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A Comparative Approach to the Relationships of European and non-European Late Pleistocene and Early Holocene Populations

Approche comparative des relations entre les populations fossiles européennes et non européennes au cours de la fin du Pléistocène et du début de l'Holocène

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Abstract

In this paper the relationship of the Late Pleistocene and Early Holocene populations of NW-Africa, the Near East and Europe is discussed. The uni- and bivariate-statistics and the discriminant analytical approaches yield only slight doubts as to the autochthonous status of the North African populations. Because the Protocromagnoids show much higher affinities to the African than does the European sample this may be an indication of common ancestorship of these groups (whether in Africa or in Western Asia remains uncertain). The exclusive orientation of the Natufians to the European sample by bivariate and discriminant function analysis has been interpreted as representing convergent adaptations in a similar socio-economic environment. There are weak or even unreasonable arguments to postulate a direct relationship of the Near East population and the Western Europeans because the geographically closer Eastern Europeans differ much more from the Natufians than the Western Europeans (for a detailed analysis of the individual affinities see Henke, 1989). The results from the principal component analysis offer no conclusive support for the above described view, but they are not in contradiction with the given interpretation either. These results seem to show less divergence between the European and non-European sample, but a detailed analysis of the regional and temporal samples, which is given in Henke (1989), allows an alignment of the interpretations of the multivariate statistics (discriminant analysis and principal component analysis).

Résumé

Ce travail analyse les relations entre les populations de la fin du Pléistocène et du début de l'Holocène en Europe, en Asie occidentale et à l'ouest de l'Afrique du Nord. Les méthodes statistiques univariées et bivariées ainsi que les analyses discriminantes indiquent une évolution autochtone des populations nord-africaines. Les affinités plus importantes des Protocromagnons pour les Africains que pour les Européens pourraient correspondre à la présence d'ancêtres communs, encore qu'on ne sache pas s'il faut les chercher en Afrique ou en Asie occidentale. Les rapprochements entre les échantillons de Natoufiens et d'Européens observés dans les analyses bivariées et discriminantes sont interprétés comme des convergences adaptatives dans des environnements socio-économique proches. Il n'y a guère d'arguments pour envisager une relation directe entre les populations du Proche-Orient et d'Europe occidentale, dans la mesure où les Européens de l'est, géographiquement plus proches, diffèrent davantage des Natoufiens que les populations d'Europe occidentale (voir Henke, 1989 pour une analyse détaillée). Les résultats de l'analyse multivariée en composantes principales ne confirment pas cette manière de voir, mais ne l'infirment pas non plus. Les études semblent montrer moins de divergences entre les échantillons européens et non-européens, mais l'examen des données dans une optique spatiale et temporelle, qui est présentée ailleurs (Henke, 1989), permet d'accorder les interprétations des diverses approches statistiques multivariées.

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Mots clés : hommes modernes, cranium, Europe, Afrique du Nord, Asie occidentale.

Introduction

The concern of my study is a comparative morphometrical analysis of Early Holocene and Late Pleistocene populations of Europe and the Circummediterranean Basin. Especially the relationships between the Upper Palaeolithic and Epipalaeolithic populations from NW-Africa and the contemporary populations from the Near East and Europe are under scrutiny, because of highly divergent hypotheses, due to inconsistent results from archaeology as well as anthropology. Until now a vast uni-, di- and multivariate comparison of the available cranial material has never been attempted. For this reason I would like to make a small contribution to a much more extensive regional and diachronic comparison by descriptive-analytical and multivariate-statistical methods (see Henke, 1989, 1990), preceded by a small review of this topic.

During the past decade anthropologists, archaeologists and palaeogeneticists have yielded a broad body of new data pertinent to the origin of modern humans (review see Henke, 1989; Smith *et al.*, 1989). Based on new data and

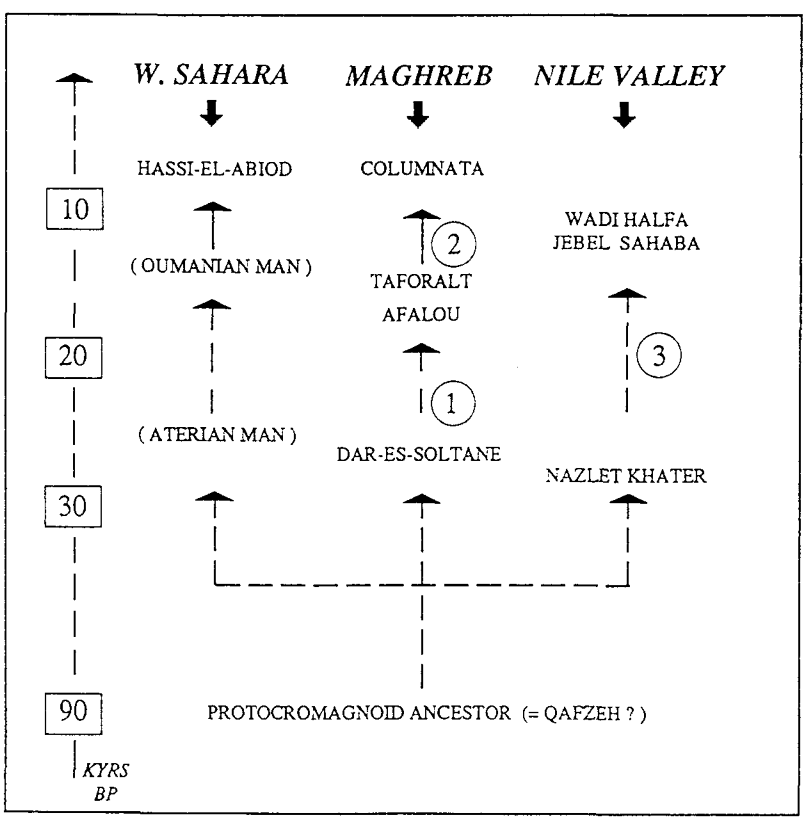

Fig. 1 Hypotheses on phyletic relationships between the 3 Mechtoid populations. According to : 1) Ferembach, 1976; 2) Chamla, 1970; 3) Thoma, 1984 (adapted from Dutour, 1989, fig. 3).

reinterpretation of older information, three models remained that describe the scenario of the origin of modern humans. Besides the well-known Afro-European sapiens hypothesis, formulated by Bräuer (1984a, b), there is Stringer and Andrew's recent African evolution model, which are both out-of-Africa-models, while Wolpoff, Wu, and Thorne's multiregional evolution model argues that there is considerable morphological and genetic continuity across the archaic/modern human boundary in regions throughout Eurasia, as well as Africa. The present state of our knowledge indicates that no model explains the available data on this subject unequivocally. Smith *et al.* (1989) add correctly : "whatever their proponents suggest". Although new paleogenetic data from the mt-DNA research and other polymorphisms (Cann *et al.*, 1987; Stoneking *et al.*, 1987; Wainscoat *et al.*, 1989; see further literature in Mellars and Stringer, 1989) are serious arguments for a replacement model, we do not yet have a real idea how the invasion of modern people into Europe took place.

Vandermeersch (1978) described the Qafzeh population from Mount Carmel, which has recently been dated at 92 k.y. B.P., as an ancestral population that gave rise to the European Cro-Magnons. There is the question whether this group (possibly together with the Skhul people) is also the "common ancestor" of the North African populations, or whether the so-called Cromagnoids from North Africa should rather be called Mechtoids, due to their separation since the end of the Riss-Würm-Glacial. Thoma (1978) proposes a nomenclature which takes an autochthonous development of the North-African populations into account and names these groups Mechtoids. Dutour (1989, S. 493) developed a relationship diagram concerning the W-Sahara, the Maghreb and Nile Valley populations which is shown in figure1 and sees Qafzeh as a possible basic population. He comments that "the most probable hypothesis concerning the origins of these three populations is the existence of a common ancestor with local evolution particular to each area and probably included by climatic changes in the Saharan belt." J.D. Clark (1989) also interpreted the African fossil record in that way, the fossil evidence appearing to point to the emergence of modern genotype in both South, East and probably North Africa at a time before its presence in Europe and possibly also before its presence in the Middle East. He asks whether the African evidence might be contemporaneous with the first modern humans from Qafzeh and Skhul? There is no doubt that more information is needed to solve this problem. This becomes especially evident when we recapitulate the divergent hypotheses that have been forwarded to explain the origin of the Mechta-Afalou people. We can do this very briefly since Ferembach (1985) has given an extended review.

The first hypothesis which was formulated by Balout (1954), Briggs (1955), Hooton (1949), Vallois (1969), Vandermeersch (1978) and others described an origin from the Near East. One wave of Cromagnoids was to have moved along the southern fringe of the Mediterranean Basin, while another wave reached Europe. Besançon *et al.* (1975-1977) gave numerous arguments against a Near Eastern origin besides Ferembach (1976, 1979) and Arensburg (1981) (see further Bernhard, 1984; Henke 1989). *The second hypothesis* postulates the origin of the Mechta-Afalou-populations from the Egyptian Sudan (Ferembach, 1976; Tixier, 1971), but there are many objections against this thesis from the standpoint of both archaeology and palaeoanthropology. *The third hypothesis* formulates an Iberian origin of the Iberomaurusians, which implies that the Iberomaurusians come from Spain via Gibraltar. An argument against this assumption is the expansion of the Iberomaurusians from east to west (Roche, 1976). *The fourth hypothesis* is the so-called new hypothesis by Ferembach (1985). She argues for an Italian origin via Sicily. Therefore the Iberomaurusians are probably Italian Epigravettians, who landed in Tunesia 24,000 years ago, from where they spread towards the west and east, taking the place of the Aterians.

According to Ferembach (1985) there seem to be good reasons to suppose that their ancestors were Aterians who migrated during a marine regression to the northern Mediterranean shores and replaced the Neandertals of that region. In contrast to this position, Zampetti (1989) interprets similarities between the African and European Gravettien as convergent.

Statement of Problem

Due to the unsolved problems, I checked the relationships of the Late Pleistocene and Early Holocene populations by a morphometrical comparison of the available crania. The following questions were raised :

1) Which are the craniomorphological differences of the NW-African populations in comparison to the European and Near Eastern groups?

2) What is the degree of discrimination of the regional populations by discriminant function analysis (DFA)?

3) Is there an obvious pattern in the NW-African people that distinguishes them from the populations of those areas which were taken into account as places of possible origin (calculation by Principal Component Analysis, PCA)?

Material and Methods

The data of the crania or cranial fragments of the European and non-European populations was mostly taken from the available literature and is documented in the Mainz data bank (see Henke, 1989a). The total sample consists of n = 546 individuals. A maximum of 32 neuro- and viscerocranial variables is listed. Age, sex, geographical coordinates, region and chronological data are registered. Besides this data set - commonly referred to as DATBAMZ - a separate regression file for 15 variables (males n = 175; females n = 103) was calculated by multiple regression for males and females. This file, REGBAMZ, was the basis for the multivariate approaches. Fig. 2 - 3 show the regional distribution of the sample, which is also displayed in histogram fig. 4. The NW-African sample is relatively large, due to the representative samples of Afalou and Taforalt, while European sites which yielded a comparable number of specimens are relatively fewer, such as Vlasac and locations in Eastern Europe. Concerning the chronological distribution, there is a steady increase in the sample size of European populations from the Middle Palaeolithic to the Late Mesolithic. The Iberomaurusian sample is nearly as large as the Early Mesolithic sample of Europe, while the Near Eastern sample is relatively small, which also holds also true for the Capsian and Columnatian material.

The anthropological and biostatistical methods have been described intensively by Henke (1989). The applied programmes for the DFA and the PCA are the SPSS/PC (Uehlinger *et al.*, 1988), while the Multiple Regression Analysis was calculated by the BMDP-programme (Bollinger *et al.*, 1983). A Turbo Pascal programme for the plotting of 95%-correlation ellipses has been written by D.F. Butz M.A. (IfA Mainz).

Results

In tab. 1 - 14, the parameters of the male and female samples of the European, Near Eastern and North African populations are given (File DATBAMZ). In comparison with the combined non-European sample, the Upper Palaeolithic and Mesolithic European populations have a significant :

- smaller cranial breadth (M8) (both sexes);
- larger smallest frontal breadth (M9) (males);
- smaller largest frontal breadth (M10) (both sexes);
- larger biauricular breadth (M11) (both sexes);
- larger biasterionic breadth (M12) (females);
- shorter parietal sagittal arcs (M27) (males);
- larger orbital breadth (M51) (males);
- smaller nasal breadth (M54) (both sexes);
- smaller internal palatal breadth (M63) (both sexes);
- smaller chin height (M69) (males);
- smaller condyloid height of the ramus (M70) (both sexes);
- smaller ramus breadth (M71) (males).

Besides the differences in the absolute measurements of the skull, there are also highly significant differences in the shape variables.

The following indices are significantly different (tab. 13 - 14). The European skulls are :
- more dolichocranic (LBI - cranial index) (both sexes);
- more acrocranic resp. less metriocranic (BHI) (both sexes);
- more metriocranic resp. less tapeinocranic (BOHI) (females);
- more eurymetopic (TFPI) (males);
- more mesenian resp. less euryenian (OGI) (both sexes);
- more mesorrhinian resp. less chamaerrhinian (NAI) (both sexes).

A comparison of the Western and Eastern European with the Near Eastern and North African populations demonstrates strong similarities between the European and the Near Eastern populations, while the North African samples differ in a lot of features: LBI, BHI, BOHI, TF(P)I, OGI and NAI in the male sample and LBI, BHI, TFPI and NAI in the female sample (Martin, labels of the abbreviations : see tab. 3).

While Ferembach (1985) claimed that the Mechta-Afalou men are Cromagnoids, distinguishing themselves from the European population by only a few features, I think there are good reasons from the morpho-metrical comparison to distinguish the Iberomaurusians from European Cromagnoids taxonomically. Besides the larger robusticity of the African population there is good evidence for climatic adaptation. The more chamaerrhinian nose of the southern sample can be explained by the Thompson-Buxton rule (Thompson and Buxton, 1923; Davies, 1929) and may be an indicator for the autochthony of the "Mechtoids", as they should be called according to Thoma (1978). As there is no space to go into a detailed univariate comparison (see Henke, 1989), we can sum up the following:
1) there are many more differences between the European und non-European populations than between the Western and Eastern Europeans;
2) the Epipalaeolithic Near East population shows mainly size differences in comparison with the European Cromagnoids, while shape differences are very small;
3) the North African populations show numerous independent features that may be due to a long lasting separation from the European and Near Eastern populations of modern man; the comparison with the Western European Upper Palaeolithic and Mesolithic sample demonstrates clearly defined differences too;
4) there seem to be good reasons due to the cranial morphology, for a close connection by gene flow between the Near Eastern and European populations, while the North African populations seem to demonstrate a divergent local evolution.

To get more insights into the morphometrical pattern of the compared populations I used a discriminant analytical approach. The first multivariate analysis for quantifying the differences is a DFA of the male samples of the European and North African populations (GEODIS 1). The Near Eastern populations - including the Protocromagnoids and the Natufians - were taken as ungrouped cases. The results are given in tab. 15 - 17. The stepwise DA excludes five variables from the analysis. The measurements with the highest effect of discrimination are M8 and M54, followed by M9 and M51, meaning that the maximum discriminators are the cranial breadth and the nasal breadth.

As can be seen from the classification results, 87.3% of the sample are correctly classified. While all the Protocromagnoids from Qafzeh and Skhul show higher affinities to the African than the European sample, the 14 Natufians join the European population. The discrimination of the female sample (GEODIS 2, tab. 16) - especially based on M1 and M54 - with 80% is less effective, but likewise higher than expected, than the different descriptions by Ferembach (1985), who sees high affinities between the northern and southern population and even claims the origin of the Iberomaurusians by migration via Sicily - Tunesia. Even if we make a correction of the classification as proposed by Van Vark and Van der Sman (1985) the classification rate remains very high.

A further comparison (GEODIS 3, tab. 17) is based on the indices. As can be seen from tab. 17, seven shape variables are taken into account. The maximum discriminator is the nasal-index (pw = 41%). The sex-mixed sample yielded a correct group classification of 74.3%, meaning that there are obvious differences in the cranial features of the regional groups which allow us to distinguish them on a medium level. Concerning the ungrouped cases, without exception we can find that every Natufian has higher affinities to the European than to the North African sample, while the Protocromagnoids are more like the Northern Africans. Based on the same dataset REGBAMZ (p = 15 , absolute measurements, resp. p = 7, indices) a discrimination of the Eastern and Western European Upper Palaeolithic and Mesolithic sample was calculated and the individuals of non-European samples were included as ungrouped cases. As demonstrated in fig. 5 - 6 there is a discrimination of approximately 64% in males and a somewhat higher figure in the female group. In the non-European sample, 23 out of 38 cases of the North African group are classified as Western Europeans, while 15 show higher affinities to the Eastern European sample. Within the smaller female sample there seems to be no preference (10 :11). Furthermore it is quite interesting that the Natufians without exception have higher affinities to the Western European sample; this is true in the males as well as the females.

If the comparison is based on the indices, the described trend even intensifies. There seem to be fewer affinities between the non-European sample and the Eastern European groups than between the Western Upper Palaeolithic and Mesolithic populations. This will be interpreted later on after the comparison of time-specific samples.

The comparison of the Upper Palaeolithic, Early and Late Mesolithic as well as Iberomaurusian samples is demonstrated by 4-group-analyses (ZEITDIS 1 to 3, tab. 18-20) for both sexes and the mixed sample. Within the male sample there is a selection of 13 variables out of 15, which participate in the discrimination. Main discriminators are - not unexpectedly - the breadth measurements M54, M8 and M9 (last one negative). When we take the heterogeneous distributions into account, 68.2% of the sample is correctly classified, which is - in comparison with a random rate of 25% - an indication of an intensive diachronic differentation. As demonstrated by the classification table, beside the Iberomaurusians the Upper Palaeolithic group has the highest rate of correct classifications (85.7 to 84.8%), while the Early Mesolithic population shows relatively high affinities to the other European samples. The Late Mesolithic sample is correctly classified by 71.2% and shows the highest rate of misclassification in the Early Mesolithic sample.

If we look at the same analysis of the females, we can see that the Iberomaurusians have less affinities to the other groups than these amongst each other. The total of correct classification is only 55.2%, which implies that the females are more similar to each other than the males. The measurement which has the highest impact by far for discrimination is the nasal breadth (M54).

That the shape of the nose is the most effective discriminator can also be seen from the discriminant analysis ZEITDIS 3 which is based on the total sample and the indices. The discrimination rate is "only" 55.7%, and, beside the Upper Paleolithic sample, the Iberomaurusians are by far the most separated group. That the Iberomaurusians are very different from the European samples and that the Upper Palaeolithics are not very similar to the Mesolithic samples, which show a broad overlapping, can be demonstrated by the diagrams fig. 7 - 9. They show the 95%-correlation ellipses of the discriminant scores of the discriminant functions one and two. In all three diagrams there is a separation of the ellipse of the Iberomaurians due to higher scores on the x-axis.

The univariate and discriminant analytical results show that the non-European populations are in many features significantly different from their European contemporaries. We have seen that the Near Eastern sample has much more affinities to the European sample than the

North African groups. This is evident from the univariate comparison as well as from the DFA. The Mechta-Afalou population is separated from the Eurasian samples by those features depending on climatic adapation and show a tendency to broader and in general more robust skulls. Both quantitative analyses give good reasons to describe the North African population as an autochthonous population (see Thoma, 1978). Especially using the discriminant analytical results presented we can judge that the "new hypothesis" of Ferembach (1985) has only slightcredibility. Although there are higher affinities between the North African and the Western European Late Pleistocene and Holocene populations than to the Eastern groups, the discrimination is too marked to take an intensive gene flow into account. Although the Natufians also have greater similarities with the Western than the geographically closer Eastern Europeans, there are well-founded doubts that this is due to gene flow. If we look at the diachronic trends within the sample, the greater similarity between the Near Eastern populations and the Western Europeans is due to a lesser size, which may be the result of convergent adapations in a similar socio-economic field.

The high affinities of the Protocromagnoids to the African sample may be proof of a common ancestorship of these populations together with the persistence of some archaic features in the Mechta-Afalou population as an early divergence from a single stock, while the European populations passed through a special adapation process.

Besides the DFA, sex-specific principal component analyses (PCA) have been calculated. The varimax-rotated factor matrices are given in tabs 21a/b. The percentage of explained variation is somewhat less then 70% for four factors, while the first and second factor together explain roughly 50% (for further information see Henke, 1989a).

As can be seen from the scattergram (fig. 10, male sample) of the individual scores (PC I and PC II), there is no clear separation of special groups in the plot. Concerning the cases Cro-Magnon I (n° 10) and Combe Capelle (n° 9) there is an obvious polarity. The CC-skull is situated at the right horizontal axis, which signals higher values of the variables M48 (facial height), M55 (nasal height), M52 (orbital height) and M51 (Orbital breadth). Differences between CM and CC in the y-axis are missing, meaning that they do not differ much in the height measurements M20 and M17 and in the nasion-basion-length (M5), which show high loading on the PC II. Within the plot the so-called Protocromagnoids from Qafzeh and Skhul (n° 1 to 4; indicated by a black bar at the right side of a circle) do not have an isolated position, but lie without exception in the fourth quadrant (see fig. 10). Of special interest are the non-European individuals in comparison to the European ones. The North African series (Afalou, Taforalt etc.) are indicated by a bar at the left side of the circles, while the Epipalaeolithics from the Near East are marked by a bar at the top. At first we can see that the Iberomaurusians and Capsians accumulate mostly in between the Cro-Magnon and the Combe-Capelle type, with some more affinities to the first one. The Natufians are also integrated into the whole sample, although some cases are marginal with very low scores at the PC II. The total structure shows the tendency of the Afalou-Mechta people being more "robust" concerning the cranium, while the Near Eastern Epipalaeolithics tend to be more gracile. Concerning the PC I there is a slight tendency to more euryenian, chamaerrhinian faces with smaller orbits. From these results, we cannot see a clear-cut separation of the European and non-European population; in contrast, there is no contradiction to a common ancestry and even a gene flow between the populations.

If we look at the female sample (fig. 11), it can be seen that Qafzeh 9 is situated at a marignal if not even unique position in the first quadrant, which indicates an individual with more than average height and length of skull (M1, M5, M17, M20, M27) and also with very high measurements in the breadth dimension (M8, M9, M10, M45 and M54). In comparison to the other subsamples, the Mechta-Afalou sample canbe described as having high scores on the PC I, while there is no preference in the PC II. Both skulls from Mugharet el-Wad are very different from each other. While M.e.W. 2 is found in the plot of the African sample, n° 10 is clearly separated by the second quadrant.

Contrary to the results derived from the DFA, the comparison of the cranial samples by PCA demonstrates no clear-cut differentiation because of an overlap of European and non-European individual scores. If we look at the distribution of the regional and time-specific groups, there is some sort of accumulation of the archaic group of Protocromagnoids apart from the others, underlining the distinct status of this Middle Palaeolithic sample. The non-European individuals show a tendency to somewhat broader skulls in the African series and somewhat more gracile skulls in the Natufians. As there is no clear distinction, there are no arguments from the PCA to exclude gene flow between the African and non-African populations although the regional and temporal subsamples show less overlap than would randomly be expected.

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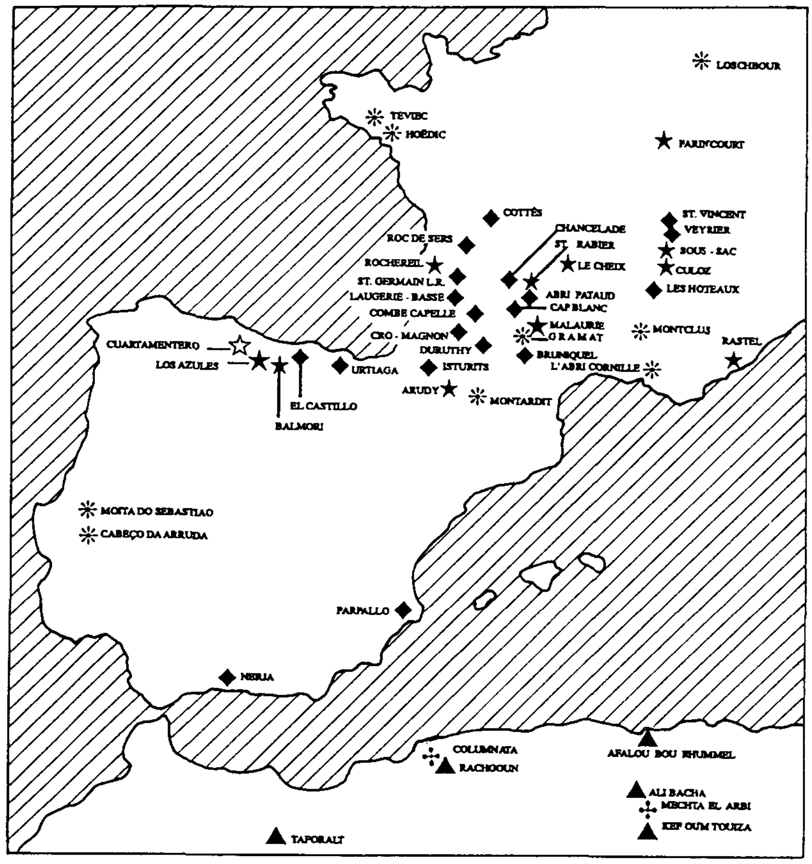
a



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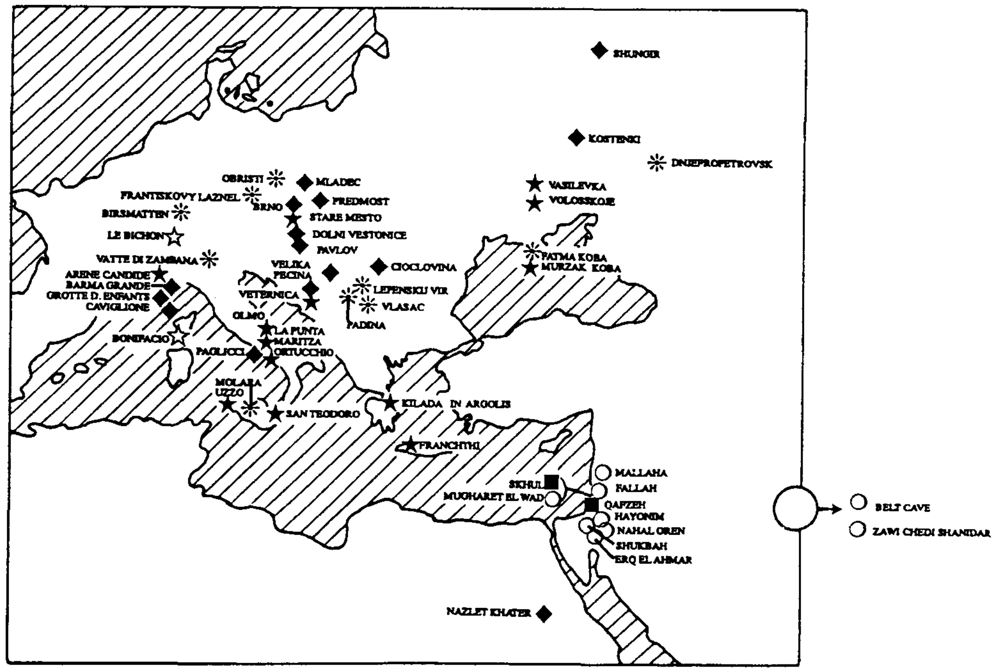
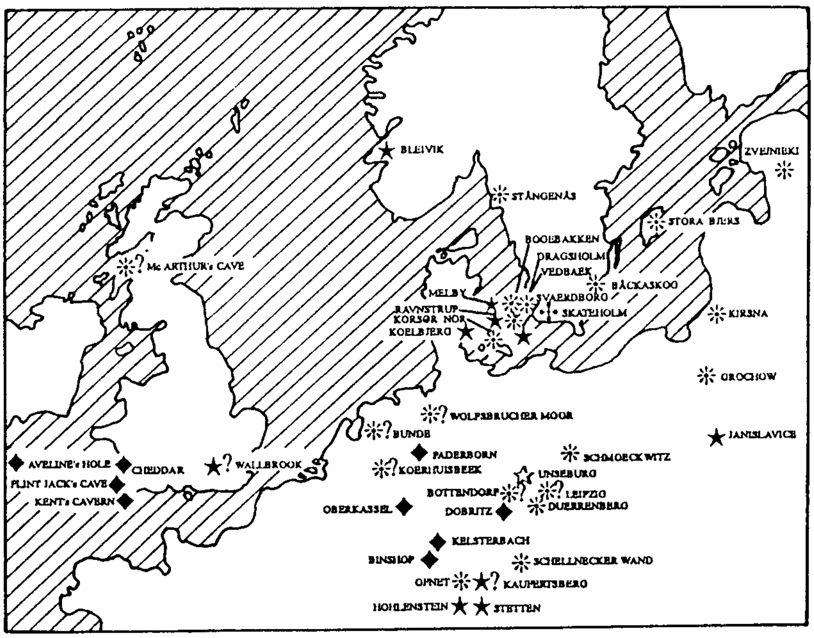


Fig. 2a-c Regional distribution of Late Pleistocene and Early Holocene Man; comments in Henke (1989a).

C



- ■ " PROTO-CROMAGNOID "
- ◆ UPPER PALAEOLITHIC
- ☆ UPPER PALAEOLITHIC TO MESOLITHIC
- ★ EARLY MESOLITHIC
- ⁂ LATE MESOLITHIC
- ○ EPIPALAEOLITHIC (NATUFIANS S.L.)
- ▲ IBEROMAURUSIAN
- ·|· CAPSIAN - COLUMNATIAN
- ? UNCERTAIN DATING

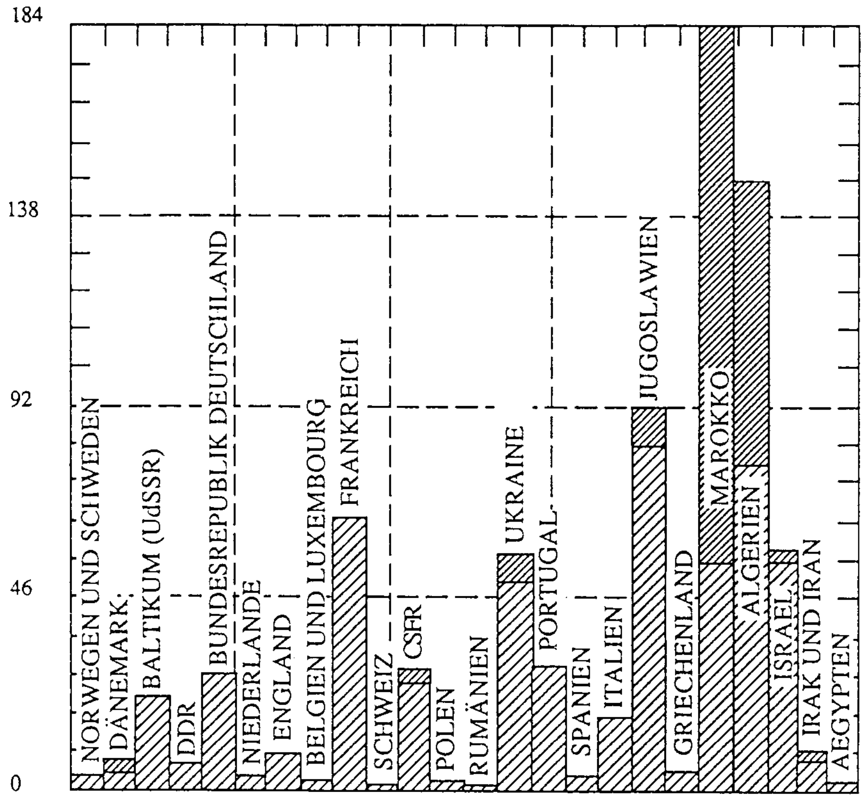


Fig. 3 Regional distribution of Late Pleistocene and Early Holocene Man in Europe, the Near East and North Africa; cranial sample light striped - n = 546; black striped bars indicate postcranial material which was not taken into consideration in this study.

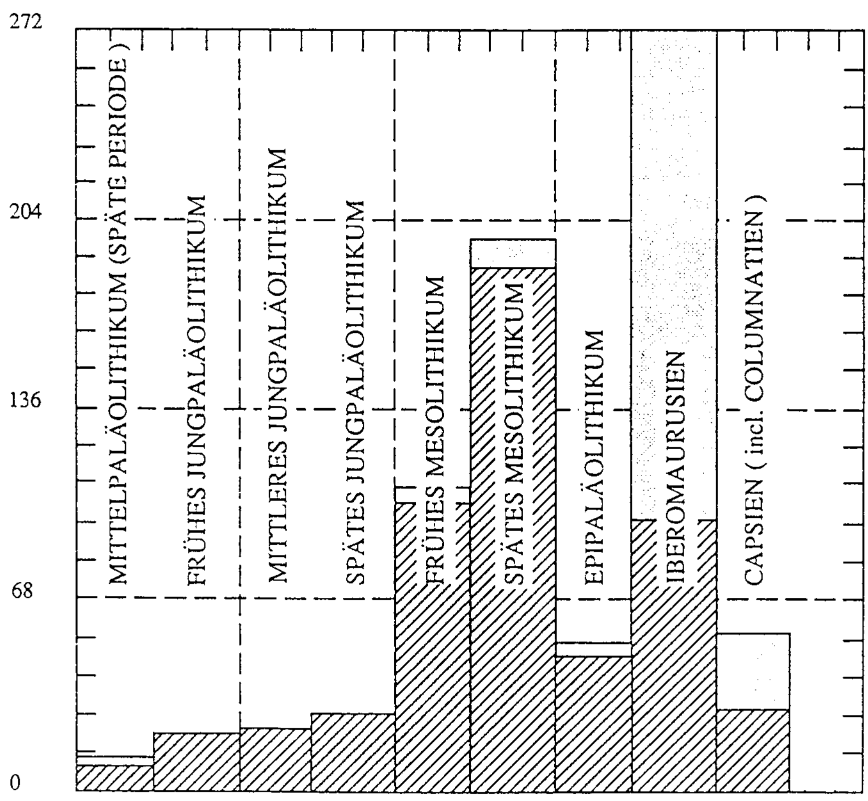


Fig. 4 Temporal distribution of Late Pleistocene and Early Holocene Man in Europe, the Near East and North Africa.

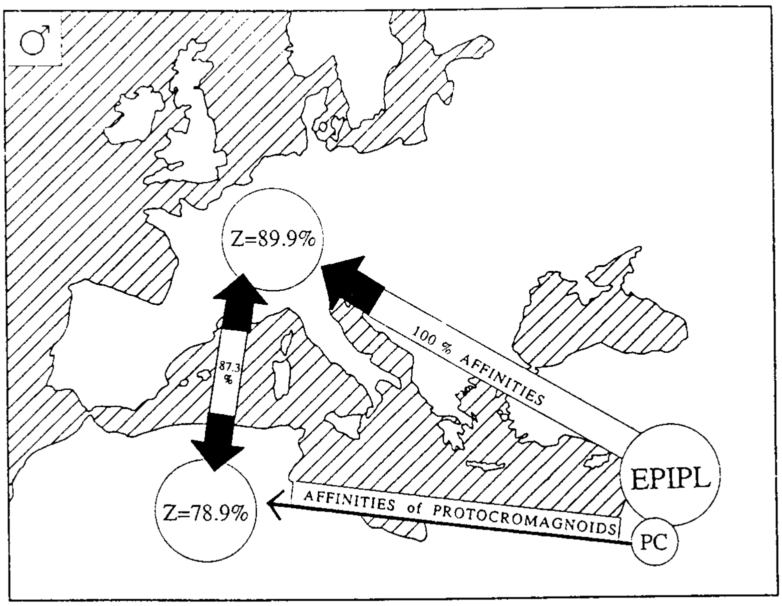


Fig. 5a Correct classification of "grouped cases" (Z) and affinities of "ungrouped cases" from the Near East (Protocromagnoid and Epipalaeolithic sample; Geodis 1, male, n = 175; p = 15).

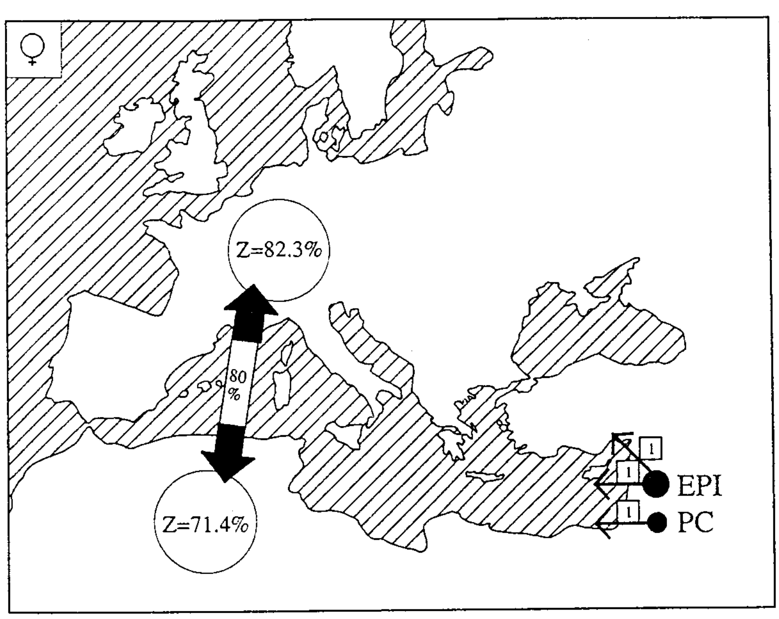
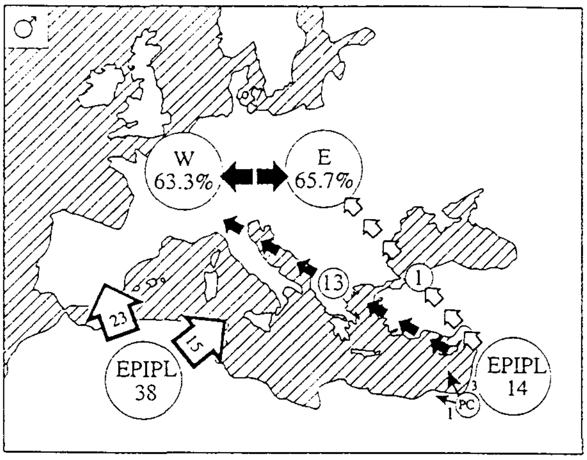


Fig. 5b Correct classification of "grouped cases" (Z) and affinities of "ungrouped cases" from the Near East (Protocromagnoid and Epipalaeolithic sample; Geodis 2, female, n = 103; p = 15).



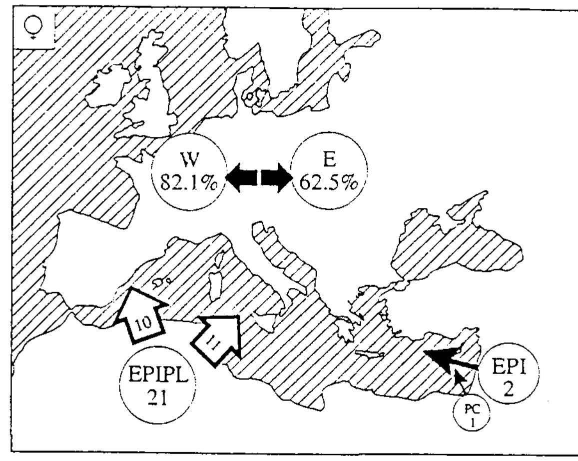
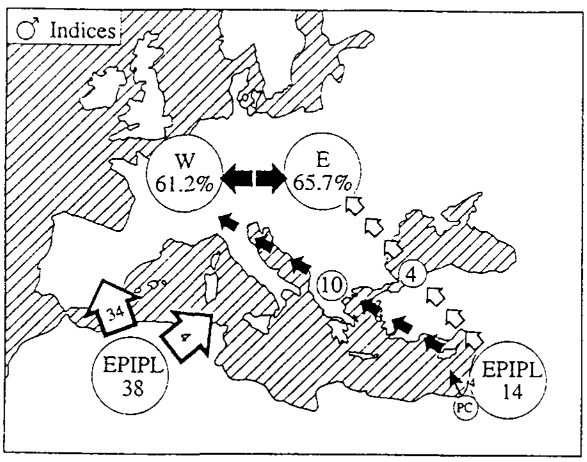
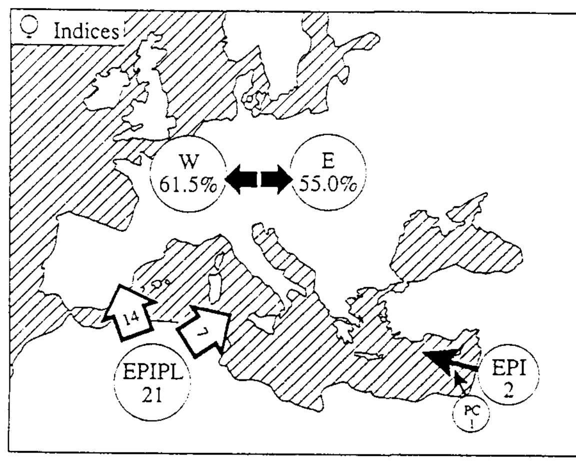


Fig. 6a Stepwise DFA (Geodis 4) : discrimination of the regional samples from Western Europe and Eastern Europe; the Near East and North Africa "ungrouped"; male sample (n = 175, p = 15 absolute measures, file REGBAMZ).

Fig. 6b Stepwise DFA (Geodis 5) : discrimination of the regional samples from Western Europe and Eastern Europe; the Near East and North Africa "ungrouped"; female (n = 103, p = 15 absolute measures, file REGBAMZ).





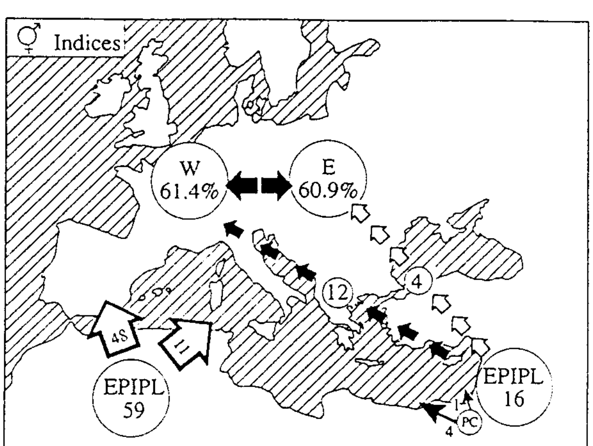


Fig. 6c-e Stepwise DFA (Geodis 6-8) : discrimination of the regional samples from Western Europe and Eastern Europe; the Near East and North Africa "ungrouped"
c) male sample (n = 175, p = 7 indices)
d) female sample (n = 103, p = 7 indices)
e) sex-mixed sample (n= 278, p = 7 indices).

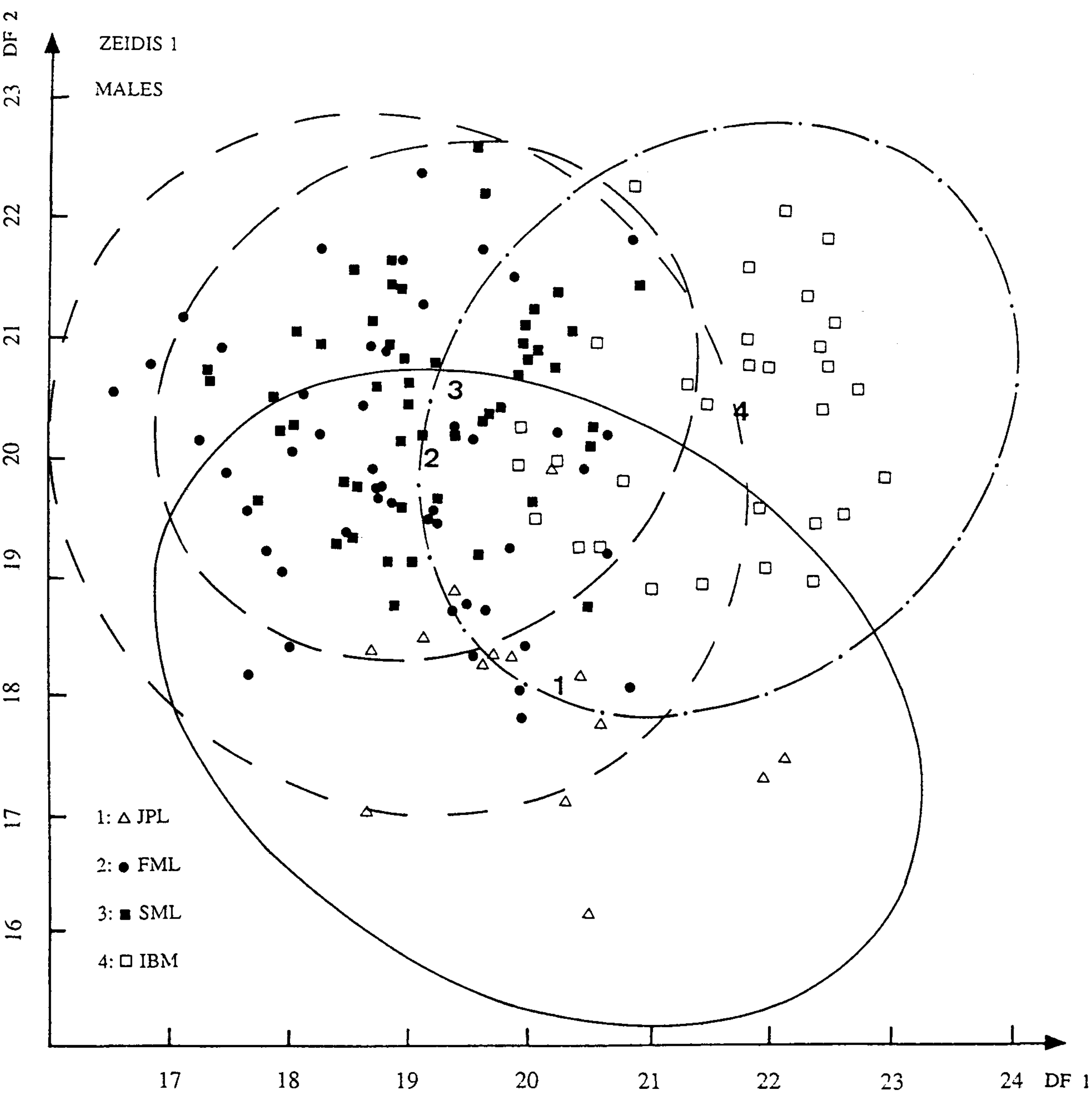


Fig. 7 Diachronic comparison of the male samples by 95% correlation ellipses of the discriminant function scores of the discriminant function n° 1 and 2 (ZEITDIS 1; variables p = 15 absolute measures; n = 148).

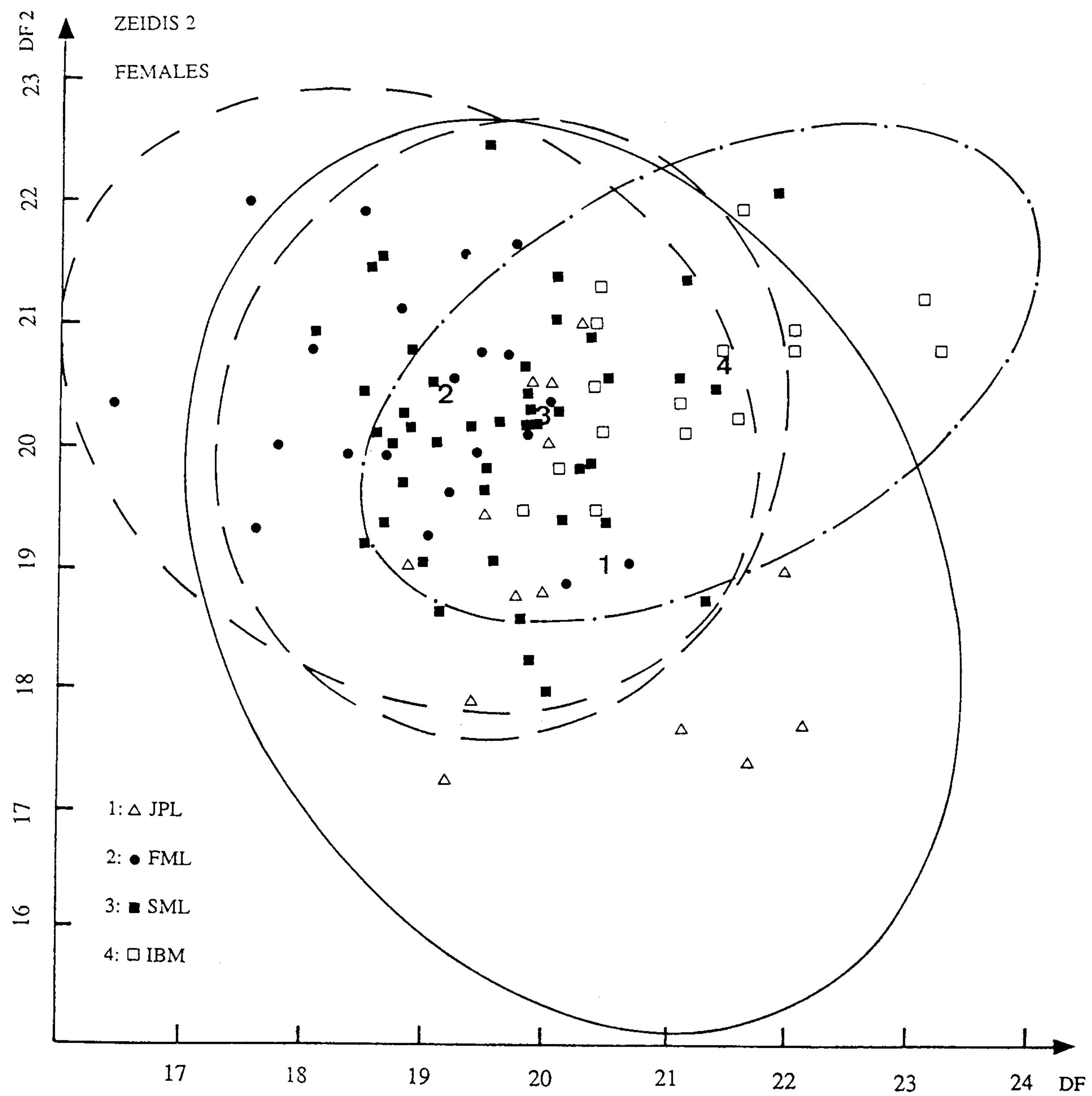


Fig. 8 Diachronic comparison of the female samples by 95% correlation ellipses of the discriminant function scores of the discriminant function n° 1 and 2 (ZEITDIS 2; variables p = 15 absolute measures; n = 96).

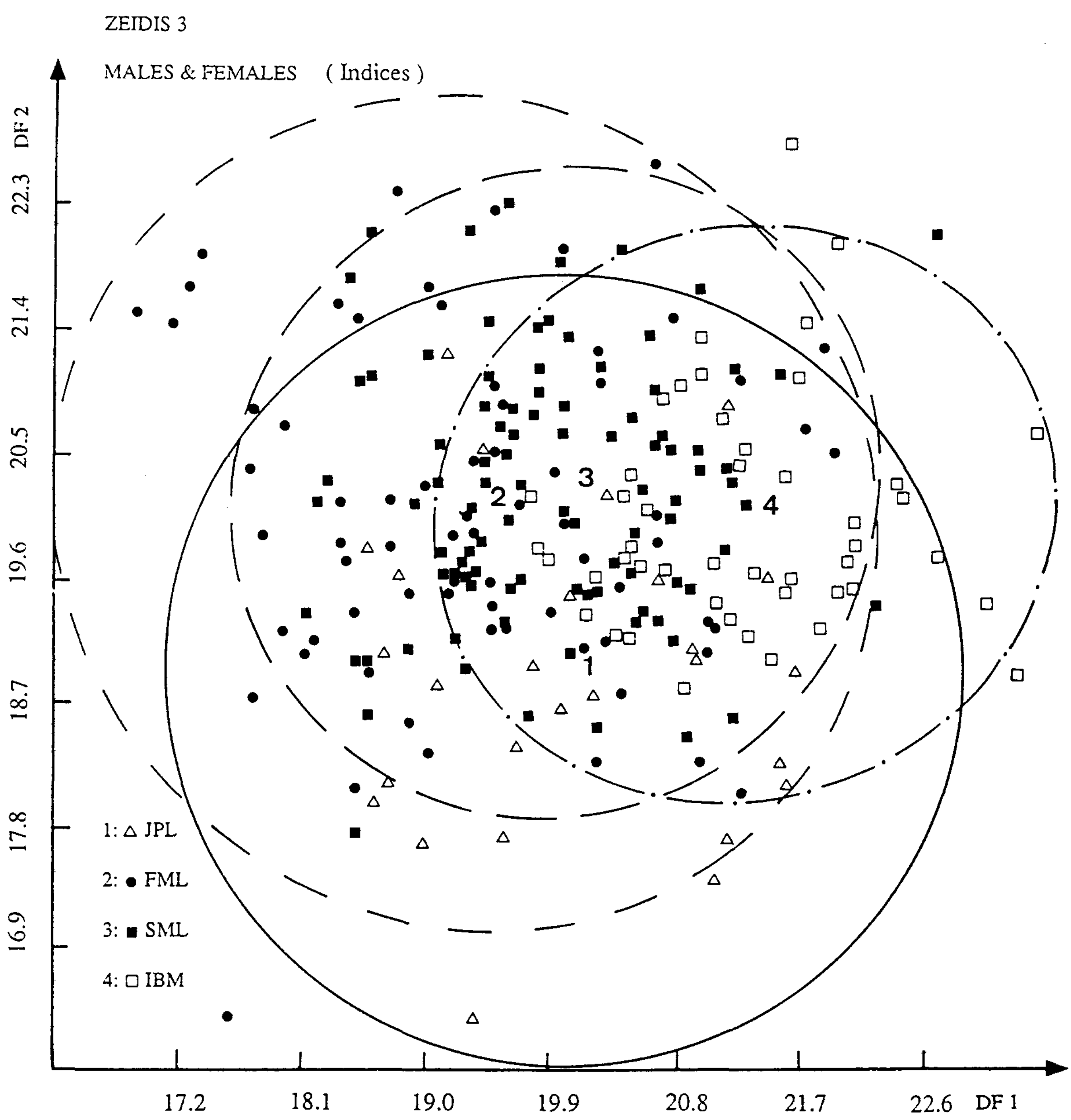


Fig. 9 Diachronic comparison of the sex-mixed samples by 95% correlation ellipses of the discriminant function scores of the discriminant function n° 1 and 2 (ZEITDIS 3; variables p = 8 indices; n = 244).

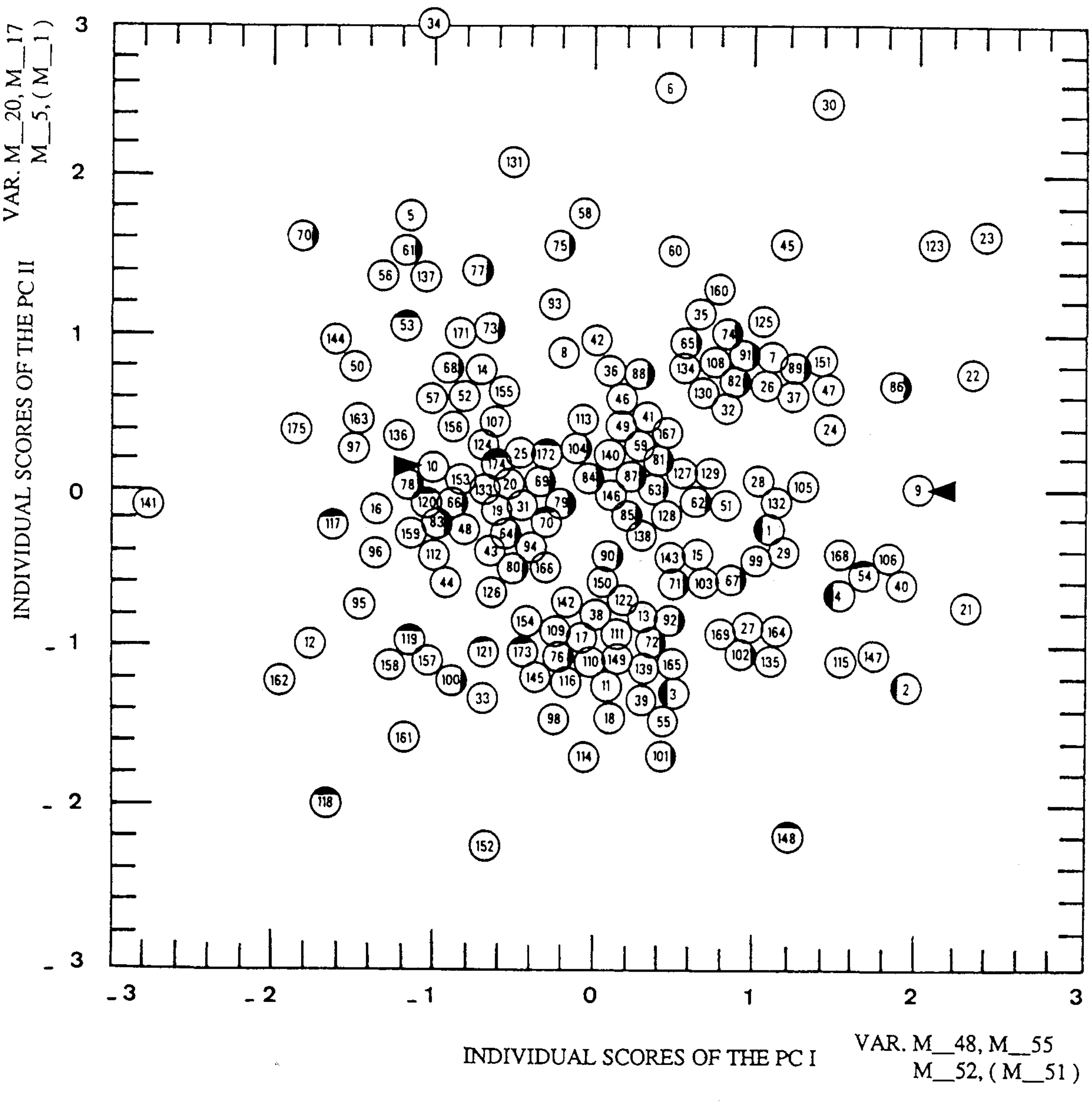


Fig. 10 Scattergram of the individual factor scores of the PC I (horizontal) and PC II (vertical); male sample (n = 175); n°, see tab. 15. Combe Capelle = 9; Cro-Magnon = 10; Iberomaurusians, Capsians and Columnatians with black sign at the right; Protocromagnoids (n°1-4) and Near Eastern Epipalaeolithic sample with black sign at the top.

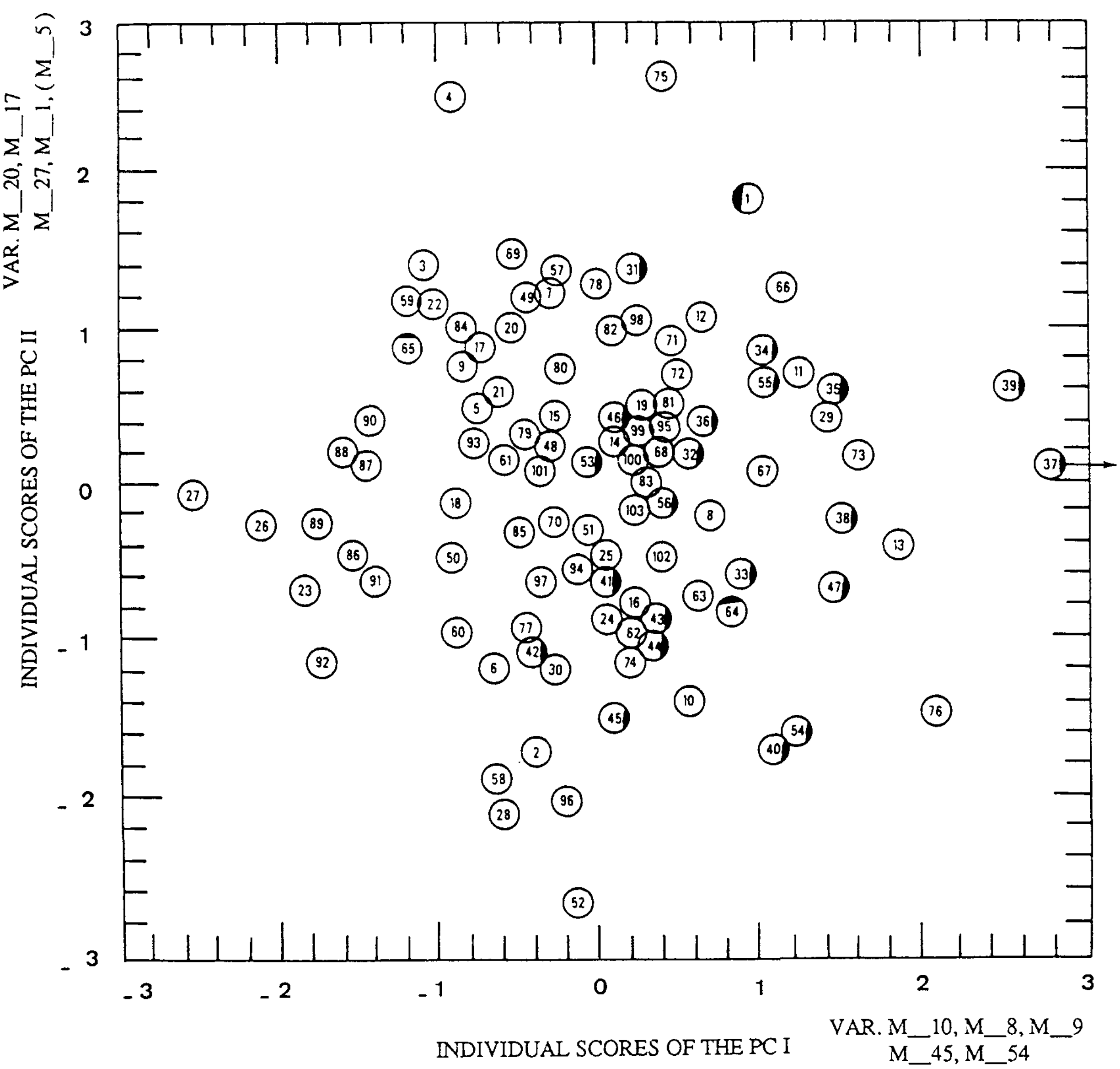


Fig. 11 Scattergram of the individual factor scores of the PC I (horizontal) and PC II (vertical); female sample (n = 103); n°: see tab. 16. Iberomaurusians, Capsians and Columnatians with black sign at the right; Protocromagnoids (n°1) and Near Eastern Epipalaeolithic sample with black sign at the top.

Table 1 Statistics of the Upper Palaeolithic and Mesolithic skull sample from Europe; males (file DATBAMZ).

	VARIABLE	MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
M1	GLOP	192,49	0,61	7,57	57,25	-0,315	-0,006	39,0	172	211	152
M8	EUEU	138,67	0,51	6,27	39,32	0,153	0,342	35,0	122	157	153
M9	FTFT	98,93	0,45	5,52	30,43	1,463	0,708	33,0	87	120	149
M17	BABR	140,44	0,75	7,36	54,23	0,040	0,167	38,0	122	160	96
M20	POBR	120,57	0,68	6,40	41,01	3,969	1,153	42,0	108	150	88
M45	ZYZY	138,63	0,72	7,68	58,91	0,395	0,060	42,0	120	162	113
M48	NAPR	70,37	0,49	5,16	26,62	-0,455	0,240	23,0	60	83	111
M51	MFEC	42,99	0,26	2,71	7,34	0,498	0,272	16,0	36	52	107
M52	PERMFEC	31,77	0,27	2,84	8,09	-0,124	-0,169	14,9	23	38	110
M54	ALAL	25,31	0,23	2,40	5,77	-0,419	0,535	12,0	20	32	106
M55	NANS	52,15	0,36	3,70	13,67	0,255	0,118	20,0	43	63	106
M66	GOGO	102,67	0,94	8,99	80,77	0,721	0,387	49,0	82	131	92
M5	BANA	105,93	0,89	8,10	65,60	0,984	0,788	44,0	88	132	82
M7	BAO	38,48	0,46	3,00	8,98	0,065	0,454	13,3	34	47	42
M10	COCO	117,58	0,55	6,20	38,44	0,306	0,032	35,0	100	135	127
M11	AUAU	124,79	0,65	6,58	43,29	0,708	0,006	38,0	103	141	102
M12	ASTAST	111,79	0,59	6,10	37,20	-0,190	0,318	29,0	99	128	106
M23	HORUMF	534,83	2,29	20,25	410,14	8,005	-1,386	158,0	432	590	78
M27	BRLARC	132,37	0,70	7,69	59,09	1,109	0,429	49,0	111	160	120
M28	LAOARC	120,8	0,76	7,43	55,20	0,046	0,151	37,0	105	142	95
M40	BAPR	101,41	1,05	8,80	77,49	1,016	0,759	47,0	85	132	70
M42	BAGN	114,33	1,79	7,61	57,88	-0,347	-0,046	30,0	99	129	18
M43	FMTFMT	109,61	0,53	5,70	32,50	1,002	0,468	36,0	93	129	115
M44	EKEK	103,06	1,39	5,92	35,00	0,833	0,866	23,0	95	118	18
M47	NAGN	117,27	0,86	7,61	57,84	0,139	-0,252	38,0	96	134	79
M62	OLSTA	47,35	0,88	5,59	31,27	3,151	1,601	26,0	40	66	51
M63	MAPABR	38,98	0,56	3,95	15,61	0,457	0,237	19,0	30	49	50
M65	KDLKDL	121,88	0,90	7,71	59,39	0,232	0,253	38,0	106	144	73
M69	IDGN	33,65	0,41	3,74	12,01	0,657	-0,196	18,0	24	42	72
M70	CONDHT	64,08	0,73	6,48	42,02	-0,354	0,131	28,0	51	79	79
M71	PERCONDH	34,44	0,78	3,12	9,73	2,267	-1,235	12,0	26	38	16
M38	CC	1560,93	14,04	88,80	7885,	0,835	0,266	438,0	1389	1827	40

Table 3 Statistics of the Upper Palaeolithic and Mesolithic skull samples from Europe; indices and CC; males (file DATBAMZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
LBI	M8/M1x100	72,18	0,35	4,16	17,28	-0,398	-0,289	24,4	58,9	83,3	144
LHI	M17/M1x100	72,87	0,41	3,86	14,90	-0,531	-0,145	16,2	64,2	80,4	91
BHI	M17/M8x100	100,95	0,72	6,97	48,51	-0,051	-0,175	35,0	81,8	116,8	93
LOHI	M20/M1x100	62,44	0,33	2,94	8,62	0,945	0,523	16,3	55,8	72,1	81
BOHI	M20/M8x100	87,20	0,65	5,89	34,74	1,513	0,875	32,5	74,7	107,1	83
TFI	M9/M8x100	71,46	0,33	3,79	14,32	0,405	0,466	20,8	63,2	83,9	135
OGI	M48/M45x100	51,04	0,42	4,15	17,19	1,464	0,904	22,3	44,1	66,4	97
JFI	M9/M45x100	71,26	0,41	4,31	18,54	0,070	0,216	23,1	60,0	83,1	108
NAI	M54/55x100	48,47	0,55	5,29	27,96	2,394	0,899	33,4	36,4	69,8	92
ORI	M52/M51x100	74,03	0,68	6,96	48,49	0,200	-0,035	35,9	57,5	93,3	105
GAI	M63/M62x100	83,31	2,25	11,26	126,79	-0,533	-0,296	45,1	59,1	104,3	25
CM	MARTIN 38	1535,81	12,67	112,6	12.673	1,982	0,818	652	1302	1954	79

Table 2 Statistics of the Upper Palaeolithic and Mesolithic skull sample from Europe; females (file DATBAMZ).

	VARIABLE	MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
M1	GLOP	182,82	0,63	6,55	42,92	-0,259	0,196	30,0	170	200	110
M8	EUEU	136,24	0,59	6,18	38,13	-0,098	-0,027	34,0	119	153	111
M9	FTFT	94,82	0,51	5,25	27,59	1,576	0,534	35,0	81	116	108
M17	BABR	134,86	0,89	7,08	50,19	0,968	0,495	36,0	120	156	63
M20	POBR	116,39	0,84	5,59	31,22	-0,277	-0,128	24,0	104	128	44
M45	ZYZY	130,45	0,82	6,58	43,35	-0,528	-0,254	28,0	115	143	65
M48	NAPR	65,51	0,56	4,63	21,43	0,369	0,290	24,0	54	78	69
M51	MFEC	40,63	0,28	2,32	5,37	-0,590	0,166	10,0	36	46	70
M52	PERMFEC	30,77	0,33	2,73	7,47	-0,547	0,227	11,6	25	37	69
M54	ALAL	24,05	0,30	2,43	5,89	11,903	2,420	17,0	20	37	64
M55	NANS	49,32	0,45	3,80	14,45	2,128	0,786	23,0	41	64	70
M66	GOGO	94,95	1,00	7,52	56,56	-0,131	-0,200	34,0	76	110	56
M5	BANA	99,06	0,77	6,03	36,32	0,380	0,619	28,0	88	116	62
M7	BAO	36,96	0,52	2,93	8,57	5,635	2,024	14,1	34	48	32
M10	COCO	113,94	0,64	5,99	35,85	-0,099	-0,064	30,0	98	128	88
M11	AUAU	119,76	0,85	7,07	49,93	0,034	-0,087	35,0	100	135	70
M12	ASTAST	108,77	0,61	5,36	28,76	0,093	-0,051	28,0	95	123	77
M23	HORUMF	515,51	2,18	13,93	194,11	1,858	0,637	75,0	487	562	41
M27	BRLARC	129,42	0,97	9,12	83,14	-0,628	0,124	40,0	111	151	88
M28	LAOARC	116,64	0,98	7,98	63,63	0,454	0,216	42,0	97	139	67
M40	BAPR	95,71	0,95	6,30	39,66	0,336	-0,366	30,0	79	109	44
M42	BAGN	106,07	1,56	6,03	36,35	-1,016	0,321	18,0	98	116	15
M43	FMTFMT	103,00	0,63	5,38	28,90	-0,103	-0,340	24,0	89	113	74
M44	EKEK	100,58	1,36	4,70	22,08	2,169	1,274	17,0	95	112	12
M47	NAGN	108,28	0,87	6,36	40,39	0,469	-0,587	31,0	90	121	54
M62	OLSTA	44,83	0,72	4,32	18,66	6,354	1,648	25,0	37	62	36
M63	MAPABR	37,63	0,61	3,36	11,28	-0,306	0,195	14,0	30	44	30
M65	KDLKDL	116,36	1,12	7,00	48,97	-0,220	0,008	27,0	103	130	39
M69	IDGN	32,36	0,81	4,28	18,31	2,340	0,288	23,0	22	45	28
M70	CONDHT	57,09	0,90	6,01	36,08	0,166	-0,883	25,0	41	66	45
M71	PERCONDHT	38,00	2,00	2,83	8,00	..	..	4,0	36	40	2
M38	CC	1455,43	20,10	96,41	9294,00	-0,323	0,124	374,0	1275	1649	23

Table 4 Statistics of the Upper Palaeolithic and Mesolithic skull sample from Europe; indices and CC; females (file DATBAMZ)

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
LBI	M8/M1x100	74,47	0,35	3,58	12,82	1,340	0,533	21,3	66,1	87,4	105
LHI	M17/M1x100	73,81	0,41	3,29	10,81	0,523	0,662	16,0	67,4	83,4	63
BHI	M17/M8x100	99,27	0,74	5,83	34,00	0,319	0,366	26,6	87,3	114,0	61
LOHI	M20/M1x100	63,10	0,40	2,63	6,90	-0,565	0,343	10,7	58,7	69,4	43
BOHI	M20/M8x100	85,41	0,91	5,93	35,20	-0,942	0,179	23,7	73,9	97,6	43
TFI	M9/M8x100	69,78	0,38	3,82	14,58	0,653	0,474	20,1	61,0	81,1	102
OGI	M48/M45x100	51,12	0,50	3,58	12,84	-0,388	0,477	15,1	43,9	59,0	51
JFI	M9/M45x100	72,64	0,45	3,62	13,10	-0,255	0,163	15,9	62,9	81,8	65
NAI	M54/55x100	48,60	0,55	4,29	18,43	-0,053	-0,479	19,2	37,0	56,3	61
ORI	M52/M51x100	75,80	0,82	6,70	44,93	0,070	0,106	35,1	60,0	95,1	67
GAI	M63/M62x100	85,71	1,85	8,05	64,85	0,398	1,053	28,8	76,1	104,9	19
CF	MARTIN 38	1397,28	15,89	103,00	10604	-3362	0,022	476	1172	1649	42

Table 5 Statistics of the Epipalaeolithic skull sample from the Near East; males (file DATBAMZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
M1	GLOP	189,33	1,36	6,32	38,83	0,605	0,152	26,0	175	201	21
M8	EUEU	136,20	1,38	6,18	38,17	-1,066	0,393	20,0	128	148	20
M9	FTFT	97,89	1,45	6,15	37,87	-1,046	-0,384	20,0	86	106	18
M17	BABR	134,30	2,83	8,95	80,01	-2,071	-0,089	22,0	123	145	10
M20	POBR	119,10	1,37	6,10	37,25	1,052	-0,886	24,0	103	127	20
M45	ZYZY	135,00	1,45	5,62	31,57	-1,069	0,195	19,0	126	145	15
M48	NAPR	67,60	1,75	5,52	30,49	0,576	1,110	17,0	62	79	10
M51	MFEC	41,38	0,40	1,59	2,52	0,315	-0,712	6,0	38	44	16
M52	PERMFEC	30,71	0,43	1,76	3,10	2,178	0,275	8,0	27	35	17
M54	ALAL	25,58	0,78	2,71	7,36	0,247	0,301	10,0	21	31	12
M55	NANS	51,64	1,33	4,41	19,46	0,351	0,972	14,0	47	61	11
M66	GOGO	96,07	2,52	9,44	89,15	-1,085	0,505	27,0	84	111	14
M5	BANA	97,20	3,15	7,05	49,70	3,185	1,493	19,0	90	109	5
M7	BAO	36,80	0,49	1,10	1,20	-3,333	0,609	2,0	36	38	5
M10	COCO	121,33	2,18	7,56	57,15	-1,457	0,288	22,0	112	134	12
M12	ASTAST	106,00	3,00	4,24	18,00	....	....	6,0	103	109	2
M23	HORUMF	526,89	3,76	11,27	127,11	4,641	-1,932	40,0	500	540	9
M27	BRLARC	138,71	1,84	6,90	47,60	1,808	1,119	26,0	130	156	14
M28	LAOARC	117,31	1,69	6,07	36,90	0,092	0,505	21,0	109	130	13
M40	BAPR	95,86	3,11	8,24	67,81	2,199	-1,154	26,0	80	106	7
M44	EKEK	104,50	13,50	19,09	....	....	....	27,0	91	118	2
M47	NAGN	112,83	1,42	3,49	12,17	-2,020	0,420	8,0	109	117	6
M62	OLSTA	47,50	1,19	2,38	5,67	-4,339	0,000	5,0	45	50	4
M63	MAPABR	38,00	1,58	3,54	12,50	3,152	1,697	9,0	35	44	5
M65	KDLKDL	122,71	3,01	7,95	63,24	-1,110	-0,657	21,0	111	132	7
M69	IDGN	35,06	0,76	3,11	9,68	-0,715	0,023	11,0	27	38	17
M70	CONDHT	51,00	....	....	....	....	....	....	....	....	1
M71	PERCONDHT	36,00	....	....	....	....	....	....	....	....	1
M38	CC	1476,10	32,73	103,49	10710.	0,488	0,730	349,0	1336	1685	10

Table 7 Statistics of the Epipalaeolithic skull samples from the Near East; males; indices and CC (file DATBAMZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
LBI	M8/M1x100	72,01	0,98	4,39	19,29	-0,788	0,276	15,3	64,7	80	20
LHI	M17/M1x100	71,96	1,71	5,14	26,42	-1,449	-0,037	14,8	64,4	79,2	9
BHI	M17/M8x100	99,16	2,07	6,22	38,70	-1,117	0,245	18,7	90,4	109,1	9
LOHI	M20/M1x100	62,65	0,83	3,62	13,09	0,514	-0,601	14,4	53,9	68,3	19
BOHI	M20/M8x100	86,97	1,19	5,05	25,46	0,587	0,167	21,2	75,7	96,9	18
TFI	M9/M8x100	71,55	1,50	5,99	35,82	0,168	-0,542	22,7	58,1	80,8	16
OGI	M48/M45x100	49,60	1,14	3,61	13,01	-0,215	0,898	10,1	45,5	55,6	10
JFI	M9/M45x100	73,41	1,45	5,03	25,34	-1,290	0,496	14,6	66,9	81,5	12
NAI	M54/M55x100	49,82	1,73	5,47	29,93	2,290	-1,174	19,9	37,5	57,4	10
ORI	M52/M51x100	73,97	1,42	5,49	30,08	4,487	1,616	23,1	66,7	89,7	15
GAI	M63/M62x100	76,91	1,26	2,52	6,37	-0,060	0,191	6,0	74	80,0	4
CM	MARTIN 38	1479,82	23,60	100,1	10027,	0,053	0,725	349,	1335,	1685,	18

Table 6 Statistics of the Epipalaeolithic skull samples from the Near East; females (file DATBAMZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
M1	GLOP	182,88	3,31	9,37	87,84	-0,851	0,281	28,0	170	198	8
M8	EUEU	138,50	2,43	6,87	47,14	-1,641	0,297	18,0	131	149	8
M9	FTFT	94,50	1,13	3,21	10,29	1,658	1,195	10,0	91	101	8
M17	BABR	133,00	....	....	....	....	....	....	....	....	1
M20	POBR	116,56	1,45	4,36	19,03	0,111	0,793	13,0	112	125	9
M45	ZYZY	130,00	6,00	8,49	72,00	....	....	12,0	124	136	2
M48	NAPR	62,75	2,59	5,19	26,92	-3,110	0,457	11,0	58	69	4
M51	MFEC	40,30	1,46	3,27	10,70	-1,657	-0,357	8,0	36	44	4
M52	PERMFEC	28,43	0,72	1,90	3,62	1,306	-0,660	6,0	25	31	7
M54	ALAL	27,75	1,55	3,10	9,58	0,758	1,138	7,0	25	32	4
M55	NANS	46,75	1,38	2,75	7,58	-3,033	0,323	6,0	44	50	4
M66	GOGO	89,00	2,84	6,96	48,40	-0,785	0,011	18,0	81	99	6
M7	BAO	35,00	....	....	....	....	....	....	....	....	1
M10	COCO	117,67	5,60	13,71	188,27	2,618	1,011	42,0	100	142	6
M12	ASTAST	112,00	....	....	....	....	....	....	....	....	1
M23	HORUMF	495,00	5,00	8,66	75,00	....	-1,732	15,0	485	500	3
M27	BRLARC	125,50	3,52	7,05	49,67	1,789	0,823	17,0	118	135	4
M28	LAOARC	116,00	5,00	7,07	50,00	....	....	10,0	111	121	2
M47	NAGN	110,33	4,06	7,02	49,33	....	-0,423	14,0	103	117	3
M62	OLSTA	44,00	....	....	....	....	....	....	....	....	1
M65	KDLKDL	112,50	1,50	2,12	4,50	....	....	3,0	111	114	2
M69	IDGN	31,67	1,41	3,45	11,87	0,814	-0,678	10,0	26	36	6
M38	CC	1336,67	23,51	40,70	1658	....	-1,615	75,0	1290	1365	3

Table 8 Statistics of the Epipalaeolithic skull sample from the Near East; females; indices and CC (file DATBAMZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
LBI	M8/M1x100	75,92	1,96	5,55	30,83	-1,220	-0,220	15,4	68,2	83,5	8
LHI	M17/M1x100	70,00	....	....	....	....	....	....	....	....	1
BHI	M17/M8x100	89,26	....	....	....	....	....	....	....	....	1
LOHI	M20/M1x100	63,88	1,18	3,33	11,10	-0,869	-0,801	8,5	59,0	67,4	8
BOHI	M20/M8x100	84,41	2,03	5,73	32,88	-0,410	-0,087	17,4	75,2	92,6	8
TFI	M9/M8x100	70,45	1,09	2,68	7,18	-0,671	-0,976	6,5	66,2	72,7	6
OGI	M48/M45x100	50,74	....	....	....	....	....	....	....	....	1
JFI	M9/M45x100	72,53	4,89	6,91	47,75	....	....	9,77	67,7	77,4	2
NAI	M54/M55x100	57,64	0,44	0,77	0,59	....	....	1,52	56,8	58,3	3
ORI	M52/M51x100	70,51	1,17	2,62	6,87	-2,923	0,503	5,50	68,2	73,7	5
CF	MARTIN 38	1404,26	32,82	92,83	8617,	-1,316	0,413	259,	1289,	1549,	8

Table 9 Statistics of the Iberomaurusian, Capsian and Columnatian skull sample from North Africa; males (file DATBANZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
M1	GLOP	193,72	0,90	6,17	38,07	0,334	0,158	29,0	178	207	47
M8	EUEU	145,21	0,78	5,42	29,36	0,081	-0,187	26,0	133	159	48
M9	FTFT	96,30	1,04	6,90	47,66	0,029	0,195	34,0	80	114	44
M17	BABR	142,35	1,14	5,46	29,78	0,924	-0,770	23,0	128	151	23
M20	POBR	119,27	0,78	5,20	29,99	-0,204	-0,161	22,0	107	129	44
M45	ZYZY	143,18	1,02	6,45	41,54	0,106	-0,712	25,0	127	152	24
M48	NAPR	69,50	0,62	3,83	14,69	0,304	-0,351	17,0	60	77	38
M51	MFEC	42,31	0,34	2,00	3,99	-0,560	-0,112	8,0	38	46	35
M52	PERMFEC	31,54	0,34	1,97	3,88	-0,339	0,246	8,5	28	36	34
M54	ALAL	28,11	0,34	2,01	4,04	1,170	-0,668	9,5	22	32	35
M55	NANS	52,99	0,45	2,66	7,05	0,080	0,088	12,0	47	59	35
M66	GOGO	114,44	1,34	5,35	28,66	-0,432	-0,674	17,0	104	121	16
M5	BANA	107,30	1,33	6,38	40,68	0,865	-0,288	29,0	91	120	23
M7	BAO	37,38	0,98	3,09	9,53	0,476	-0,449	10,7	31	42	10
M10	COCO	121,42	0,94	5,62	31,62	-0,126	-0,181	25,0	109	134	36
M11	AUAU	120,60	1,68	6,49	42,11	1,684	-1,176	24,0	104	128	15
M12	ASTAST	112,07	0,98	3,65	13,30	-0,850	0,011	12,0	106	118	14
M23	HORUMF	543,87	2,67	16,44	270,33	0,733	-0,673	76,0	500	576	38
M27	BRLARC	133,87	1,08	7,25	52,53	0,452	0,468	33,0	120	153	45
M28	LAOARC	123,08	1,08	6,84	46,74	0,048	0,406	32,0	108	140	40
M40	BAPR	101,37	1,54	6,71	45,02	-0,282	0,018	26,0	88	114	19
M44	EKEK	105,22	1,26	3,77	14,19	-0,520	-0,294	12,0	99	111	9
M47	NAGN	119,87	1,32	5,13	26,27	-0,540	-0,661	16,0	110	126	15
M62	OLSTA	48,14	0,55	1,46	2,14	-1,544	-0,337	04,0	46	50	7
M63	MAPABR	45,91	0,86	3,11	9,64	-0,863	0,321	10,3	41	51	13
M65	KDLKDL	126,67	1,87	6,49	42,06	-0,494	0,232	21,0	117	138	12
M69	IDGN	37,00	0,87	4,06	16,48	-0,250	-0,254	16,0	28	44	22
M70	CONDHT	68,26	1,00	4,37	19,09	0,001	0,596	16,0	62	78	19
M71	PERCONDHT	39,39	0,76	3,24	10,49	-0,218	0,623	11,0	35	46	18
M38	CC	1601,64	16,05	96,29	9272,	-0,978	-0,288	354,0	1420	1774	36

Table 11 Statistics of the Iberomaurusian, Capsian and Columnatian skull sample from North Africa; males; indices and CC.

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
LBI	M8/M1x100	75,06	0,48	3,26	10,61	0,800	-0,411	16,8	65,2	82	46
LMI	M17/M1x100	74,02	0,46	2,19	4,790	-0,704	-0,288	7,7	70,0	77,6	23
BHI	M17//M8x100	96,92	0,99	4,65	21,58	-0,312	0,483	16,8	89,,5	106,3	22
LOHI	M20/M1x100	61,78	0,42	2,78	7,70	0,309	-0,262	13,2	55,1	68,3	43
BOHI	M20/M8x100	82,38	0,647	4,29	18,40	-0,136	-0,228	19,8	73,0	92,8	44
TFI	M9/M8x100	66,60	0,70	4,57	20,90	0,020	-0,030	20,7	54,8	75,5	43
OGI	M48/M45x100	48,58	0,58	3,25	10,58	-0,004	-0,100	14,3	40,8	55,1	32
JFI	M9/M45x100M	68,32	1,00	5,72	32,66	0,177	0,281	25,4	57,2	82,7	33
NAI	M54/55x100	53,13	0,62	3,52	12,38	-1,068	0,126	12	46,8	58,8	32
ORI	M52/M51x100	74,79	0,87	5,09	25,91	-0,533	0,406	19,4	65,9	85,4	34
GAI	M63/M62x100	96,85	3,15	7,71	59,50	-1,941	0,291	18,6	87,8	18,6	6
CM	MARTIN 38	1583,71	13,27	87,0	7566,	0,127	0,082	396,	1420,	1816,	43

Table10 Statistics of the Iberomaurusian, Capsian and Columnatian skull sample from North Africa; females (file DATBAMZ).

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
M1	GLOP	182,53	1,36	7,68	59,03	5,060	-1,620	42,0	154	196	32
M8	EUEU	140,73	0,92	5,01	25,10	0,377	0,380	22,0	132	154	30
M9	FTFT	96,23	1,13	6,17	38,12	0,414	0,094	29,0	82	111	30
M17	BABR	134,81	2,03	8,13	66,16	-0,376	-0,190	30,0	118	148	16
M20	POBR	114,48	1,01	4,85	23,53	-0,607	-0,069	18,0	105	123	23
M45	ZYZY	131,76	1,80	8,23	67,69	0,196	-0,611	32,0	113	145	21
M48	NAPR	64,42	1,25	5,45	29,70	-0,414	0,176	21,0	54	75	19
M51	MFEC	40,71	0,53	2,33	5,43	-0,107	-0,247	9,0	36	45	19
M52	PERMFEC	30,79	0,52	2,38	5,64	-0,777	0,497	8,0	28	36	21
M54	ALAL	26,55	0,64	2,80	7,85	0,576	-1,010	10,0	20	30	19
M55	NANS	49,28	0,97	4,13	17,04	-0,344	-0,731	14,0	40	54	18
M66	GOGO	100,35	2,43	10,01	100,24	2,493	1,255	42,0	86	128	17
M5	BANA	98,07	2,43	9,39	88,21	-0,820	-0,113	33,0	82	115	15
M7	BAO	35,58	1,12	2,23	4,99	3,104	-1,751	4,7	32	37	4
M10	COCO	119,39	1,10	5,63	31,69	1,461	0,347	26,0	107	133	26
M11	AUAU	112,57	1,51	3,99	15,95	1,285	-1,294	11,0	105	116	7
M12	ASTAST	103,57	0,87	2,30	5,29	2,619	-1,453	7,0	99	106	7
M23	HORUMF	517,64	3,58	16,78	281,67	1,530	-0,730	73,0	471	544	22
M27	BRLARC	129,21	1,15	6,06	36,77	-0,492	0,030	24,0	119	143	28
M28	LAOARC	117,75	1,97	8,81	77,57	0,210	0,457	36,0	102	138	20
M40	BAPR	93,54	2,52	9,07	82,27	1,497	-0,747	36,0	74	110	13
M44	EKEK	98,40	1,40	3,13	9,80	0,002	0,606	8,0	95	103	5
M47	NAGN	112,50	3,52	9,96	99,14	-0,980	0,507	28,0	101	129	8
M62	OLSTA	42,25	1,25	2,50	6,25	4,000	2,000	5,0	44	49	4
M63	MAPABR	42,00	1,20	3,18	10,08	-0,608	-0,437	9,00	37	46	7
M65	KDLKDL	119,23	1,61	5,82	33,86	2,579	1,498	22,0	112	134	13
M69	IDGN	33,58	0,90	3,91	15,31	2,287	0,847	18,0	27	45	19
M70	CONDHT	60,53	1,32	5,42	29,39	1,576	1,034	22,0	52	74	17
M71	PERCONDHT	34,80	0,71	3,32	11,02	1,732	1,019	15,0	29	44	22
M38	CC	1391,85	34,72	155,25	24102,	-0,348	0,263	285,0	1112	1697	20

Table 12 Statistics of the Iberomaurusian, Capsian and Columnatian skull sample from North Africa; females; indices and CC.

VARIABLE		MEAN	STDERR	STDDEV	VARIA	KURT	SKEW	RANGE	MIN	MAX	n
LBI	M8/M1x100	77,37	0,78	4,17	17,42	-0,321	0,445	16,4	70,6	87,0	29
LMI	M17/M1x100	74,67	1,14	4,57	20,85	1,060	0,952	17,5	68,2	85,7	16
BHI	M17/M8x100	95,15	1,13	4,51	20,29	-0,058	-0,524	16,6	85,5	102,1	16
LOHI	M20/M1x100	62,70	0,57	2,68	7,16	-0,534	0,161	10,3	57,8	68,2	22
BOHI	M20/M8x100	80,98	0,79	3,70	13,70	-0,815	0,266	13,0	74,8	87,9	22
TFI	M9/M8x100	68,46	0,78	4,13	17,01	-0,528	0,231	16,0	60,6	76,5	28
OGI	M48/M45x100	48,78	0,63	2,66	7,09	0,629	0,991	9,9	45,5	55,4	18
JFI	M9/M45x100M	74,29	1,25	5,72	32,70	-0,482	0,374	20,4	65,0	85,4	21
NAI	M54/55x100	54,79	1,15	4,87	23,69	0,132	0,443	19,8	46,2	65,9	18
ORI	M52/M51x100	75,58	1,29	5,60	31,41	0,026	-0,765	19,6	63,3	82,9	19
GAI	M63/M62x100	88,70	2,12	4,23	17,90	1,565	0,691	10,23	84,1	94,3	4
CF	MARTIN 38	1405,31	20,64	94,56	8942,	-1,299	0,117	298,	1251,	1549,	21

Table 13 Comparison of the classifications of indices (means) of the male skulls from Europe, the Near East and North Africa.

INDEX	WESTEUROPA	OSTEUROPA	NAHER OSTEN	NORDAFRIKA
LBI	dolichocran	dolichocran	dolichocran	----> mesocran
LHI	orthocran	orthocran	orthocran	orthocran
BHI	akrocran	akrocran	akrocran	----> metriocran
LOHI	orthocran	orthocran	orthocran	orthocran
BOHI	akrocran	akrocran	akrocran	----> metriocran
TF(P)I	eurymetop	eurymetop	eurymetop	----> metriometop
OGI	mesen	mesen	----> euryen	----> euryen
NAI	mesorrhin	mesorrhin	mesorrhin	---->chamaerrhin
ORI	chamaeconch	chamaeconch	chamaeconch	chamaeconch
GAI	brachystaphylin	(mesostaphylin)	(leptostaphylin)	(brachystaphylin)

Table 14 Comparison of the classifications of indices (means) of the female skull from Europe, the Near East and North Africa.

INDEX	WESTEUROPA	OSTEUROPA	NAHER OSTEN	NORDAFRIKA
LBI	dolichocran	dolichocran	---->mesocran	----> mesocran
LHI	orthocran	orthocran	....	orthocran
BHI	akrocran	akrocran	....	----> metriocran
LOHI	orthocran	---->hypsicran	---->hypsicran	orthocran
BOHI	metriocran	metriocran	metriocran	metriocran
TF(P)I	eurymetop	eurymetop	eurymetop	----> metriometop
OGI	euryen	---->mesen	....	euryen
NAI	mesorrhin	mesorrhin	(chamaerrhin)	----> chamaerrhin
ORI	chamaeconch	chamaeconch	(chamaeconch)	chamaeconch
GAI	(mesostaphylin)	(brachystaphylin)	....	(brachystaphylin)

Table 15 Stepwise DFA (GEODIS-1): discrimination of the regional samples from Europe and North Africa (Near East "ungrouped); male sample (n = 175,p = 15; file REGBAMZ)

Means																
Sample	n	M1	M8	M9	M17	M20	M45	M48	M51	M52	M54	M55	M5	M10	M27	M28
Europe	119	192,70	138,10	98,56	140,53	119,55	138,35	70,45	42,94	31,83	25,47	52,37	106,4	117,2	132,7	121,00
N-Africa	38	193,95	145,08	97,34	141,53	119,92	143,18	70,08	42,33	31,62	27,93	53,09	107,7	122,1	133,00	122,8
Total	157	193,00	139,79	98,27	140,77	119,64	139,52	70,36	42,79	31,72	26,07	52,54	106,7	118,4	132,80	121,4

Standard dev.															
Sample	M1	M8	M9	M17	M20	M45	M48	M51	M52	M54	M55	M5	M10	M27	M28
Europe	7,27	6,18	5,48	6,60	5,57	7,18	4,94	2,63	2,74	2,27	3,55	7,39	6,03	7,30	6,25
N-Africa	5,17	4,98	6,58	4,52	5,04	6,11	3,61	1,92	1,90	1,96	2,61	5,32	5,11	6,30	6,07
Total	6,83	6,61	5,76	6,16	5,44	7,22	4,65	2,49	2,56	2,43	3,36	6,95	6,17	7,05	6,23

PARAMETERS of the Fcn

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	DF	Sig.
					0	0,503	103,076	10	0.000
1*	.9881	100.00	100.00	0.7050					

STANDARDIZED and UNSTANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS			
M8	.74085	M8	.1252901
M9	-.59963	M9	-.1041293
M17	.29390	M17	.4767304E--01
M20	-.42180	M20	-.7739117E--01
M45	.29412	M45	.4238787E-01
M48	-.37451	M48	-.8038636E-01
M51	-.47018	M51	-.1894346
M54	.70958	M54	.3225712
M5	.31605	M5	.4544345E-01
M28	.30512	M28	.4914360E--01
		(constant)	-16.11125

ACTUAL GROUP	N° of cases	PREDICTION Europe	North africa
EUROPE	119	107 89.9%	12 10.1%
NORTH AFRICA	38	8 21.1%	30 78.9%
"UNGROUPED CASES" PROTOCROMAG./NATUFIANS	18	14 (Nat.) 77.8%	4 (PC) 22.2%
CORRECT CLASSIFIED "GROUPED CASES"			87.3%

Table 15 (continued), Stepwise DFA (GEODIS-1) : discrimination of the regional samples from Europe and North Africa (Near East "ungrouped"); male sample (n=175, p=15; file REGBAMZ) Classification of the individuals : Europe=1; North Africa= 2.

Case Number	Mis Val Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P (G/D)	Discrim Scores
1	QAFZEH 6	Ungrpd	2	.3107	.5795	1	.4205	.7340
2	SKHUL IV	Ungrpd	2	.8795	.9096	1	.0904	1.5962
3	SKHUL V	Ungrpd	2	.5034	.7532	1	.2468	1.0786
4	SKHUL IX	Ungrpd	2	.5111	.9848	1	.0152	2.4050
5	ARENE CANDIDE 1	1	1	.9266	.9464	2	.0536	-.6502
6	BARMA GRANDE 5	1	1	.3604	.9916	2	.0084	-1.4728
7	CHANCELADE 1	1	1	.4995	.7506	2	.2494	.1171
8	CHEDDAR	1	1	.4753	.7335	2	.2665	.1557
9	COMBE CAPELLE	1	1	.7037	.8559	2	.1441	-.1778
10	CRO-MAGNON 1	1	1	.7843	.8836	2	.1164	-.2844
11	GROTTE D. ENF.	1**	2	.6277	.8235	1	.1765	1.2628
12	KOSTENKI 2	1	1	.3394	.9923	2	.0077	-1.5135
13	OBERKASSEL 1	1	1	.8873	.9519	2	.0481	-.6998
14	PAVLOV 1	1	1	.5825	.8008	2	.1992	-.0084
15	PREDMOST 3	1	1	.7535	.8738	2	.1262	-.2442
16	PREDMOST 9	1	1	.5578	.7871	2	.2129	.0279
17	URTIAGA 1	1	1	.1802	.9968	2	.0032	-1.8982
18	PADERBORN	1**	2	.9835	.9374	1	.0626	1.7685
19	VOLOSSKOJE 1	1	1	.7206	.9702	2	.0298	-.9157
20	VOLOSSKOJE 2	1	1	.6035	.9793	2	.0207	-1.0775
21	VOLOSSKOJE 3	1	1	.1529	.9974	2	.0026	-1.9875
22	VOLOSSKOJE 4	1	1	.829	.9987	2	.0013	-2.2922
23	VOLOSSKOJE 5	1	1	.2004	.9964	2	.0036	-1.8387
24	VOLOSSKOJE 6	1**	2	.6661	.8407	1	.1593	1.3163
25	VASILEVKA 1 3	1	1	.8500	.9023	2	.0977	-.3690
26	VASILEVKA 1 4	1**	2	.5679	.7928	1	.2072	1.1767
27	VASILEVKA 1 6	1	1	.8810	.9100	2	.0900	-.4084
28	VASILEVKA 1 5	1	1	.4948	.7473	2	.2527	.1246
29	VASILEVKA 1 10	1	1	.2664	.9946	2	.0054	-1.6694
30	VASILEVKA 1 17	1	1	.8905	.9122	2	.0878	-.4205
31	VASILEVKA 1 2	1**	2	.2562	.5101	1	.4899	.6124
32	VASILEVKA 1 13	1	1	.6074	.9790	2	.0210	-1.8387
33	VASILEVKA 3 8	1	1	.3740	.9911	2	.0089	-1.4471
34	VASILEVKA 3 12	1	1	.7945	.8868	2	.1132	-.2977
35	VASILEVKA 3 23	1	1	.9738	.9390	2	.0610	-.5910
36	VASILEVKA 3 24	1	1	.2461	.9952	2	.0048	-1.7179
37	VASILEVKA 3 25	1**	2	.8674	.9067	1	.0933	1,5809
38	VASILEVKA 3 26	1	1	.4125	.9895	2	.0105	-1.3776
39	VASILEVKA 3 28	1	1	.6035	.8117	2	.1883	-.0388
40	VASILEVKA 3 31	1	1	.9275	.9463	2	.0537	-.6491
41	VASILEVKA 3 33	1	1	.0518	.9992	2	.0008	-2.5029
42	VASILEVKA 3 34	1**	2	.3470	.6202	1	.3798	.8074
43	VASILEVKA 3 35	1	1	.6645	.8400	2	.1600	-1244
44	VASILEVKA 3 36	1	1	.1031	.9984	2	.0016	-2.1879
45	VASILEVKA 3 37	1	1	.0813	.9987	2	.0013	-2.3012
46	VASILEVKA 3 38	1	1	.3840	.9907	2	.0093	-1.4286
47	VASILEVKA 3 42	1	1	.3952	.6677	2	.3323	-.2922
48	VASILEVKA 3 1953	1	1	.6744	.9741	2	.0259	-.9783
49	MURZAK KOBA 2	1	1	.8707	.9075	2	.0925	-.3953
50	FATMA KOBA 1	1	1	.3285	.6000	2	.4000	.4191
51	KIRSNA 1	1	1	.8727	.9080	2	.0920	-.3979
52	BOTTENDORF 1	1	1	.8538	.9562	2	.0438	-.7424
53	FALLAH 14	Ungrpd	1	.3162	.5860	2	.4140	.4442
54	MALLAHA 37	Ungrpd	1	.7606	.8761	2	.1239	-.2535
55	ERG. EL AHMAR	Ungrpd	1	.3236	.9929	2	.0071	-1.5452
56	SAN TEODORO 1	1	1	.6778	.9738	2	.0262	-.5289
57	SAN TEODORO 2	1	1	.9767	.9303	2	.0697	-.9736
58	SAN TEODORO 3	1	1	.5140	.9847	2	.0153	-1.2108
59	LE RASTEL 1	1	1	.8738	.9537	2	.0463	-.7169

Table 15 (continued)

Case Number	Mis Val Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P (G/D)	Discrim Scores
60	GRAMAT 1	1	1	.7771	.8814	2	.1186	-.2750
61	AFALOU 1	2	2	.5130	.7596	1	.2404	1.0937
62	AFALOU 2	2	2	.4582	.9875	1	.0125	2.4896
63	AFALOU 5	2	2	.1252	.9980	1	.0020	3.2813
64	AFALOU 9	2**	1	.3170	.5870	2	.4130	.4424
65	AFALOU 10	2	2	.3757	.9910	1	.0090	2.6336
66	AFALOU 11	2	2	.2306	.9956	1	.0044	2.9467
67	AFALOU 12	2	2	.5799	.9808	1	.0192	2.3013
68	AFALOU 14	2	2	.2853	.9941	1	.0059	2.8162
69	AFALOU 15	2	2	.5544	.7851	1	.2149	1.1566
70	AFALOU 17	2	2	.4055	.9898	1	.0102	2.5796
71	AFALOU 20	2**	1	.3385	.6111	2	.3889	.3989
72	AFALOU 23	2**	1	.3527	.6262	2	.3738	.3712
73	AFALOU 25	2	2	.2609	.5166	1	.4834	.6236
74	AFALOU 31	2	2	.4384	.7051	1	.2949	.9730
75	AFALOU 36	2	2	.8509	.9025	1	.0975	1.5598
76	AFALOU 40	2	2	.5263	.9840	1	.0160	2.3814
77	AFALOU 43	2**	1	.5084	.7565	2	.2435	.1031
78	AFALOU 46	2**	1	.5663	.7918	2	.2082	.0155
79	AFALOU 47	2	2	.1992	.9964	1	.0036	3.0317
80	AFALOU 48	2	2	.4827	.9863	1	.0137	2.4498
81	AFALOU 28	2	2	.7413	.9683	1	.0317	2.0779
82	AFALOU 24	2	2	.3612	.6348	1	.3652	.8347
83	TAFORALT 1	2	2	.3131	.9932	1	.0068	2.7565
84	TAFORALT 9	2	2	.2866	.9940	1	.0060	2.8133
85	TAFORALT 14	2	2	.4505	.9879	1	.0121	2.5024
86	TAFORALT 11	2	2	.4378	.9884	1	.0116	2.5237
87	TAFORALT 12	2**	1	.4643	.7253	2	.2747	.1737
88	TAFORALT 121	2	2	.5721	.9813	1	.0187	2.3128
89	TAFORALT 15	2	2	.5701	.9814	1	.0186	2.3157
90	TAFORALT 151	2	2	.1576	.9973	1	.0027	3.1608
91	TAFORALT 152	2	2	.2054	.9962	1	.0038	3.0141
92	TAFORALT 20	2**	1	.4737	.7324	2	.2676	.1583
93	HOEDIC 6	1**	2	.3411	.6139	1	.3861	.7959
94	HOEDIC 9	1	1	.5840	.9806	2	.0194	-1.1057
95	BIRSMATTEN-B. 1	1	1	.3547	.9918	2	.0082	-1.4835
96	KAUFERTSBERG	1	1	.6646	.8401	2	.1599	-.1246
97	HOHLENSTEIN 1	1**	2	.8811	.9100	1	.0900	1.5982
98	URTIAGA ML.	1	1	.7105	.8585	2	.1415	-.1870
99	MECHTA EL ARBI	2	2	.8501	.9023	1	.0977	1.5588
100	COLUMNATA A	2	2	.2194	.9959	1	.0041	2.9759
101	COLUMNATA B	2	2	.3142	.5837	1	.4163	.7414
102	COLUMNATA C	2	2	.6317	.9773	1	.0227	2.2271
103	COLUMNATA D	2**	1	.7953	.8870	2	.1130	-.2987
104	KEF OUM TOUIZA	2	2	.4075	.6789	1	.3211	.9195
105	DNJEPOPETROVSK	1	1	.4165	.6868	2	.3132	.2544
106	ZVEJNIEKI 2	1	1	.6374	.9769	2	.0231	-1.0295
107	ZVEJNIEKI 17	1	1	.8763	.9534	2	.0466	-.7137
108	ZVEJNIEKI 35	1	1	.2408	.9953	2	0047	-1.7312
109	ZVEJNIEKI 37	1	1	.9781	.9383	2	0617	-.5856
110	ZVEJNIEKI 71	1	1	.3298	.9927	2	.0073	-1.5327
111	ZVEJNIEKI 74	1	1	.1978	.9964	2	-0036	-1.8461
112	ZVEJNIEKI 122	1	1	.3729	.6466	2	.3534	.3329
113	ZVEJNIEKI 154	1	1	.7504	.9675	2	.0325	-.8763
114	ZVEJNIEKI 165	1	1	.6172	.9784	2	.0216	-1.0580
115	ZVEJNIEKI 170	1	1	.2206	.9959	2	.0041	-1.7829
116	ZVEJNIEKI 0	1	1	.3055	.9935	2	.0065	-1.5829
117	M. EL WAD 1	Ungrpd	1	.2578	.9949	2	.0051	-1.6897
118	M. EL WAD 4	Ungrpd	1	.7311	.9643	2	.0307	-.9018

Table 15 (continued)

Case Number	Mis Val Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Group	Highest P (G/D)	Discrim Scores
119	M. EL WAD 7	Ungrpd	1	.5597	.7881	2	.2119	.0252
120	M. EL WAD 8	Ungrpd	1	.9411	.9442	2	.0558	-.6320
121	M. EL WAD 35	Ungrpd	1	.8993	.9143	2	.0857	-.4316
122	VLASAC 4A	1**	2	.4289	.6973	1	.3027	.9568
123	VLASAC 6	1	1	.1703	.9970	2	.0030	-1.9295
124	VLASAC 14	1	1	-7041	.8560	2	.1440	-.1783
125	VLASAC 17	1	1	.2536	.5066	2	.4934	.5834
126	VLASAC 27	1	1	.9978	.9342	2	.0658	-.5554
127	VLASAC 31	1	1	.2599	.5152	2	.4848	.5685
128	VLASAC 41	1	1	.5762	.9811	2	.0189	-1.1170
129	VLASAC 43	1	1	.9645	.9280	2	.0720	-.5137
130	VLASAC 45	1	1	.3412	.6139	2	.3861	.3937
131	VLASAC 56	1	1	.6848	.9733	2	.0267	-.9640
132	VLASAC 60	1	1	.7051	.8564	2	.1436	-.1797
133	VLASAC 69	1	1	.9137	.9175	2	.0825	-.4497
134	VLASAC 69A	1**	2	.3744	.6481	1	.3519	.8596
135	VLASAC 78A	1**	2	.9882	.9366	1	.0634	1.7626
136	VLASAC 79	1	1	.2361	.9955	2	.0045	-1.7429
137	VLASAC 82	1	1	.3663	.6400	2	.3600	.3453
138	BLEIVIK	1	1	.6166	.8182	2	.1818	-.0574
139	MELBY	1	1	.9667	.9402	2	.0598	-.5999
140	CULOZ 1	1	1	.4744	.7328	2	.2672	.1573
141	CULOZ 2	1	1	.0533	.9992	2	.0008	-2.4905
142	ROCHEREIL	1	1	.8727	.9538	2	.0462	-.7183
143	STORA BJERS	1	1	.1682	.9971	2	.0029	-1.9362
144	LOSCHBOUR	1	1	.2514	.5035	2	.4965	.5888
145	ST. RABIER	1	1	.7983	.8879	2	.1121	-.3025
146	VEDBAEK 3	1	1	.4095	.6806	2	.3194	.2667
147	KORSOR NOR	1	1	.9317	.9214	2	.0786	-.4724
148	ZAWI CHEMI	Ungrpd	1	.0379	.9994	2	.0006	-2.6340
149	KILADA IN ARGO	1	1	.8566	.9040	2	.0960	-.3774
150	ARENE CANDIDE 4	1	1	.1683	.9971	2	.0029	-1.9357
151	ARENE CANDIDE 5	1	1	.8844	.9523	2	.0477	-.7035
152	LE BICHON 1	1	1	.7488	.8722	2	.1278	-.4724
153	FRANCHTHI 1	1	1	.7557	.8745	2	.1255	-.2470
154	FRANCHTHI 2	1	1	.0788	.9988	2	.0012	-2.3157
155	McARTHUR's C.216	1	1	.9204	.9189	2	.0811	-.2470
156	MARITZA 2	1	1	.1787	.9969	2	.0031	-1.9029
157	ARRUDA 2	1	1	.2113	.9961	2	.0039	-1.8082
158	ARRUDA 6	1	1	.4845	.9862	2	.0138	-1.2571
159	OFNET 2484	1	1	.2649	.5219	2	.4781	.5568
160	OFNET 2493	1	1	.8232	.9598	2	.0402	-.7815
161	OFNET 2596	1	1	.4958	.7480	2	.2520	.1230
162	TEVIEC 2	1	1	.9615	.9410	2	.0590	-.6064
163	TEVIEC 4	1	1	.7079	.9713	2	.0287	-.9328
164	TEVIEC 7	1	1	.5566	.7864	2	.2136	.0297
165	TEVIEC 8	1	1	.5640	.7906	2	.2094	.0187
166	TEVIEC 9	1	1	.7421	.9682	2	.0318	-.8872
167	TEVIEC 11	1	1	.3080	.5763	2	.4237	.4614
168	TEVIEC 13	1	1	.8786	.9531	2	.0469	-.7109
169	TEVIEC 16	1	1	.8807	.9528	2	.0472	-.7082
170	HAYONIM H4	Ungrpd	1	.5976	.8087	2	.1913	-.0303
171	HAYONIM H19	Ungrpd	1	-5540	.7848	2	.2152	.0337
172	HAYONIM H20	Ungrpd	1	.8391	.9884	2	.1006	-.3551
173	NAHAL OREN	Ungrpd	1	.4567	.9876	2	.0124	-1.3024
174	NAHAL OREN	Ungrpd	1	.7997	.9625	2	.0375	-.8119
175	PADINA	1	1	.5667	.9817	2	.0183	-1.1311

Table 16 Stepwise DFA (GEODIS-2) : discrimination of the regional samples from Europe and North Africa (Near East "ungrouped"); female sample (n = 103, p = 15; file REGBAMZ)

Means

Sample	n	M1	M8	M9	M17	M20	M45	M48	M51	M52	M54	M55	M5	M10	M27	M28
Europe	79	182.08	135.53	94.41	134.19	115.11	129.58	65.61	40.77	30.76	24.06	49.39	98.72	113.23	128.96	117.05
N-Africa	38	181.52	140.86	96.76	135.00	114.24	131.62	64.62	41.01	30.78	26.67	49.21	98.29	119.62	129.14	116.52
Total	100	181.96	136.65	94.90	134.36	114.93	130.01	65.40	40.82	30.76	24.61	49.35	98.63	114.57	129.00	116.94

Standard dev.

Sample	M1	M8	M9	M17	M20	M45	M48	M51	M52	M54	M55	M5	M10	M27	M28
Europe	6.55	6.30	5.46	7.21	4.30	6.03	4.36	2.32	2.53	1.71	3.57	5.75	5.73	8.54	6.39
N-Africa	8.83	5.69	5.86	7.84	5.08	7.56	5.16	2.05	2.35	2.27	3.83	8.02	5.52	6.33	7.29
Total	7.04	6.53	5.60	7.32	4.48	6.39	4.53	2.26	2.48	2.12	3.61	6.25	6.23	8.10	6.55

PARAMETERS of the Fcn

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	DF	Sig.
					0	.6265	44.422	6	.0000
1*	.5962	100.00	100.00	.6111					

STANDARDIZED and UNSTANDARDIZED DISCRIMINANT FUNCTION COEFFICIENTS			
M1	-.50319	M1	-.7112769E-01
M17	.25681	M17	.3496057E-01
M20	-.54105	M20	-.1205600
M54	.83336	M54	.4532078
M10	.45469	M10	.7993606E-01
M27	.31752	M27	.3902594E-01
		(constant)	-3.242740

ACTUAL GROUP	N° of cases	PREDICTION Europe	North Africa
EUROPE	79	65 82.3%	14 17.7%
NORTH AFRICA	21	6 28.6%	15 71.4%
"UNGROUPED CASES" PROTOCROMAG./NATUFIANS 1 2	3	1 (Nat.) 33.3%	2 (nat./PC) 66.7%
CORRECT CLASSIFIED "GROUPED CASES"			80.0%

Table 16 (continued)

Case Number	Mis Val Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Group	Highest P (G/D)	Discrim Scores
176	QAFZEH 9	Ungrpd	2	.9171	.8271	1	.1729	1.3784
177	AVELINE's HOLE 9	1	1	.9749	.8605	2	.1395	-.4225
178	BRNO 3	1	1	.8764	.8862	2	.1138	-.5496
179	BRUNIQUEL 24	1	1	.0449	.9960	2	.0040	-2.3992
180	DOLNI VESTONICE 3	1	1	.3763	.5251	2	.4749	.4907
181	DURUTHY	1	1	.5506	.9469	2	.0531	-.9910
182	GR. D. ENFANTS 5	1**	2	.4264	.5666	1	.4334	.6871
183	MLADEC 1	1	1	.8114	.9010	2	.0990	-.6327
184	OBERKASSEL 2	1	1	.5936	.6813	2	.3187	.1395
185	ABRI PATAUD	1	1	.5967	.6831	2	.3169	.1350
186	PREDMOST 4	1**	2	.6296	.7018	1	.2982	1.0002
187	PREDMOST 5	1**	2	.4994	.6209	1	.3791	.8071
188	PREDMOST 10	1**	2	.8421	.8942	1	.1058	1.6817
189	ST GERMAIN 4	1	1	.1964	.9850	2	.0150	-1.6859
190	DOEBRITZ 1	1	1	.9972	.8525	2	.1475	-.3906
191	BINSHOF/SPEYER	1**	2	.4763	.6045	1	.3955	.7703
192	VOLOSSKOJE 7	1	1	.4117	.9645	2	.0355	-1.2151
193	VOLOSSKOJE 8	1	1	.4821	.9561	2	.0439	-1.0971
194	VOLOSSKOJE 9	1	1	.8011	.7838	2	.2162	-.1421
195	VASILEVKA 1 11	1	1	.5205	.9510	2	.0490	-1.0367
196	VASILEVKA 1 20	1	1	.8729	.8116	2	.1884	-.2341
197	VASILEVKA 3 10	1	1	.8381	.8951	2	.1049	-.5985
198	VASILEVKA 3 14	1	1	.4462	.5821	2	.4179	.3676
199	VASILEVKA 3 16	1	1	.3767	.9683	2	.0317	-1.2781
200	VASILEVKA 3 18	1	1	.4234	.9631	2	.0369	-1.1946
201	VASILEVKA 3 19	1	1	.0269	.9973	2	.0027	-2.6072
202	VASILEVKA 3 22	1	1	.0446	.9961	2	.0039	-2.4028
203	VASILEVKA 4 1	1	1	.6929	.9243	2	.0757	-.7890
204	MURZAK KOBA 1	1	1	.6557	.7159	2	.2841	.0518
205	ORTUCCHIO 1	1	1	.6238	.6986	2	.3014	.0963
206	AFALOU 3	2	2	.5717	.6681	1	.3319	.9169
207	AFALOU 18	2**	1	.5228	.6368	2	.3632	.2450
208	AFALOU 29	2	2	.6322	.9346	1	.0654	1.9611
209	AFALOU 30	2	2	.7201	.9193	1	.0807	1.8408
210	AFALOU 32	2	2	.9017	.8219	1	.1781	1.3590
211	AFALOU 13	2**	1	.4239	.5647	2	.4353	.4055
212	AFALOU 27	2	2	.0059	.9990	1	.0010	4.2334
213	AFALOU 34	2	2	.5638	.9450	1	.0550	2.0598
214	AFALOU 37	2	2	.5596	.9456	1	.0544	2.0659
215	AFALOU 38	2	2	.2106	.9839	1	.0161	2.7344
216	AFALOU 44	2**	1	.6791	.7280	2	.2720	.0196
217	AFALOU 8	2	2	.4137	.5565	1	.4435	.6651
218	TAFORALT 83	2**	1	.4152	.5577	2	.4423	.4206
219	TAFORALT 17	2	2	.2905	.9769	1	.0231	2.5396
220	TAFORALT 20	2	2	.9063	.8789	1	.1211	1.6002
221	TAFORALT 24	2**	1	.5875	.6776	2	.3224	.1484
222	TAFORALT 2500	2	2	.0923	.9928	1	.0072	3.1658
223	HOEDIC 1	1	1	.2993	.9761	2	.0239	-1.4320
224	HOEDIC 8	1	1	.8754	.8865	2	.1135	-.5509

Table 16 (continued)

Case Number	Mis Val Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Group	Highest P (G/D)	Discrim Scores
225	HOHLENSTEIN 2	1	1	.2855	.9774	2	.0226	-1.4621
226	DUERRENBERG 1	1	1	.9678	.8436	2	.1564	-.3537
227	URTIAGA 2	1**	2	.3823	.5303	1	.4697	.6089
228	MECHTA E. A. 332	2	2	.6892	.7331	1	.2669	1.0826
229	COLUMNATA 999E	2	2	.9964	.8523	1	.1477	1.478
230	COLUMNATA 922	2	2	.7287	.9177	1	.0823	1.8293
231	RACHGOUN	2**	1	.4497	.5847	2	.4153	.3619
232	LE CHEIX 1	1	1	.6530	.9312	2	.0688	-.8437
233	ZVEJNIEKI 9	1	1	.6319	.9346	2	.0654	-.8731
234	ZVEJNIEKI 16	1	1	.9295	.8313	2	.1687	-.3056
235	ZVEJNIEKI 57	1	1	.4232	.9632	2	.0368	-1.1950
236	ZVEJNIEKI 76	1	1	.5130	.9520	2	.0480	-1.0482
237	ZVEJNIEKI 121	1	1	.9224	.8747	2	.1253	-.4915
238	ZVEJNIEKI 140	1**	2	.4040	.5485	1	.4515	.6479
239	M. EL WAD 2	Ungrpd	2	.9322	.8722	1	.1278	1.5676
240	M. EL WAD 10	Ungrpd	1	.0422	.9962	2	.0038	-2.4253
241	VLASAC 2	1	1	.9653	.8428	2	.1572	-.3506
242	VLASAC 9	1**	2	.8410	.8945	1	.1055	1.6832
243	VLASAC 29	1**	2	.3542	.5055	1	.4945	.5560
244	VLASAC 36	1	1	.6719	.9279	2	.0721	-.8176
245	VLASAC 38	1	1	.9386	.8343	2	.1657	-.3170
246	VLASAC 40	1	1	.1111	.9914	2	.0086	-1.9874
247	VLASAC 46	1	1	.6007	.6854	2	.3146	.1293
248	VLASAC 48	1**	2	.8589	.8904	1	.1096	1.6603
249	VLASAC 55	1	1	.8112	.7879	2	.2121	-.1551
250	VLASAC 67	1	1	.7719	.7715	2	.2285	-.1042
251	VLASAC 70	1**	2	.6023	.9393	1	.0607	2.0036
252	VLASAC 77	1	1	.9999	.8533	2	.1467	-.3942
253	VLASAC 83	1	1	.8785	.8857	2	.1143	-.5470
254	BAEKASKOG	1	1	.9018	.8800	2	.1200	-.5174
255	KOELBJERG 1	1	1	.0619	.9949	2	.0051	-2.2614
256	RAVNSTRUP 2	1	1	.4375	.5754	2	.4246	.3823
257	MONTCLUS 1	1	1	.9942	.8550	2	.1450	-.4014
258	ARENE CANDIDE 3	1**	2	.5493	.6541	1	.3459	.8837
259	McARTHUR's C.215	1	1	.7764	.9084	2	.0916	-.6781
260	MALAURIE	1	1	.7194	.9195	2	.0805	-.7534
261	ARRUDA 5	1	1	.3508	.9710	2	.0290	-1.3272
262	ARRUDA 908	1	1	.1421	.9892	2	.0108	-1.8619
263	MOITA 4	1	1	.4642	.9583	2	.0417	-1.1260
264	MOITA 7	1	1	.3746	.9685	2	.0315	-1.2820
265	MOITA 16	1	1	.7261	.7509	2	.2491	-.0437
266	MOITA 17	1	1	.9416	.8353	2	.1647	-.3208
267	MOITA 18	1	1	.4643	.9583	2	.0417	-1.1258
268	MOITA 19	1	1	.6038	.9390	2	.0610	-.9131
269	OFNET 2497	1	1	.7963	.9042	2	.0958	-.6522
270	OFNET 2488	1**	2	.8228	.7926	1	.2074	1.2586
271	OFNET 2501	1	1	.6468	.7112	2	.2888	.0641
272	OFNET 2504	1	1	.8732	.8870	2	.1130	-.5536
273	TEVIEC 1	1	1	.7050	.7409	2	.2591	-.0155
274	TEVIEC 3	1	1	.9507	.8672	2	.1328	-.4559
275	TEVIEC 6	1	1	.4077	.5516	2	.4484	.4338
276	TEVIEC 14	1	1	.2681	.9789	2	.0211	-1.5016
277	TEVIEC 15	1	1	.6847	.7308	2	.2692	.0119
278	TEVIEC 18	1**	2	.6338	.7041	1	.2959	1.0061

Table 17 Stepwise DFA (GEODIS 3) : discrimination of the regional samples from Europe and North Africa (Near East "ungrouped"); male and female sample (n = 278, p = 7 indices, file REGBAMZ).

MEANS OF THE INDICES SAMPLE/VARIABLE	n	LBI	BHI	TFI	JFI	OGI	NAI	ORI
EUROPE	198	72,9	86,1	70,8	72,0	50,9	48,8	74,8
N-AFRICA	59	75,9	82,2	67,7	70,1	49,1	53,3	74,9
TOTAL	257	73,6	85,2	70,1	71,6	50,5	49,9	74,8

STANDARD DEVIATIONS SAMPLE/VARIABLE	n	LBI	BHI	TFI	JFI	OGI	NAI	ORI
EUROPE	198	4,14	5,46	3,86	4,18	3,65	4,57	6,50
N-AFRICA	59	3,91	3,95	4,36	6,27	3,03	4,04	5,16
TOTAL	257	4,27	5,40	4,18	4,79	3,59	4,82	6,21

PARAMETERS OF THE DISCRIMINANT FUNCTION

Fnc	Eigenval.	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	DF	Sig
1*	0,4118	100,00	100,00	.5401	0	0.7083	87.085	5	.0000

STANDARDIZED and UNSTANDERDIZED
DISCRIMINANT FUNCTION COEFFICIENTS

BHI	-.41645	BHI	-.8080842E-01
TFI	-.37951	TFI	-.9531835E-01
JFI	-.19125	JFI	-.4035796E-01
NAI	.84032	NAI	.1884754
ORI	.22824	ORI	.3669840E-01
		(constant)	4.307805

CLASSIFICATION RESULTS

ACTUAL GROUP	N° of cases	PREDICTION Europe	North Africa
EUROPE	198	146 73.7%	52 26.3%
NORTH AFRICA	59	14 23.7%	45 76.3%
"UNGROUPED CASES" PROTOCROMAG. / NATUFIANS (5) (16)	21	15 (Nat.) 71.4%	6 (Nat./PC) 28.6 %
CORRECT CLASSIFIED "GROUPED CASES"			74.32

Table 18 Stepwise DFA : discrimination of the temporal samples from Europe, North Africa and the Near East
Upper Palaeolithic (JPL) vs. Early Mesolithic (FML) vs. Late Mesolithic (SML) vs. Iberomaurusian (IBM)
Ungrouped : Protocromagnoids, Natufians, Capsians and Columnatians;
male sample (n = 175, p = 15 indices, file REGBAMZ)

PARAMETERS OF THE DISCRIMINANT FUNCTIONS

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	Df	Sig
					0	.2696	181.531	39	.0000
1*	1.1174	26.58	62.58	.7264	1	.5709	77.630	24	.0000
2*	.5016	28.09	90.68	.5780	2	.8573	21.329	11	.0301
3*	.1665	9.32	100.00	.3378					

* marks the 3 canonical discriminant functions remaining in the analysis

STANDARDIZED
DISCRIMINANT FUNCTION COEFFICIENTS

VARIABLE	FUNCTION 1	FUNCTION 2	FUNCTION 3
M1	.08947	-.65852	-.10270
M8	.60935	.20196	-.36554
M9	-.58857	.12816	-.56088
M17	.11343	1.12446	-.73572
M20	-.34378	-.39165	.93839
M45	.19961	.01539	.63332
M48	-.35272	-.08377	.02013
M51	-.23736	-.67630	-.27028
M52	-.19202	.43497	.36718
M54	.65060	.39691	-.17347
M5	.28566	-.15869	.46576
M10	.33368	-.49050	.20746
M28	.14086	.58809	.20188

CLASSIFICATION RESULTS

ACTUAL GROUP	N° of cases	PREDICTION JPL	FML	SML	IBM
UPPER PALAEOLITHIC	14	85.7%	7.1%	0%	7.1%
EARLY MESOLITHIC	49	16.3%	49.0%	26.5%	8.2%
LATE MESOLITHIC	52	5.8%	17.3%	71.2%	5.8%
IBEROMAURUSIAN	33	6.1%	3.0%	6.1%	84.8%
UNGROUPED CASES	26	15.4%	26.9%	38.5%	19.2%
CORRECT CLASSIFIED "GROUPED CASES" :					68.2%

Table 19 Stepwise DFA : discrimination of the temporal samples from Europe, North Africa and the Near East
Upper Palaeolithic (JPL) vs. Early Mesolithic (FML) vs. Late Mesolithic (SML) vs. Iberomaurusian (IBM)
Ungrouped : Protocromagnoids, Natufians, Capsians and Columnatians
female sample (n = 103, p = 15, file REGBAMZ)

PARAMETERS OF THE DISCRIMINANT FUNCTIONS

Fcn	Eigenvalue	PCT of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks Lambda	Chisquare	DF	Sig
					0	.4299	75.561	21	.0000
1*	.6667	64.16	64.16	.6325	1	.7165	29.839	12	.0030
2*	.2929	28.19	92.35	.4760	2	.9263	6.849	5	.2321
3*	.0795	7.65	100.00	.2714					

* marks the 3 canonical discriminant functions remaining in the analysis

STANDARDIZED
DISCRIMINANT FUNCTION COEFFICIENTS

VARIABLE	FUNCTION 1	FUNCTION 2	FUNCTION 3
M1	-.12806	-.75250	.27543
M8	.23714	.36566	-1.19158
M51	-.36884	.57440	.45164
M52	-.04019	.88715	-.209696
M54	.80063	.39558	-.20893
M55	-.32205	-.31020	.08867
M10	.36109	-.35250	1.19678

CLASSIFICATION RESULTS

ACTUAL GROUP	N° of cases	PREDICTION			
		JPL	FML	SML	IBM
UPPER PALAEOLITHIC	14	64.3%	7.1%	14.3%	14.3%
EARLY MESOLITHIC	21	9.5%	61.9%	28.6%	0%
LATE MESOLITHIC	43	14.0%	30.2%	39.5%	16.3%
IBEROMAURUSIAN	18	11.1%	5.6%	5.6%	77.8%
UNGROUPED CASES	8	25.0%	0%	37.5%	37.5%
CORRECT CLASSIFIED "GROUPED CASES" :					55.2%

Table 20 Stepwise DFA : discrimination of the temporal samples from Europe, North Africa and the Near East
Upper Palaeolithic (JPL) vs. Early Mesolithic (FML) vs. Late Mesolithic (SML) vs. Iberomaurusian (IBM)
Ungrouped : Protocromagnoids, Natufians, Capsians and Columnatians
male and female sample (n = 278, p = 8 indices, file REGBAMZ)

PARAMETERS OF THE DISCRIMINANT FUNCTIONS

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chisquare	Df	Sig
					0	.5529	140.437	24	.0000
1*	.4753	68.66	68.66	.5676	1	.8157	48.276	14	.00000
2*	.1619	23.38	92.03	.3732	2	.9477	12.721	6	.0477
3*	.0551	7.97	100.00	.2286					

* marks the 3 canonical discriminant functions remaining in the analysis

STANDARDIZED
DISCRIMINANT FUNCTION COEFFICIENTS

VARIABLE	FUNCTION 1	FUNCTION 2	FUNCTION 3
LBI	.30967	1.04874	.38815
BHI	.31757	.99608	.37707
BOHI	-.50706	-.20124	-.38897
TFI	-.35260	.34328	.07326
JFI	-.03446	-.41165	.80251
OGI	.09391	.42426	-.09474
ORI	.05286	.58064	-.23103
NAI	.87160	.11341	-.28526

CLASSIFICATION RESULTS

ACTUAL GROUP	N° of cases	PREDICTION JPL	FML	SML	IBM
UPPER PALAEOLITHIC	28	64.3%	7.1%	17.9%	10.7%
EARLY MESOLITHIC	70	21.4%	45.7%	22.9%	10.0%
LATE MESOLITHIC	95	16.8%	12.6%	50.5%	20.0%
IBEROMAURUSIAN	51	5.9%	0%	19.6%	74.5%
UNGROUPED CASES	29	20.7%	17.2%	24.1%	37.9%
CORRECT CLASSIFIED "GROUPED CASES" :					55.7%

Table 21a Varimax-rotated factor matrix of the male sample of the Late Pleistocene and Early Holocene (file REGBAMZ n = 175)

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
M1	0,36861	0,55657	0,20133	0,43687
M8	0,01543	-0,11811	0,77262	0,06654
M9	-0,02486	0,07178	0,64890	0,19217
M17	0,14705	0,83154	0,00953	-0,11718
M20	-0,11475	0,90056	0,08425	-0,07367
M45	0,40832	-0,00194	0,58125	0,02439
M48	0,84789	0,07928	0,05677	0,15395
M51	0,52426	0,12218	0,30675	0,22410
M52	0,72457	-0,01462	-0,18200	-0,01669
M54	0,27555	0,25377	0,49461	0,01322
M55	0,80358	0,16133	0,13080	-0,07433
M5	0,45384	0,70415	-0,01758	0,26322
M10	-0,12939	0,12405	0,81195	-0,13314
M27	-0,02384	0,38277	0,31720	-0,59060
M28	0,09437	0,09617	0,22864	0,77671

Table 21 b Varimax-rotated factor matrix of the female sample of the Late Pleistocene and Early Holocene (file REGBAMZ n = 103).

VARIABLE	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4
M1	0,24895	0,61235	0,33136	0,41586
M8	0,85787	0,02920	-0,14047	-0,09688
M9	0,66432	0,29781	-0,00735	0,13609
M17	0,25740	0,61144	0,16028	0,47495
M20	0,13437	0,81108	0,14987	0,06545
M45	0,63903	0,30547	0,37175	0,13747
M48	0,08556	0,34913	0,81762	0,15228
M51	0,34622	-0,11306	0,53339	0,34500
M52	0,00292	-0,01610	0,83356	-0,00128
M54	0,62817	0,12927	-0,08808	0,22702
M55	0,13134	0,27509	0,75409	0,21560
M5	0,07746	0,54172	0,31472	0,56101
M10	0,88453	0,02790	0,18618	-0,03018
M27	0,11413	0,79489	0,02045	-0,31289
M28	0,04817	-0,05135	0,16482	0,87056