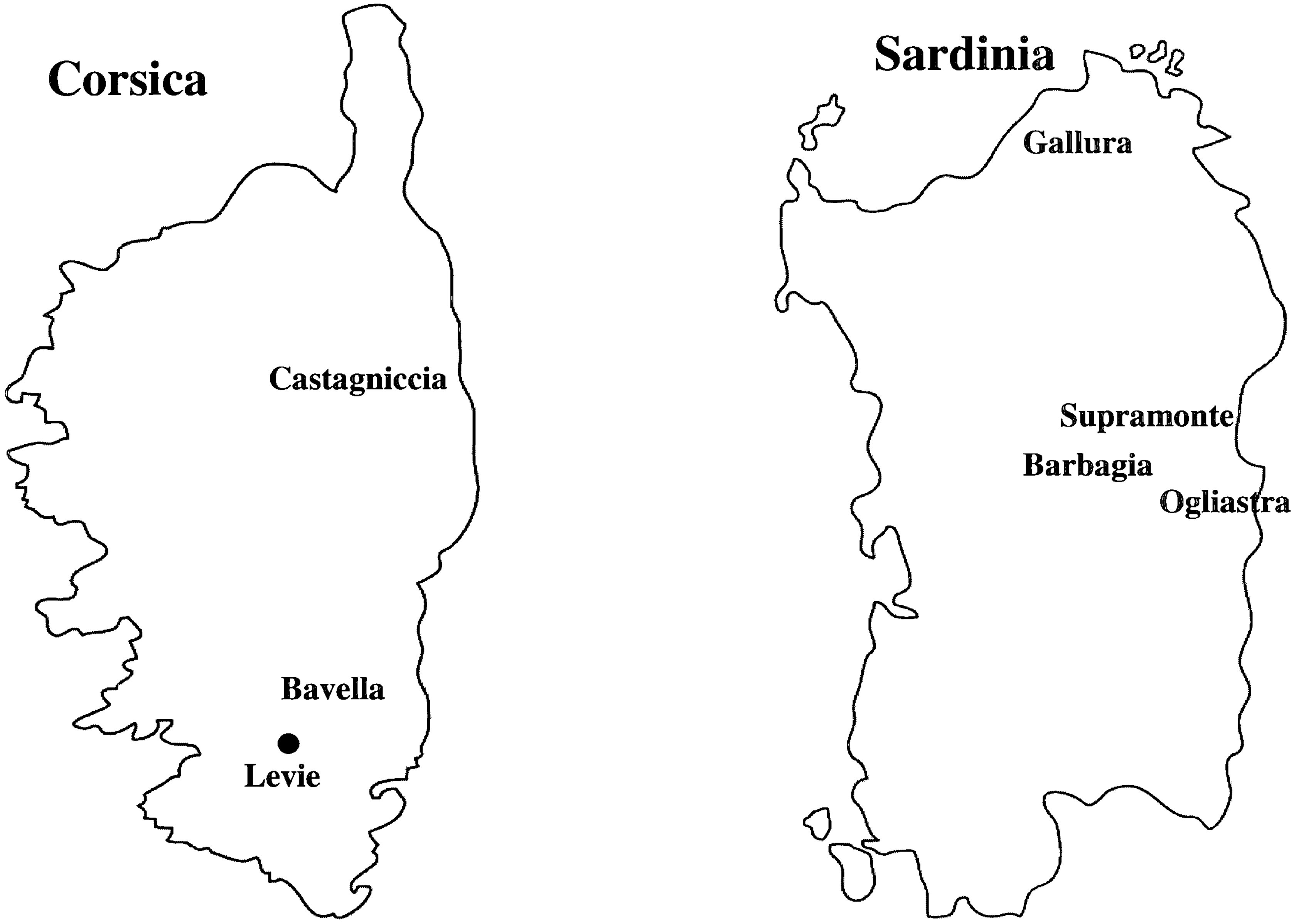
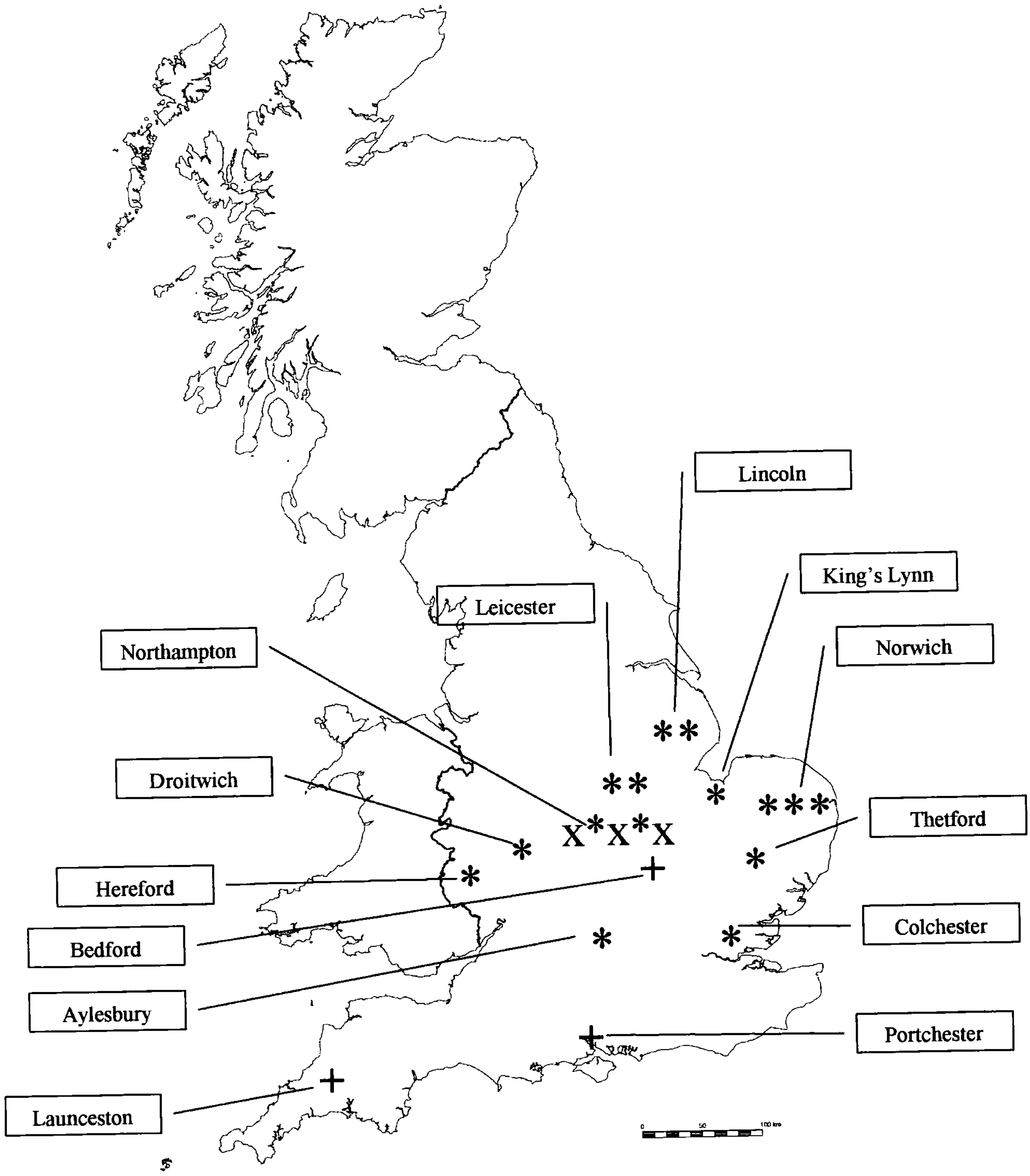
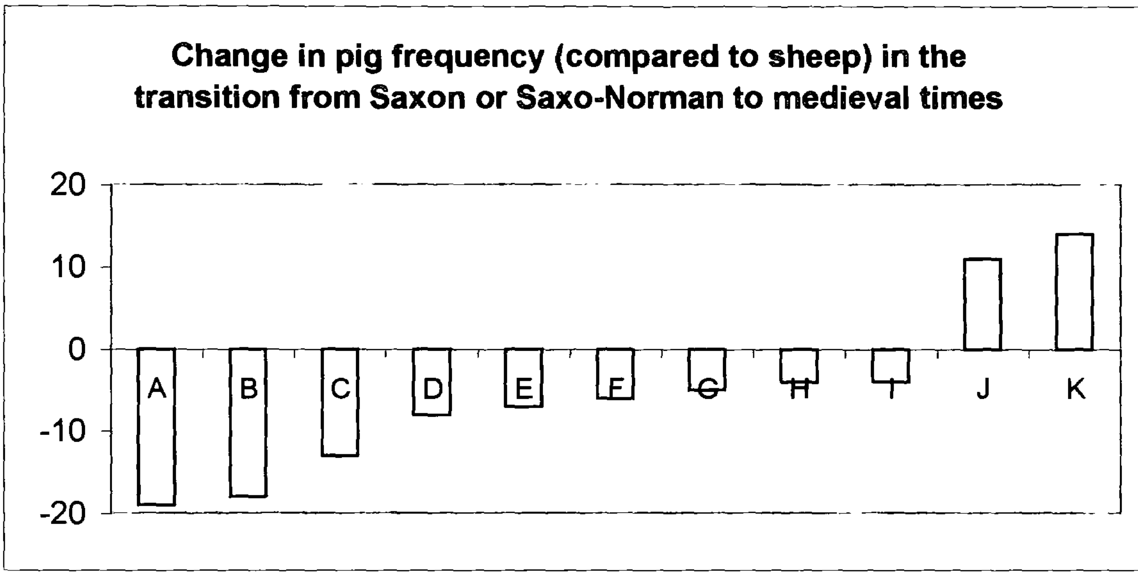

Corsica
Castagniccia
Bavella
Levie
Sardinia
Gallura
Supramonte
Barbagia
Ogliastra

Figure 4.2



Lincoln
King's Lynn
Leicester
Norwich
Northampton
Droitwich
Thetford
Hereford
Bedford
Colchester
Aylesbury
Portchester
Launceston

Figure 5.1


Change in pig frequency (compared to sheep) in the transition from Saxon or Saxo-Norman to medieval times
20
10
0
-10
-20
A
B
C
D
E
F
G
H
I
J
K

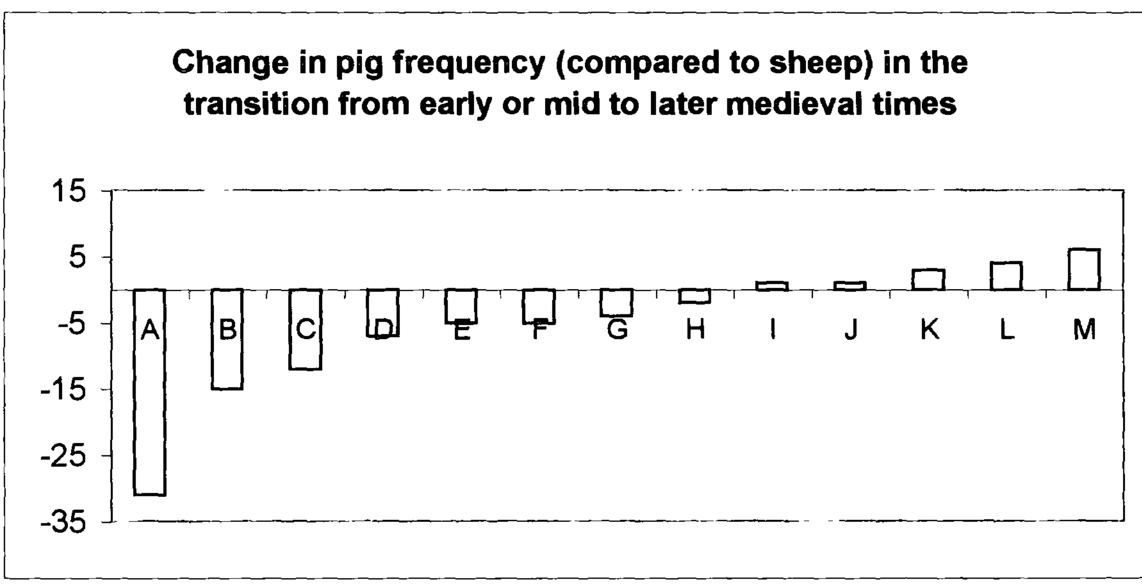

Change in pig frequency (compared to sheep) in the transition from early or mid to later medieval times
15
5
-5
-15
-25
-35
A
B
C
D
E
F
G
H
I
J
K
L
M

Figure 5.2

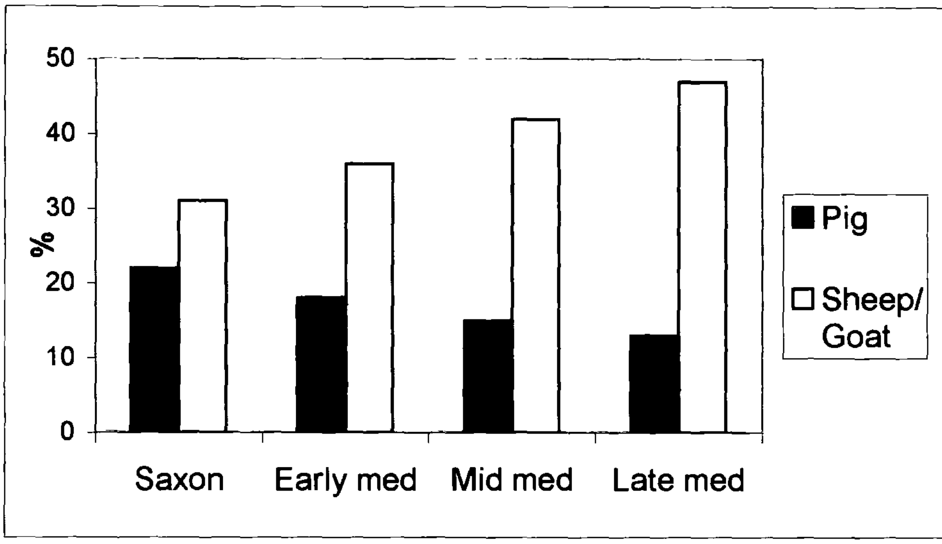


Figure 5.3

Figure 5.4

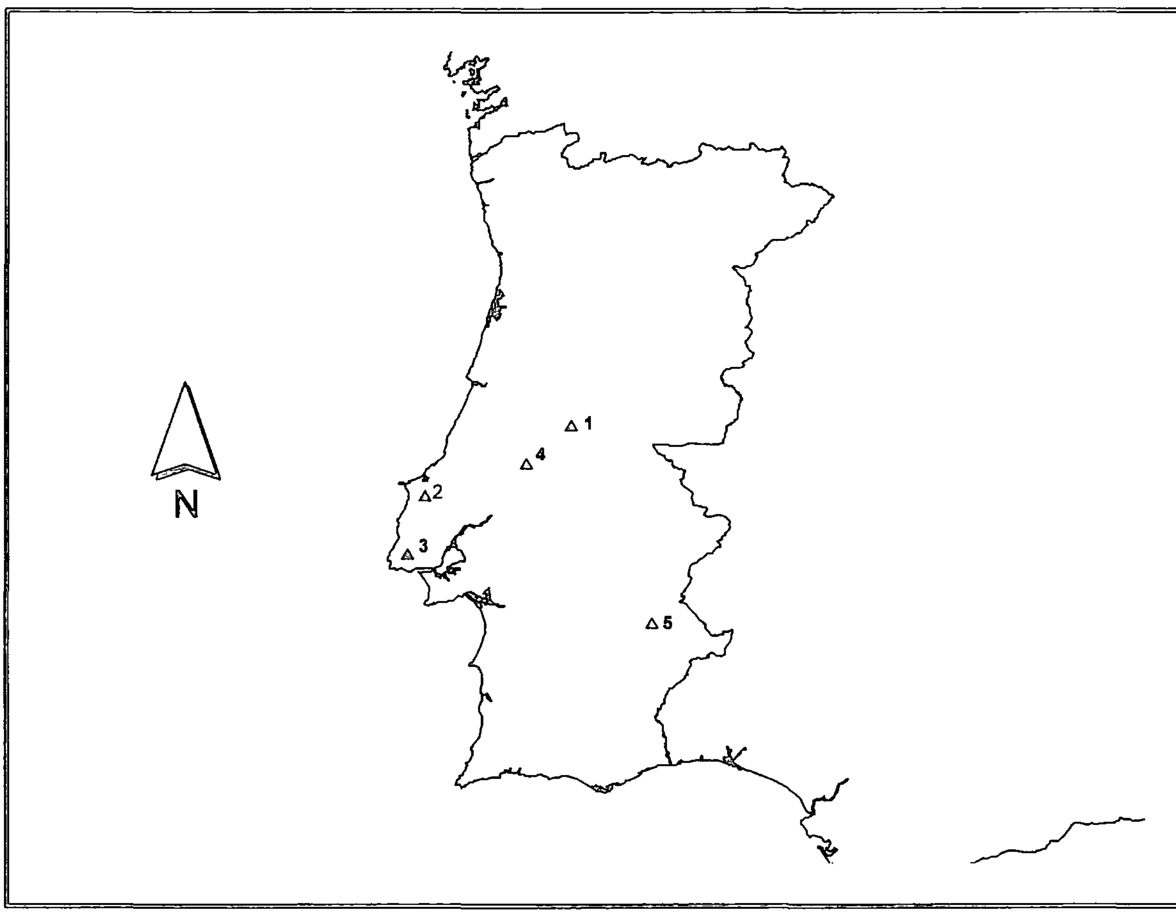


Figure 6.1
1: Caldeirão; 2: Zambujal; 3: Leceia; 4: Alcáçova de Santarém; 5: Mercador

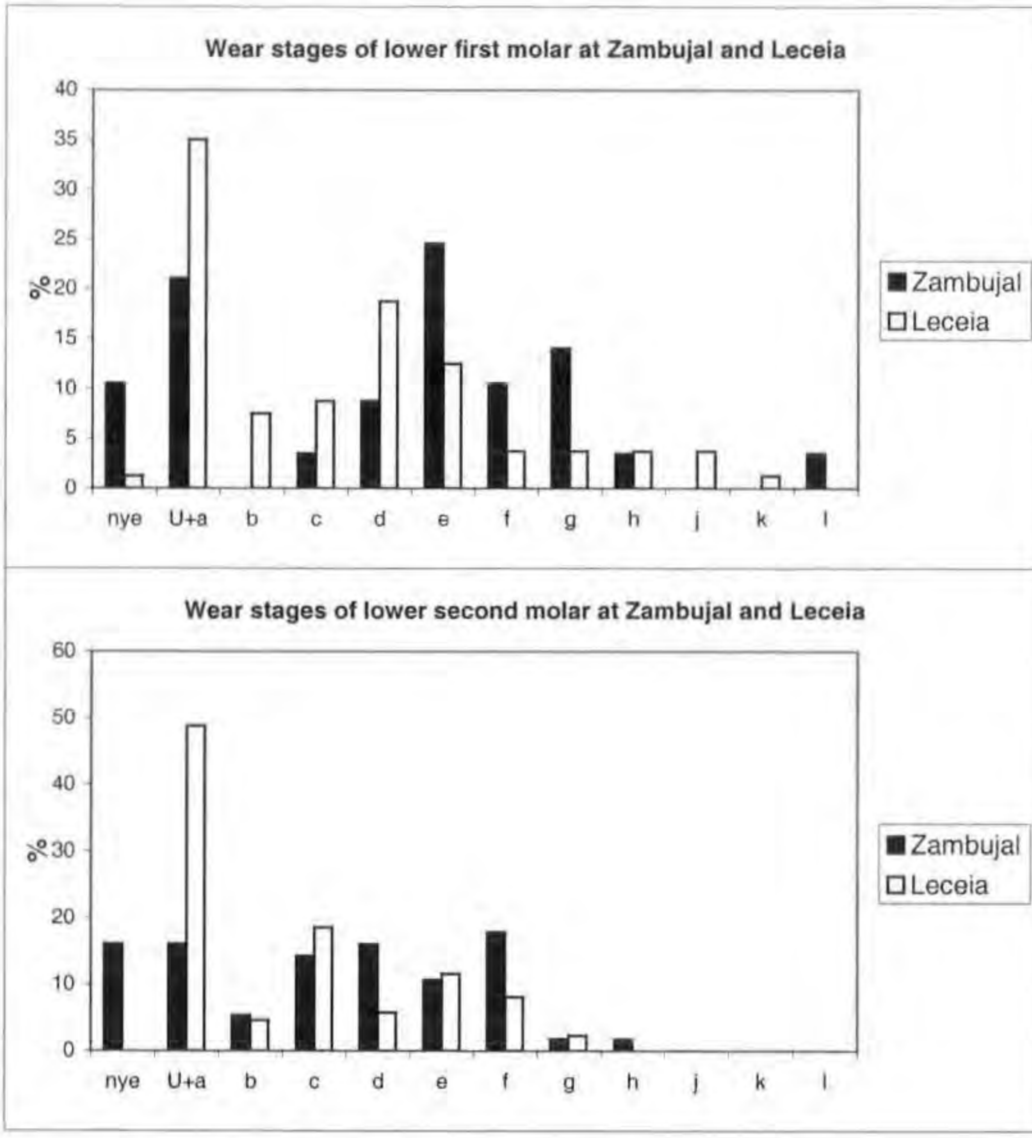

Wear stages of lower first molar at Zambujal and Leceia
40
35
30
25
%20
15
10
5
0
nye U+a b c d e f g h j k l
Zambujal
Leceia
Wear stages of lower second molar at Zambujal and Leceia
60
50
40
%30
20
10
0
nye U+a b c d e f g h j k l
Zambujal
Leceia

Figure 6.2

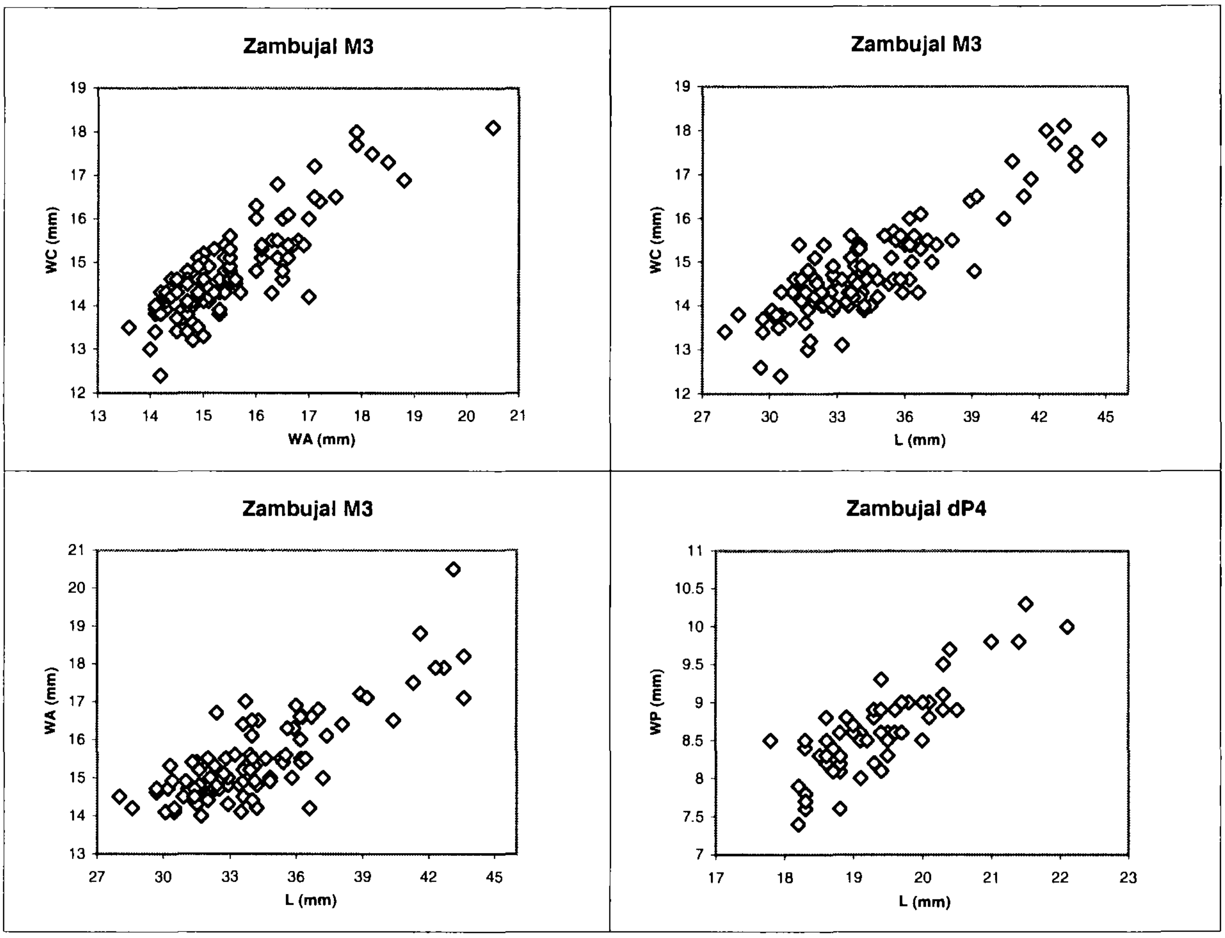

Zambujal M3
WC (mm)
WA (mm)
Zambujal M3
WC (mm)
L (mm)
Zambujal M3
WA (mm)
L (mm)
Zambujal dP4
WP (mm)
L (mm)

Figure 6.3

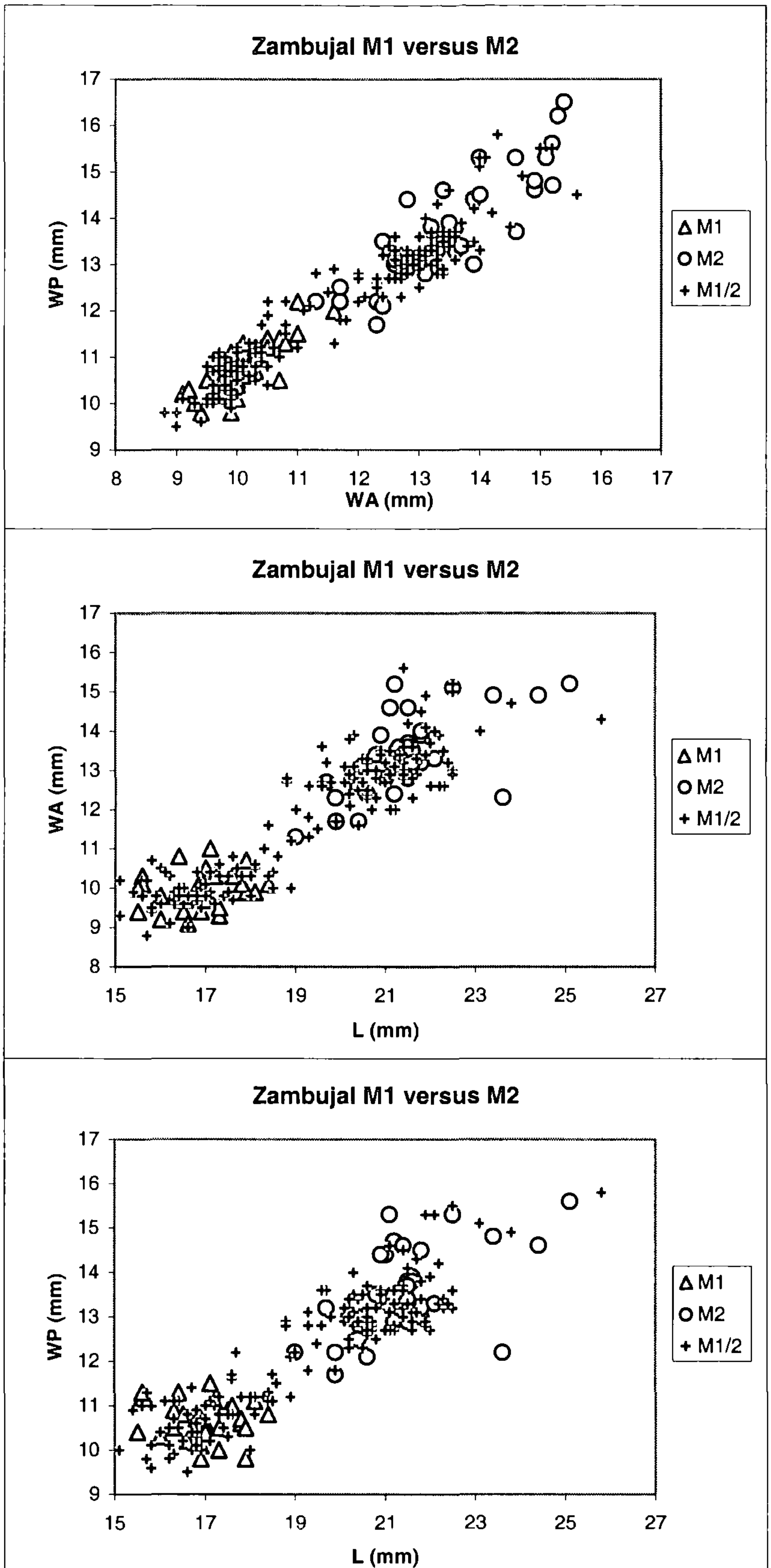
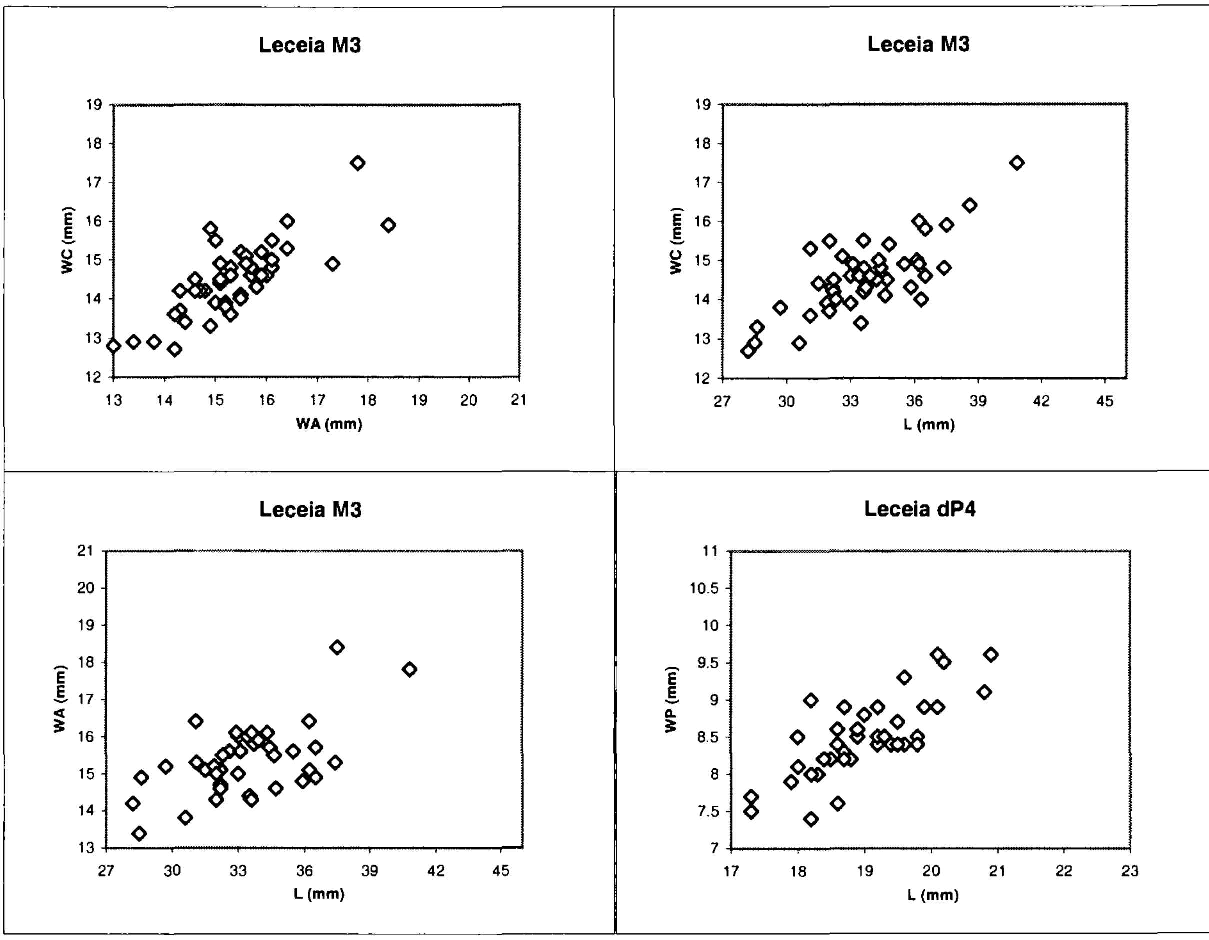
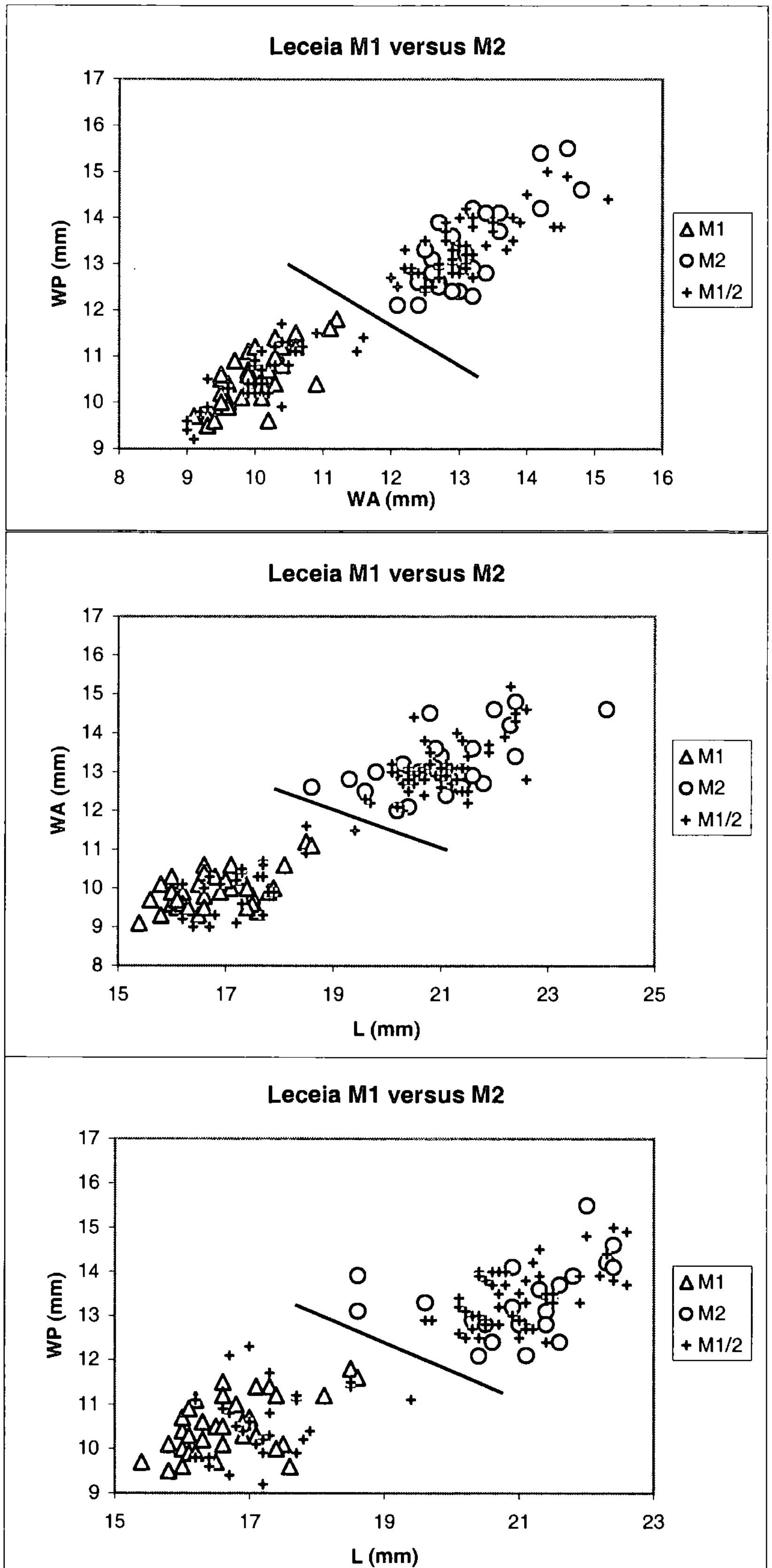

Zambujal M1 versus M2
WP (mm)
WA (mm)
M1
M2
M1/2
Zambujal M1 versus M2
WA (mm)
L (mm)
M1
M2
M1/2
Zambujal M1 versus M2
WP (mm)
L (mm)
M1
M2
M1/2

Figure 6.4



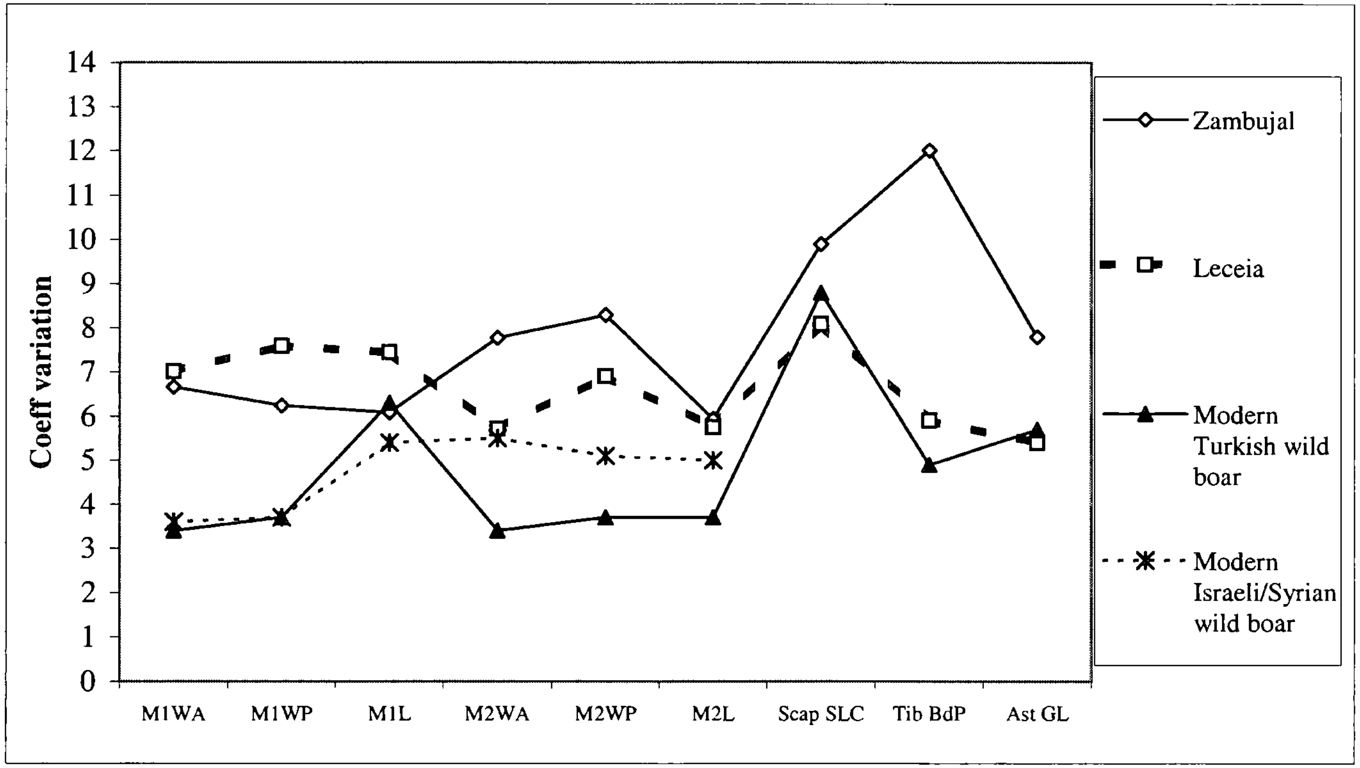
Leceia M3
WC (mm)
WA (mm)
Leceia M3
WC (mm)
L (mm)
Leceia M3
WA (mm)
L (mm)
Leceia dP4
WP (mm)
L (mm)

Figure 6.5



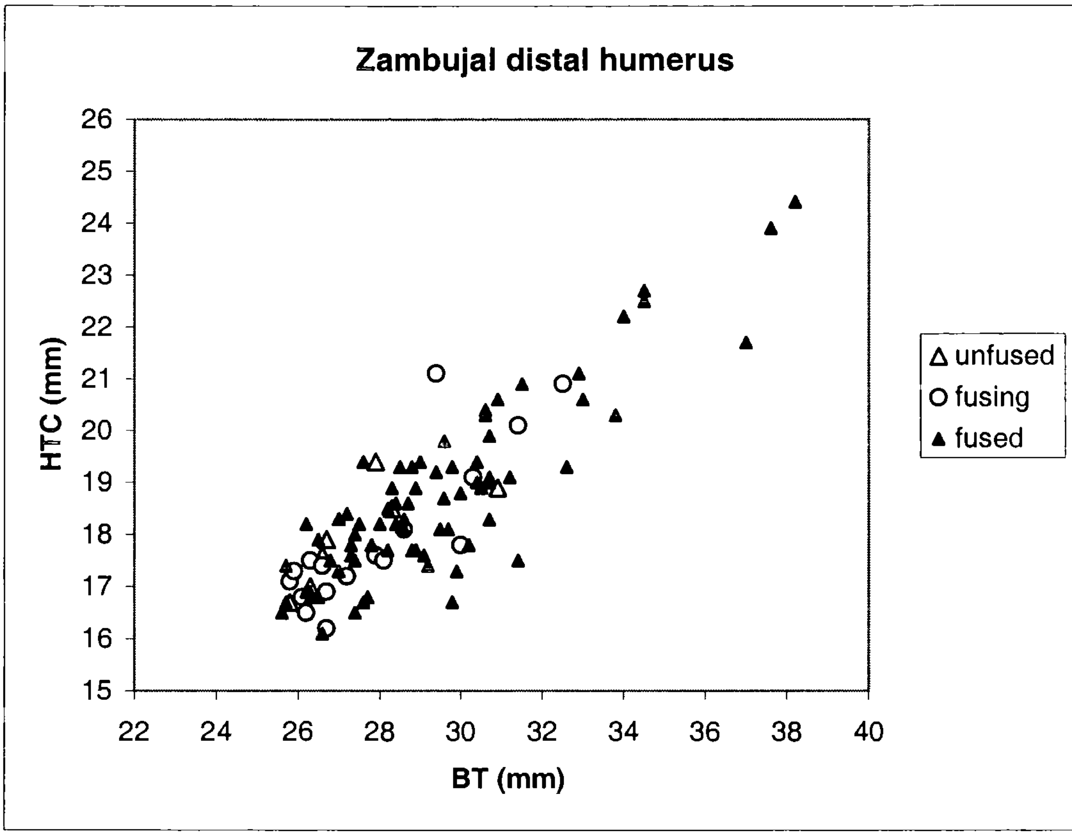
Leceia M1 versus M2
WP (mm)
WA (mm)
M1
M2
M1/2
Leceia M1 versus M2
WA (mm)
L (mm)
M1
M2
M1/2
Leceia M1 versus M2
WP (mm)
L (mm)
M1
M2
M1/2

Figure 6.6

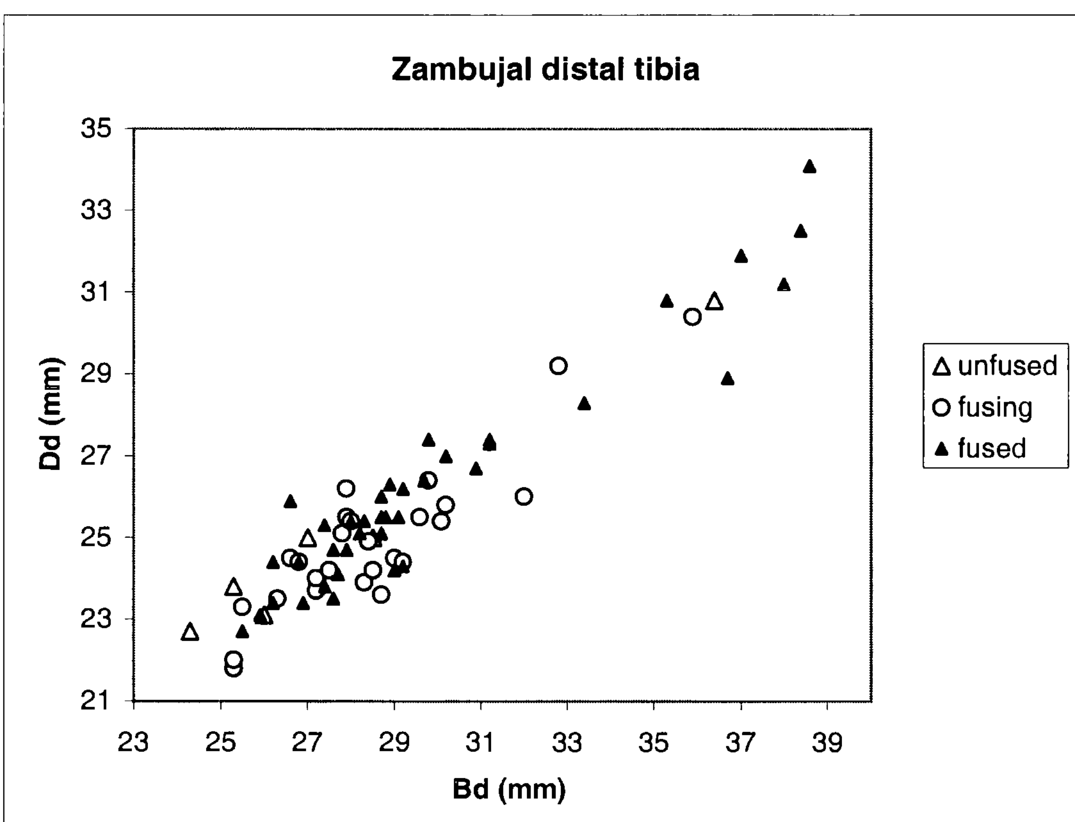


Coeff variation
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
M1WA
M1WP
M1L
M2WA
M2WP
M2L
Scap SLC
Tib BdP
Ast GL
Zambujal
Leceia
Modern Turkish wild boar
Modern Israeli/Syrian wild boar

Figure 6.7

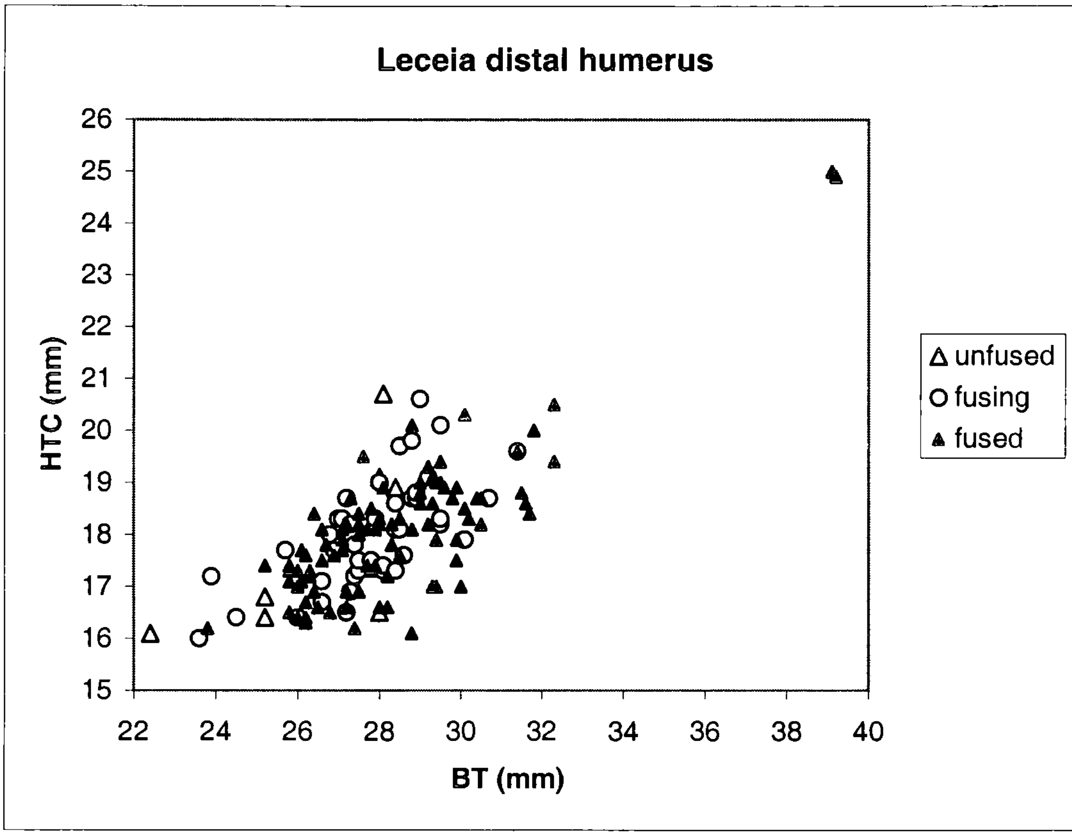


Zambujal distal humerus
HTC (mm)
26
25
24
23
22
21
20
19
18
17
16
15
22
24
26
28
30
32
34
36
38
40
BT (mm)
unfused
fusing
fused

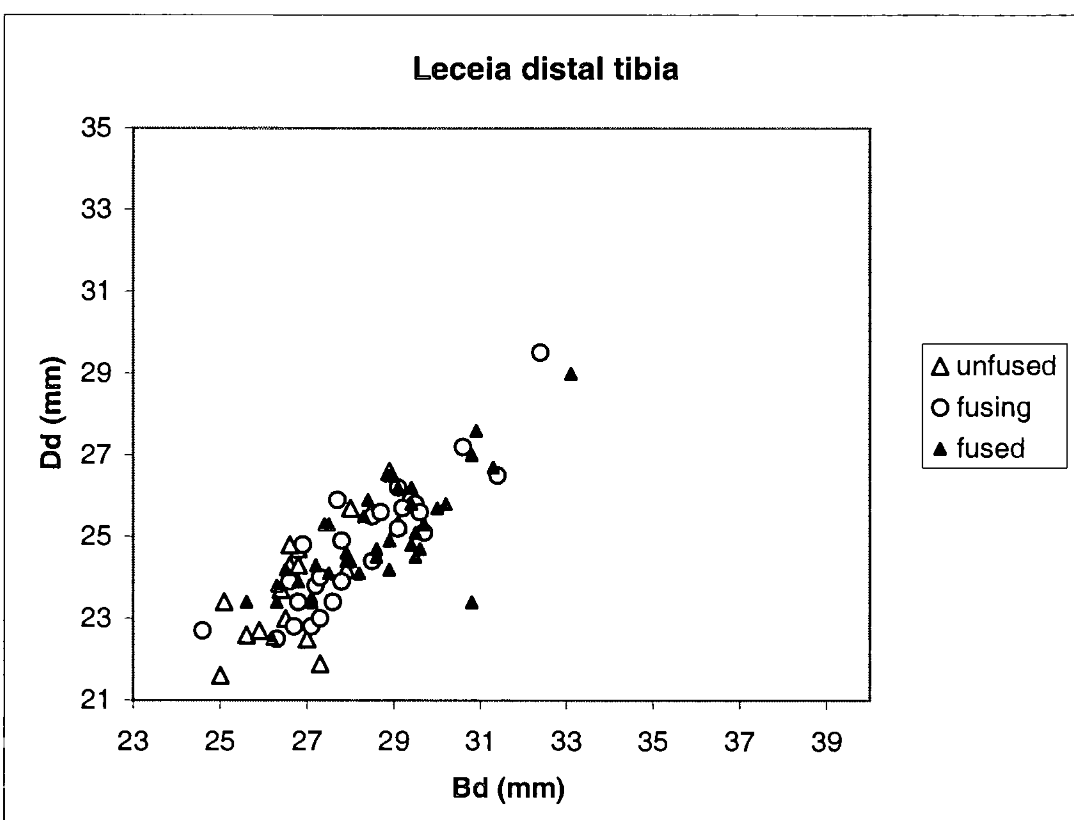


Zambujal distal tibia
Dd (mm)
35
33
31
29
27
25
23
21
23
25
27
29
31
33
35
37
39
Bd (mm)
unfused
fusing
fused

Figure 6.8

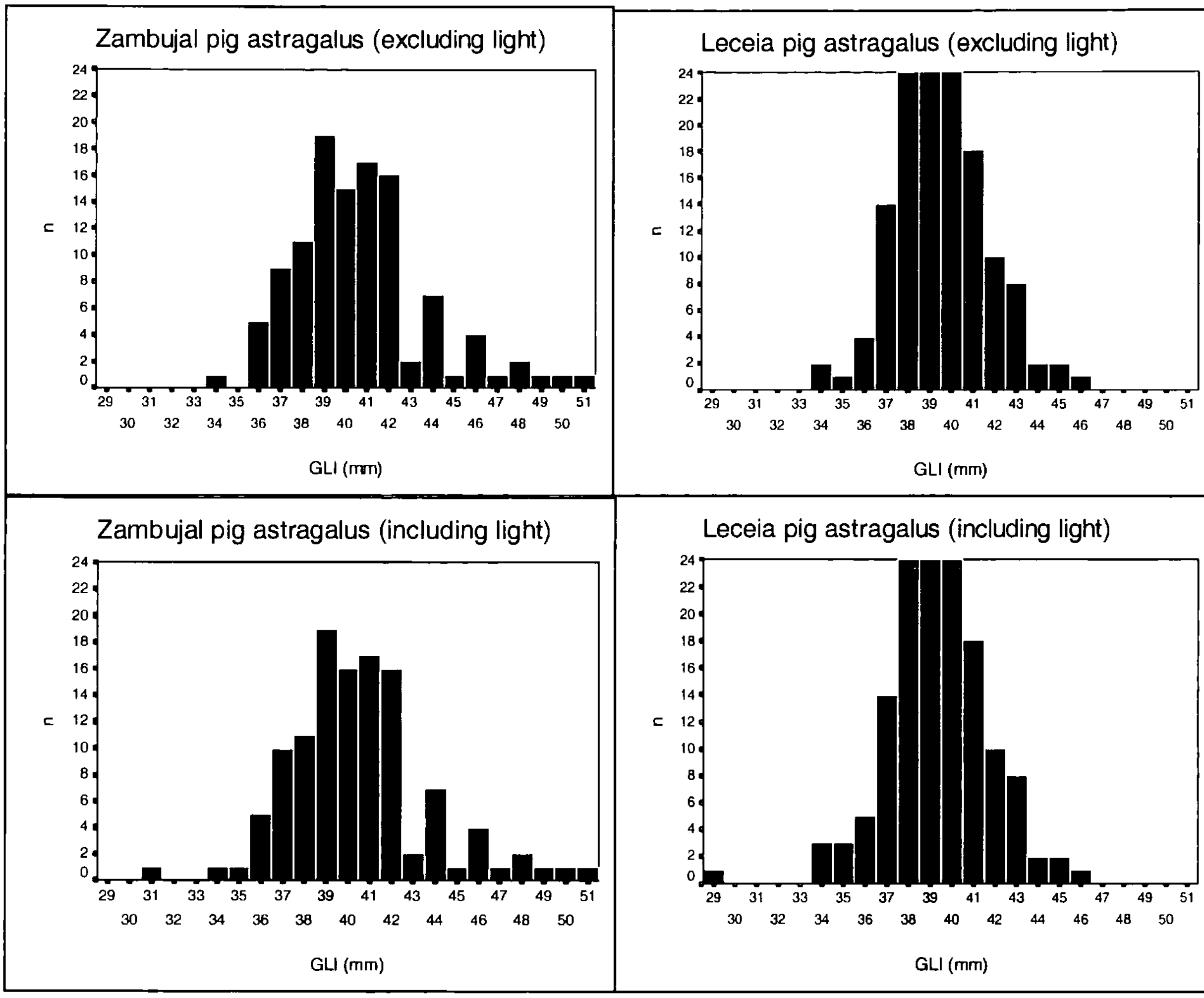


Leceia distal humerus
HTC (mm)
BT (mm)
26
25
24
23
22
21
20
19
18
17
16
15
22
24
26
28
30
32
34
36
38
40
Δ unfused
O fusing
▲ fused



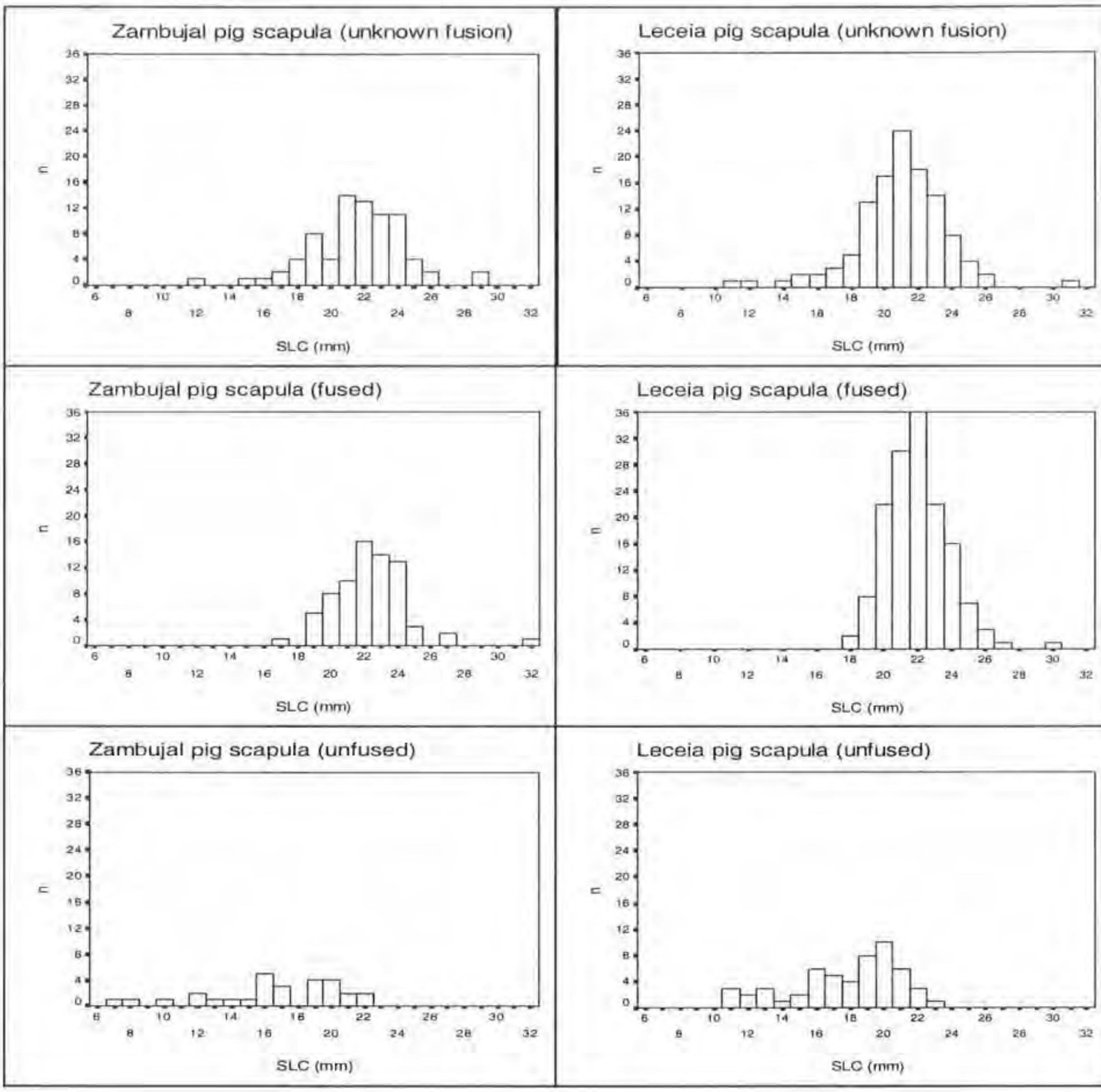
Leceia distal tibia
Dd (mm)
Bd (mm)
35
33
31
29
27
25
23
21
23
25
27
29
31
33
35
37
39
Δ unfused
O fusing
▲ fused

Figure 6.9



Zambujal pig astragalus (excluding light)
Leceia pig astragalus (excluding light)
Zambujal pig astragalus (including light)
Leceia pig astragalus (including light)
n
GLl (mm)

Figure 6.10



Zambujal pig scapula (unknown fusion)
Leceia pig scapula (unknown fusion)
Zambujal pig scapula (fused)
Leceia pig scapula (fused)
Zambujal pig scapula (unfused)
Leceia pig scapula (unfused)
n
SLC (mm)

Figure 6.11

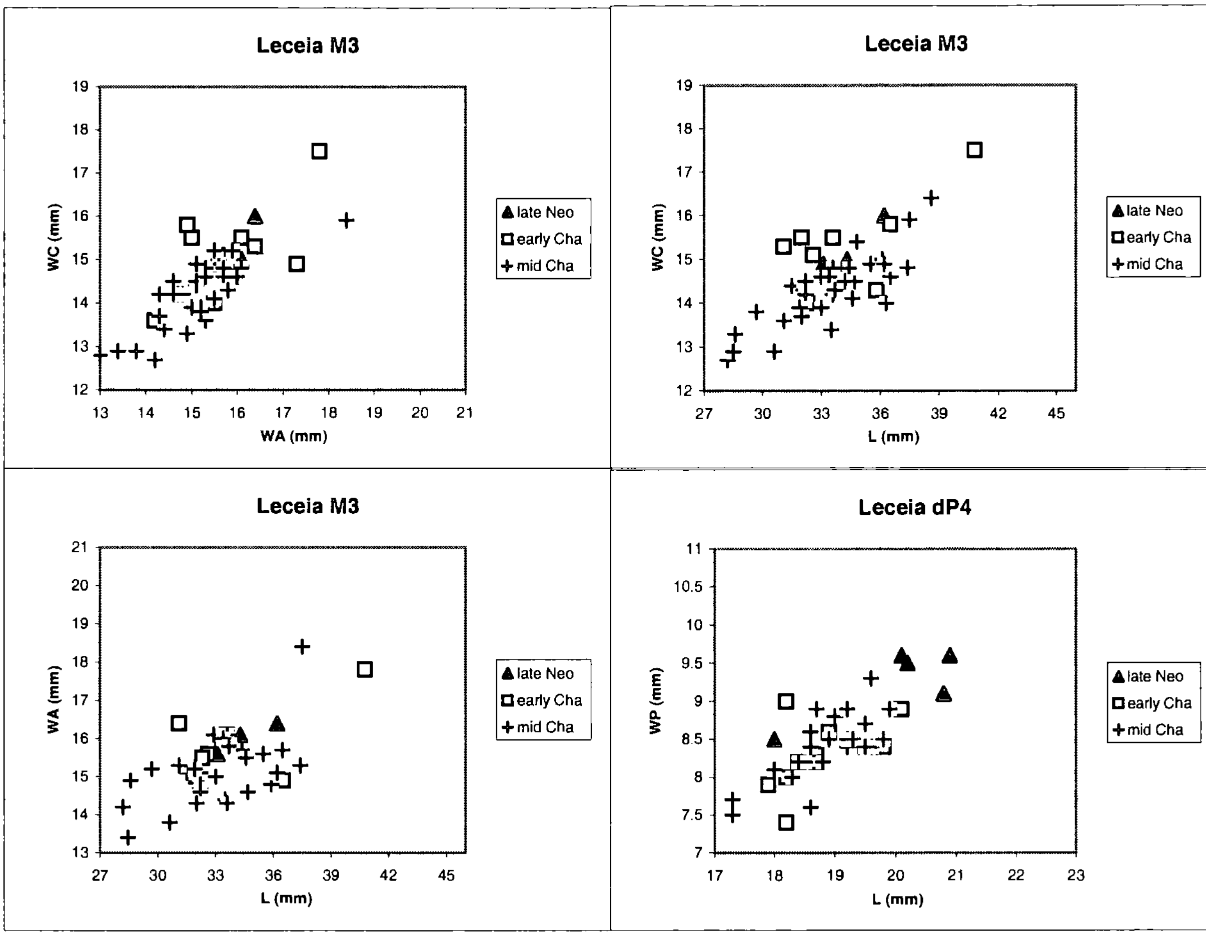
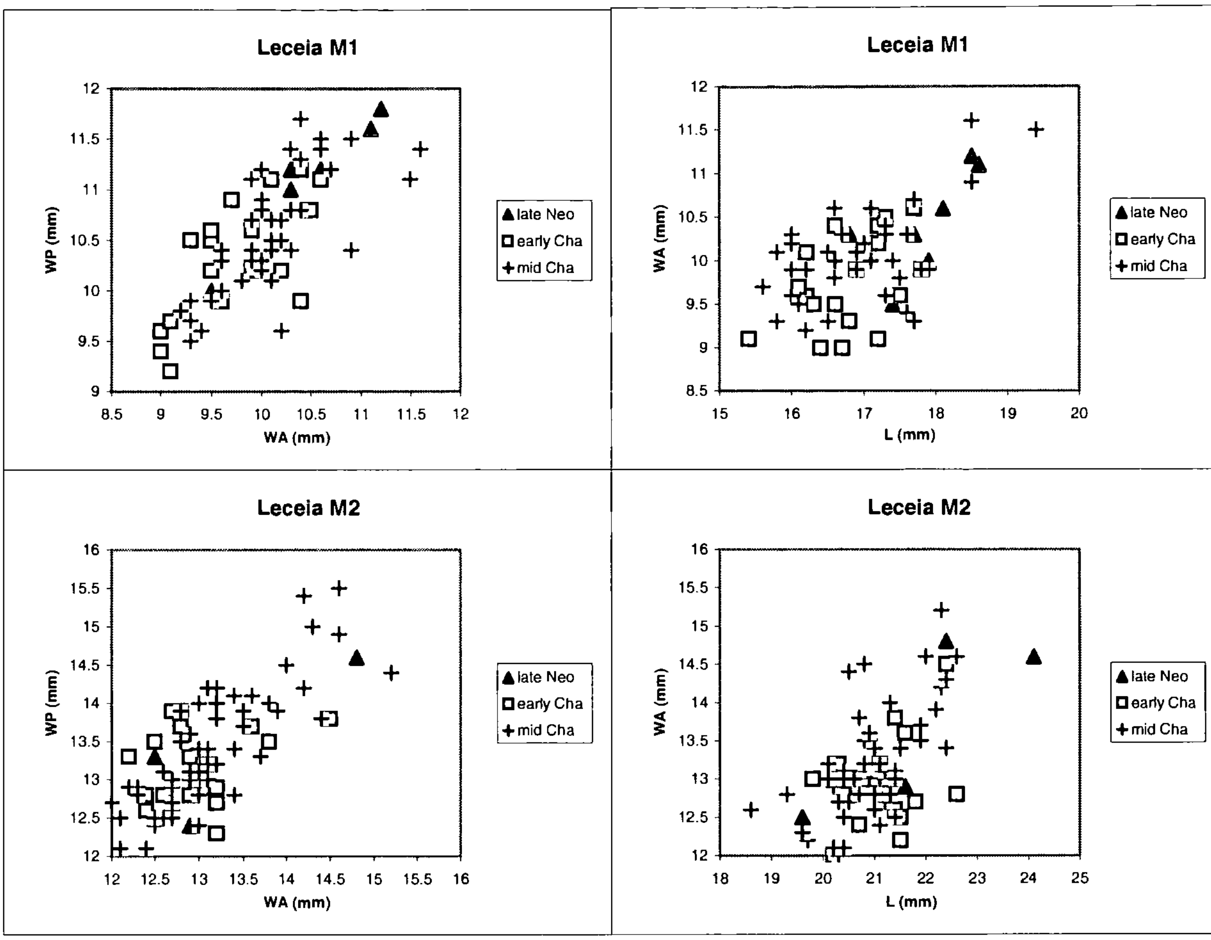
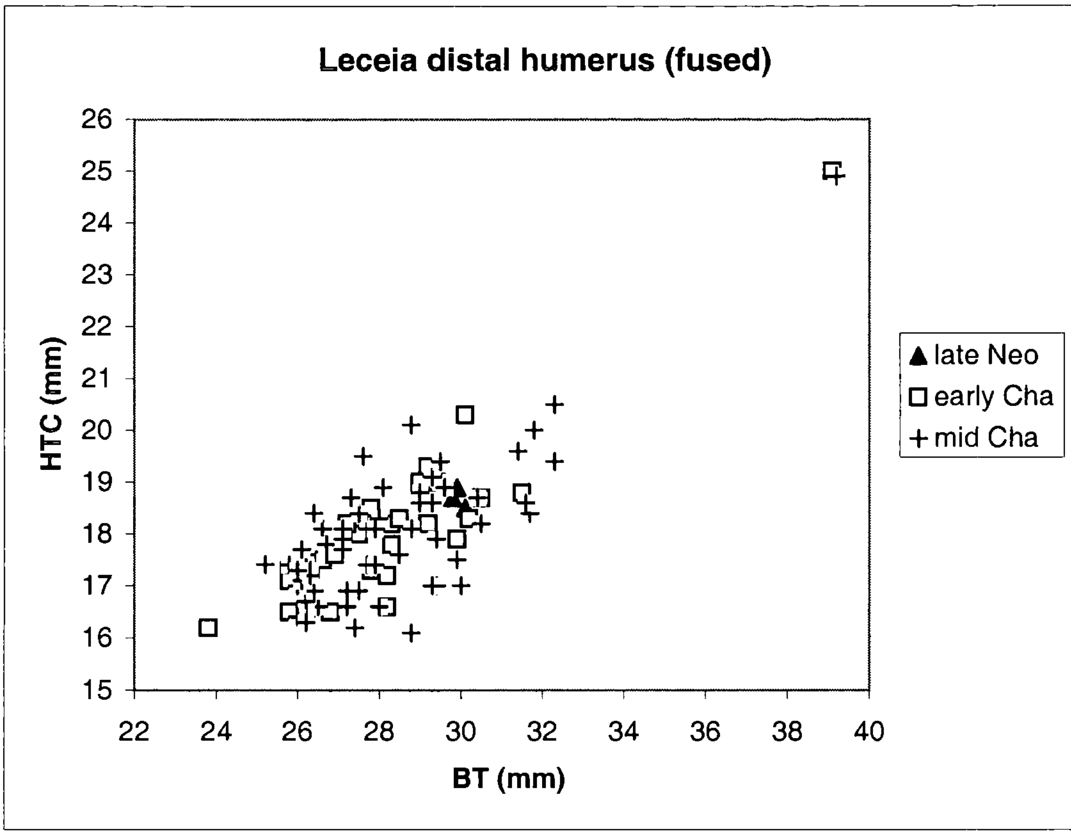

Leceia M3
WC (mm)
WA (mm)
late Neo
early Cha
mid Cha
Leceia M3
WC (mm)
L (mm)
late Neo
early Cha
mid Cha
Leceia M3
WA (mm)
L (mm)
late Neo
early Cha
mid Cha
Leceia dP4
WP (mm)
L (mm)
late Neo
early Cha
mid Cha

Figure 6.12



Leceia M1
WP (mm)
WA (mm)
late Neo
early Cha
mid Cha
Leceia M1
WA (mm)
L (mm)
late Neo
early Cha
mid Cha
Leceia M2
WP (mm)
WA (mm)
late Neo
early Cha
mid Cha
Leceia M2
WA (mm)
L (mm)
late Neo
early Cha
mid Cha

Figure 6.13


Leceia distal humerus (fused)
HTC (mm)
BT (mm)
late Neo
early Cha
mid Cha

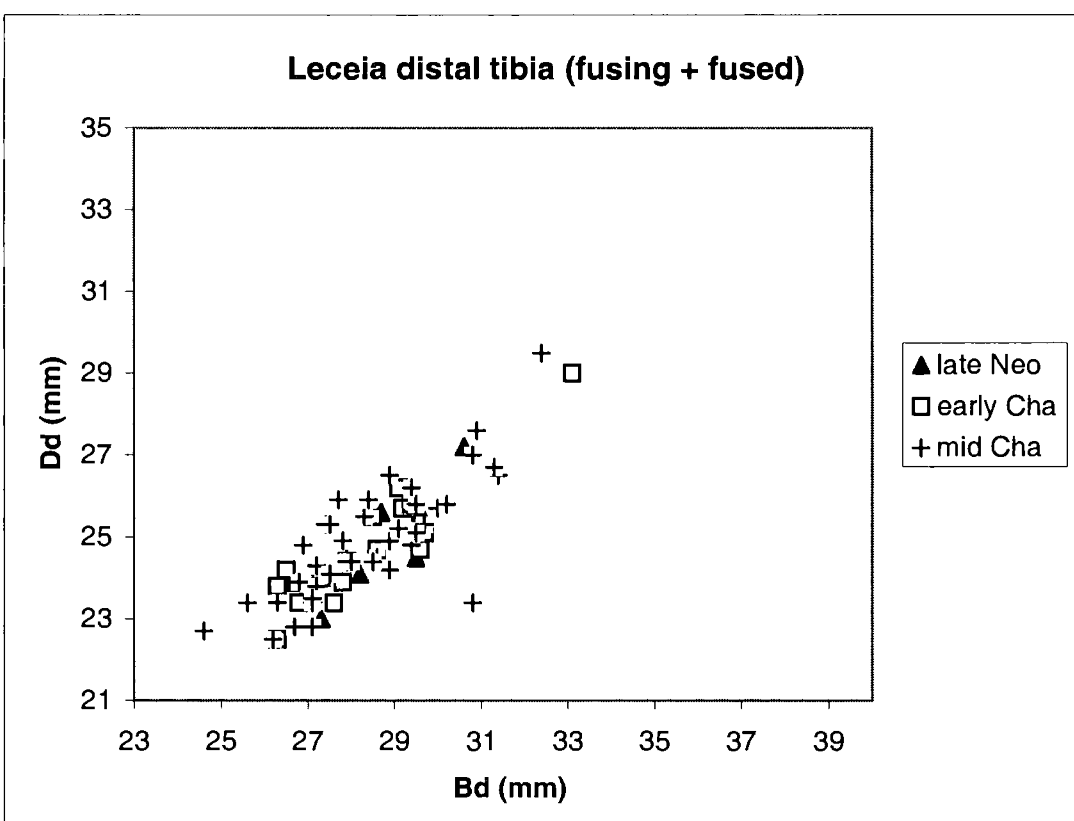

Leceia distal tibia (fusing + fused)
Dd (mm)
Bd (mm)
late Neo
early Cha
mid Cha

Figure 6.14

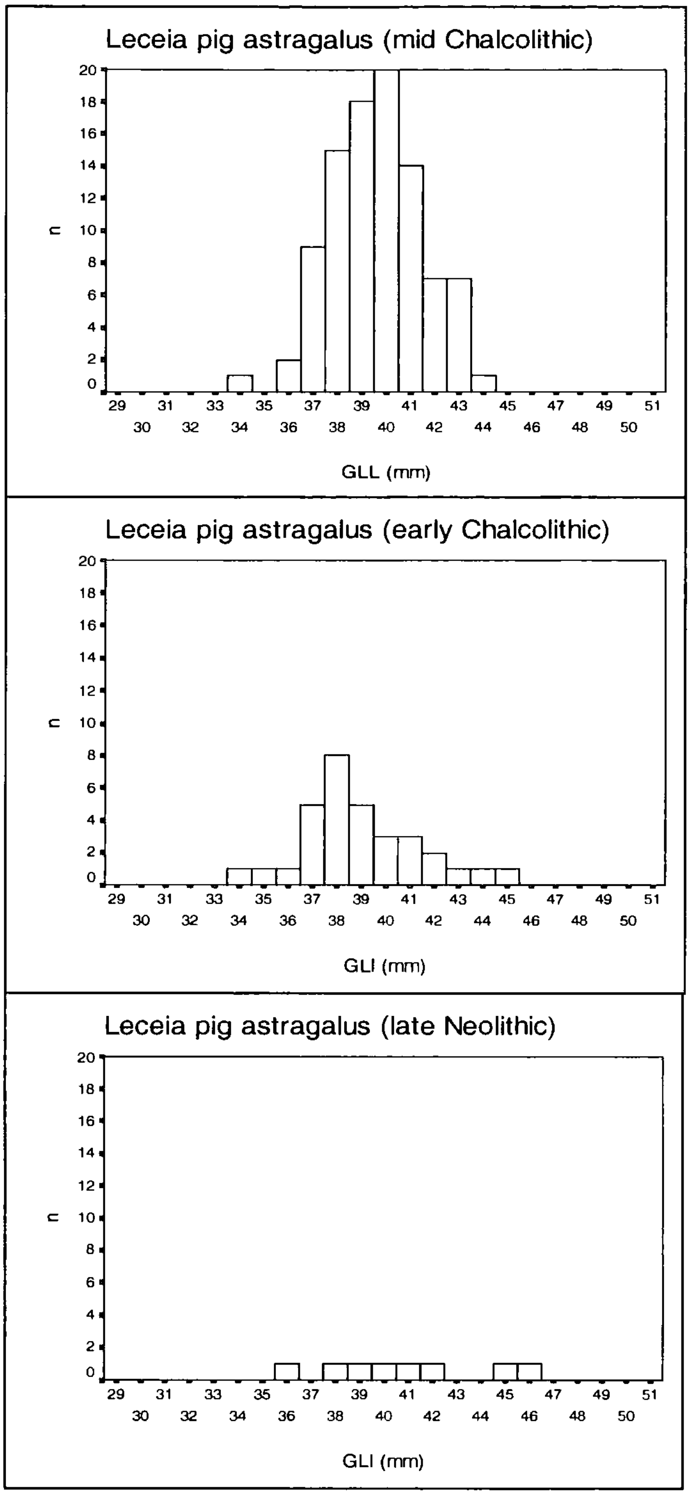
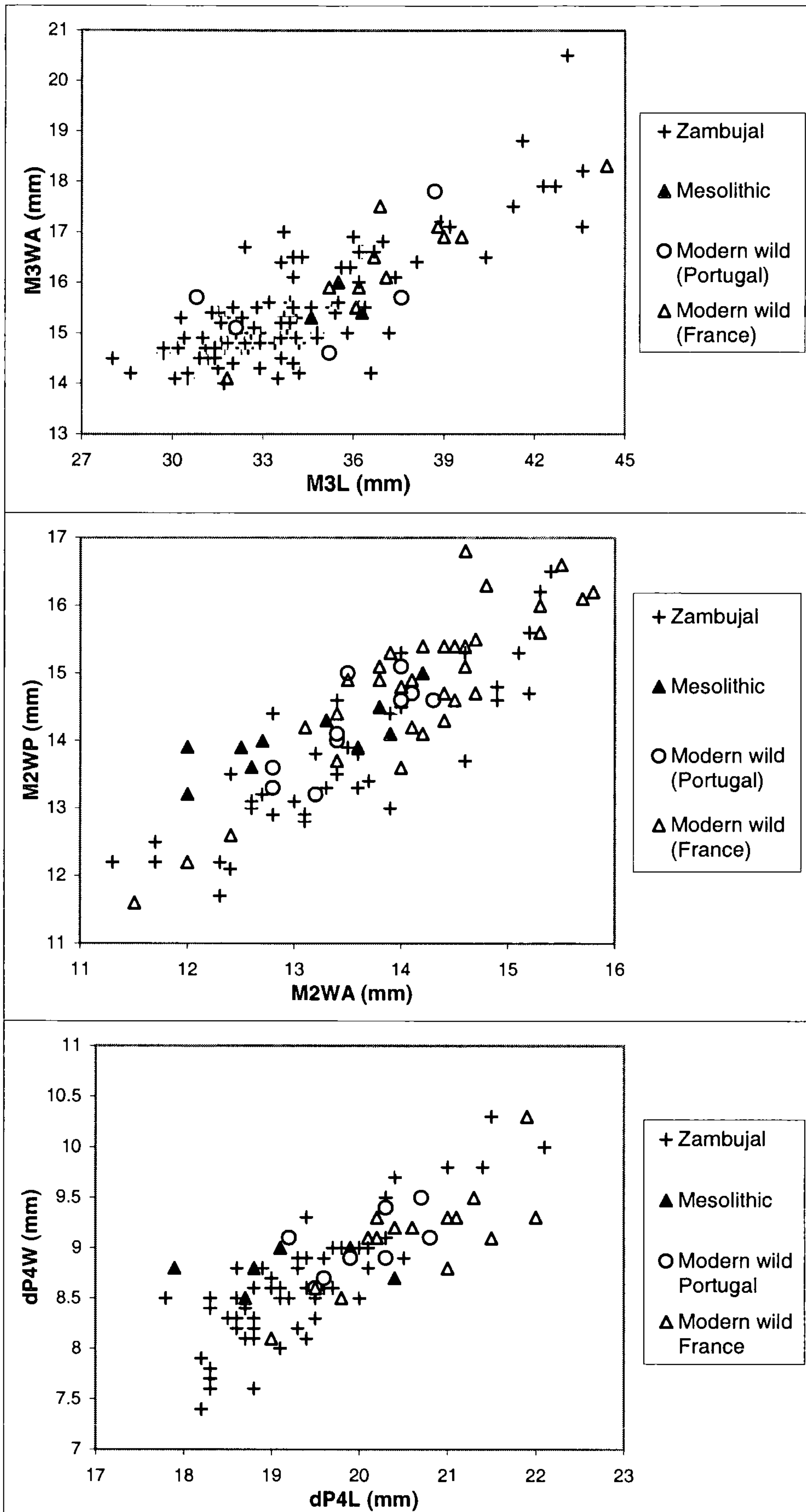

Leceia pig astragalus (mid Chalcolithic)
n
GLL (mm)
Leceia pig astragalus (early Chalcolithic)
n
GLl (mm)
Leceia pig astragalus (late Neolithic)
n
GLl (mm)

Figure 6.15



M3WA (mm)
M3L (mm)
+ Zambujal
▲ Mesolithic
O Modern wild (Portugal)
Δ Modern wild (France)
M2WP (mm)
M2WA (mm)
+ Zambujal
▲ Mesolithic
O Modern wild (Portugal)
Δ Modern wild (France)
dP4W (mm)
dP4L (mm)
+ Zambujal
▲ Mesolithic
O Modern wild Portugal
Δ Modern wild France

Figure 6.16

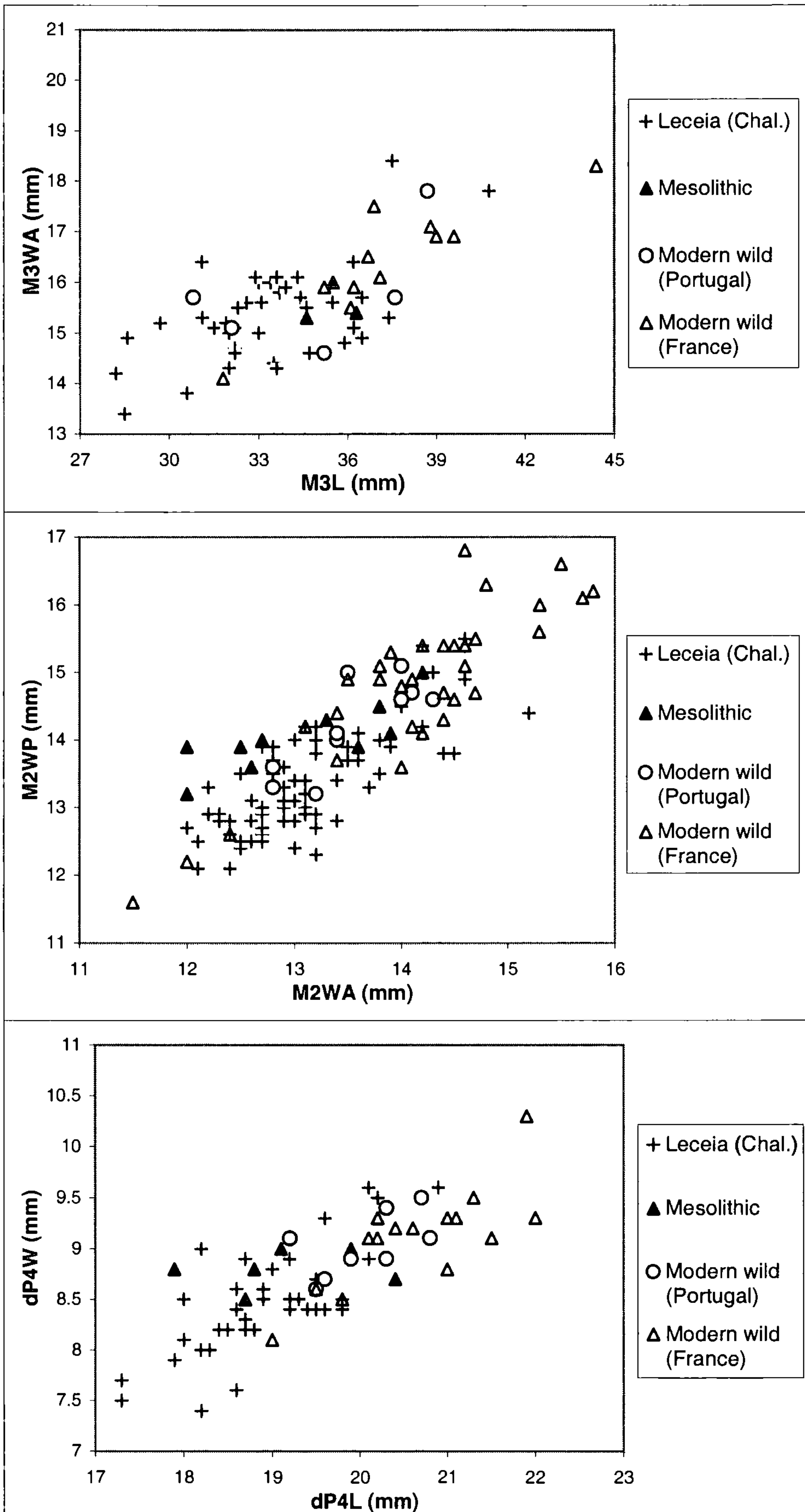
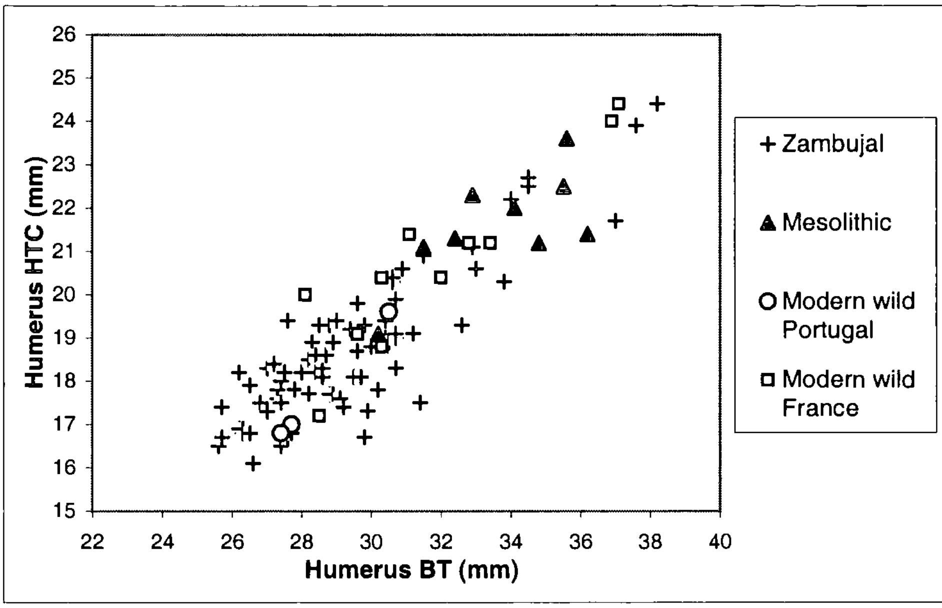
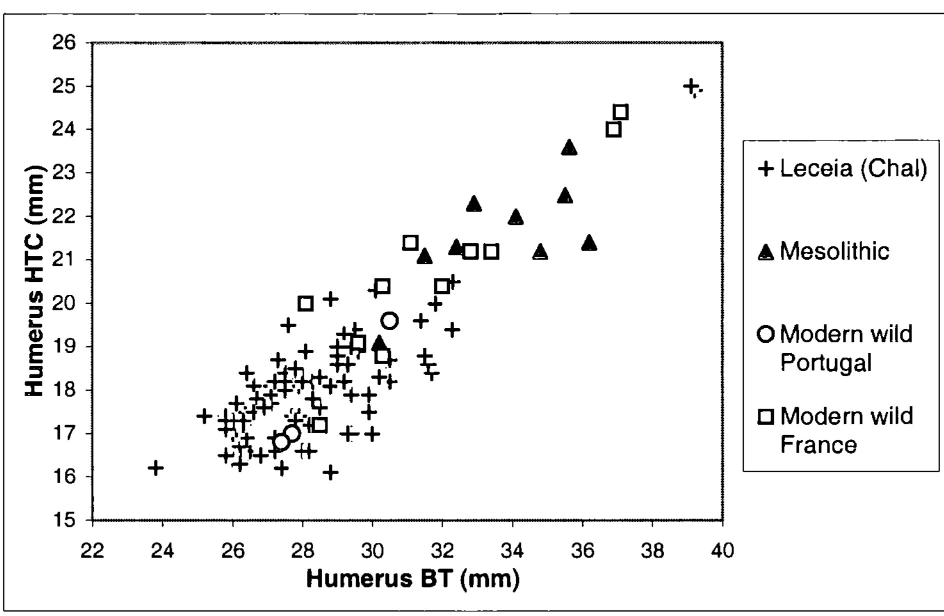

M3WA (mm)
M3L (mm)
+ Leceia (Chal.)
▲ Mesolithic
O Modern wild (Portugal)
Δ Modern wild (France)
M2WP (mm)
M2WA (mm)
+ Leceia (Chal.)
▲ Mesolithic
O Modern wild (Portugal)
Δ Modern wild (France)
dP4W (mm)
dP4L (mm)
+ Leceia (Chal.)
▲ Mesolithic
O Modern wild (Portugal)
Δ Modern wild (France)

Figure 6.17

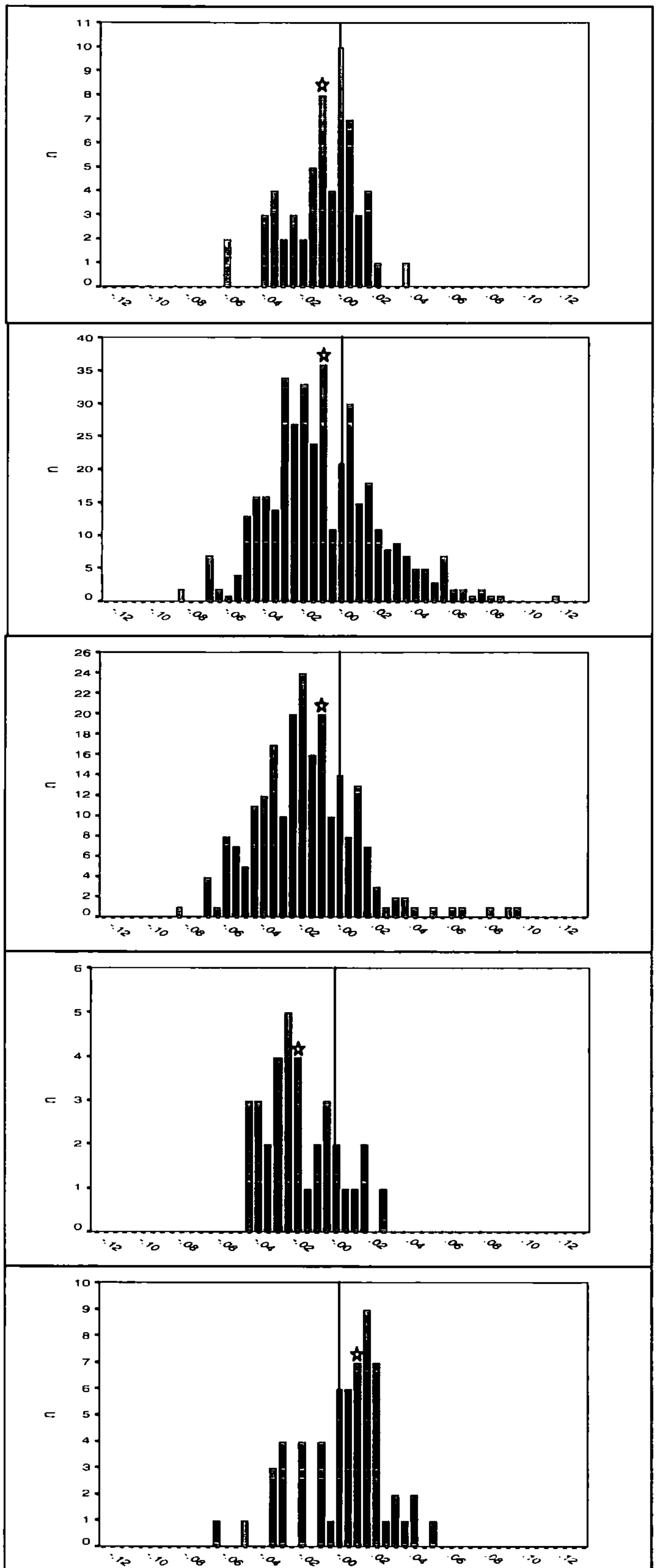


Humerus HTC (mm)
Humerus BT (mm)
+ Zambujal
Mesolithic
Modern wild Portugal
Modern wild France



Humerus HTC (mm)
Humerus BT (mm)
+ Leceia (Chal)
Mesolithic
Modern wild Portugal
Modern wild France

Figure 6.18



Mesolithic

Zambujal
(Chalcolithic)

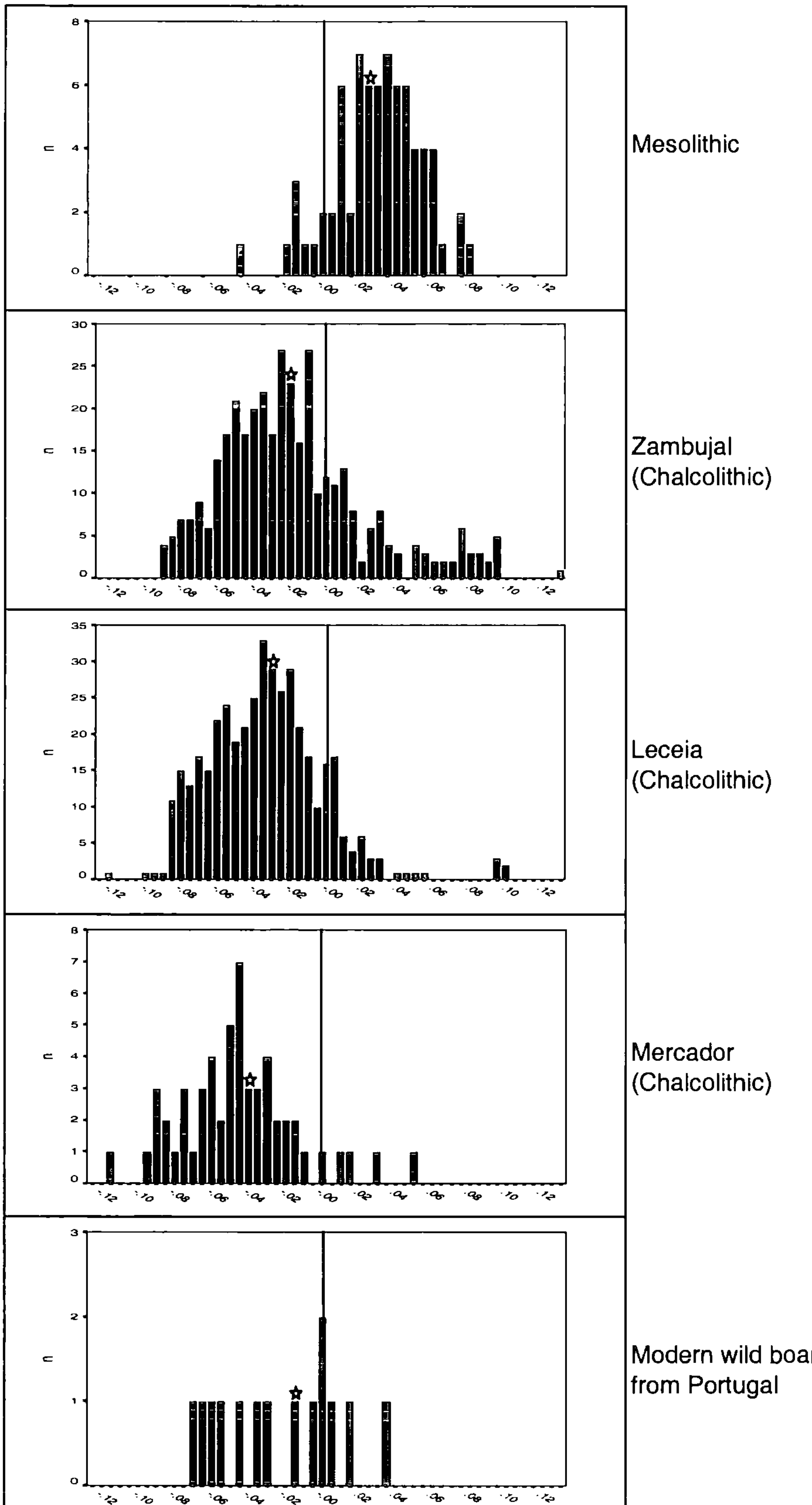
Leceia
(Chalcolithic)

Mercador
(Chalcolithic)

Modern wild boar
from Portugal

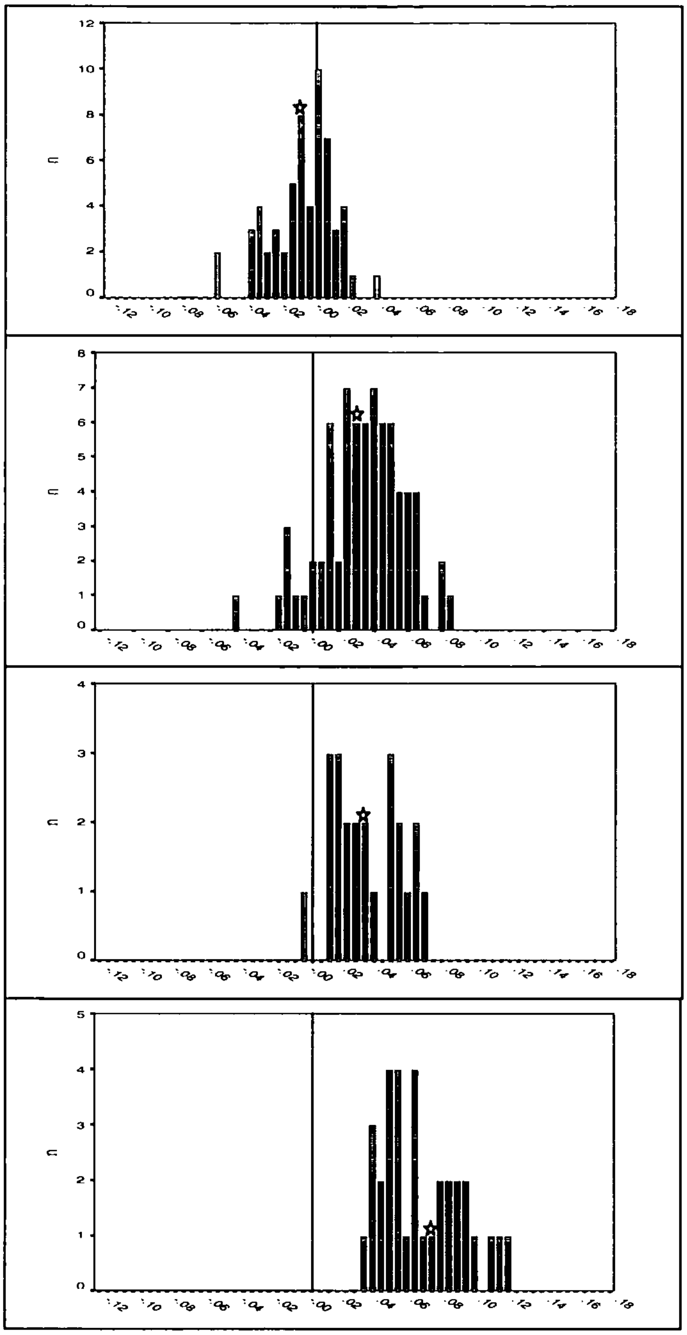
TOOTH WIDTHS

Figure 6.19



POSTCRANIAL BONES

Figure 6.20



Mesolithic Portugal Tooth widths

Mesolithic Portugal Bones

Mesolithic Switzerland Tooth widths

Mesolithic Switzerland Bones

Figure 6.21

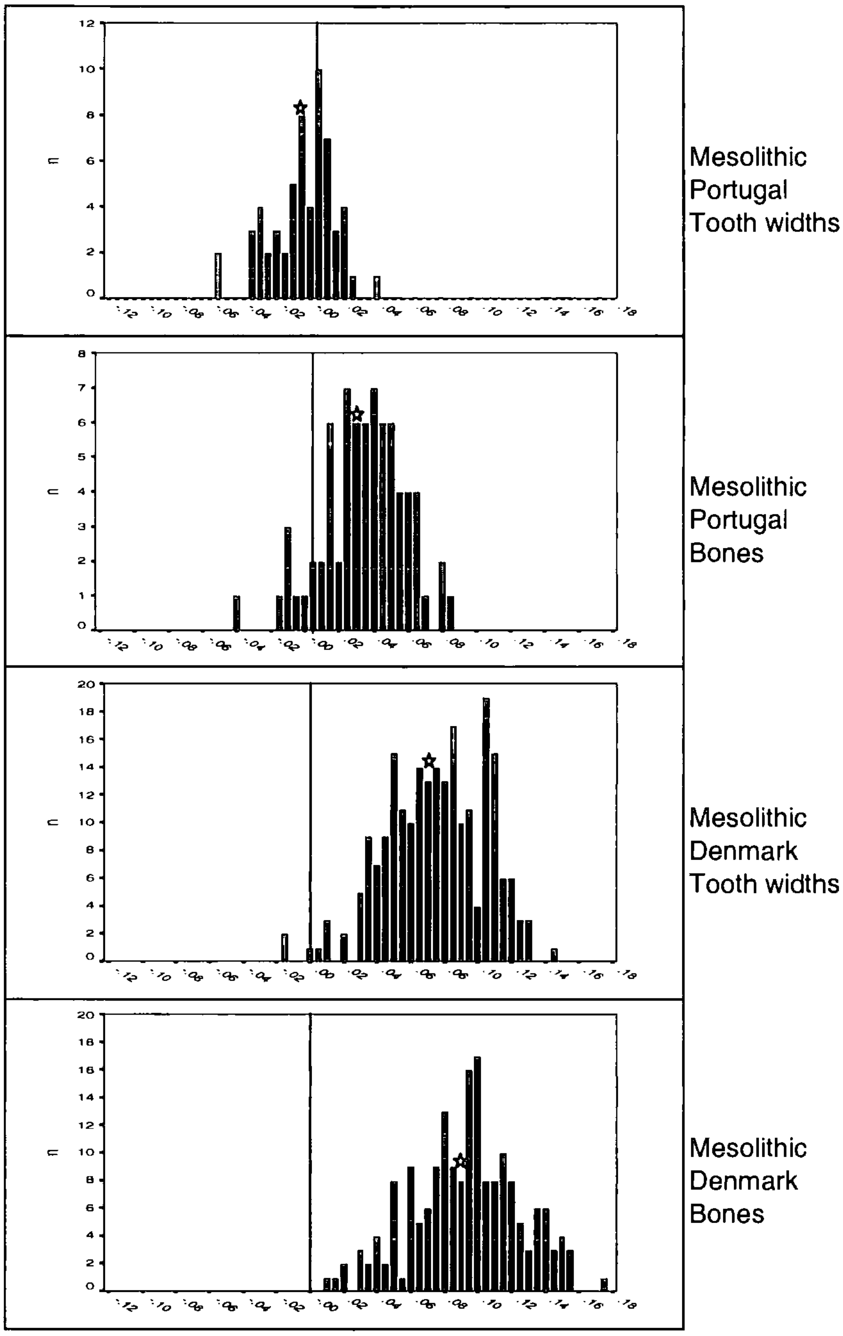
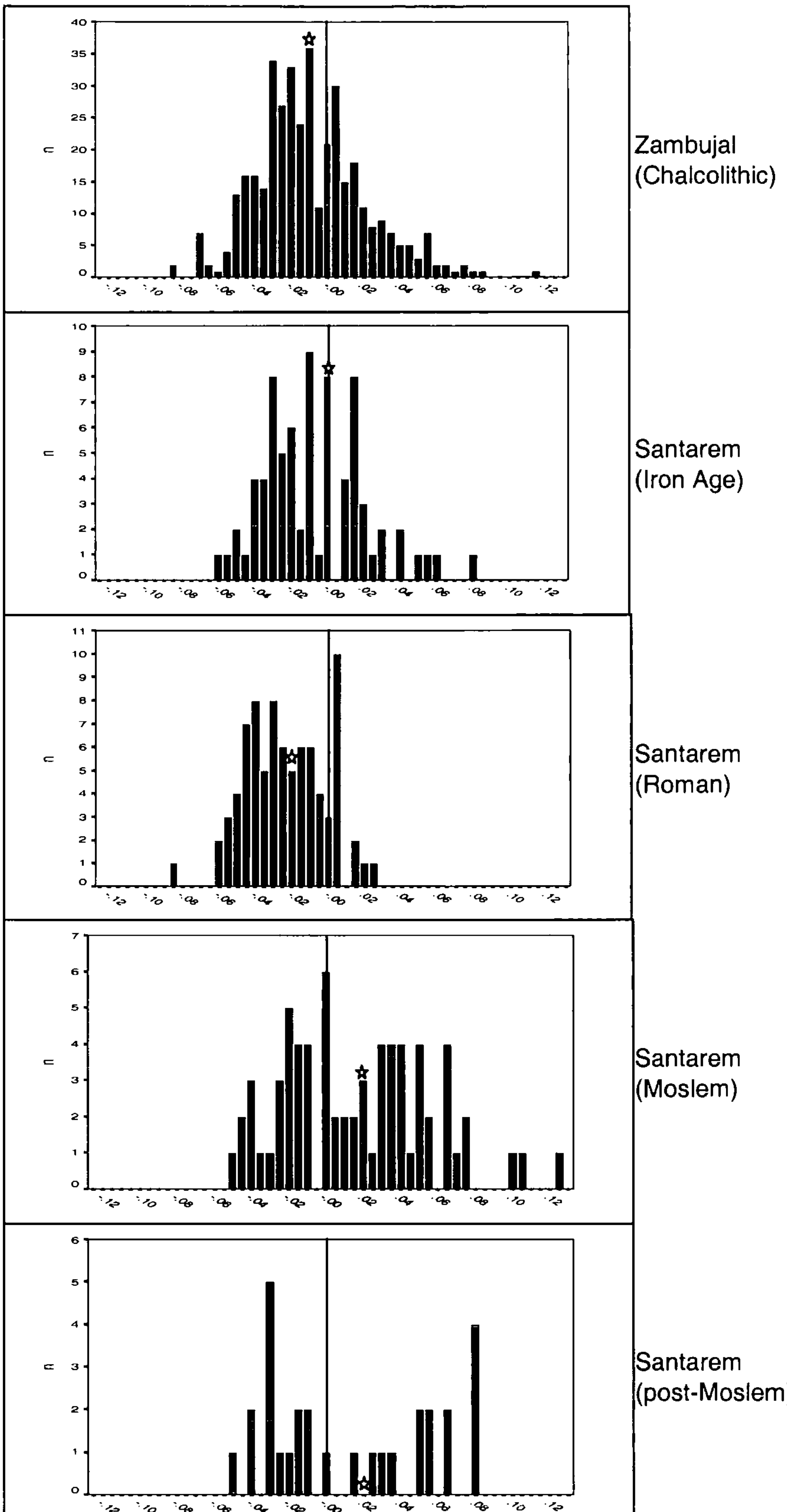
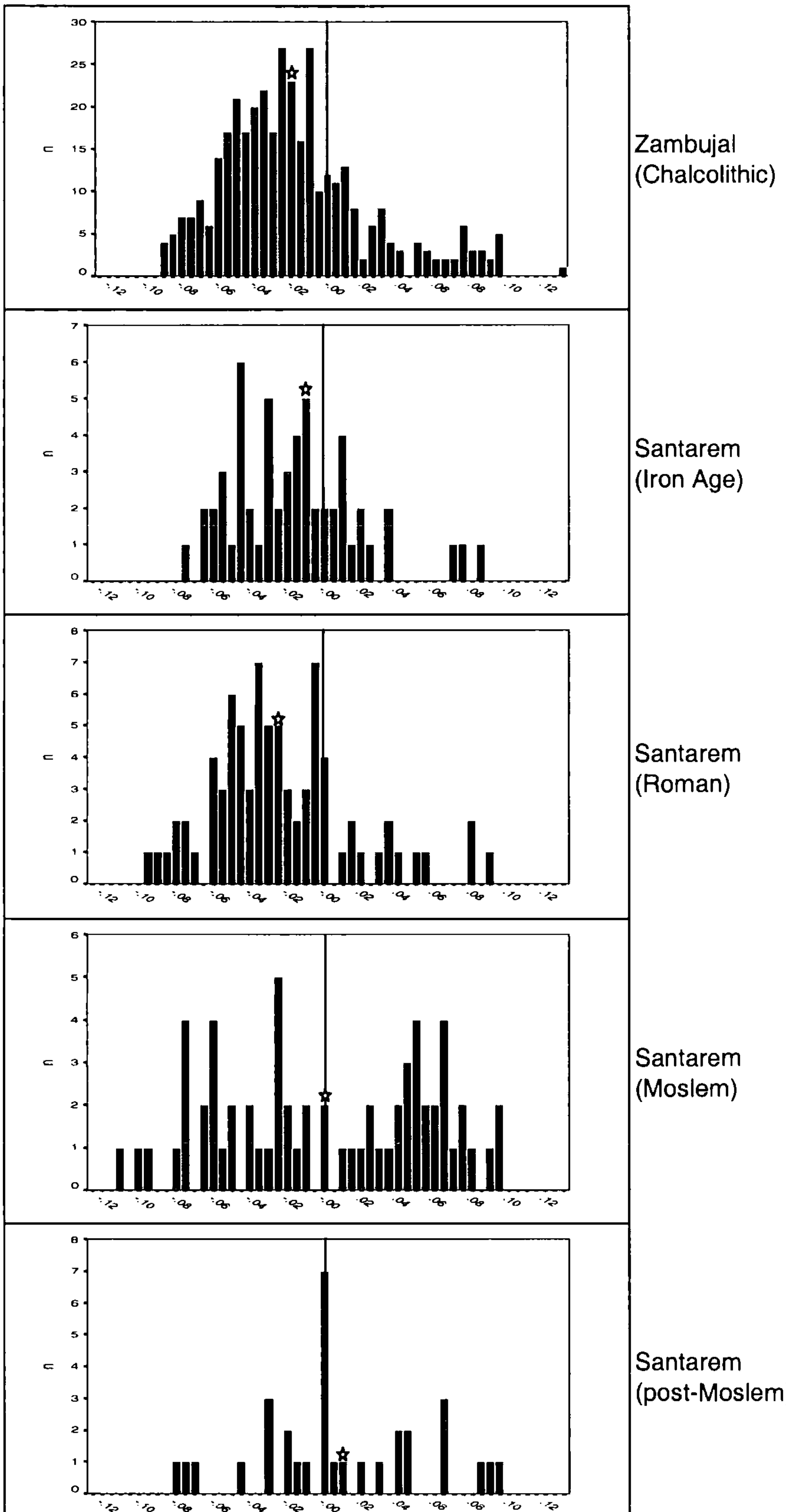

Mesolithic
Portugal
Tooth widths
Mesolithic
Portugal
Bones
Mesolithic
Denmark
Tooth widths
Mesolithic
Denmark
Bones

Figure 6.22



TOOTH WIDTHS

Figure 6.23



POSTCRANIAL BONES

Figure 6.24

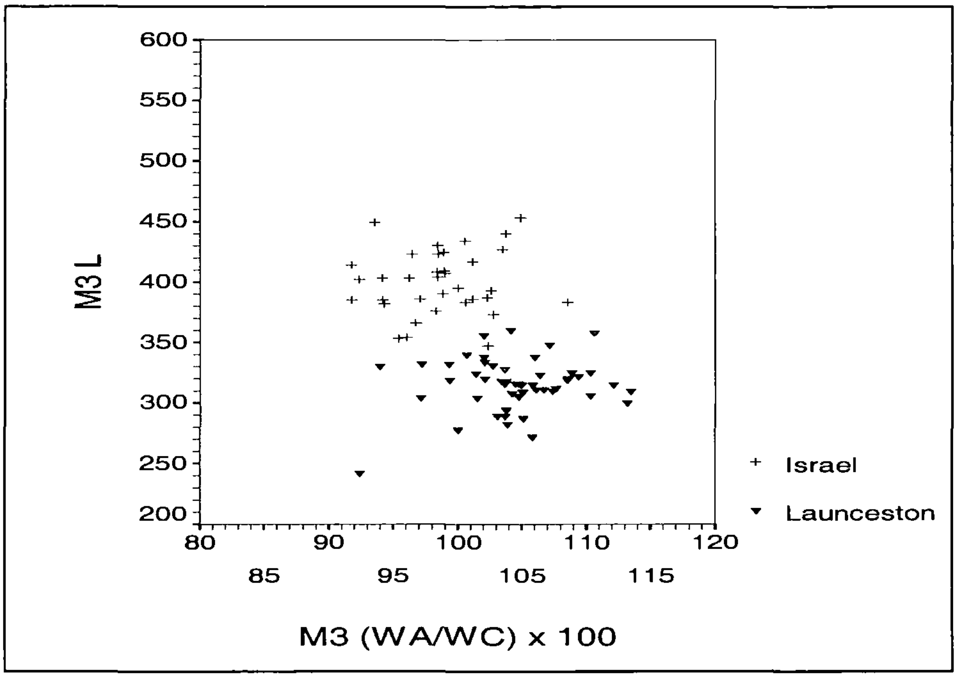


Figure 6.25

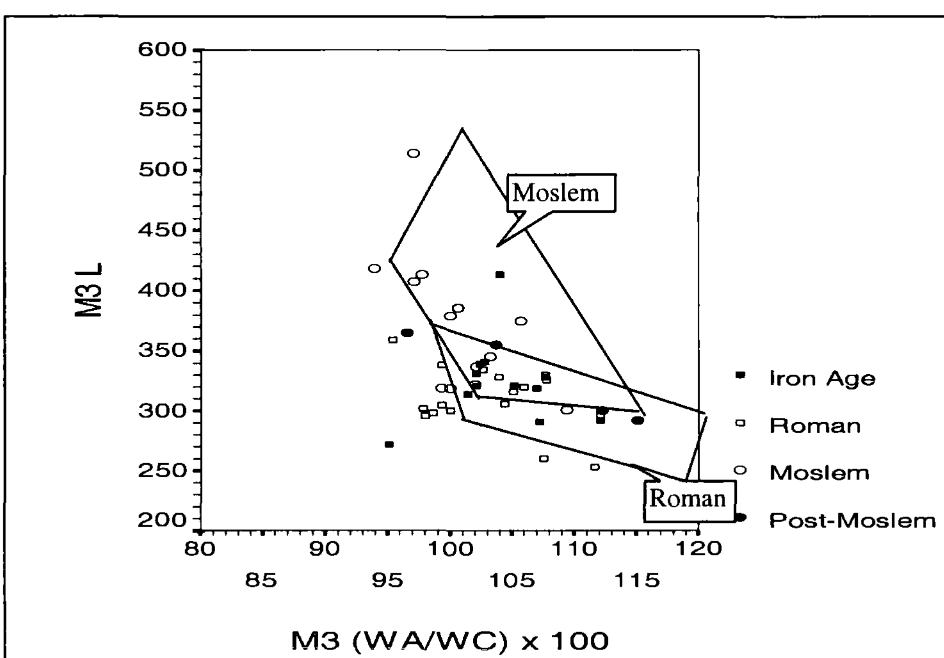


Figure 6.26

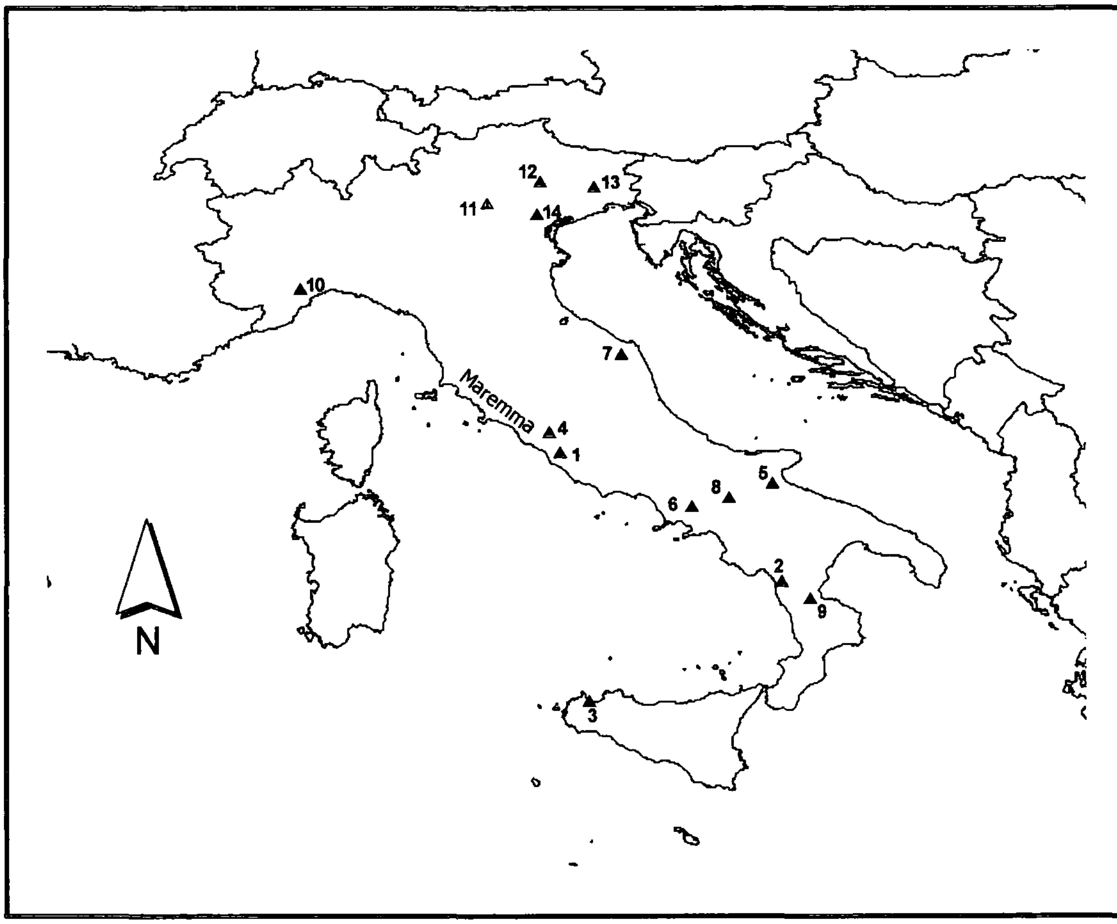
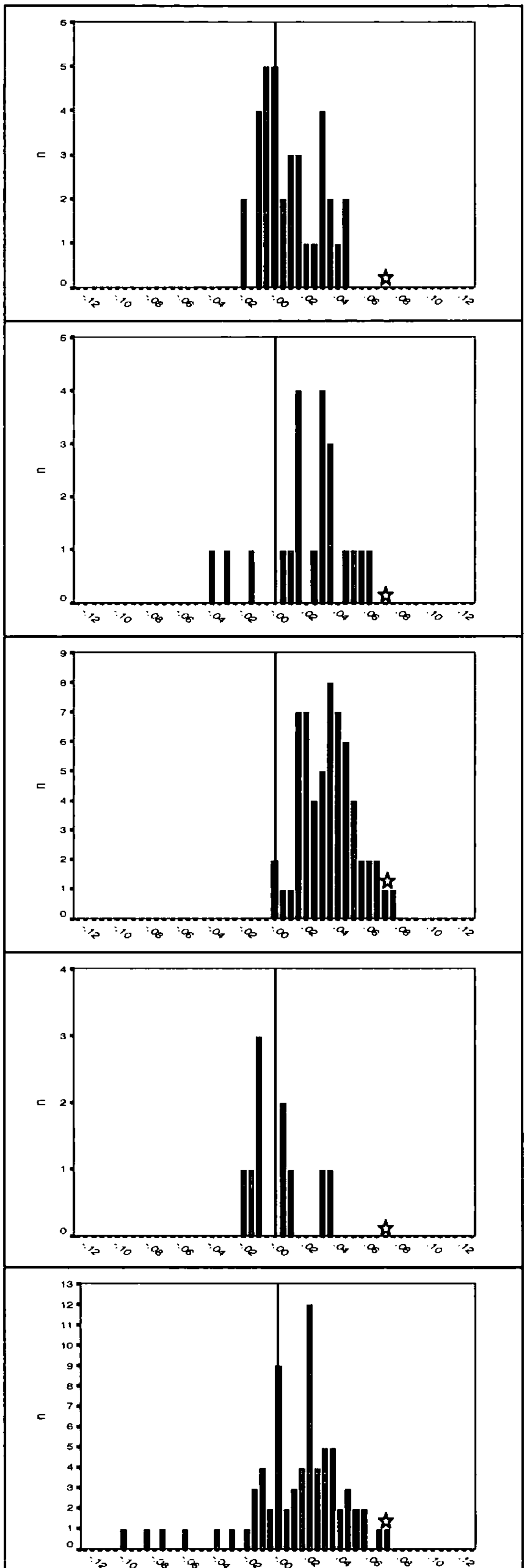


Figure 7.1
1: Palidoro; 2: Grotta della Madonna; 3: Grotta dell'Uzzo; 4: La Marmotta; 5: Masseria Candelaro; 6: Mulino S. Antonio; 7: Conelle di Arcevia; 8: La Starza; 9: Torre Mordillo; 10: Arene Candide; 11: Rocca di Rivoli; 12: Cornuda; 13: Concordia Sagittaria; 14: Molino Casarotto



Palidoro (Latium)
(upper Palaeolithic)
n=35
mean=0.013

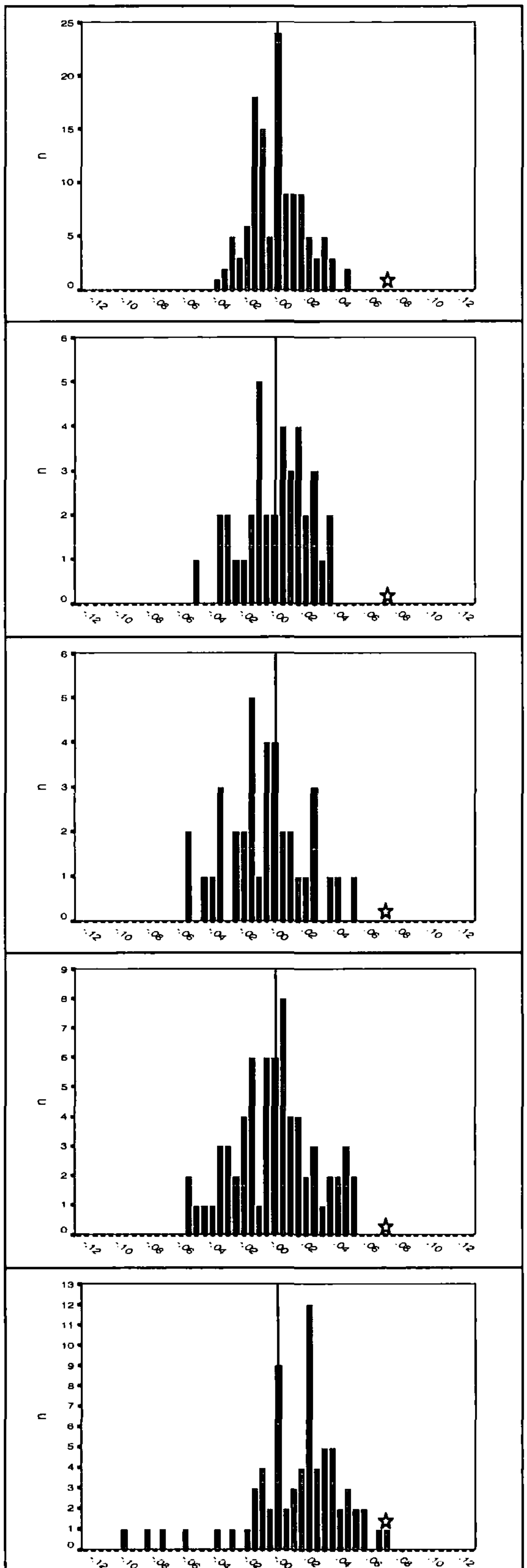
Grotta della Madonna (Calabria)
(upper Palaeolithic)
n=21
mean=0.024

Grotta della Madonna
(Mesolithic)
n=60
mean=0.037

Grotta della Madonna
(Mid Bronze)
n=10
mean=0.006

Italian wild boar
(modern)
n=71
mean=0.014

Figure 7.2



Grotta dell'Uzzo (Sicily)
(Mesolithic)
n=124
mean=0.001

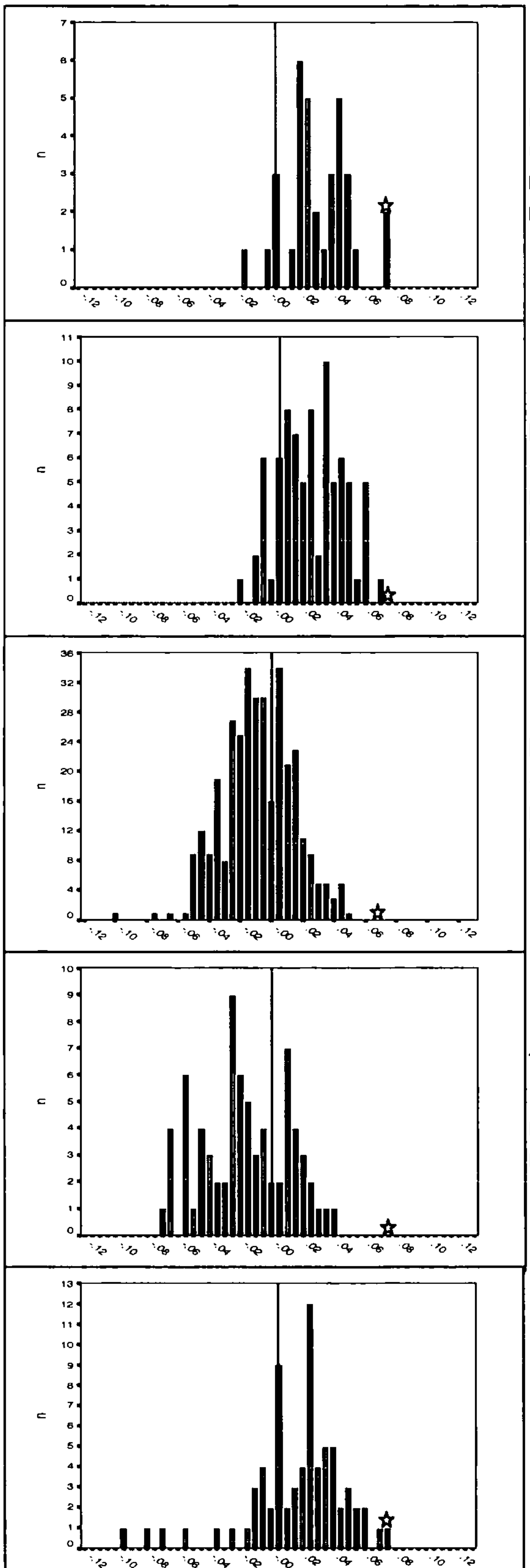
Grotta dell'Uzzo
(Meso/Neo transition)
n=37
mean=0.003

Grotta dell'Uzzo
(early Neolithic)
n=37
mean=-0.004

Grotta dell'Uzzo
(all Neolithic)
n=67
mean=0.002

Italian wild boar
(modern)
n=71
mean=0.014

Figure 7.3



La Marmotta (Latium)
(early Neolithic)
n=34
mean=0.029

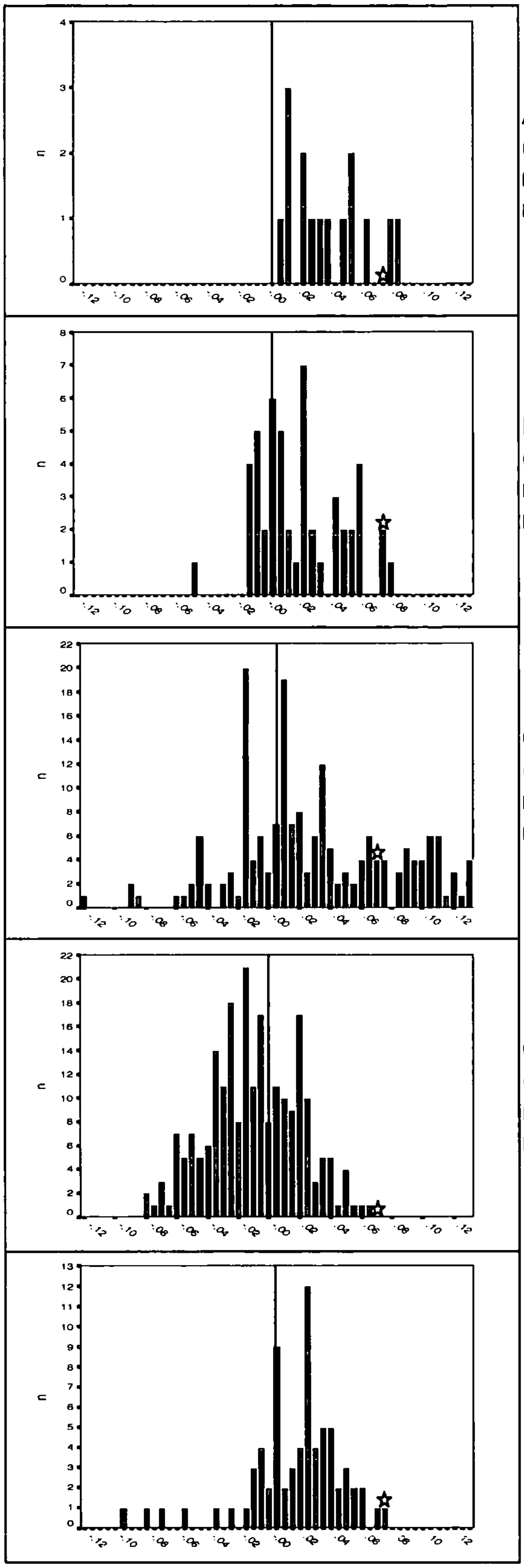
Masseria Candelaro (Apulia)
(mid Neolithic)
n=79
mean=0.023

La Starza (Campania)
(mid Bronze)
n=340
mean=-0.011

Torre Mordillo (Calabria)
(late Bronze)
n=73
mean=-0.020

Italian wild boar
(modern)
n=71
mean=0.014

Figure 7.4



Arene Candide (Liguria)
(mid Neolithic)
n=15
mean=0.038

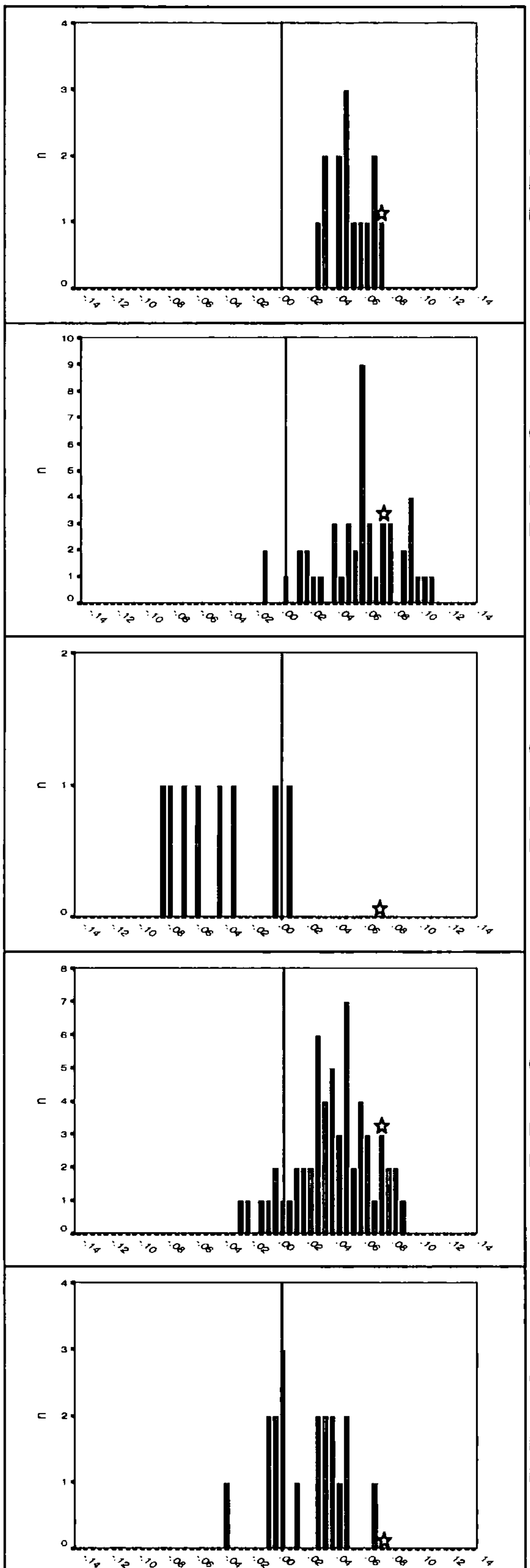
Rivoli (Veneto)
(mid Neolithic)
n=50
mean=0.020

Conelle (Marche)
(Eneolithic)
n=187
mean=0.028

Concordia Sagittaria (Veneto)
(late Bronze)
n=223
mean=-0.012

Italian wild boar
(modern)
n=71
mean=0.014

Figure 7.5



Palidoro (Latium)
(upper Palaeolithic)
n=14
mean=0.055

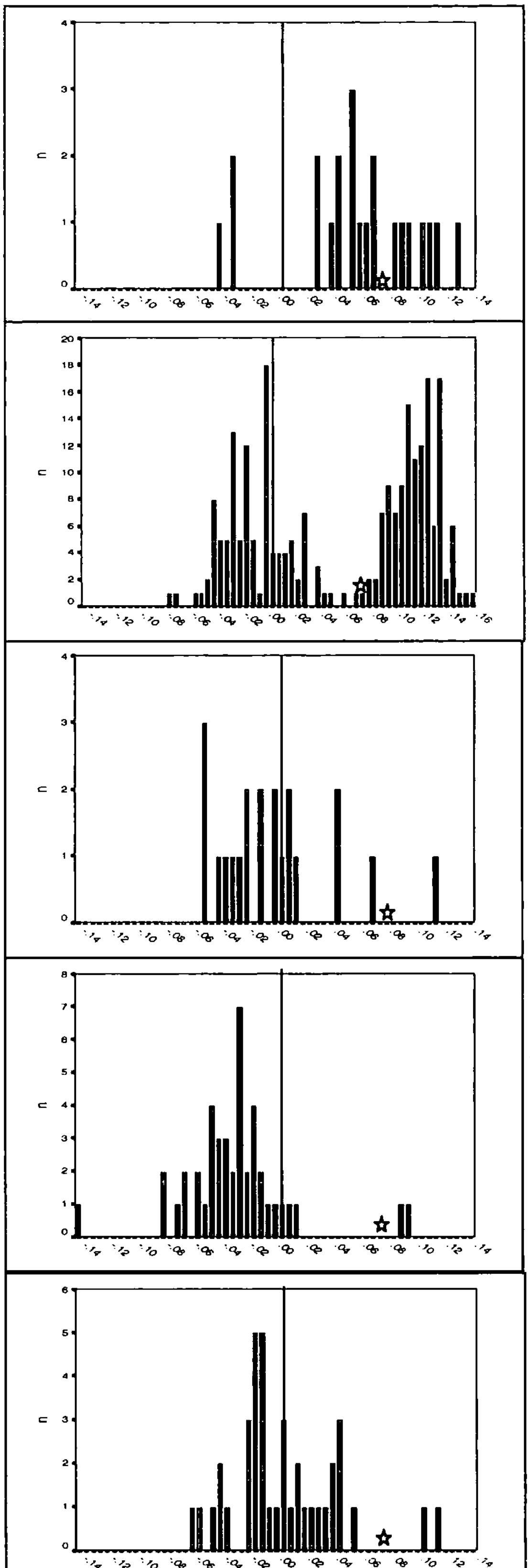
Grotta della Madonna (Calabria)
(upper Palaeolithic+Mesolithic)
n=46
mean=0.061

Grotta della Madonna
(Mid Bronze)
n=8
mean=-0.040

Grotta dell'Uzzo (Sicily)
(Mesolithic + transition)
n=57
mean=0.044

Grotta dell'Uzzo
(Neolithic)
n=19
mean=0.024

Figure 7.6



La Marmotta (Latium)
(early Neolithic)
n=22
mean=0.060

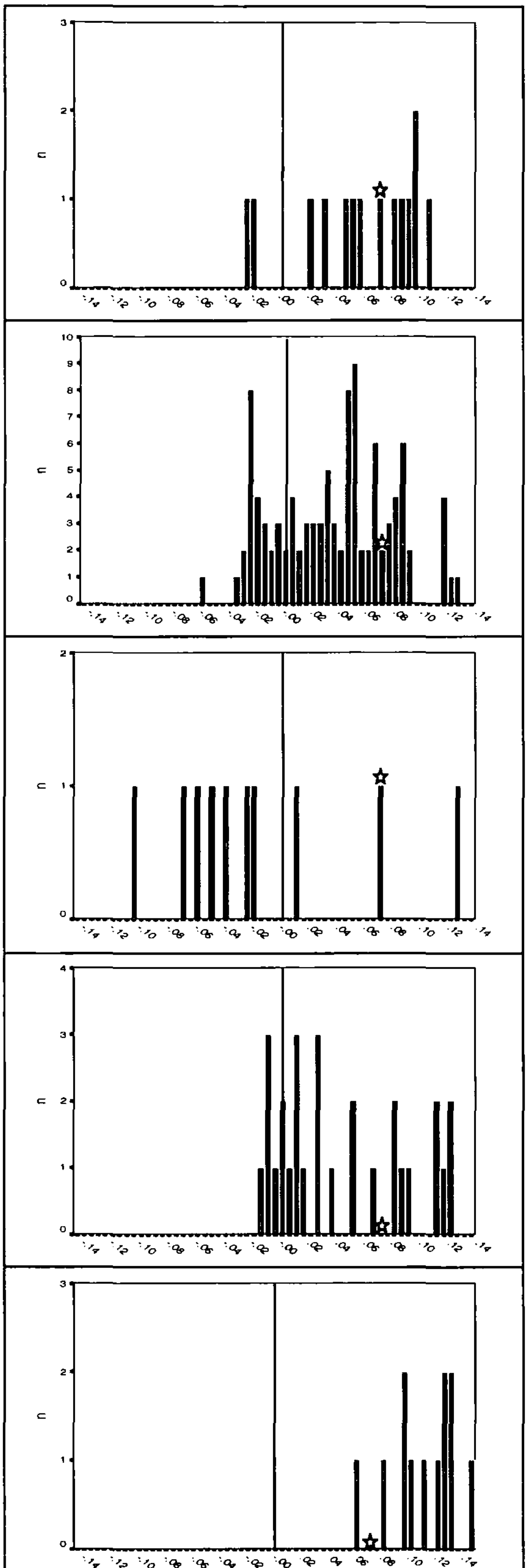
Conelle (Marche)
(Eneolithic)
n=237
mean=0.061

La Starza (Campania)
(mid Bronze)
n=21
mean=-0.001

Torre Mordillo (Calabria)
(late Bronze)
n=43
mean=-0.026

Concordia Sagittaria (Veneto)
(late Bronze)
n=39
mean=0.008

Figure 7.7



Arene Candide (Liguria)
(early Neolithic)
n=14
mean=0.063

Arene Candide
(mid Neolithic)
n=101
mean=0.038

Arene Candide
(late Neolithic)
n=10
mean=-0.014

Rivoli (Veneto)
(mid Neolithic)
n=28
mean=0.045

Cornuda (Veneto)
(mid Neolithic)
n=12
mean=0.112

Figure 7.8

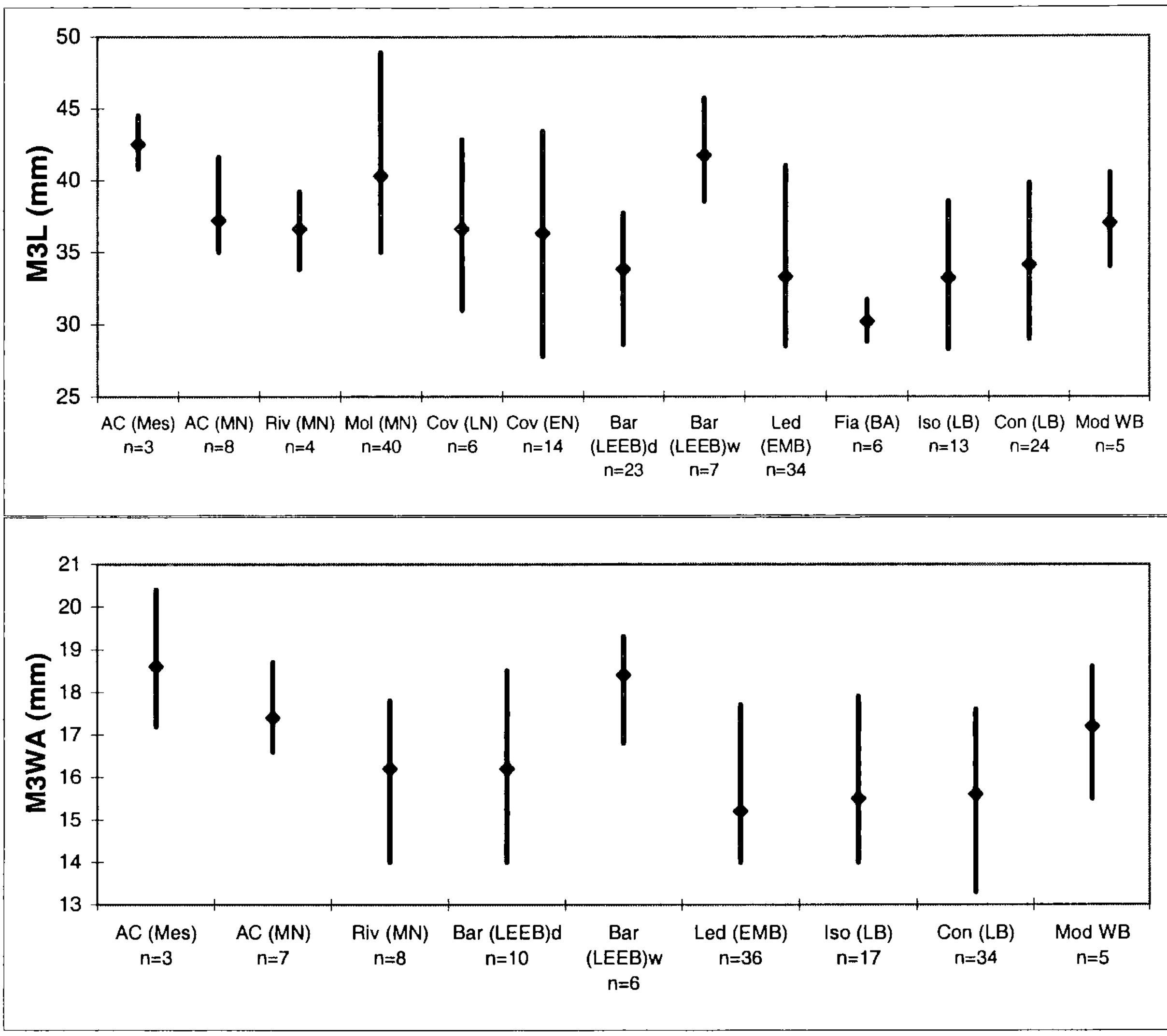

M3L (mm)
50
45
40
35
30
25
AC (Mes) n=3
AC (MN) n=8
Riv (MN) n=4
Mol (MN) n=40
Cov (LN) n=6
Cov (EN) n=14
Bar (LEEB)d n=23
Bar (LEEB)w n=7
Led (EMB) n=34
Fia (BA) n=6
Iso (LB) n=13
Con (LB) n=24
Mod WB n=5
M3WA (mm)
21
20
19
18
17
16
15
14
13
AC (Mes) n=3
AC (MN) n=7
Riv (MN) n=8
Bar (LEEB)d n=10
Bar (LEEB)w n=6
Led (EMB) n=36
Iso (LB) n=17
Con (LB) n=34
Mod WB n=5

Figure 7.9

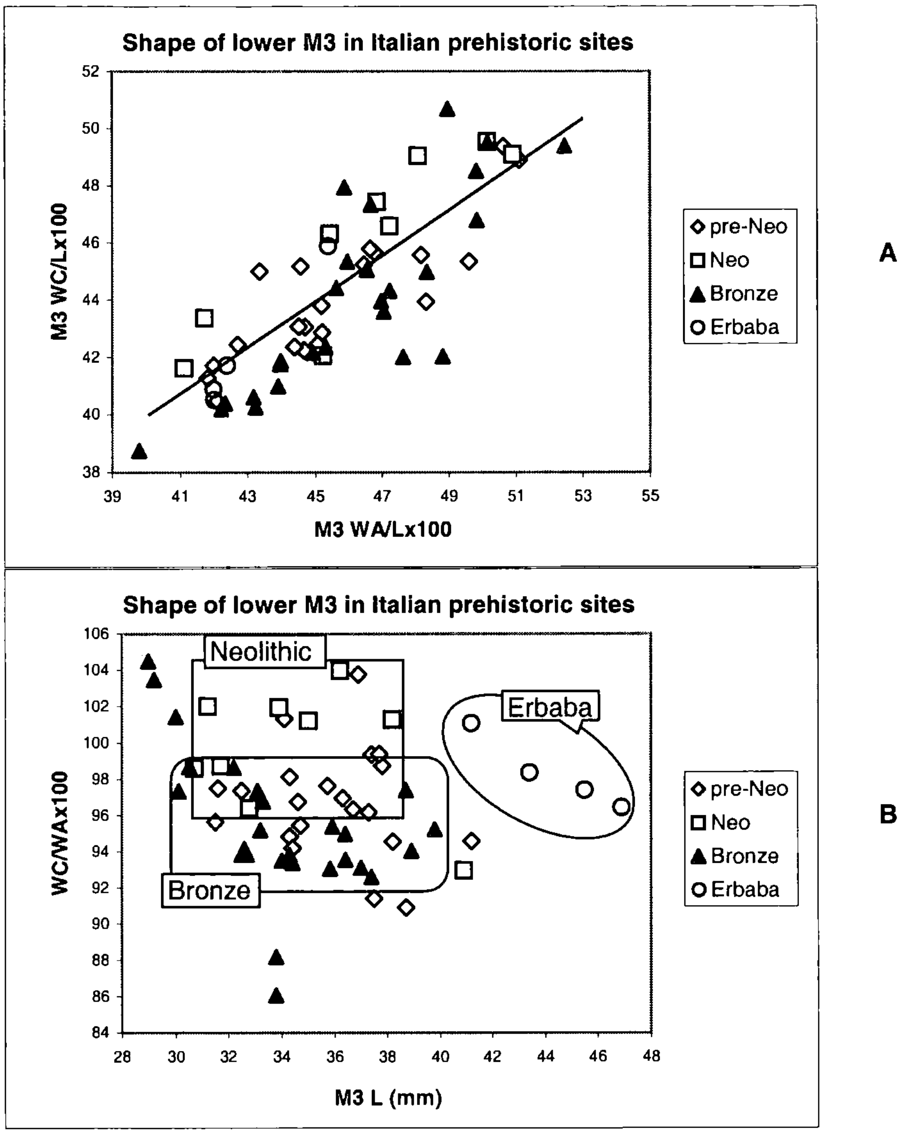

Shape of lower M3 in Italian prehistoric sites
M3 WC/Lx100
M3 WA/Lx100
pre-Neo
Neo
Bronze
Erbaba
A
Shape of lower M3 in Italian prehistoric sites
WC/WAx100
M3 L (mm)
Neolithic
Erbaba
Bronze
pre-Neo
Neo
Bronze
Erbaba
B

Figure 7.10

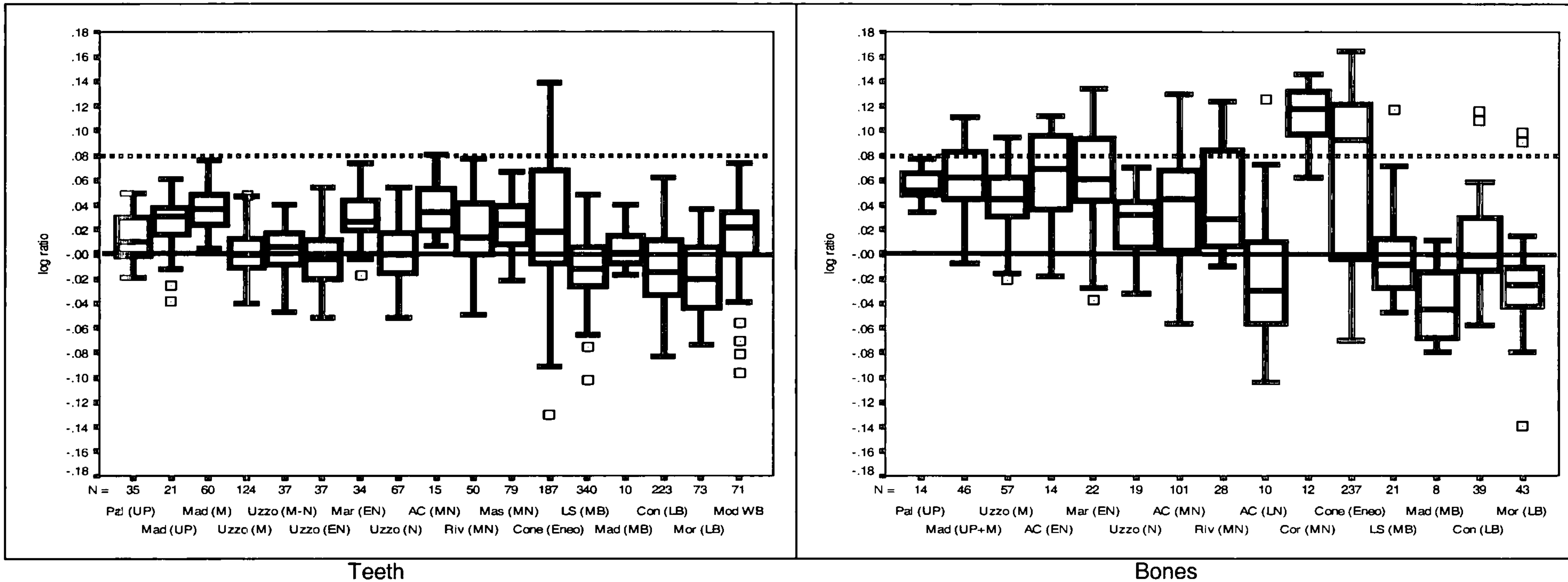

log ratio
.18
.16
.14
.12
.10
.08
.06
.04
.02
-.00
-.02
-.04
-.06
-.08
-.10
-.12
-.14
-.16
-.18
N = 35 21 60 124 37 37 34 67 15 50 79 187 340 10 223 73 71
Pal (UP) Mad (M) Uzzo (M-N) Mar (EN) AC (MN) Mas (MN) LS (MB) Con (LB) Mod WB
Mad (UP) Uzzo (M) Uzzo (EN) Uzzo (N) Riv (MN) Cone (Eneo) Mad (MB) Mor (LB)
Teeth
log ratio
N = 14 46 57 14 22 19 101 28 10 12 237 21 8 39 43
Pal (UP) Uzzo (M) Mar (EN) AC (MN) AC (LN) Cone (Eneo) Mad (MB) Mor (LB)
Mad (UP+M) AC (EN) Uzzo (N) Riv (MN) Cor (MN) LS (MB) Con (LB)
Bones

Figure 7.11

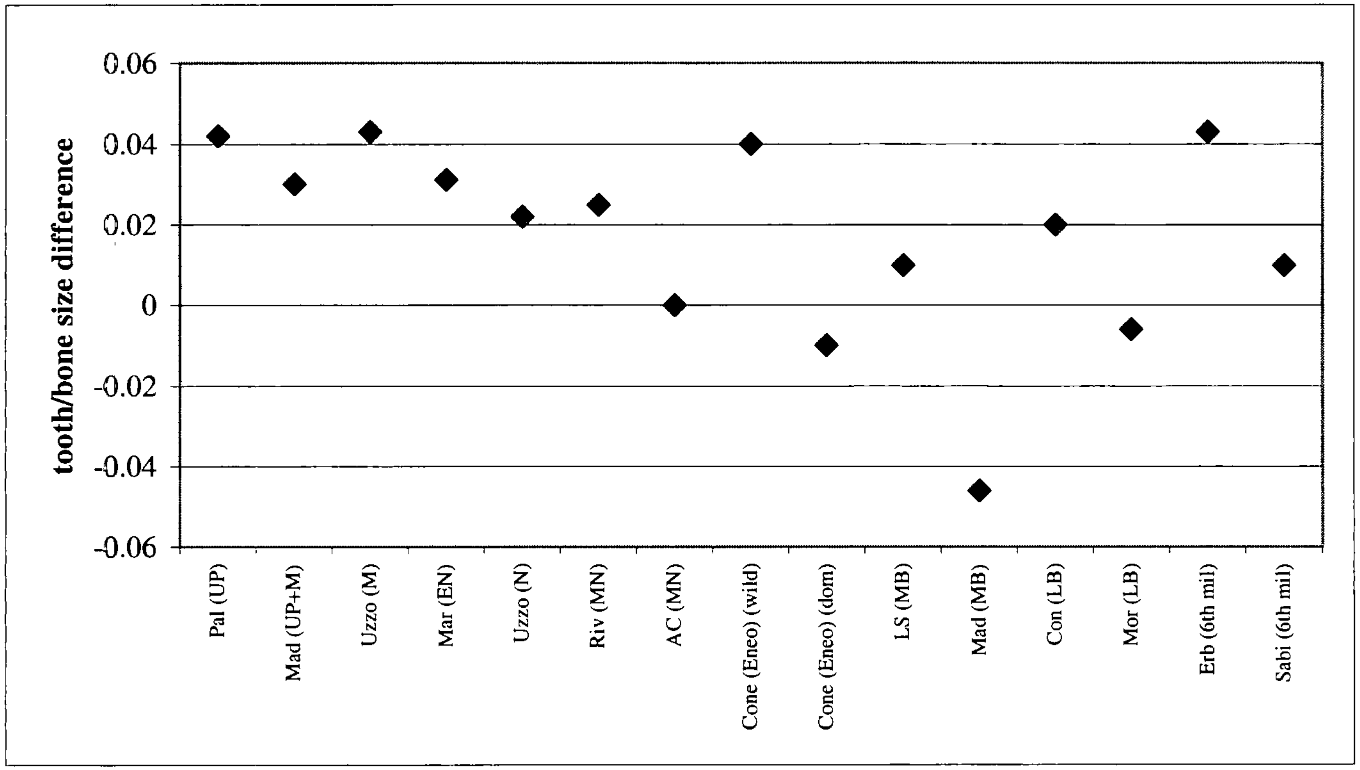

tooth/bone size difference
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
Pal (UP)
Mad (UP+M)
Uzzo (M)
Mar (EN)
Uzzo (N)
Riv (MN)
AC (MN)
Cone (Eneo) (wild)
Cone (Eneo) (dom)
LS (MB)
Mad (MB)
Con (LB)
Mor (LB)
Erb (6th mil)
Sabi (6th mil)

Figure 7.12

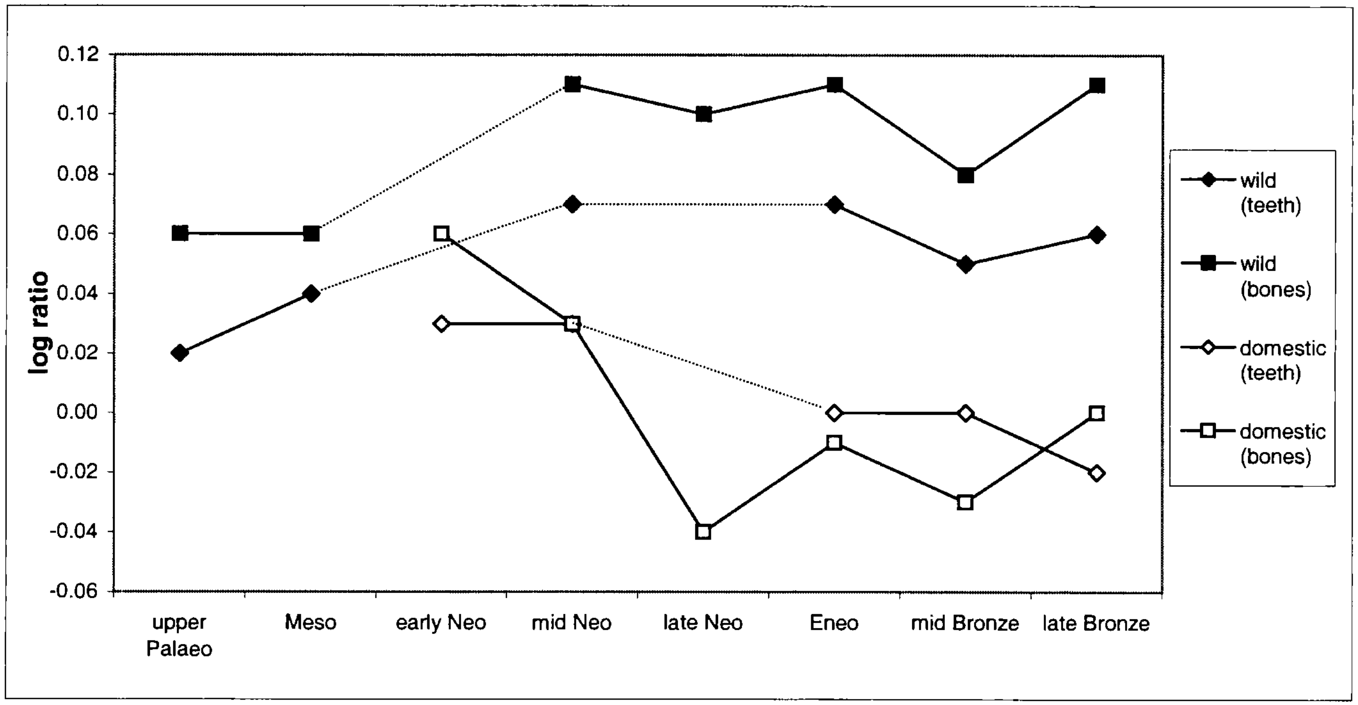
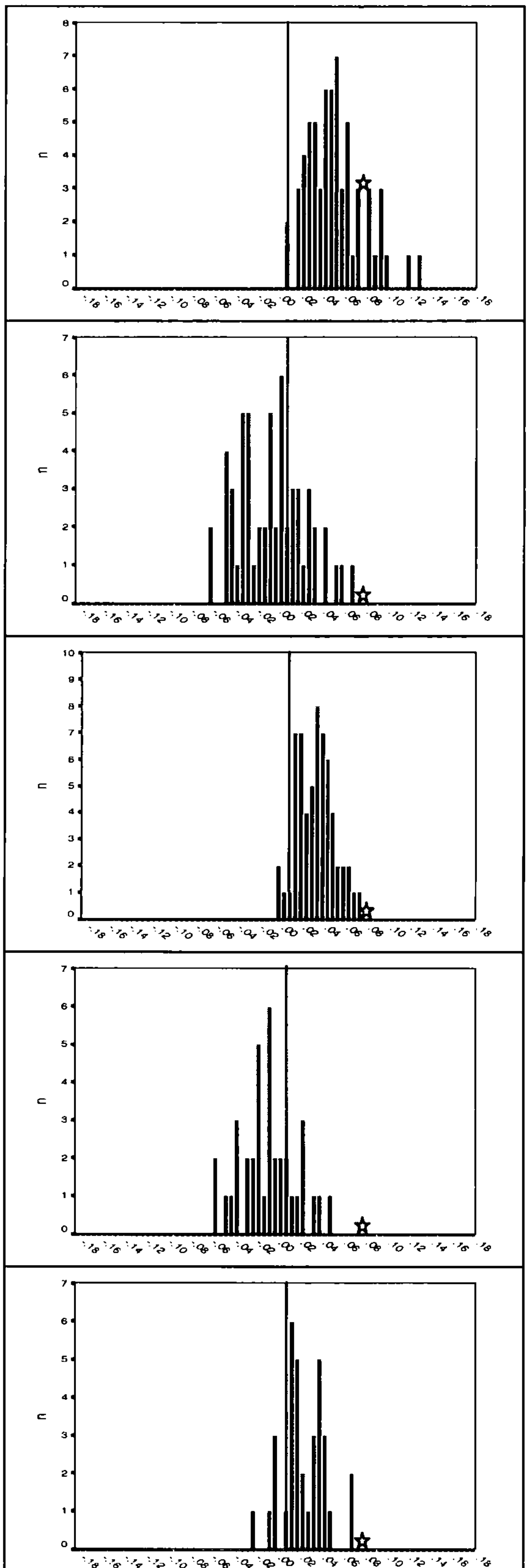

0.12
0.10
0.08
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
log ratio
upper Palaeo
Meso
early Neo
mid Neo
late Neo
Eneo
mid Bronze
late Bronze
wild (teeth)
wild (bones)
domestic (teeth)
domestic (bones)

Figure 7.13



Erbaba (Turkey)
(6th millennium BC)
n=63
mean=0.056

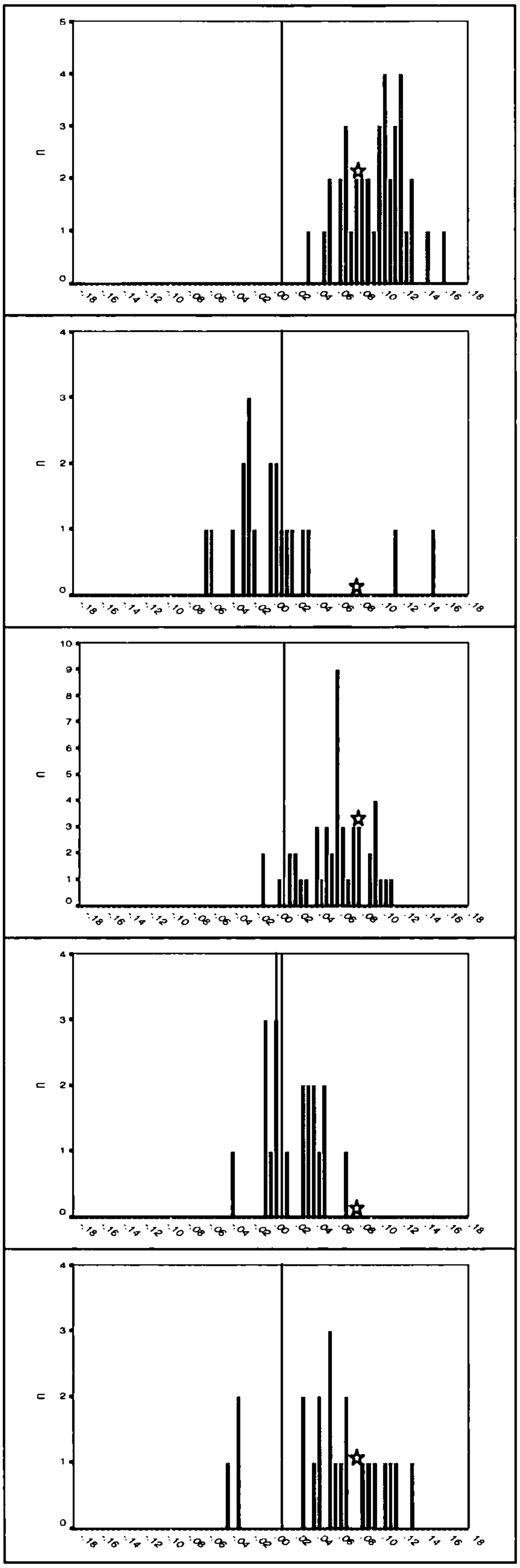
Sabi Abyad (Syria)
(6th millennium BC)
n=57
mean=-0.001

Grotta della Madonna (Calabria)
(7th millennium BC)
n=60
mean=0.037

Grotta dell'Uzzo (Sicily)
(6th millennium BC)
n=67
mean=-0.004

La Marmotta (Latium)
(6th millennium BC)
n=34
mean=0.029

Figure 7.14



Erbaba (Turkey)
(6th millennium BC)
n=38
mean=0.099

Sabi Abyad (Syria)
(6th millennium BC)
n=20
mean=0.009

Grotta della Madonna (Calabria)
(10th-7th millennium BC)
n=46
mean=0.061

Grotta dell'Uzzo (Sicily)
(6th millennium BC)
n=19
mean=0.024

La Marmotta (Latium)
(6th millennium BC)
n=22
mean=0.060

Figure 7.15

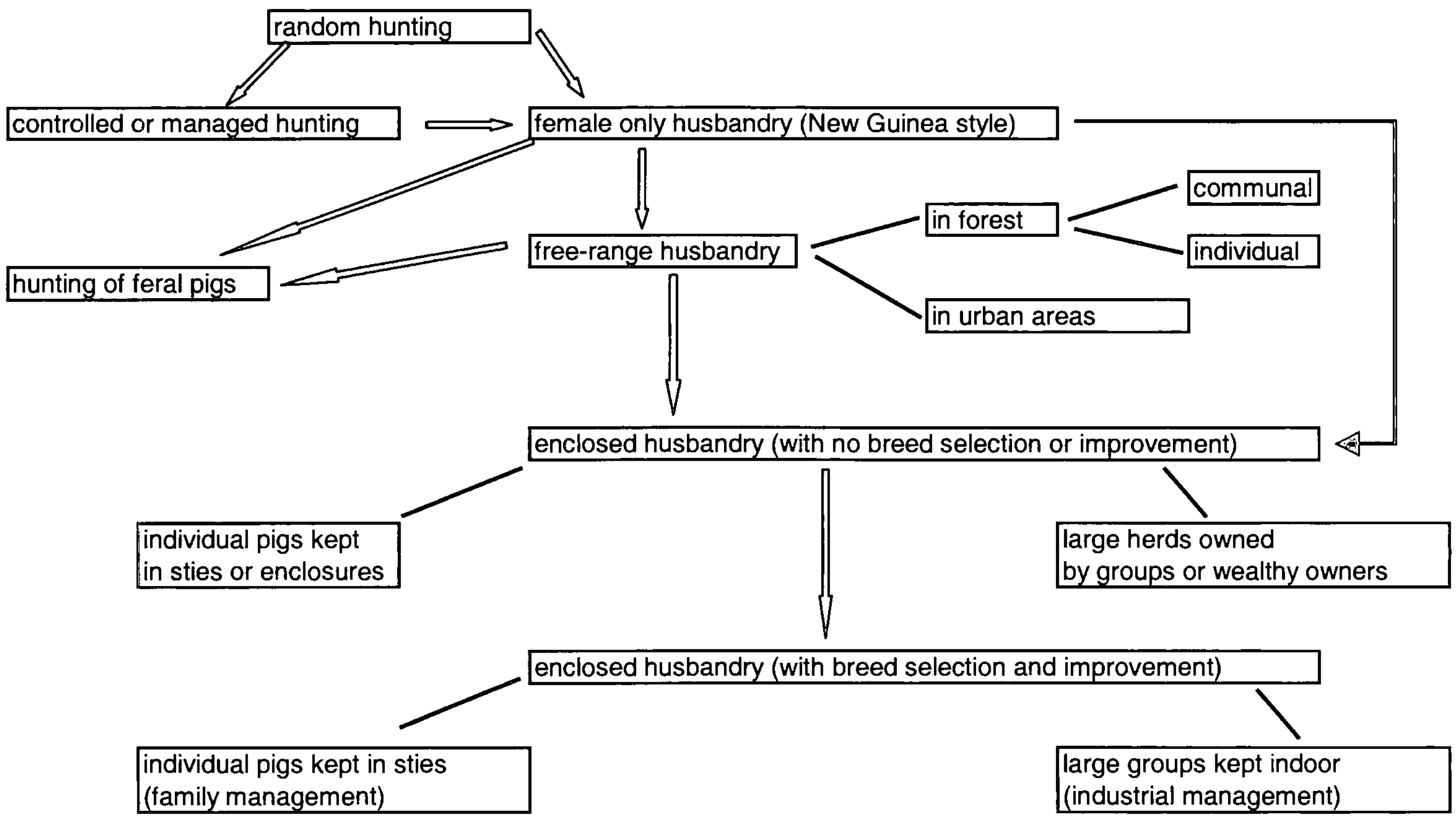

random hunting
controlled or managed hunting
female only husbandry (New Guinea style)
hunting of feral pigs
free-range husbandry
in forest
communal
individual
in urban areas
enclosed husbandry (with no breed selection or improvement)
individual pigs kept
in sties or enclosures
large herds owned
by groups or wealthy owners
enclosed husbandry (with breed selection and improvement)
individual pigs kept in sties
(family management)
large groups kept indoor
(industrial management)

Figure 8.1

Plate 3.1

Plate 3.2

Plate 4.1

Plate 4.2

Plate 4.3

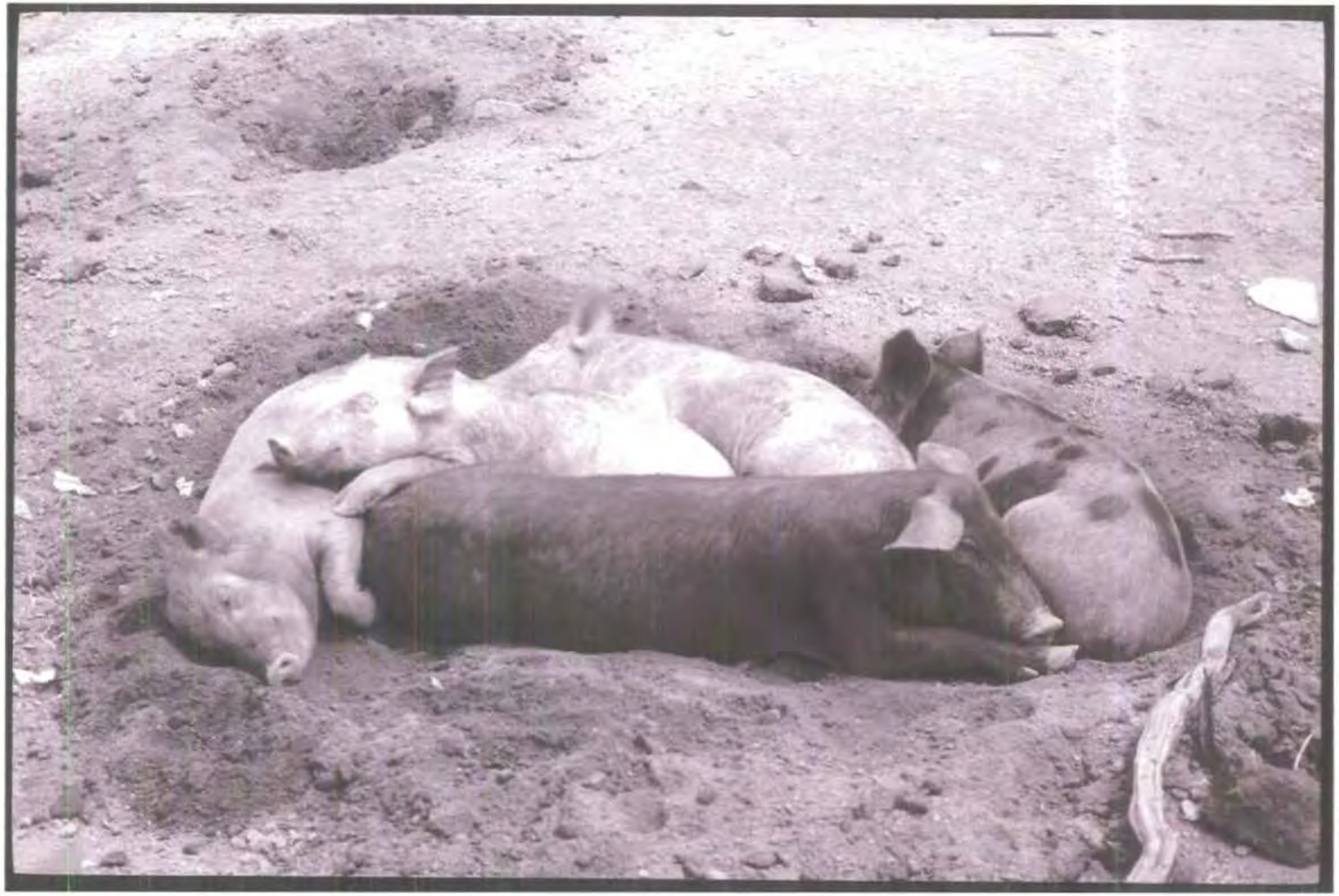


Plate 4.4

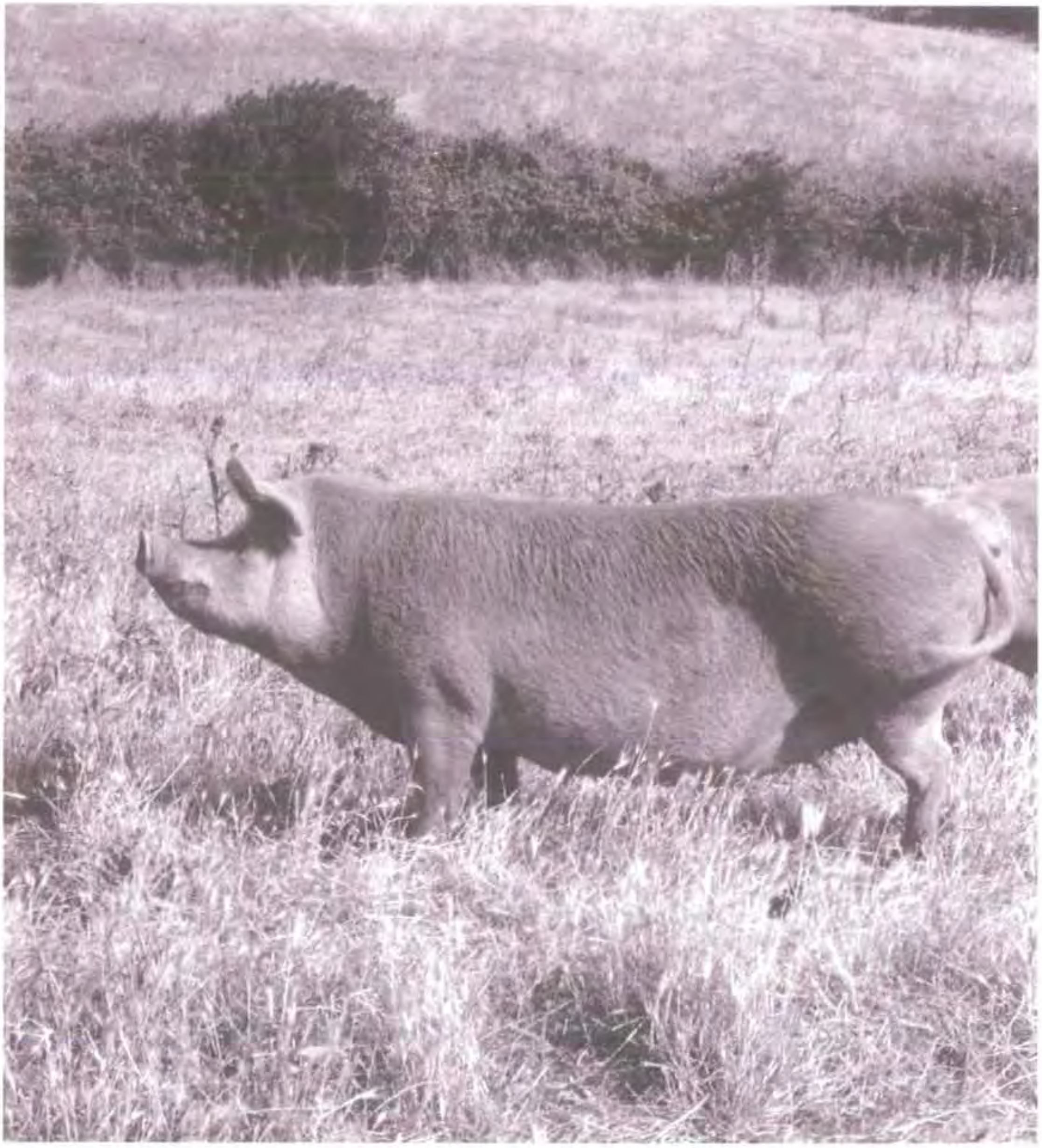


Plate 4.5

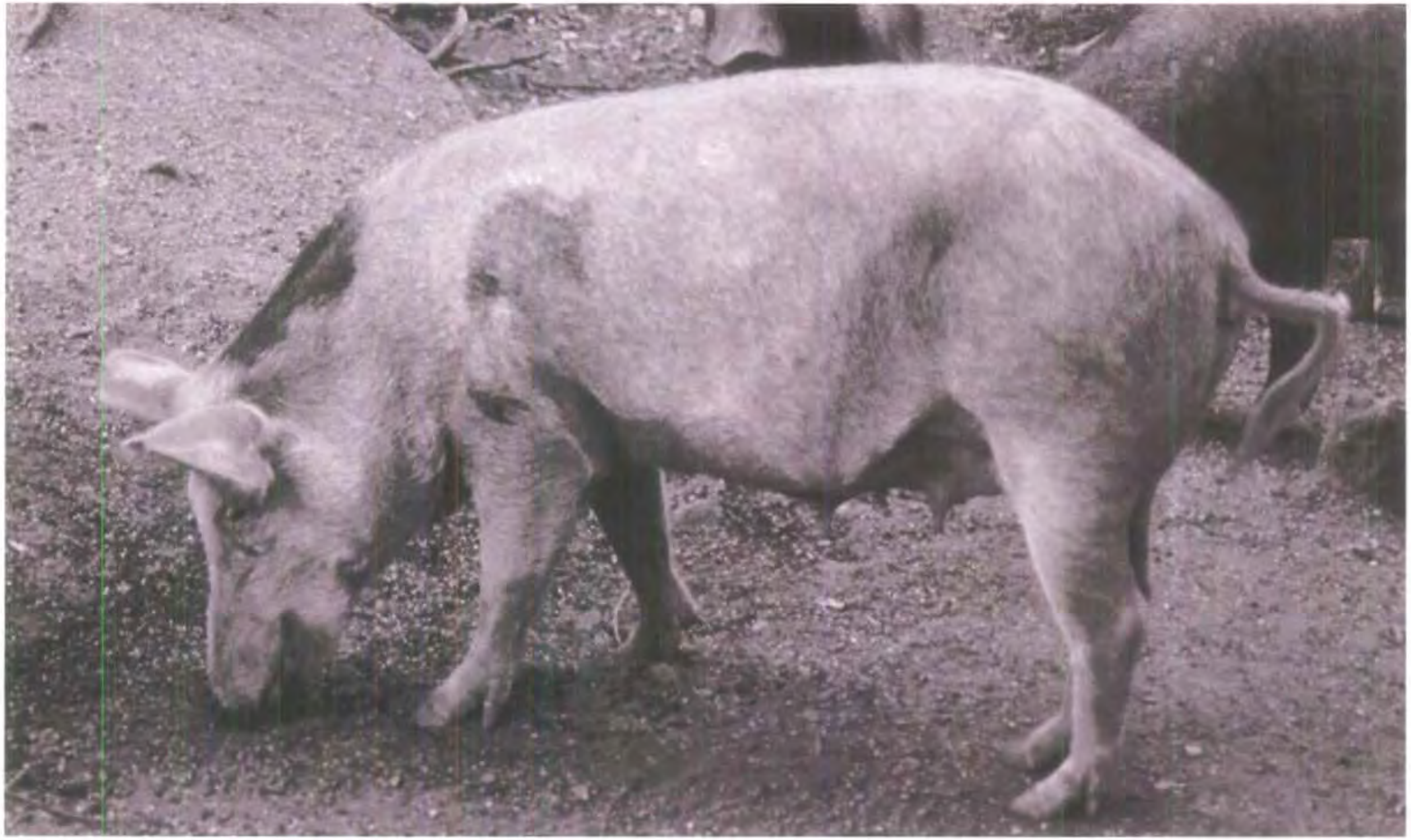


Plate 4.6

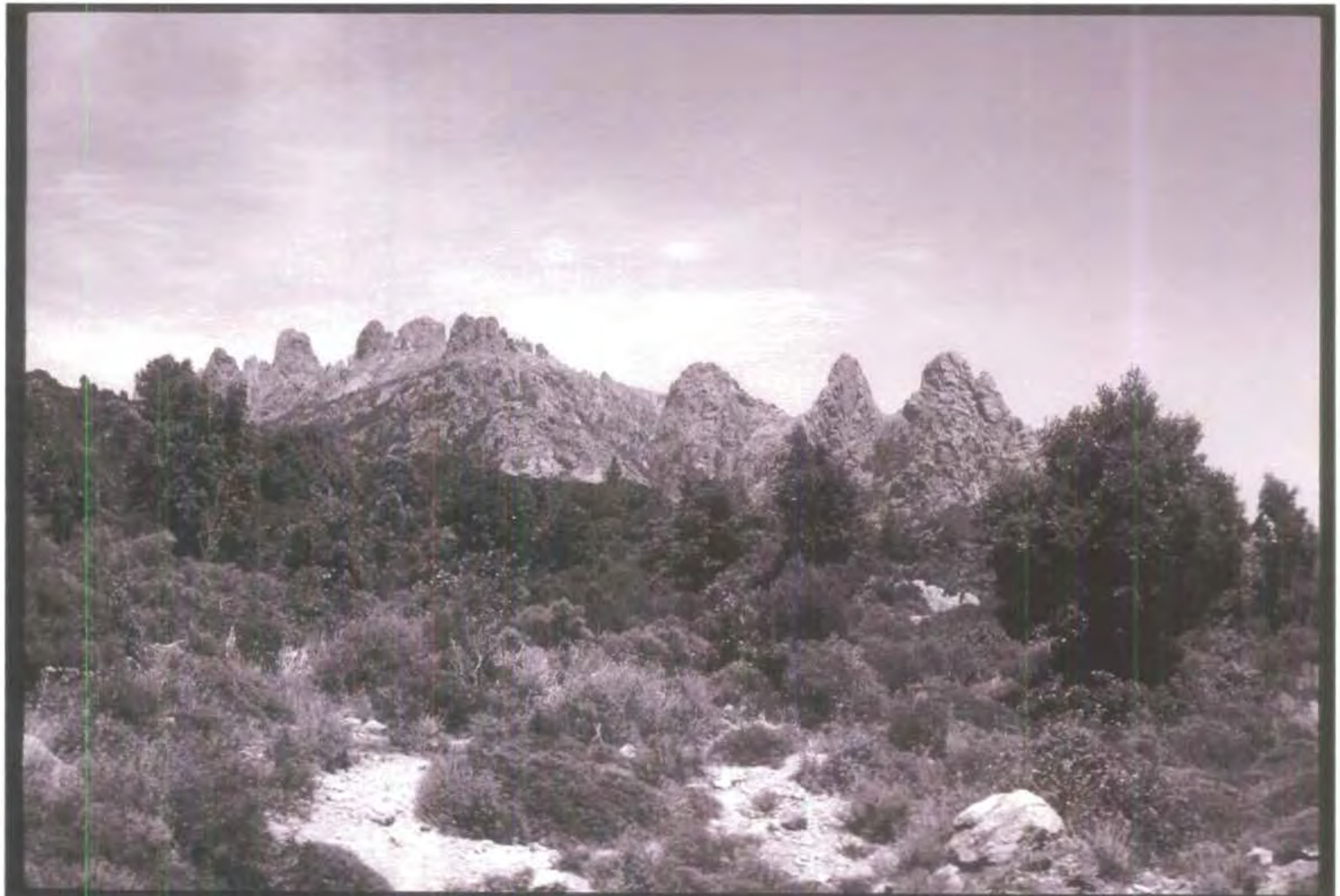


Plate 4.7

Plate 4.8

Plate 4.9

Plate 4.10

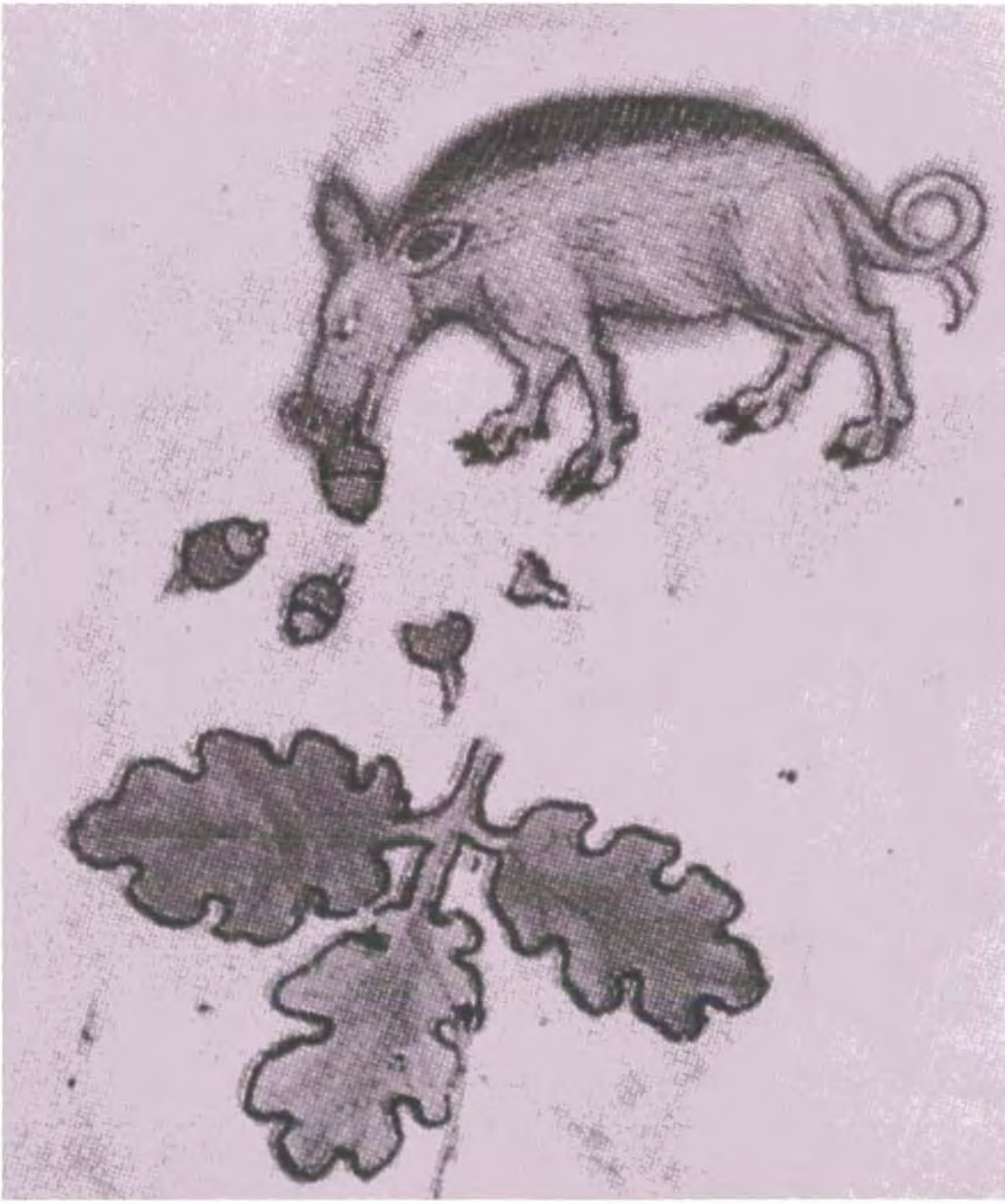


Plate 5.1

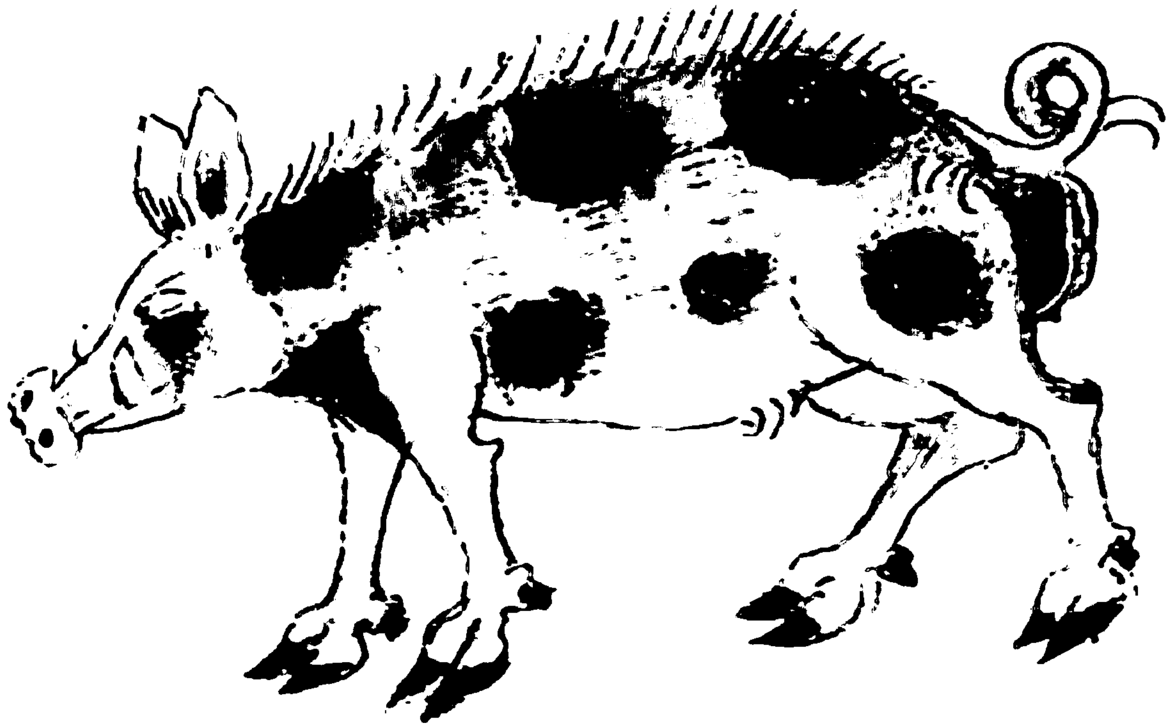


Plate 5.2