

SPOT CHECK ANALYSIS OF CREMATIONS FROM THE URNFIELD OF PREROMAN IRON AGE AT GROBTIMMENDORF, NORTH GERMANY

I. KUHL *

RESUME

Dans ce sondage on va analyser 71 vestiges humains incinérés (16,4%) qui sont datés de l'âge du Fer, période de la Tène du Champ d'Urnes de Großtimmendorf, Kreis Ostholstein, Allemagne du nord.

A part deux exceptions dont on n'est pas sûr (8 et 81), tous les adultes sont des femmes. L'âge de leur mort va de la Maturité à la Maternité tardive (tombe 322). L'âge des enfants décédés commence au stade "lère enfance", les très petits enfants semblent manquer dans ce cimetière (voir : Rites d'enterrement : enterrements doubles).

Taille.

On a pu faire des mesures de quelques restes squelettiques deux fois la largeur de l'Asterion de l'arrière crâne : dans la tombe 19(a) on mesure par bande 124 mm, au pied à coulisse (caliper) 100,0 mm. Dans la tombe 80 : bande 116 mm, pied à coulisse 93,4 mm (mesure 12 d'après Martin/Saller).

On a mesuré aussi la hauteur des alvéoles au maxillaire supérieur, la largeur de l'ouverture du nez (Apertura piriformis), l'épaisseur de la partie supérieure de l'humérus, du fémur et de la fibula ainsi que la plus grande largeur du Trochlea Tali. Toutes ces mesures sont de petite taille.

On en a déduit la taille des corps d'après les mesures du Capitulum radii et du Caput femoris selon le tableau de Malinowski d'après J. Strzalko et L. Manouvier (1969). Elle varie de 147,5 à 155 cm.

Variations anatomiques.

Dans 6 vestiges incinérés se trouvaient des wormiens (Sutura ossicles), une fois Sutura frontalis (300). Les foveolae granulares sont rares et petits ; dans la tombe 81 se trouvait une Ohrexostose, des "Tori alveolares" peu développés dans la tombe 273, le Foramen supratrochleare dans la tombe 66.

On doit insister sur des pseudotumeurs des os de la main (carpalia) tombes 236, 239, 324). Dans la tombe 239 on les trouve au niveau de l'Os lunatum sous diverses formes, en même temps on trouve dans une vertèbre du cou de ce corps incinéré une lésion kystique (cystic lesion). Des pseudolésions singulières se trouvent dans un os lunatum de la tombe 307, une Multangulum majus de la tombe 324 et il y en a une spécialement grande dans un os naviculare de la tombe 236.

Pathologie et symptômes identiques.

Dans les tombes 199 et 300 on trouve une hypoplasie du sinus frontal. Dans les tombes 20 et 290 des orbites peu profondes nous montrent que les globes oculaires devaient être protubérants.

En plus des déformations pathologiques des jeunes comme *Cribra orbitalia* (55) et des nodules de Schmorl (19, 214, 323) on trouve dans les corps incinérés les dégénération normales causées par l'âge ; par exemple dans la tombe 418 deux trous d'abcès dans le maxillaire supérieur.

Unique jusqu'à présent est l'hypoplasie du maxillaire inférieur de la tombe 322 où les muscles se sont endurcis du côté buccal du Proc. muscularis et où les dents sont typiquement usées à cause d'un "cover bite". Elle comprend aussi le collet des incisives du maxillaire inférieur et nous montre une dégénérescence due à la paradontose du bord alvéolaire.

Dans la tombe 37 les incisives d'un jeune homme qui n'ont pas complètement brûlées, étaient aplaties. De plus l'émail de la canine est bosselée, la deuxième incisive est couverte de lignes perturbantes très fines et transversales.

On trouve parfois une spondylarthrose et une spondylosis deformans peu marquée, dans la tombe 19 (a) ; elle est assez marquée.

Dans la tombe 418 on trouve deux phalanges (troisième) ; sur l'une se trouve à la base une formation ostéomyélique de l'arthrose de Heberde.

On trouve dans 16 corps incinérés des os qui permettent l'analyse des lignes de Harris. Les lignes montrent différents systèmes :

1. Des lignes fines qui évoquent un stress permanent (29, 373)
2. Des lignes marquées avec intervalles qui montrent la croissance annuelle des os. Elles montrent un stress important mais momentané.
3. Des compressions en cordon sous la surface de l'épiphyse ouverte. Elles montrent un stress très grave entraînant la mort (30, 286, 368).

Rites d'enterrement :

Enterrements doubles. Deux vrais enterrements doubles sont les tombes 19 (une femme mûre et un individu très jeune) et 32 (2 enfants dans l'enfance I tendive).

La tombe 437 est un cas spécial où on a trouvé en plus des restes du squelette d'une femme adulte les fragments d'un très petit enfant, sans doute mort-né, voire même un fœtus. La femme est sans doute morte à la suite de complications obstétricales.

Dans deux tombes il y a des os d'animaux ; dans la tombe 5 des restes d'au moins un jeune veau et un porc de plus de 3 ans qui proviennent d'un repas de funérailles.

Dans la tombe 239 on trouve 7 vertèbres de brochet qui faisaient sans doute partie d'un collier.

On a trouvé du charbon de bois dans 7 tombes, les recherches ont montré de l'érable et aulne, une fois du noisetier et du pin.

Sable fondu. Dans les tombes 37 et 199 on trouve des substances noires, avec des bulles, très légères. Leur analyse chimique (X ray diffraction analysis) montre comme matière principale de l'aluminium (Al) et du silicium (Si) et indique que c'est du sable fondu. Le phosphore (P) vient des os. Wells a aussi fait cette conclusion lors de l'analyse de restes anglais du British Museum.

Dans 20% des urnes on a trouvé de la pierre à fusil brûlé et blanchâtre en petits morceaux ou éclats. Ils ne peuvent parvenir que du foyer. On a trouvé dans 3 corps incinérés des os qui ont été déformés lors de l'incinération. Ces déformations ne peuvent avoir lieu que pendant la phase plastique de la substance des os par 400-500 degrés celsius.

Ce sont toujours des endroits des os près des articulations qui sont déformés.

French translation : I. Wodtke, Schleswig

INTRODUCTION

Mainly in the years 1959/60 and 1976 the urnfield near Großtimendorf, Gemeinde Timmendorferstrand, Kreis Ostholstein, situated west of the bay of Lübeck had been excavated (fig. 1).

The cemetery is dated in Preroman Iron Age.

438 graves had been found, 71 are presented here, that means 16,4%.

Informations are given about single individuals and the population with regard to epigenetic traits and pathology. Finally some secondary observations considering burial rites are mentioned. Previously the results of anthropological analyses are presented in a table.

RESULTS OF ANALYSES

This spotcheck also includes the larger cremations of the urnfield which could be presumed to be the remnants of males, but with the exception of cremation 81 all analysed adults are females in different stages of certainty. The mature skeletons of urns 8 and 81 show some robustness, but in 8 there is no positive reference to male sex. The individual in cremation 81 however shows a moderate developed occipital protuberance of Broca 1-2 (fig. 2, fig. 5,2) an ear exostosis which is more often seen in males, and a large circumference of radial shaft of 39,5 mm (from 37 mm onwards it normally indicates a male. Kühl 1985, p. 120). Further the lateral side of linea aspera femoris is slightly roughened. So I cannot decide, whether it is a sturdy female or a male. (fig. 2)

Age.

This spotcheck includes twelve children of age middle to late infans I (fig. 5, 18). Children of infancy age seem to be absent in this urnfield. (The only exception seems to be urn 437 with additional bone fragments of a presumable neonate or fetus in the cremation of an adult female who supposedly died by complications of birth (fig. 5, 15)). Six children died while the period of infans II, one individual reached the transition stage of infans II - juvenile (37), four juvenile age (19b, 23, 66, 328). Age stages of the grown up individuals cover young adult (2a, 3b, 405) to matur, cremation 322 to late mature. Nobody reached senile age.

As feature of developed age and as particular rarity in cremations the ossified processus ensiformis of sternum is found in the urns 236 and 239 (fig. 9, 10).

Measures.

Some cremations include bone fragments suitable for measuring, some point to morphological features, others are relevant for sexing. The occipital protuberances show extension 0 - 2 in the classification system of Broca. Sometimes it is scarcely to be seen or a mere roughening (fig. 5, 3-5, fig. 8,3, and Kühl 1985, Taf. III, 14). In two cases (19a, 80, fig. 3B, 8,3) measures could be given of the occipital breadth (measure 12 of Martin/Saller) (Kühl 1977/79)

Nr. of urn	1/2 breadth	full breadth	Calculated measurement by caliper in mm
	mm tape measurement	mm	
19a		124	100,0
80	58	116	93,4

In order to obtain hints as to e.g. breadth of asterionon it is essential on account of cremation induced bending of the part to use a provisional measurement which is taken from uncremated skulls by measurement of the asterion breadth by using a caliper and also a tape measure on the bone surface giving two different measurements, the difference of which being calculated in percentile. This percentile is then subtracted from the measurement taken from the cremated occipitale region (or its preserved left or right half), in order to obtain an approximate measurement of its original breadth.

Thickness of the supraorbital margin varies from 1,5 - 2,5 mm, 2,8 - 3,0 at most, once 3,3 mm (crem. 290). Thicknesses until 4 mm which are typically for supraorbital margins in males, are absent in this spot-check.

The arcus superciliares are mostly scarcely developed, as is seen in crem. 199, Fig. 4,8 and 9. In crem. 8 they are well developed, but smooth, so it is uncertain whether this individual is a sturdy female or a male. (fig. 4, 6 and 7).

From the maxilla two measurements could be obtained : alveolar height (measure 48 by Martin/Saller) from six cremations, they vary from 13,5 - 22,5 mm :

Nr. of urn	Alveolar height mm
70	16,5 - 17
199	13,5 - 14
236	16 - 17
227	up to 22,5
307	up to 20,5 (fig. 5, 6)
318	16

From again six cremations measurements of half of the nasal breadth (apertura piriformis) could be obtained, they vary from 9,5 - 10,5 mm :

Nr. of urn	$\frac{1}{2}$ nasal breadth mm
19	9,5
70	10,0
199	10,0
236	10,5
273	9,5
307	10,0 (complete nasal breadth in Fig. 5, 6)

The only measure which could be obtained from the mandible derives from cremation 55 : Breadth of ramus is 26 mm.

Different measurements for judging single individuals and the population could be obtained also from the extremities :

Glenoid cavity : In the cremations 2a and 227 only the largest breadth could be measured, it is 25 mm. In cremation 70 the glenoid cavity is completely preserved showing breadth of 24 and length of 33,5 mm. These dimensions correspond to measures obtained from female cremations deriving from other urnfields.

Humeral shaft : The circumference of the humeral shaft is preserved in five cremations and varies from 40 - 55 mm :

Nr. of urn	Circumference of humeral shaft mm
64	45
68	40
119	49
227	41 - 42
273	55

Radial shaft : In 15 cremations the circumference of radial shaft could be measured, they vary from 26 - 33 mm. Though the larger circumferences of 38 mm in cremation 34 and the 39,5 mm in cremation 81 enter already the male section of the variation, in cremation 8 the female features predominate, but cremation 81 shows more robusticity, so it could be a male.

Heads of femur sometimes show relatively large foveae capitis femorae, best preserved in cremation 81 of 10 x 14,6 mm and depths of 5,5 mm, showing additionally a sclerotic border, and cremation 366 with 14 x 16 mm (fig. 9, 17 and 18).

Femoral shaft : The circumference of the shaft is preserved in cremation 68 and measures 62 mm. In cremation 300 it is only preserved in the upper third of the shaft and measures 71 mm.

Fibula shaft : Circumference of the shaft ranges from 27 - 31 mm :

Nr. of urn	Circumference of shaft of fibula mm
55	28
199	31
227	31
324	27

Trochlea tali : From the talus in some cremations the trochlea is relatively well preserved, so one can obtain measures. The largest (anterior) breadth vary from 24,5 - 27,2 mm :

Nr. of urn	Anterior breadth of trochlea tali mm
68	28,5
239	26,5
318	26,8
322	27,2
366	24,5

The middle breadth of talus from urn 2a and 68 is 27 mm.

For comparison : On the simultaneous female urnfield near Schwissel the anterior breadth of trochlea tali vary from 26 - 30 mm (Kühl, 1982).

Body height :

In some cremations diameter of capitulum radii and capitulum femoris are available for evaluating body height. They are obtained by using the table by Malinowski after J. Strzako and L. Manouvrier (1969).

Diameter of 12 heads of radii vary from 17 - 21 mm, the resulting body heights vary from 147,7 - 159 cm. Diameter of ten heads of femur vary from 32 - 42,5 mm, the body heights are less than 147,5 mm - 155,5 ll (measures for diameters of heads of femur for females starts in table of Malinowski not before 36 mm).

For evaluating body height also fragments of capitulum radii and caput femoris could be included by using a scheme of circles, because their circumferences are approximately circular. The resulting values are within the variation of the better preserved ones.

The here presented measures also show relatively limited variation, so it is improbable that Großtimendorf was a cemetery for both sexes.

Epigenetic traits :

1. Sutural ossicles. They are found in six cremations, two at a time in cremation 23, 33 and 307 (in the latter the ossicles already fused together). One ossicle at a time is present in the double-cremation 19 and in urn 55, 199, and 323. This and one of cremation 23 are of three-cornered shape. (fig. 1, 5, 16 and 17).

2. Sutura frontalis is preserved in cremation 300 (fig. 4, 13) and incompletely fused in crem. 76 (fig. 4, 11 and 12).

3. Foveolae granulares are relatively rare and only preserved in cremation 227 and 324. They are small and trough-shaped.

4. One ear-exostosis is present at the anterior vault of skeleton 81, showing some robustness (fig. 5, 14, 14a).

5. Slight fossa praenasalis is present in crem. 307 and 418 (fig. 5, 6, 7).

6. Meagre developed tori alveolaris mandibulae are present at inner vault of left and right side in cremation 273. They are localized between the first and second Incisor r., at the first premolar r. else between the second premolar and the first molar l. and r. (fig. 5, 12).

7. For. supratrochleare. The lower part of this foramen is preserved at the humerus from cremation 66. Reason for the singular occurrence of this variation is the rarity of preservation of this region in cremations. So in cremation 19 (double-cremation) two distal articular regions of humeri are damaged at this area, the third shows no foramen.

8. Pseudo-cysts. In one cremation a cervical vertebra and in twelve cremations carpal bones are present, four of them show pseudocysts, so-called for they were probably not covered with mucous membranes. This kind of cysts is not caused by hard work and not yet seen in today living persons (diagnosis by Dr. med. W. Müller)(fig. 9, 1-9).

(There is one exception : B. Bugyi reports 1968, that smaller and larger "nekrobiotical" Pseudocysts in carpals are caused by working with pneumatic tools. This occurs by Hulten, 1928, on condition that the distal surfaces of ulna and radius are not in a level, but the ulna protrudes more than 1 mm, what is, after Hulten, the so-called "Plusvariant").

In crem. 307 a singular, in crem. 239 are multiple cysts present in the os lunatum, perhaps worth mentioning is an additional second line of muscle attachment present at the lower end of the humerus in crem. 239 (fig. 9, 14). Furthermost in this crem. 239 a cervical vertebra shows another pseudocyst at its lateral part. (fig. 9, 1)(See another case in Kühl, Paleobios 1, 1983, fig. 13, 11). In crem. 236 remnant of an os naviculare is present showing a large cyst approx. occupying the whole breadth of the bone (fig. 9, 8).

From the distal row of the carpals there is an os multangulum majus in crem. 324 showing a singular cyst. (fig. 9, 7)(Other cases see in Kühl 1988 : Vertebra on Taf. XIII, 9 and carpal bone on Taf. XVIII, 9a).

Pathological and similar appearances :

1. Frontal sinusses. In cremations 199 and 300 exists extreme hypoplasia of frontal sinusses (fig. 4, 8, 10, 13). In contrast in crem. 318 and 323 large sinusses are developed.

2. Cribra orbitalia. It is present in a mild form in the remnants of the orbital roof of crem. 55 (fig. 1, 4).

3. In cremations 20 and 290 the orbital roof is almost flat which indicate protruding eyeballs (fig. 4, 3-4). At the better preserved fragment of cremation 20 the surface of the frontal bone and the orbital roof almost form a right angle.

4. The better preserved left mastoid process of crem. 19a (fig. 3 D) shows two different stages of pneumatization : At the lower end finemashy cavities, presumably caused by retardation, in the area above the cavities are of normal sizes (fig. 5? 13).

5. Maxilla. In the maxilla of crem. 227 the antrum of Highmore partly extends downwards almost to the alveolar border. By this the root of a molar perforates its floor (fig. 5, 8).

Maxillae of three cremations show abscesses and toothloss : in the left maxilla of crem. 199 an abscess of 4 mm in diameter of first molar, including meeting down of the alveolar border. In the preserved left maxilla of cremation 379 an abscess developed in the area of 1. and 2. premolar and 1. molar (P1-M1), additionally alveolar closure following loss of 1. incisor (fig. 5, 10).

Also in the left maxilla of cremation 408 atrophy of alveoli following loss of 1; incisor, abscess at 2. incisor and remodelling of alveoli following tooth loss from 2. premolar to 2. molar is present. Region of 3. molar is not preserved.

In the well preserved maxilla of cremation 418 also two abscesses are present : At the left canine and the right second incisor (fig. 7). Additionally in the mandible of this cremation loss of one molar.

6. Mandibula.

Arthrosis at the right mandibular joint with defects in the Fovea pterygoidea is present in cremation 64 (fig. 5, 11). The articular process of mandible is slightly bended forward in crem. 22, 77, 227, 249 and 236, fig. V, 9 (see also KÜhl 1988, Taf. VIII, 9-11). Loss of one molar of mandible is found in cremation 418.

A hitherto in paleopathology literature not published hypoplasia of mandible is found in cremation 322 : Preserved is the upper part of left ramus including proc. muscularis and anterior part of proc. articularis with the head absent and four anterior teeth showing particular attrition (fig. 6, 5-8). The complete proc. muscularis is very small and at the buccal side covered with fine lines of muscle attachments in a sharp limited area (fig. 6, 3-3b).

Two of the four teeth are incisors of mandible showing facets of attrition at the labial side which are friction surfaces caused by cover bite, that means, the anterior sides of the mandibular incisors are rubbing at the backside of the maxillary teeth, and probably hurting the soft tissue of the alveolar process causing inflammatory processes. The situation of these facets also indicates parodontosis of the not preserved mandible, for the facets are also covering the necks of the teeth (fig. 6, 5-6).

7. Teeth.

In cremation 37 the incompletely burnt grey crowns of a second v. incisor and a canine of maxilla are preserved. The anterior surfaces show very fine lines of enamel disturbances transversely running almost the complete crowns, at the incisor only the lowest 1,3 mm of the crown are without lines (fig. 7, 1a), then follow broader lines and at last very fine lines which became visible only by enlargement of the photo. Additionally the edges of these two crowns display some attrition (fig. 7, 1b, 2b, see additionally HL on fig. 10,7).

Few lines of developmental disturbances are also present in teeth of double cremation 19 and 214 (fig. 6, 11) and extensive at one root of crem. 373 (fig. 6, 9). To this cremation see also HL on fig. 10, 1 + 5. Four of eleven teeth in crem. 214 show developmental disturbances of rootgrowth in their lower third. One root is steplike formed, other tips are bended (fig. 6, 12 - 15). Additionally there is some cementosis on few roots. One root of incisor of mandible and some other roots are normal. See also HL on fig. 10, 21. Cementosis is present also at roots of crem. 64, 214, 224, and 227 (fig. 6, 10).

Cervical caries is present once, and that in crem. 12.

Attrition of teeth is present in crem. 408 : two crowns show severe oblique attrition, an anterior tooth is worn until the bifurcation. Attrition of teeth in crem. 322 see under : 6, mandibula.

8. Vertebrae.

Present are the common changes : Schmorl's nodes and spondylosis deformans, sometimes spondylarthrosis.

In double cremation 19 only one Schmorl's node is preserved, particular severe spondylosis including marginal osteophytes and wear of the vertebral plates, one fragment presumably from the first segment of the sacrum with onset of pars lateralis (fig. 8, 6 and 7). In crem. 214 one Schmorl's node is present in the plate of a larger vertebra, while cervical and thoracic vertebrae are without this change. In this cremation also spondylarthrosis is present, as well as on the massa lateralis of crem. 19a (fig. 8, 4). Other cremations afflicted with spondylarthrosis are crem. 77, 81, 273, 307, 379, 408, and 419.

In crem. 323 larger fragments of 16 vertebrae are preserved, only few of them show Schmorl's nodes, but they are relatively large and of irregular form, additionally the vertebrae show beginning of spondylosis deformans by marginal osteophytes (fig. 8, 8). This is also the case in crem. 20, 76.

9. Extremities.

Radius. At the lower border of the circumferentia of one of the two preserved radial heads a partial arthrotical osteophyt of height 1 mm is developed. (fig. 9, 15).

Phalanges. In cremation 418 two third phalanges of fingers are preserved, one of them show an extreme osteophyt at its base (fig. 9, 13). By diagnosis of Dr. W. Müller this is a degenerative joint disease, a "Heberden-Arthrosis" which originates from a genetic defect, that means, the disposition is inherited.

10. Harris Lines (HL)(fig. 10)

In 18 cremations of this spot check fragments of long bones suitable for analysing HL are present, all of them show Harris Lines : 3b, 19, 21, 23, 24, 29, 30, 33, 37, 66, 70, 211, 214, 224, 249, 286, 368, 427. Although only few bone fragments can be exactly determined, most of the found distributions of lines can be classified into four systems : 1. Close sequences of very fine lines throughout the whole bone fragment (crem. 24, 373, fig. 10, 1, 2, 16). They are only found in larger long bones (i.e. distal femur) because of their rapid growth, and are showing line distances of about 1 - 2 mm or less.

2. More or less distinct lines in distances mostly indicating annual growth rates of the bone. This system forms the largest group of occurrence of HL. (crem. 70, 211, 214, 224, 249, 368, 437, fig. 10, 12, 14, 19, 21, 23, 24). To this system also belong crem. 66 and 23

(scapula and ilium), because of their small annual growth rates (fig. 10, 9 - 11). In the fragment of the scapula of crem. 3b only few HL are present. This case is not pictured.

In crem. 70 longer fragments of distal femur, proximal and distal tibia are preserved, but only in the distal end of the tibia HL are developed (fig. 10, 24).

3. Distinct, thick lines with intermediate fine lines, called by J.E. Loddell (1984) : "interlinear opacities". This system is mostly found in long bones with larger growth rates, i.e. distal femur. In the crem. 18 of Großtommendorf they are only found in crem. 214 and 224 (fig. 10, 21 and 23).

While the thick lines represent presumably the recovery from late winter famine, the fine lines indicate intermediate less disturbances occurring during summer and autumn.

4. A special form of HL is the bandlike opacity running transversely the shaft immediately below the open epiphyseal surface without any sign of following normal bone growth. So these bands are result of a severe disturbance which lead to the death of the children. Within the 18 cremations showing HL this appearance is found four times which is a high rate. The cremations are : 30, 286, 368, and 373 (fig. 10, 1, 3 - 6).

In three cases (37, 214, 373) in the cremations also teeth are found : the incomplete burnt crowns of second incisor and canine of maxilla of crem. 37 show transversely running very fine lines of disturbance of mineralization, at the second incisor starting between the first and second year of life (fig. 7, 1a).

From crem. 373 at one of some teeth the root show also transversely running lines of disturbances (fig. 6, 9).

By M. Schultz, 1982, they are resulting from protein malnutrition in early childhood (see his Abb. 4).

In crem. 214 one tooth show some lines of disturbances at the root and crooked tips of the roots of four of the preserved eleven teeth. (fig. 6, 11-15).

Comparison of the HL-systems with ages of death show, that individuals showing close sequences of lines (29, 373) and such with bands of increased density below the open epiphyseal surface died already from middle Infans I to late Infans II-age (30, 286, 368, 373). Individuals showing the HL-system with annual distances survive generally into adulthood (70, 214, 224, 249, 368, 437), the youngest is that of crem. 66 of juvenile age.

Burial Rites.

Some findings give references to cultural background :

a. Double cremations.

This spot check analysis of 70 graves from the cemetery of Großtommendorf includes two double cremations, that means in each case skeletal remnants of two individuals in one urn.

Urn 19 contained a mature female and a young juvenile individual (fig. 8, 1-5), urn 32 two children of age late infans I.

This kind of double cremation is not found on the contemporary urnfield of Schwissel which is situated appr. 35 km west from Großtommendorf. On the cemetery of Schwissel each deceased has her own urn, but sometimes there are found two or three urns within one packing of stones.

b. Animal bones.

Also well cremated animal bones derive from the burials 5 and 239 showing different significance : The bones from urn 5 represent the remnants of a funeral meal, consisting of at least two animals : Remnant of right mandible with for. mentale from cattle and a metaphyseal region of shaft bone of juvenile cattle, furthermore olecranon process with fused epiphysis of pig, more than three years old, and remnants of vertebral bodies with fused epiphyses from a small animal, at last remnants of vertebral arches, undeterminable (fig. 11, 2-7).

In urn 239 there are seven vertebrae of pike that perhaps formed a necklace. Wilke (1936) reported the special significance in folklore of the vertebrae of fish which are said to protect the wearer from the evil eye and from the dangers of pregnancy (fig. 11, 1). Determination of animal bones : H.J. Frisch.

These vertebrae of pike and another finding indicate the custom of placing grave goods on the pyre : in cremation 33 apart from two drops of melted bronze a larger lump of this metall is found. This lump partly embraces a rib fragment (fig. 12, 7a, b).

By this we may conclude, that the bronze object was placed on the chest of the deceased during the cremating.

c. Charcoal.

Remnants of charcoal are found in eight cremations of this spotcheck, results of determination are :

Nr. of urn	Kind of tree	Investigator
19	alder and maple	H.G. Richter
20	deciduous tree	H. Gottwald
23	alder	H.G. Richter
34	alder or hazel	H. Gottwald
38	alder	H. Gottwald
63	maple	H. Gottwald
199	alder and pine	H.G. Richter

Though this is a small serial, alder and maple seemed to be the preferred kinds of wood, on the other hand the absence of oak is striking which was the mainly used kind of wood in bronze age.

This change at least does not reflect a change of the custom, but a change of the vegetation caused by climatical alteration.

d. Melted sand.

The sometimes in cremations found black, blistery and very light melted substances are also present in two cremations of this spot check : 37 and 199.

Results of x-ray diffraction examination :

Nr. of urn	main constituents	secondary elements	trace elements
37	Al, Si	P	Ca, Cu, Fe, Cl, K, S
199	Al, Si, P	-	Ca, Cu, Fe, Cl, K, S

(Main constituents : more than 10%

secondary elements : 1 - 10%

trace elements : less than 1%)

(Determination by Mg. K. Mader and G. Baumgarten)

The main occurrence of aluminium (Al) and silicon (Si) in these melted clots indicate sand which possibly had been used for extinguishing the fire of the pyre.

The elements phosphorus (P) and calcium (Ca) originate from the bones, by presumption of K. Mader and already before by the British Museum, letter by Calvin Wells, 1965 (Kühl, 1987) :

"Microscopic Examination.

Microscopic examination of the sample showed that the "clinker" was chiefly composed of sintered grains of silica (SiO_2) ; in the outer layer the degree of sintering was slight but the interior of the spherical cavities had almost completely fused. Mixed with the silica were small amounts of foreign materials, such as a bead of iron/iron oxide and fragments of bone, probably derived from the body and its accoutrements. The results of this microscopic examination support the findings of the Laboratorium der Farbwerke Hoechst (West Germany), (who reported that it was a "glasähnliche Substanz").

"Spectrographic analysis gave as the main constituents : Si, Ca, Al, P, Mg, Fe ; also detected were : K, Mn, Ti, Zn, Na, B, Zr ; in addition there were : Cu, Ba, Sr, Ni, Pb. The phosphorus content was 3,14% which one may presume was due to phosphates from bone. The main constituent appears to be like glass, there is no question of any organic materials such as resin being present since the loss in weight after heating for two hours at 450°C was only 2%.

X-Ray Diffraction Examination.

X-Ray diffraction showed that the quartz form of silica had been almost completely converted in the fused areas into the high temperature form, cristobalite. This conversion takes place in pure silica at a temperature of 1410°C which is far higher than the average temperature of 900°C for these cremations, as estimated by Calvin Wells. However, the effect of impurities in lowering the temperature at which this conversion takes place has to be taken into account. For example, it has been reported that the addition of one percent either sodium (Natrium) or potassium oxide (Kalium) will completely convert quartz of the same grain size into cristobalite in four hours at 1100°C .

Conclusion.

The "clinker" consists chiefly of partially fused sand which was probably derived from sandy earth lying directly under the funeral pyre. Since "clinker" of this type has apparently not been previously noted, it must be assumed that it was produced through some unusual combination of circumstances. Among these may have been a higher than average temperature caused by a strong draught, dry wood, or the presence of particularly inflammable material, and the presence of a suitable catalyst (e.g. bone ash) in the sand".

And C. Wells concluded : "It seems, therefore, that this clinker and my keratin are different substances although the residues looked very alike". (Wells, 1960).

e. Burnt flint.

In 18 (25,3%) of the cremations 1 - 10 small pieces or very thin chips of whitish burnt flint with slight deepenings caused by bursting off of very small pieces are present. In some of them the shape of a flake is preserved (Fig. 11, 9).

These fragments of flint derive from the cremation place which eventually consisted not of a mere pyre. and are also found in cremations of the Latène Period urnfields Schwissel, Kreis Segeberg and Nettelsee, Kreis Plön.

f. Deformations caused by bearing during cremation.

One part of the skull and some of joints from long bones showing marked deformations caused by pressure during the cremation when bones exposed to temperatures of 400 - 500° centigrades display minimal hardness (Kühl, 1986).

In few cremations the posterior surface of the apex pyramidis show some flattening, the most distinct case is to be seen in crem. 55 (fig. 12, 6).

Of crem. 418 the larger portion of a caput humeri is preserved, whose curvature is flattened, additionally there is a shallow impression in the middle of the head, so to say an inversion of the curvature (fig. 12, 3a, B and Kühl 1986). In crem. 19 the lower joint of a humerus is found with flattening of this area from distal (fig. 12, 4). In crem. 273 two deformed bones are found : the distal shaft of a humerus shows a flattened region (fig. 12, 1). Particularly the head of the femur is deformed : a lateral part is completely flattened with the surface partly shoven to folds (fig. 12, 2 a, b, arrow).

g. Melted Bronze.

Among the cremation of urn 33 a lump of melted bronze is found which encloses the fragment of a rib. This circumstance points to the rite, of placing the deceased together with their personal things, i.e. clothes and things belonging to it, on the pyre. In this case there lay a bronze object on the chest of this older child during the cremation took place (fig. 12, 8a, b)(Kühl, 1987).

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CAPTIONS.

Table : Results of anthropological analyses.

Fig. 1 : Situation of Großtimmendorf.

Fig. 2 : Preserved region of the occipital bone of crem. 81.

Fig. 3 : Fragments of skull bones of crem. 19a which could be localized, four aspects. In A the arrows point to remnant of the frontal sinusses. In B the breadth of the occipital bone is to be seen. In D the arrow points to the mastoid process seen in fig.

Fig. 4 : 1. Two fragments of the orbital roofs showing slight cribra orbitalia (arrows). cremation 55.
 2. For comparison an orbital roof from a Bronze Age cremation without cribra orbitalia.
 3.4. Two fragments of very flat orbital roofs : 3. crem. 290, 4. crem. 20. The frontal surface and the orbital roof almost form a right angle. See for comparison the depth of the orbit in 2. indicated by the shadow. See arrows in 2.3.4.
 5. The frontal surface and supraorbital margin of 4.
 6. Supraorbital region with arcus supraorbitalis (arrow) of crem. 8.
 7. The same fragment, view from below shows the bulging of the arcus (arrow).
 8. Supraorbital region of crem. 199, seen in the same aspect as 7., showing a very flat arcus (small arrow). The thick arrows point to the hypoplastic frontal sinusses.
 9. The same fragment of crem. 199, frontal aspect. The arrow points to the region of the arcus.
 10. X-ray of 9. showing crista frontalis (c. fr.) and the hypoplastic sinusses (small arrows).
 11.12. Two aspects of the frontal fragment of crem. 76 showing an incomplete fused frontal suture (arrows).
 13. X-ray of one frontal half of crem. 300 showing the margin of the unfused frontal suture (thick arrow) and two hypoplastic frontal sinusses (thin arrows).

Fig. 5 : 1. Triangulare ossicle from the occipital fontanel. Crem. 23
 2. larger portion of the occipital from crem. 81 with fused lambdoid suture and slight prominent protuberance (arrow).
 3.-5. Occipital fragments with scarcely developed protuberances : 3. crem. 322, 4. crem. 70, and 5. crem. 10

6. Anterior portions of both halves of the maxilla with preserved nasal breadth (double arrow), slight fossae praenasalis (small arrows), and broken off spina nasalis anterior (thick arrow). crem. 307.
7. Anterior portions of both halves of maxilla showing slight fossae praenasales (smallest arrows), and the damaged region of the spina nasalis anterior (middle arrow). crem. 418.
- 8.9. crem. 227. 8. Portion of maxilla with the Highmore cavity almost extending to the alveolar border. By this one root of a teeth penetrates into this cavity (arrow). 9. From the same cremation is the processus articularis mandibular with the head slightly bended forward (arrox).
10. Left half of maxilla from crem. 379 with a larger abscess (singulare arrow) extending from, penetrating into the antrum of Highmore and limited by a sclerotic border. The three arrows point to the remaining part of antrum of Highmore, n.f. indicate the nasal floor.
11. Articular process of mandible of crem. 64. 11a. The arrow points to the arthrotical roughening. 11b. The joint surface seen from above showing the thinness of the articular process.
12. Inner vault of the mandible showing some flat tori (arrows).
13. Damaged backside of the left mastoid process of crem. 19 a showing different sizes of pneumatic cavities : Below very small cavities, then larger cavities. Above the inner vault of the skull.
14. Crem. 81. remnant of right temporal bone with roof of the auditory porus showing an exostosis at the anterior vault, lateral aspect. a. View against the roof.
15. Bones of the presumable neonate, the arrow points to the apex pyramidis. Probable mother-child crem. 437.
16. Sutural ossicle of crem. 32.
17. Sutural ossicle of crem. 199.
18. Crem. 138, partly damaged pars basialis of the skull. Below the surface of the fusion with the sphenoid.

- Fig. 6 : 1.2. For comparison to 3. : from mandibles muscular processes of normal sizes. 1. crem. 379, 2. crem. 214.
3. Fragment of mandibular ramus of crem. 322 showing an underdeveloped muscular process. 3a. Enlarged, buccal surface showing the strong developed muscular roughening. 3b. Enlarged lingual surface of 3.
4. A gracile muscular process of crem. 20 which obviously was not in contrast to the skull.
- 5.-8. Teeth belonging to crem. 322. 5.-6. Two incisors of mandible showing typical attrition at the labial surface, indicating cover bite. The facets of attrition extend until the beginning of the root, pointing to parodontosis of the alveolar border of the jaw which is not preserved.
8. Presumably an upper tooth.
9. Crem. 373. Root of a tooth showing numerous lines of disturbances of mineralization. The crown is broken off by the fire. Additionally see Harris Lines on fig. 10, 1 and 5.
10. Root of an anterior tooth showing clots of cementosis (arrow), crem. 227.

11.15. Crem. 214 : 11 showing lines of disturbances ; 12-15 showing crooked tips of the roots (arrows). The two small arrows point to the apical foraminae. Additionally see Harris Lines on fig. 10, 21.

Fig. 7 : 1. Second right incisor of maxilla of crem. 37. 1a. Front surface displaying the lower part with normal surface, than immediately start lines which become thinner and closer near the edge to the root. 1b. Same tooth from below showing attrition.

2. Canine of maxilla of crem. 37. 2a. Frontal surface showing also the situation of the attrition at the edge (arrow). 2b. Same tooth from below exhibiting the extension and form of the attrition.

Fig. 8 : 1.2. Inner vault of both frontal bones of double cremation 19 showing crista frontalis (small arrows).

2. The large arrow points to the preserved for. caecum.

3. Portion of the occipital bone, the large arrow points to the area of the scarcely developed protuberance, the small arrows point to the lambdoidal suture (see fig. 3B).

4-5. Two massae laterales of double cremation 19.

4. This fragment probably originates from the older female, for the joint surface with the skull is slightly roughened (arrow). In 5. the same joint surface is smooth (see arrows). See also the same direction of cracks in both the fragments.

6. Remnant of a vertebra with signs of severe degenerative changes, particular the enlargement of the roughened vertebral surface (arrow).

7. A probable remnant of the upper part of the sacrum : a severe deformed surface of the vertebral portion, partly extending laterally and covering the beginning of the wing (arrow).

8. Six of the several fragments of the vertebrae of crem. 323, all showing marginal osteophytes pointing to spondylosis deformans (some arrows).

9. Fragment of the axis of crem. 19 showing normal size. For comparison to 10. The very delicate axis of crem. 55

Fig. 9 : 1.2. Cervical vertebra with a cystic lesion of crem. 239.

1. Photo. 2. X-ray shows the sclerotic wall (arrows).

3. Oblique aspect of an os lunatum from the same cremation 239, showing one larger pseudocyst (arrow).

4. X-ray of the same bone showing the larger (arrow) and some smaller pseudocysts.

5. Articular surface of an os lunatum with a larger pseudocyst at the same anatomical region as in 3.4. (arrows).

7. Os multangulum major with a smaller pseudocyst (arrow).

8. Fragment of an os naviculare with a pseudocyst of extreme size (arrow) of crem. 236.

9. X-ray of this fragment (f.)

10. Ossified proc. ensiformis of sternum, crem. 236.

11. Fragment of a long bone showing a strong attachment for soft tissues (arrow), crem. 273.

12.13. Two third phalanges of crem. 418. 12. a normal phalangy. 13. Third phalangy with an osteophyt at its base, a so-called "Heberden-Arthrosis".

14. Distal end of humerus of crem. 239 showing a second line of muscular attachment (arrow). To this cremation also belong 1 and 3/4.
15. Lateral aspect of a proximal radial end showing slight arthrosis (arrow), above the same fragment seen from below, the arrow points to the arthrotical marginal osteophyt. Crem. 379.
16. For comparison to 15 : Below lateral aspect of a normal radial fragment (arrow), above the same fragment seen from below without any osteophyt. Crem. 300.
17. Crem. 81. Fragment of femoral head showing a large fovea capitis femoris surrounded by a sclerotic border (arrow).
18. Crem. 366, the arrow points to the large fovea which show no sclerotic border, as is normal.

Fig.10 : Harrix Lines. Measurement appr. 1,5 x 1.

- Joint surface. - - - - - Epiphyseal line.
 ~~~~~ Open epiphyseal surface.
- 1.2. Close sequences of fine lines.
  1. Crem. 373, child of late infans II. The bone fragment show additionally to the HL a bandlike opacity immediatelly below the epiphyseal surface (arrow), see more distinct in 5, another bone of this child.
  2. crem. 29, child of age middle Infans I.
  - 3.6. Fragments of long bones from different cremations, showing besides of HL bandlike opacities immediatelly below the open epiphyseal surfaces.
  3. Crem. 286, child of age 2. half of Infans II.
  4. Crem. 30, child of age middle Infans I.
  5. Crem. 373 (see 1 !), child of age late Infans II (12-13 years).
  6. Crem. 368, child of age middle Infans II (appr. 10 years)(see also 12).
  7. Crem. 37, individual of transition stage late Infans II - Juvenil. Fragment of distal femur.
  - 8.10. Crem. 66, Juvenile.
  8. Fragment of smaller long bone showing some fine and one distinct line next to the open epiphyseal surface.
  9. Portion of a scapula, the joint surface is broken off, to be seen are eight HL in close sequence. The black spot indicates the onset of the acromion (arrow).
  10. Fragment of the other scapula with the preserved joint surface and the same sequence of HL.
  11. Crem. 23, late Juvenile. Fragment of the ilium with open epiphyseal surface. Considering the slow growing of this bone the HL appear in close sequence.
  12. crem. 368, child of age middle Infans II (appr. 10 years, see also 6). Fragment of long bone with scalelike sequence of HL.
  - 13 and 24. Crem. 70, Adult individual.
  13. Distal end of fibula with HL in the epiphysis (arrow).
  14. crem. 437, Adult individual. Fragment of tibia (proximal) showing seven HL, two of them, next to the epiphysis, are only shaddows (resorption ?).
  15. crem. 211, latest Infans II.
  16. Crem. 24, latest Infans II. The bone fragment shows HL until the open epiphysis.

17. Crem. 21, late Infans II. The distance of the youngest HL to the open epiphysis is as large as to the foregoing lines.
18. Crem. 19, inner aspect of the vault of a long bone showing some HL in the spongy tissue.
19. Crem. 249, Adult female. The remnant of a long bone shows five HL in scalelike distances.
20. Crem. 33, late Infans II showing some HL in different distances.
- 21.22. Crem. 214, developed adult female. The fragment of a long bone shows some more or less distinct lines, at the upper end two interlinear opacities (arrow). X-ray and photo.
22. The marginal osteophyt at the upper margin of the fovea dentis of the atlas points to developed age of the individual and to the slow resorption of the HL in former times.
23. Crem. 224, late adult (?) female. The fragment of a larger long bone show five HL with some interlinear opacities (arrows).
24. Crem. 70 (see also 13), Adult individual. Distal end of tibia with fused epiphysis showing seven HL in scalelike distances, the youngest is shadowlike. (Distal end of femur and proximal end of tibia of this skeleton are without HL).

Fig.11 : 1. Seven vertebrae of pike, crem. 239.

- 2.7. Animal bones of crem. 5.
2. Remnant with foramen mentale of right mandible of cattle.
3. Olecranon process of pig with fused epiphysis (arrow).
- 4.5. Remnants of vertebral arches.
6. Remnants of vertebral bodies with fused plates. a. Fragment of a vertebra with remnants of the arches. b. Enlargement of a.
7. Remnant of a long bone with open epiphysis (arrow). b. Aspect of this fragment from above showing the structure of the open epiphysis (enlarged).
8. Seven fragments of burnt flint with deepenings caused by the heat of the cremation fire, crem. 328.
9. Flake of flint displaying the bulk (Bulbus), see arrow. The cracks of the surface are also caused by the cremation fire. Crem. 300.

Fig.12 : 1. Distal end of humerus, partly flattened by bearing during cremation (arrows), crem. 273.

2. From the same cremation 273 femoral head, it exhibited a threecornered outline with one side completely flattened, seen in b. : flattened side of the femoral head, the surface partly compressed into folds (arrow).
3. fragment of humeral head of crem. 418 showing flattening. a. Lateral aspect, at right side of the picture remnants of the tubercles. b. View upon the head, the arrow points to the shallow through caused by the pressure.
4. fragment of distal joint region of a humerus of double cremation 19. The distal outline is partly flattened, see arrows. For comparison
5. Distal joint of a humerus from crem. 1524 of urnfield Schwissel displaying normal contour.
6. Left apex pyramidis of crem. 55 exhibiting distinct flattening of the portion between the lower border and the porus (arrow) and slight flattening at the right portion.

7. For comparison a not deformed apex pyramidis of crem. 236.
8. A melted lump of bronze from crem. 33 enclosing the fragment of a rib, in 8a. aspect of the transversely broken rib ; in 8b. lateral aspect of the rib.

# RESULTS OF THE ANTHROPOLOGICAL ANALYSIS

| Nr. | Age                                  | Sex               | Epigenetic traits                                          | Pathological changes                             | Additions                                                               |
|-----|--------------------------------------|-------------------|------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------|
| 2a  | young adult                          | female ( 1 )      |                                                            | R L                                              |                                                                         |
| 3b  | young adult                          | female ( 1 )      |                                                            |                                                  |                                                                         |
| 4   | adult                                | female ?          |                                                            |                                                  |                                                                         |
| 5   | adult<br>(m.-l. adult?)              | female ?          | 5 Foveolae granulares                                      |                                                  | Remnants of at least two animals<br>(cattle and pig) of a funeral meal) |
| 7   | young mature ?                       | female ?          |                                                            |                                                  |                                                                         |
| 8   | mature                               | sturdy female(?)  |                                                            | Presumable parodontosis in both<br>anterior jaws | One piece of burnt flint                                                |
| 9   | adult                                | ?                 |                                                            |                                                  |                                                                         |
| 10  | middel adult                         | female ( 1 )      |                                                            |                                                  |                                                                         |
| 12  | developed adult                      | female ?          |                                                            | one cervical caries                              | 6 pieces of burnt flint                                                 |
| 14  | evtl. adult                          | ?                 |                                                            |                                                  |                                                                         |
| 17  | some years old<br>child              | ?                 |                                                            |                                                  |                                                                         |
| 19  | a) mature<br>b) young juvenile       | female ( 1 )<br>? | 2 x For. supraorbitale<br>1 x Incisura supra-<br>orbitalis | Schmorl's nodes,<br>Spondylosis deformans, HL    | One piece of burnt flint.<br>Alder and maple                            |
| 20  | developed adult                      | female ?          | 2 For. zygomaticofaciales                                  | Beginning spondylosis deformans                  | Deciduous tree. 6 pieces of burnt flint                                 |
| 21  | late infans II                       | ?                 |                                                            | R L                                              |                                                                         |
| 23  | late juvenile                        | ?                 | 1 triangular ossicle<br>and one, 24mm long                 | H L                                              | Alder                                                                   |
| 24  | late infans II                       | ?                 |                                                            | H L                                              | 3 pieces of burnt flint                                                 |
| 26  | adult                                | female ?          |                                                            |                                                  |                                                                         |
| 28  | late infans I                        | ?                 |                                                            | H L ?                                            |                                                                         |
| 29  | middle infans I                      | ?                 |                                                            | H L                                              |                                                                         |
| 30  | middle infans I                      | ?                 |                                                            |                                                  |                                                                         |
| 31  | middle infans I?                     | ?                 |                                                            |                                                  |                                                                         |
| 32  | a) late infans I<br>b) late infans I | ?<br>?            | 1 Sut. ossicle                                             |                                                  | 4 pieces of burnt flint<br>3 pieces of burnt flint                      |
| 33  | late infans II                       | ?                 | 2 ossicles, 2 For.<br>zygomaticofaciales                   | H L                                              | 2 pieces of burnt flint                                                 |
| 34  | late (?) adult                       | female ?          |                                                            |                                                  | Alder or hazel, 3 pieces of burnt flint                                 |

| Nr. | Age                              | Sex                      | Epigenetic traits                                                  | Pathological changes                                                            | Additions                                              |
|-----|----------------------------------|--------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------------------------------|
| 36  | middle adult                     | female ?                 | 1 sut. ossicle                                                     | H L                                                                             | Melted sand                                            |
| 37  | late infans II<br>- juvenil      | ?                        |                                                                    | Disturbances of mineralization in<br>2. incisor and canine of maxilla. H L      | Alder. 1 piece of burnt flint                          |
| 38  | 1. Halfte infans II              | ?                        |                                                                    |                                                                                 |                                                        |
| 38a | middle infans I<br>(3 - 4 years) | ?                        |                                                                    |                                                                                 |                                                        |
| 55  | middle adult                     | delicate<br>female (1)   | 1 larger ossicle, two for.<br>zygomaticofaciales                   |                                                                                 | Maple. 1 piece of burnt flint                          |
| 63  | adult (?)                        | female ?                 |                                                                    | Arthrosis in mandibular joint.<br>Attrition and cementosis in teeth             |                                                        |
| 64  | young-middle mature              | delicate<br>female (1)   |                                                                    | H L                                                                             |                                                        |
| 66  | juvenile                         | ?                        | For. supratrochleare                                               | Closure of alveoli of 2. + 3. (?)<br>molar of left mandible                     |                                                        |
| 67  | young mature ?                   | female                   |                                                                    | Arthrosis of metacarpal or metatarsal                                           | Red paste on one bone                                  |
| 68  | mature                           | female                   | 1 ossicle                                                          | H L                                                                             |                                                        |
| 70  | adult                            | female (1)               |                                                                    | Spondylitis deformans                                                           |                                                        |
| 75  | mature                           | female                   | Inc. supraorbitalis, sut.<br>frontalis incomplete fused            |                                                                                 |                                                        |
| 77  | young mature                     | female ?                 |                                                                    |                                                                                 |                                                        |
| 80  | adult                            | female ?                 | 2 for. zygomaticofaciales                                          |                                                                                 |                                                        |
| 81  | developed mature                 | sturdy female<br>or male | Ereuxostosis                                                       | Spondylarthrosis                                                                |                                                        |
| 82  | middle infans I<br>(4-5 years)   | ?                        |                                                                    |                                                                                 |                                                        |
| 138 | middle infans I<br>(4-5 years)   | ?                        |                                                                    |                                                                                 |                                                        |
| 176 | adult (middle ?)                 | ?                        |                                                                    |                                                                                 |                                                        |
| 199 | middle adult                     | sturdy<br>female (1)     | 1 larger ossicle, 1 for.<br>parietale, incisura supra-<br>orbitale | Abcess of Ki in left maxilla<br>1 Schmorl's node in lumbar vertebra             | 1 piece of burnt flint<br>Alder and pine. Melted sand. |
| 211 | latest infans II                 | ?                        |                                                                    | H L                                                                             | 1 piece of burnt flint                                 |
| 214 | developed adult                  | female ?                 | 4 of 11 roots of teeth<br>show crooked tips                        | Slight cementosis. 1 Schmorl's node<br>in larger vertebra. Spondylarthrosis. HL |                                                        |
| 224 | late adult (?)                   | female                   | Incisura supraorbitalis                                            | H L                                                                             |                                                        |
| 227 | middle adult                     | female (1)               | Foveolae granulares                                                |                                                                                 |                                                        |
| 236 | late adult                       | delicate<br>female (1)   | Lunar pseudocyst                                                   |                                                                                 |                                                        |
| 239 | young mature                     | delicate<br>female (1)   | Lunar pseudocyst, zystic<br>lesion in cerv. vertebra               |                                                                                 |                                                        |
| 249 | adult                            | female                   |                                                                    | Mandibular articular process bended<br>forward. H L                             | 2 pieces of burnt flint                                |

| Nr. | Age                                | Sex                      | Epigenetic traits                                                            | Pathological changes                                                                                                           | Additions                                           |
|-----|------------------------------------|--------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 273 | 2. half of adult                   | female ?                 | 2 for. zygomaticofaciales,<br>Small tori mandibular                          | Spondylitis deformans. Slight arthrosis at radial head                                                                         | Caput femoris deformed by pressure during cremating |
| 286 | 2. half of Infans II               | ?                        |                                                                              | H L                                                                                                                            |                                                     |
| 290 | young-middle adult                 | female                   |                                                                              |                                                                                                                                |                                                     |
| 300 | adult                              | delicate female<br>( I ) | Sutura frontalis                                                             |                                                                                                                                | 5 pieces of burnt flint                             |
| 307 | late adult                         | female                   | 2 Sut. ossicles, fossa praenasalis, 1 lunar pseudocyst                       | Beginning spondylitis deformans at 1 cervical vertebra                                                                         |                                                     |
| 318 | middle to second half of adult     | female ( I )             | Incisura supraorbitalis I. and r.                                            |                                                                                                                                | 4 pieces of burnt flint                             |
| 322 | late mature                        | female                   |                                                                              | Hypoplasia of mandible, cover bite special attrition of teeth                                                                  |                                                     |
| 323 | middle-to late adult               | evtl. female             | 1 triangular ossicle                                                         | Schwartz's nodes of irregular form. Beginning spondylitis deformans                                                            |                                                     |
| 324 | late adult                         | female                   | 3 Foveolae granulares,<br>1 For. parietale, 1 pseudocyst in mutangulum majus |                                                                                                                                |                                                     |
| 328 | young juvenile                     | ?                        |                                                                              |                                                                                                                                |                                                     |
| 366 | middle adult                       | female ( I )             |                                                                              |                                                                                                                                | 10 pieces of burnt flint                            |
| 368 | middle Infans II (appr. 10 years)  | ?                        |                                                                              |                                                                                                                                |                                                     |
| 373 | late Infans II (appr. 12-13 years) | ?                        |                                                                              |                                                                                                                                |                                                     |
| 379 | late adult to mature               | female                   | 2 For. supraorbitale r.                                                      | Abscess from P1-M1 in left maxilla. Slight arthrosis at radial head                                                            |                                                     |
| 398 | middle Infans I                    | ?                        |                                                                              |                                                                                                                                |                                                     |
| 405 | young adult                        | female                   |                                                                              |                                                                                                                                |                                                     |
| 408 | latest adult to young mature       | evtl. female?            |                                                                              | In left maxilla abscess in alveoli of I 1, alveolar closure of alveoli I 1 and from P2, M1 onwards. Oblique attrition of teeth |                                                     |
| 414 | middle Infans I (3-4 years)        | ?                        |                                                                              |                                                                                                                                | 1 piece of burnt flint                              |
| 418 | mature? or latest adult?           | evtl. female             | Fossa praenasalis                                                            | In maxilla abscesses at alveoli of left canine and right I 2, in mandible at a molar. Heberden-arthritis                       |                                                     |
| 419 | mature                             | female                   |                                                                              | Spondylarthrosis at small vertebral joint                                                                                      |                                                     |
| 437 | a) adult and b) neonate/fetus      | female<br>?(infant)      |                                                                              | Presumably death by complication of birth. HL                                                                                  |                                                     |

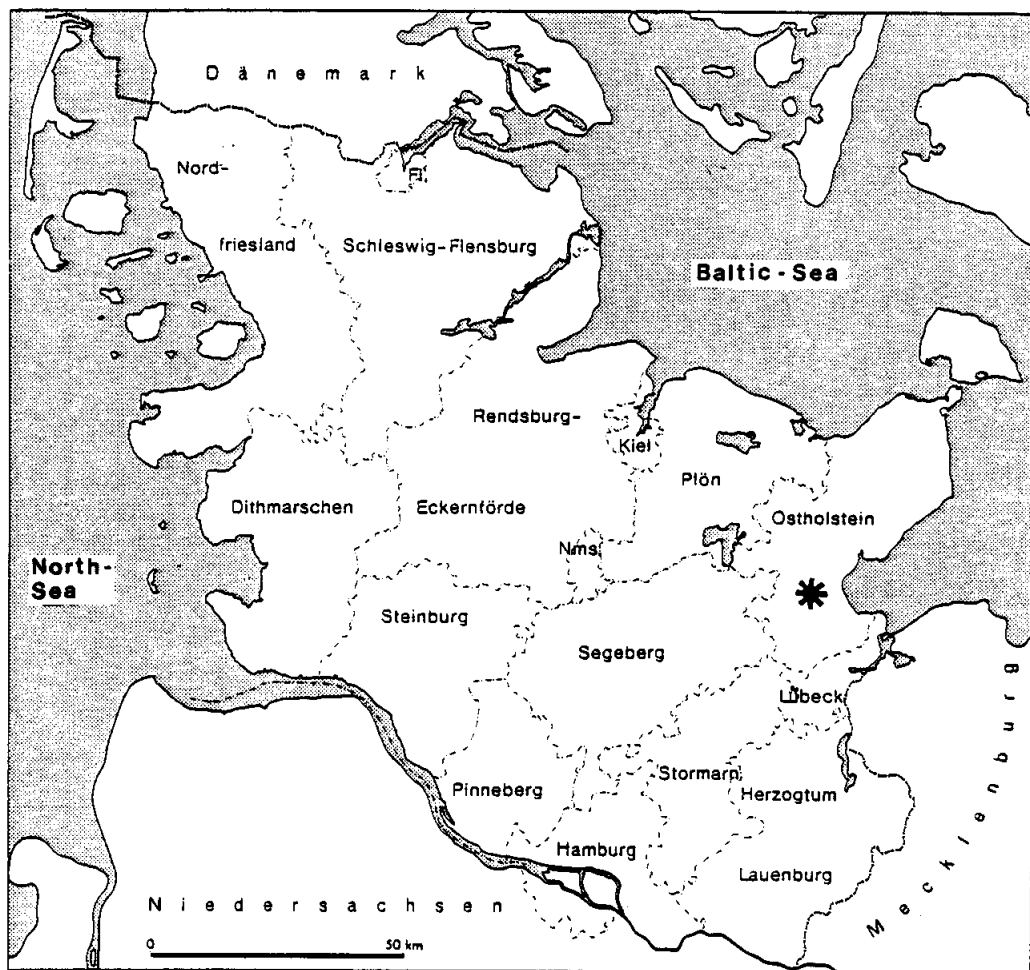


FIGURE N° 1



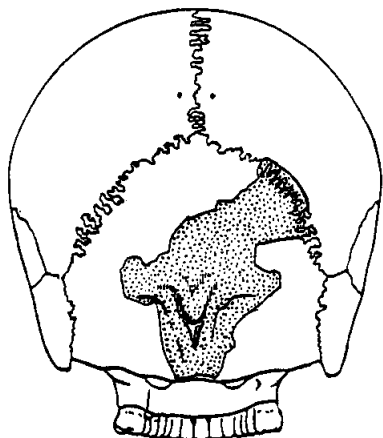


FIGURE N° 2

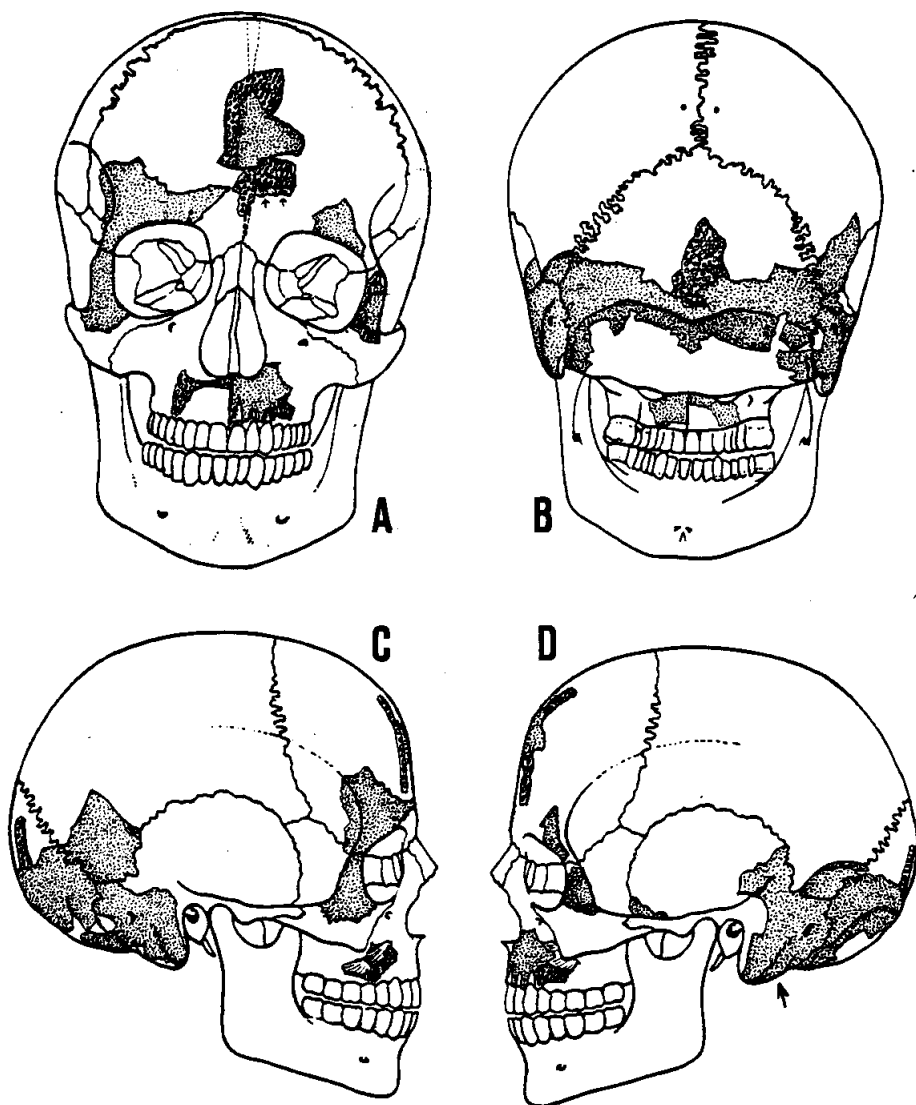


FIGURE N°3

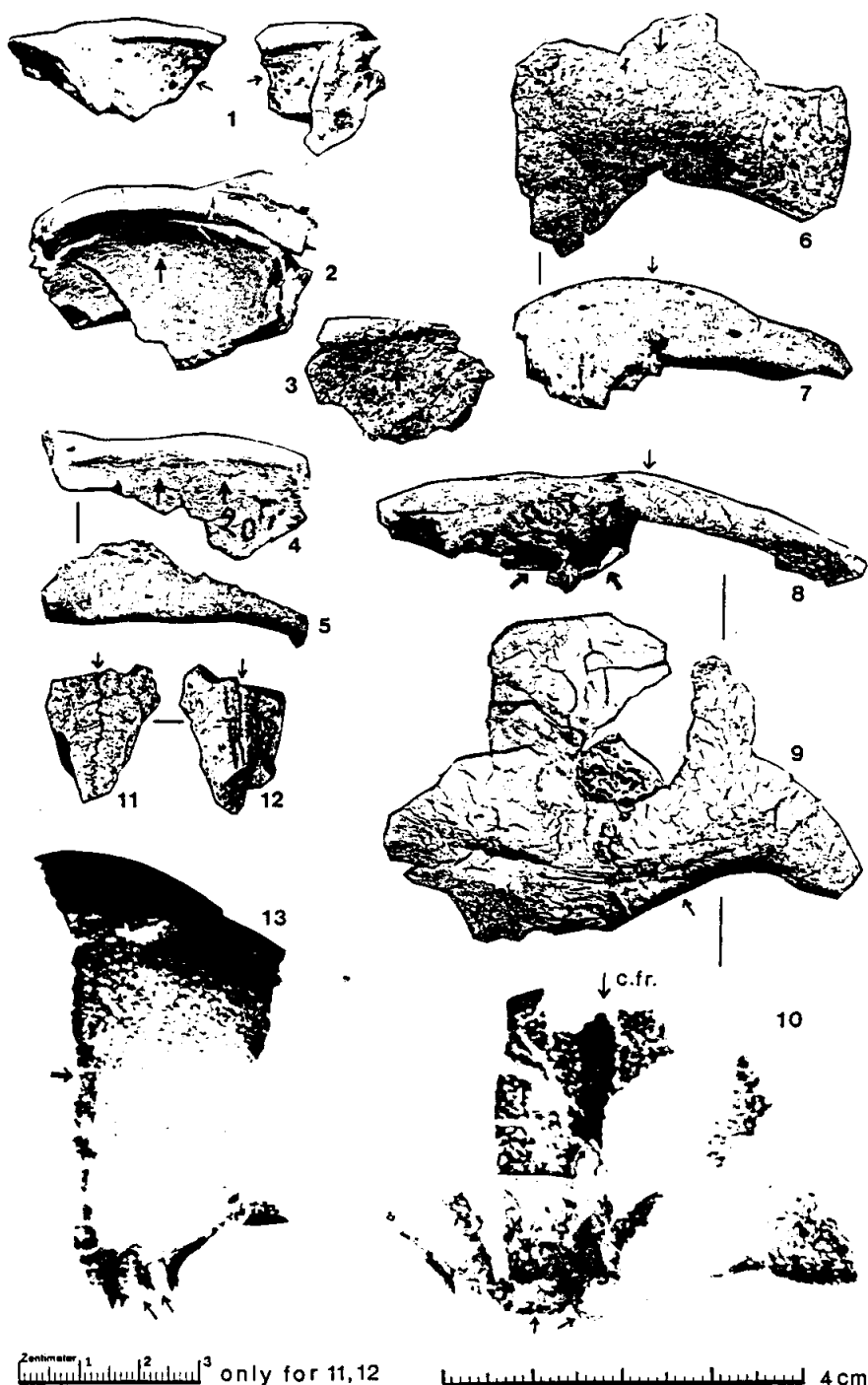


FIGURE N° 4

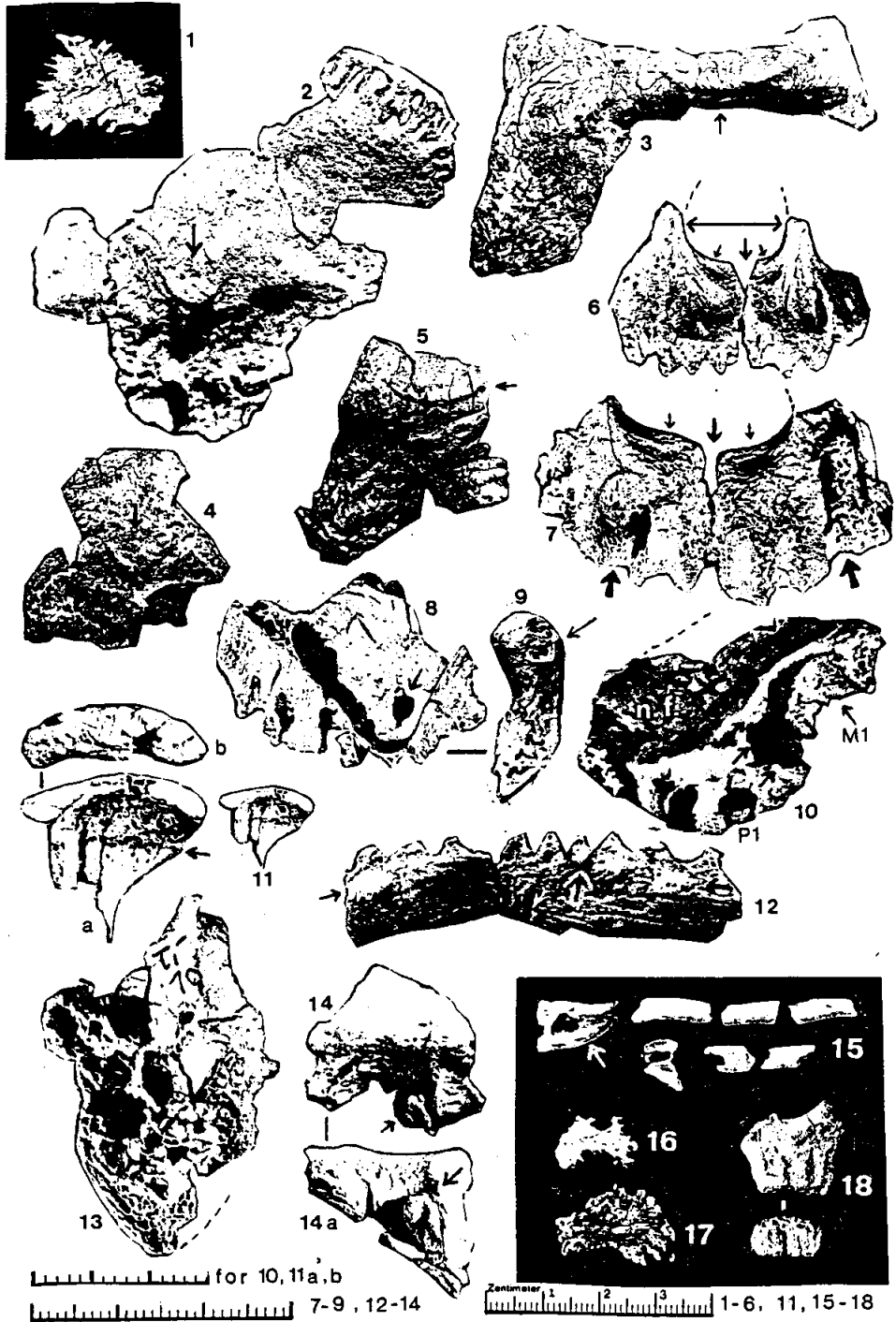


FIGURE N° 5

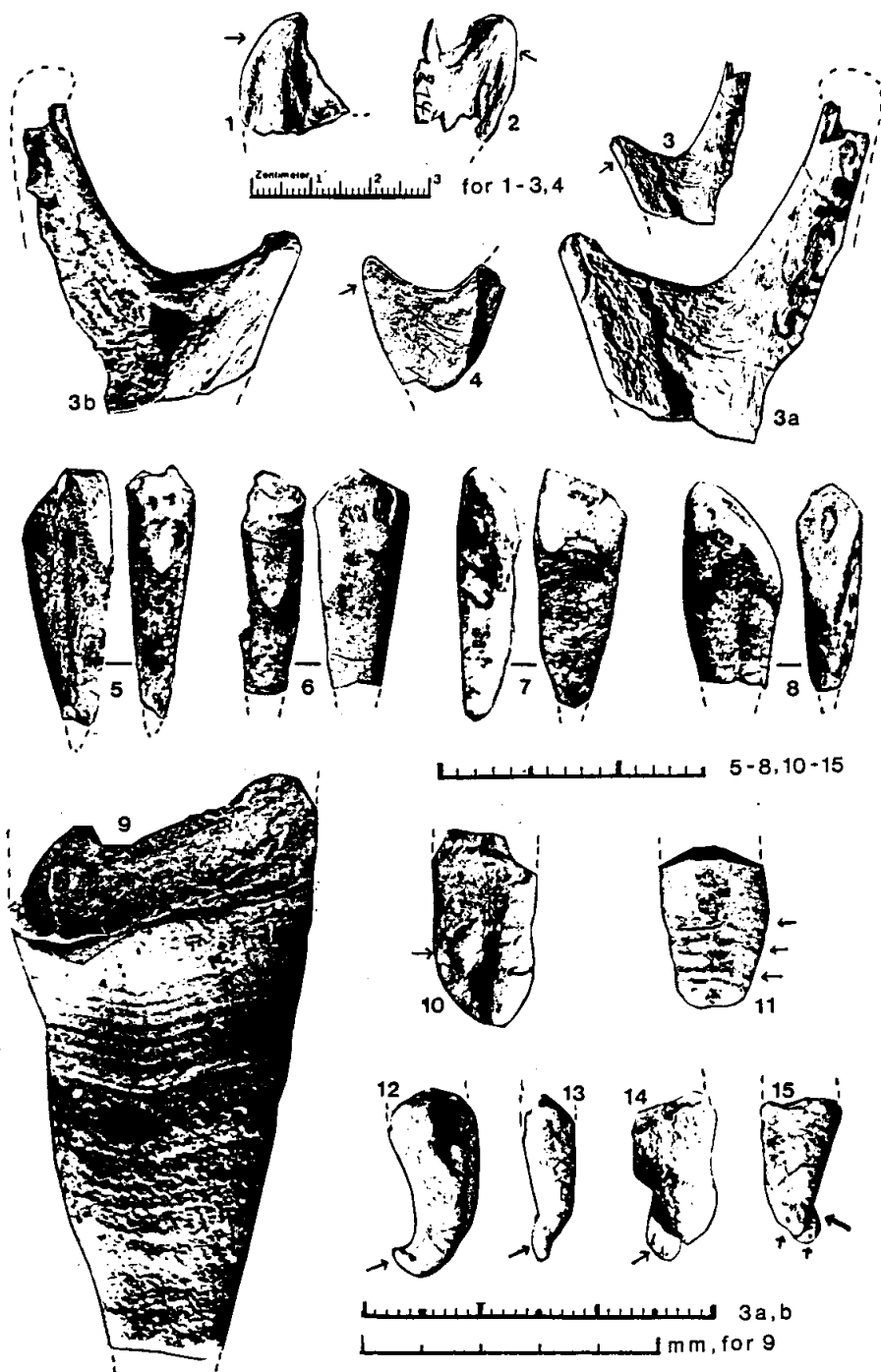


FIGURE N° 6

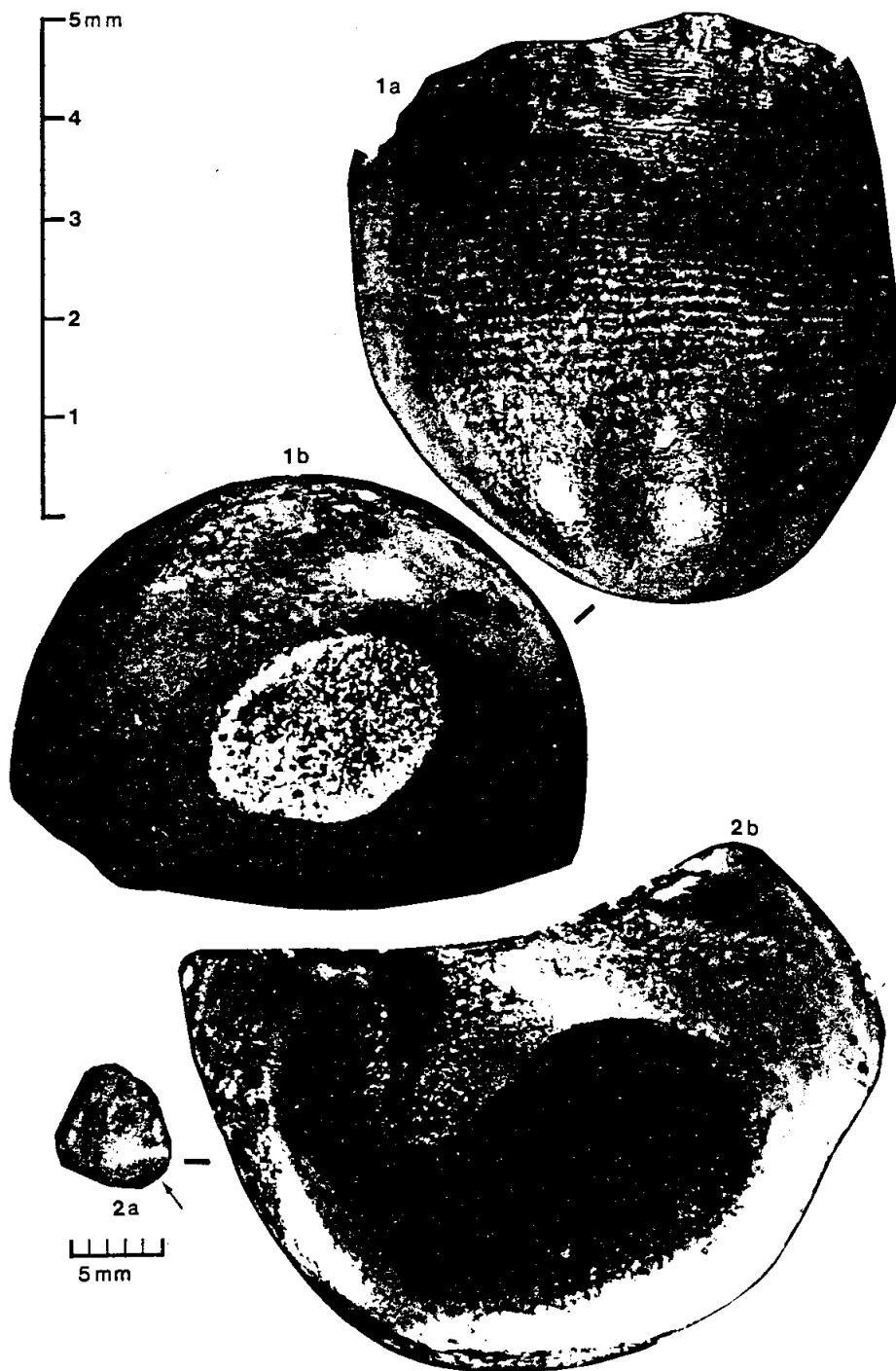


FIGURE N° 7

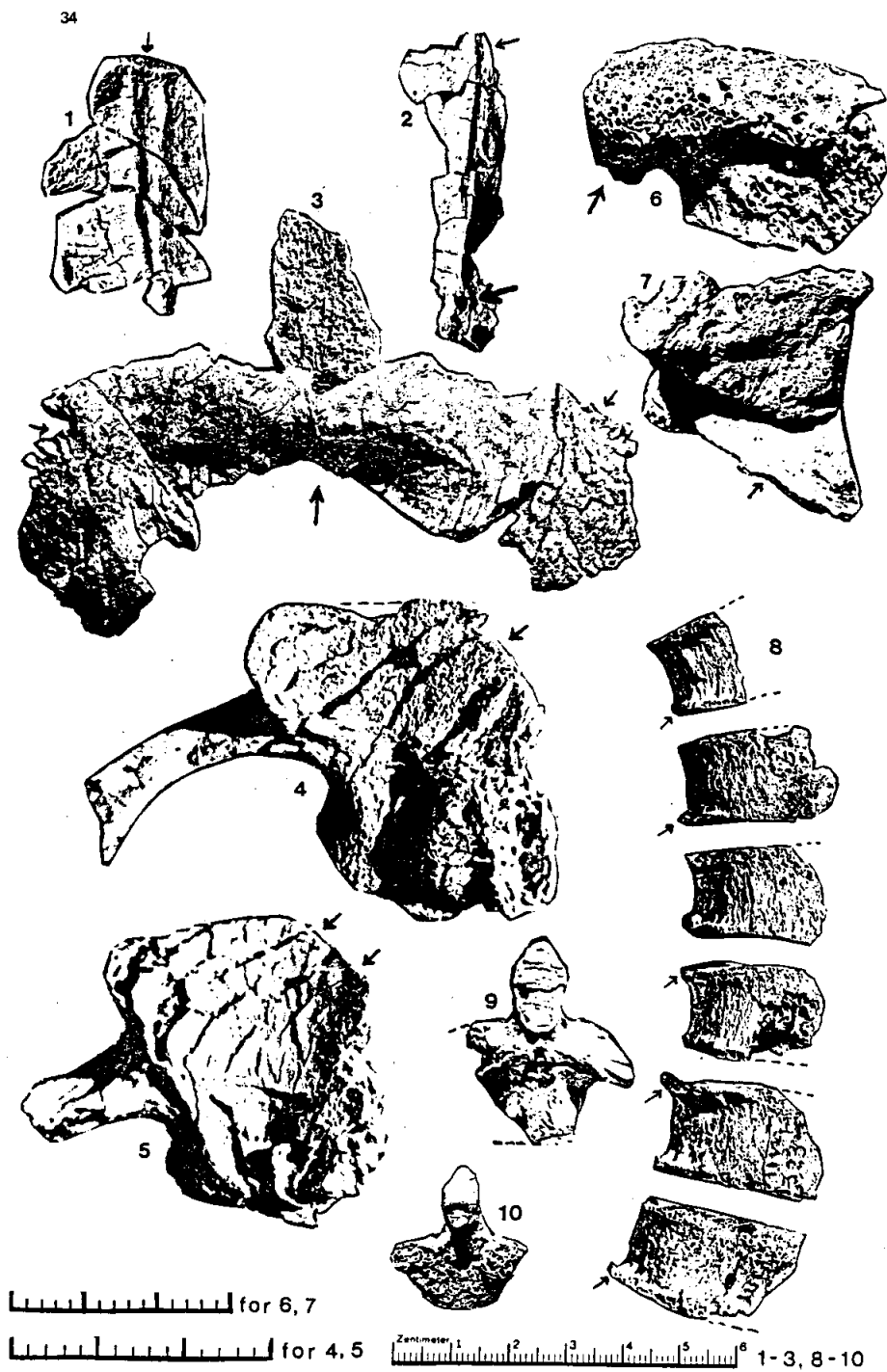


FIGURE N° 8

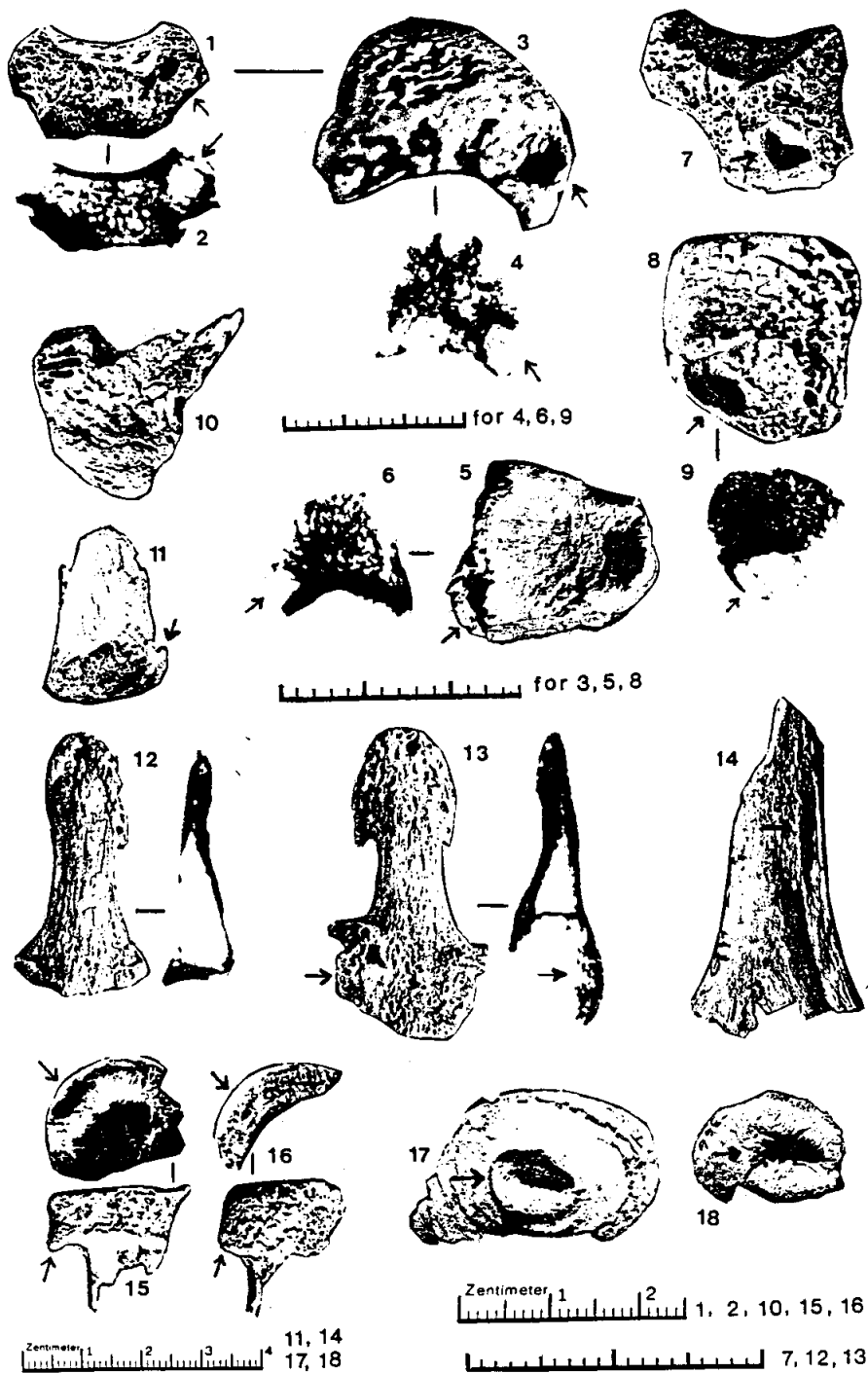


FIGURE N° 9

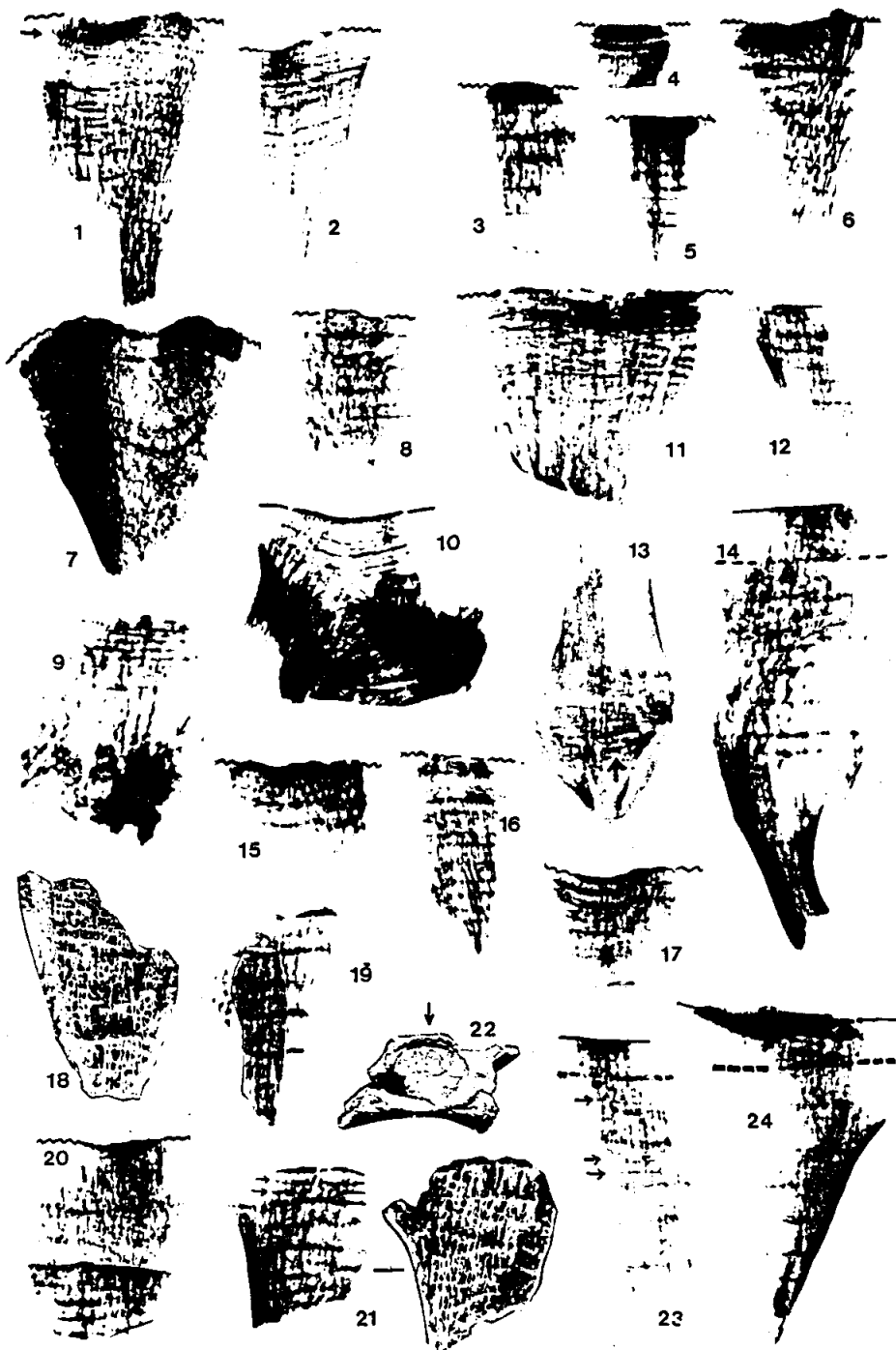


FIGURE N° 10



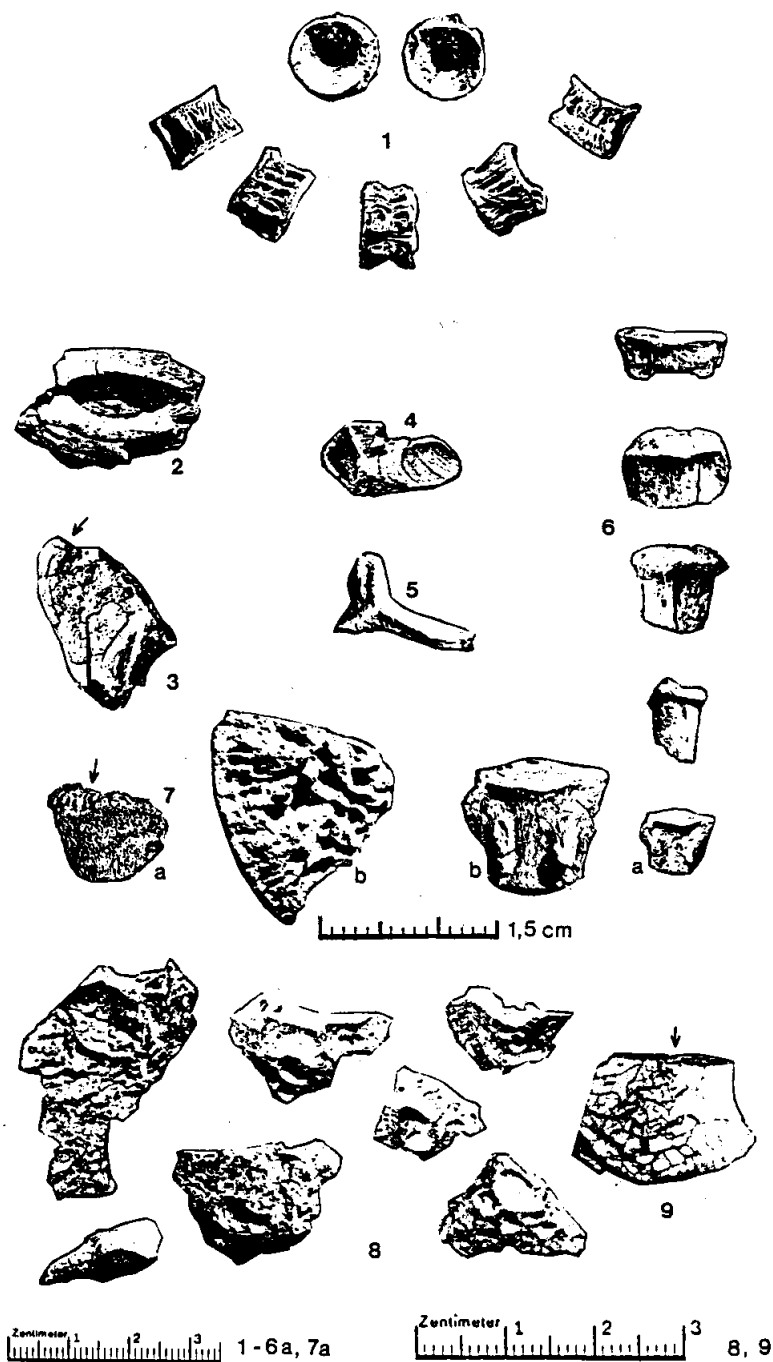


FIGURE N° 11

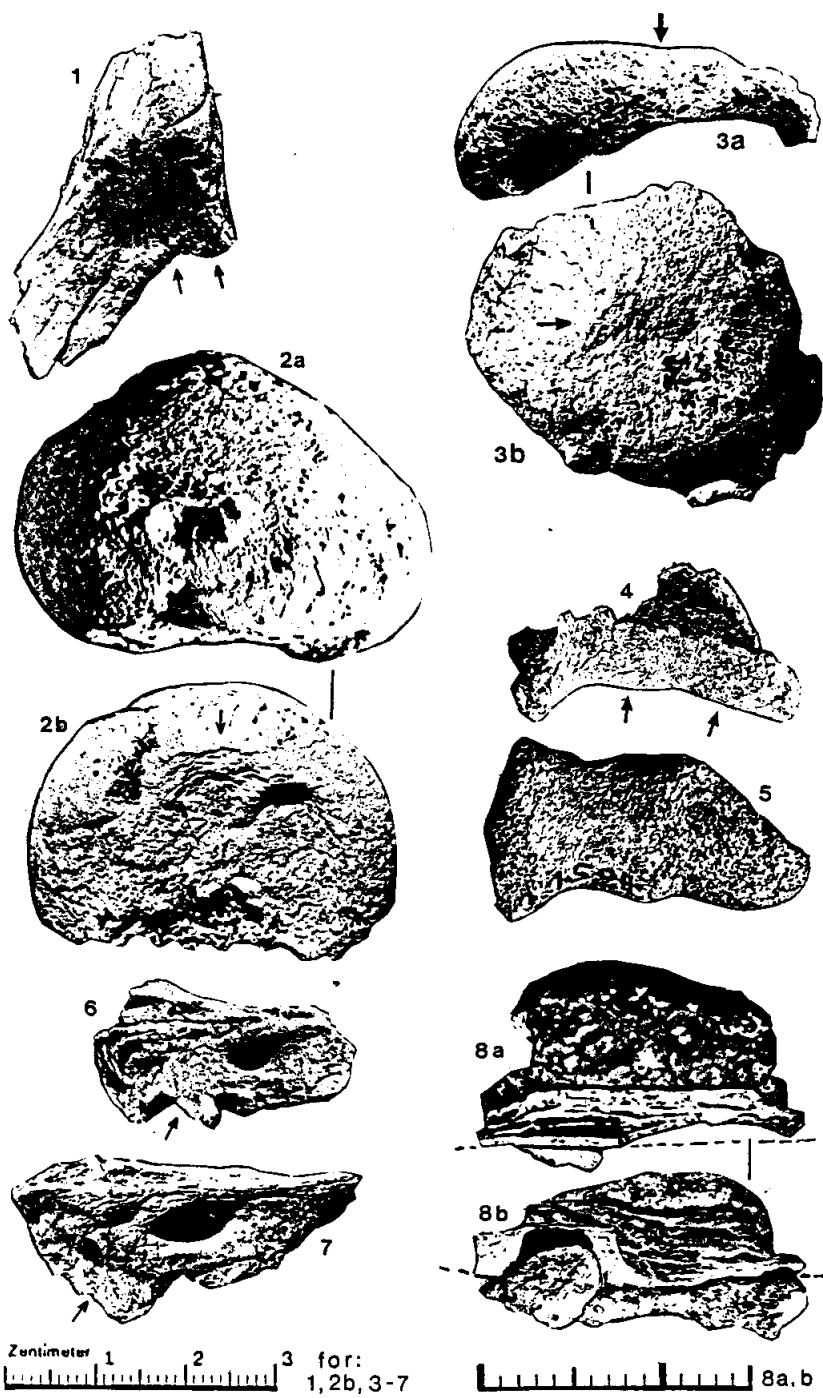


FIGURE N° 12