

A palaeo-odontological approach to the Bronze Age cave-burials from Sinsin-Trou del Leuve (Namur, Belgium)

Myrjam BUELENS, Tjeerd POT and Eugène WARMENBOL

INTRODUCTION (E.W.)

Sepulchral caves are a relatively well-known feature of the later Bronze Age in the calcareous areas of southern Belgium (Warmenbol, 1988). Most of them were discovered and emptied during the past century and much of what they contained has been lost since.

The richest of these caves, the Trou del Leuve in Sinsin, was first excavated in 1884 by A. Bequet and J. Godelaine, who found an unspecified number of inhumations and some quite remarkable artifacts associated with them (Bequet, 1883). L. Dollo carried out an extremely summary study of the human bones and considered them to belong to up to nine individuals including a man, a woman and two children (Dollo, 1885).

A. Bequet quite correctly compared the bronze grave-goods, including two knives, a razor and a series of pins, to the late Bronze Age material recovered from the Swiss lake-dwellings (Raepsaet-Charlier, 1972).

Some other caves were excavated at the turn of the century in Jemelle and Waulsort (Namur), but were not correctly dated at the time owing to the fact that their Bronze Age ceramics remained largely unrecognized as such (Warmenbol, 1991).

The Trou del Leuve was again excavated between 1979 and 1984 by P. Buelens and J. Delicaet (Warmenbol, 1983, 1984 & 1985), but by then it had been largely wrecked by looters looking for gold, which they unfortunately found (Brulet, 1972). The much disturbed cave still held some very interesting material, part of it in a stratigraphical context. Perhaps the most intriguing discovery was that of an apparently undisturbed deposit which associated some human remains — a skull fragment and a *patella* — with half a dozen complete pots, a bone needle, a spindle-whorl and a bronze pin, and which we are reluctant to call a grave (Warmenbol, 1984; 1987 : 260). Nevertheless, most of the numerous bones found must belong to inhumation graves, and one of the possible explanations for their being so widely dispersed and broken up (Mariën, 1970) is that the bodies had per-

haps been deposited without any covering.

Two fragments of socketed axes, a segment of a sickle, the knob from a metal-hilted sword, a much mishandled part of a decorated bronze cup, and hundreds of sherds of often very fine ceramics, indirectly confirm that these graves belong to the later Bronze Age and must be attributed to the Urnfield culture and, more particularly, to the “groupe Rhin-Suisse-France orientale” (Warmenbol, 1988).

Our purpose here is to give a first palaeo-odontological assessment of the human remains, which must be dated to the later Bronze Age exclusively, and are thus of major importance since most of the human material of that period underwent cremation (Desittere, 1968; De Laet, 1982).

MATERIAL AND METHODS OF RESEARCH (M.B. and Tj. P.)

The human dental material excavated consists of the remains of mostly incomplete dentitions including 4 fragments of maxillae and 5 fragments of mandibulae (with a variable number of teeth still *in situ*) as well as 16 separate teeth found out of any skeletal context. The remains were recovered during the excavations led by P. Buelens and J. Delicaet (Warmenbol, 1983, 1984 & 1985) and by A. Boschmans (1975). The remains are in the collections of the “Werkgroep Natuurhistorisch Museum Boekenberg” (Deurne) and the “Vereniging Mens en Natuur” (Holsbeek), respectively. Unfortunately there was no opportunity to examine the material in any other collections. Apart from varying degrees of damage to the alveolar bone and the *post mortem* loss of teeth, the state of conservation of the material can be qualified as remarkably good. This raises some questions with respect to possible reasons for the incompleteness of the excavated material, a factor which cannot be easily accounted for (see above). As for the research methodology adapted, a restriction had to be imposed for practical reasons. A full account would require a comprehensive description of the development of so-called “palaeo-odontological research” and its background. In the context of this

rather limited study, this seems to make no sense and might even be confusing. Apart from references to the relevant publications (Pot, 1977; Perizonius and Pot, 1981; Pot, 1988; Buelens and Pot, 1989; Pot, de Groot and van Rooijen, 1989) an explanation of some of the basic elements of this kind of research remains necessary.

Some effects can be seen in the morphological features and specific traces in dentition that are caused by physiological and pathological phenomena in the mouth during life. Together they form the so-called "dental archive" which can be read and studied like any other archive. It is the task of the palaeo-odontologist to extract relevant data from dental archives excavated, to interpret them and to present the results in a meaningful manner to the archaeologist.

To this end an investigation form has been de-

signed (Pot, 1988) for the entering of both the permanent (32 teeth) and the temporary (deciduous) dentition (20 teeth). A blank form (fig. 1) represents a schematic projection of a 180° open mouth of a skull, positioned so as to face the investigator. As a consequence, the left and right side of the dentition are the reverse of reality (see R and L). The central vertical and horizontal lines can be considered as cross sections through the median plane (between left and right) and the plane of contact between *maxilla* and *mandibula* (the occlusal plane). This "cross" divides the dentition into 4 quadrants.

The quadrants of the permanent dentition are labelled 1, 2, 3 and 4 and, starting from the upper right (left on the form), pass via the upper and lower left to the lower right. In the same way, the quadrants of the temporary dentition (for which the 4 outer "blocks" on the form should be ignored) are labelled 5, 6, 7 and 8.

Age	
ER	
AT	
PCI	
AR	

Peculiarities	

Excavation	
Site	
Nr. of find	
Investigator	
Dating	

Fig. 1 : A blank investigation form for the entering of palaeo-odontological data.

Starting from the median line the numbers 1 to 8 (permanent dentition) and 1 to 5 (temporary dentition) are added to the quadrant number. Each tooth and its place in the dentition will receive a single number. For example: 25 (pronounce 'two five') represents the permanent second molar in the upper left quadrant and 74 ('seven four') the first lower left deciduous molar.

In the limited context of this publication we can give no further detail as to how the different data should be indicated (scored) on the form. As can be seen from the form, each tooth must be assessed on three different 'levels' in relation to the occlusal plane.

The outer level represents the teeth in their *alveoli* (sockets), with the alveolar bone indicated by dots. If a tooth has been lost *post mortem*, the crown and root are blacked in on the form inside the intact *alveolus*.

Several other lines enable other options to be indicated, such as 'not yet erupted', 'lost *ante mortem*', 'presence of peri-apical bone lesions', etc.

The middle level allows for the indication of caries (tooth decay) and the different surfaces of the tooth that may be affected.

The third (inner) level is used to note the degree of attrition (wear) of the occlusal surface of the tooth, according to Brothwell's (1981) (modified and supplemented) age/attrition scale.

Omitting further considerations and specific details of various other aspects of this methodology, we will present the results of the investigation of one dental fragment as an example (fig. 2). The results will then be discussed on the individual and collective level of the population.

INVESTIGATION AND RESULTS (M.B. and Tj. P.)

We will successively consider the fragments of maxilla, the fragments of mandibula, and the separate teeth.

D 20/9/8 (fig. 3 A)

The almost complete upper left quadrant (permanent 2, temporary 6) of a dentition. The frontal part of the median palatal suture has been preserved, while the dorsal part has been lost, as well as the corresponding part of the palate. Starting from the median line, we have identified:

- The *alveolus* of the permanent central incisor (21) lost *post mortem*, its shape indicating that the formation of the *radix* (root) was still incomplete; probably the tooth had not yet erupted fully.
- Behind the rest of the *alveolus* of the deciduous lateral incisor (62) lost *post mortem*, the still

unerupted and only partially developed permanent incisor (22).

- The *alveolus* of the temporary canine (63) lost *post mortem* with the partially developed permanent canine (23) underneath.
- The temporary first and second molars (64, 65). Neither of the molars can be removed, so the probable presence of their successors the permanent premolars 24 and 25 cannot be checked.
- The permanent first molar (26); very slight traces (facets) of attrition (wear) on its occlusal surface indicate a short period of use.
- The still unerupted permanent second molar (27); as far as can be assessed, the development of the crown was almost complete.
- Though some alveolar bone has been lost (*post mortem*), it seems justifiable to conclude that an eventual development of the permanent third molar (28) had not started yet.

The developmental and eruptive stages of the dentition (Workshop of European Anthropologists, 1980) indicate an age of death of approximately 7 years. This seems to be confirmed by the degree of attrition of the temporary molars, as well as by some alveolar resorption around these teeth.

F 30/10/53 (fig. 3 B)

One incomplete upper right quadrant (permanent 1, temporary 5) of a dentition. Whereas a small part of the median palatal suture near the front teeth has been preserved, the remainder, together with part of the palate and the dorsal part of the alveolar bone, has been lost. Starting from the median line, we have identified:

- The *alveoli* of the temporary central and lateral incisors (51, 52) and canine (53), all lost *post mortem*; directly behind these *alveoli*, small holes in the palate indicate the presence of the still unerupted permanent successors of both the incisors and the canine (11, 12 and 13).
- The temporary first (54) and second (55) molars, showing hardly any attrition; the development of the distal *radix* of 55 is still incomplete. Though not verifiable (apart from using X-rays!), it can be assumed that the permanent premolars 14 and 15 are present underneath 54 and 55.
- Merely a trace of the mesial part of the *alveolus* of the permanent first molar and the separate molar in question (16) itself. The development of its crown has just been completed and the very beginning of the root formation can be seen. The inside dentin of the crown shows the first indications of the development of the horns of the pulp cavity. The enamel of this still unerupted molar clearly shows hypoplastic pits

R
L

leeftijd

ER	
AT	17
PCI	
AR	

bijzonderheden:

opgraving	SINSIN (Namur) Belgium
grafveld	Trou del Leuve
vondsnummer	E 22/3/1
onderzoek(er)	M. Buelens
datering	Bronze

Fig. 2 : The filled-in investigation form using the data from fragment nr. E 22/3/1.

Age determined by ER = eruption

AT = attrition molars

PCI = attrition premolars, canines, incisors

AR = alveolar resorption

1		<p>jaw bone with tooth :</p> <ul style="list-style-type: none"> a non exposed pulp cavity b exposed pulp cavity (attrition, caries) c exposed pulp cavity questionable 	11/12		<p>11 jaw bone without alveolus - <i>ante mortem</i> tooth loss 12 as previous - congenitally absent tooth</p>
2		<p>loose tooth :</p> <ul style="list-style-type: none"> a identified b other identification (tooth nr.) possible c identification questionable 	13/14		<p>13 jaw bone without alveolus - no choice possible between 5, 11, 12 14 jaw bone without alveolus : • decid. denition in the case of not yet erupted successor • perm. denition in the case of not yet existing tooth germ</p>
3/4		<ul style="list-style-type: none"> d temporary tooth with root resorption e <i>post mortem</i> lost (part of) root(s) f only enamel cap preserved 	15		<p>caries : a crown surface without carious cavity b crown surface with carious cavities c unassessable surfaces (absent : not erupted, fracture)</p>
5		<p>jaw bone with incomplete tooth : 3 incomplete crown because of <i>post mortem</i> fracture 4 only root(s) because of caries</p>	16		<p>Periapical alveolar bone : a no periapical bone lesion b periapical bone lesion c unassessable periapical bone d bone present but without the alveolus of a fully erupted tooth (5, 10, 11, 12, 13, 14) e no periapical bone present</p>
6/7		<p>loose non- or incompletely erupted tooth : a identified if relevant for estimation of age : a stage of crown formation b stage of root formation</p>	17		<p>Occlusal attrition : a attrition assessable - number scale b attrition unassessable</p>
8/9/10		<ul style="list-style-type: none"> 8 jaw bone and tooth absent 9 empty alveolus because of <i>post mortem</i> tooth loss 10 <i>post mortem</i> non- or incompletely erupted tooth 	18		<p>Approximal attrition - only if relevant : a attrition absent or present b attrition unassessable</p>

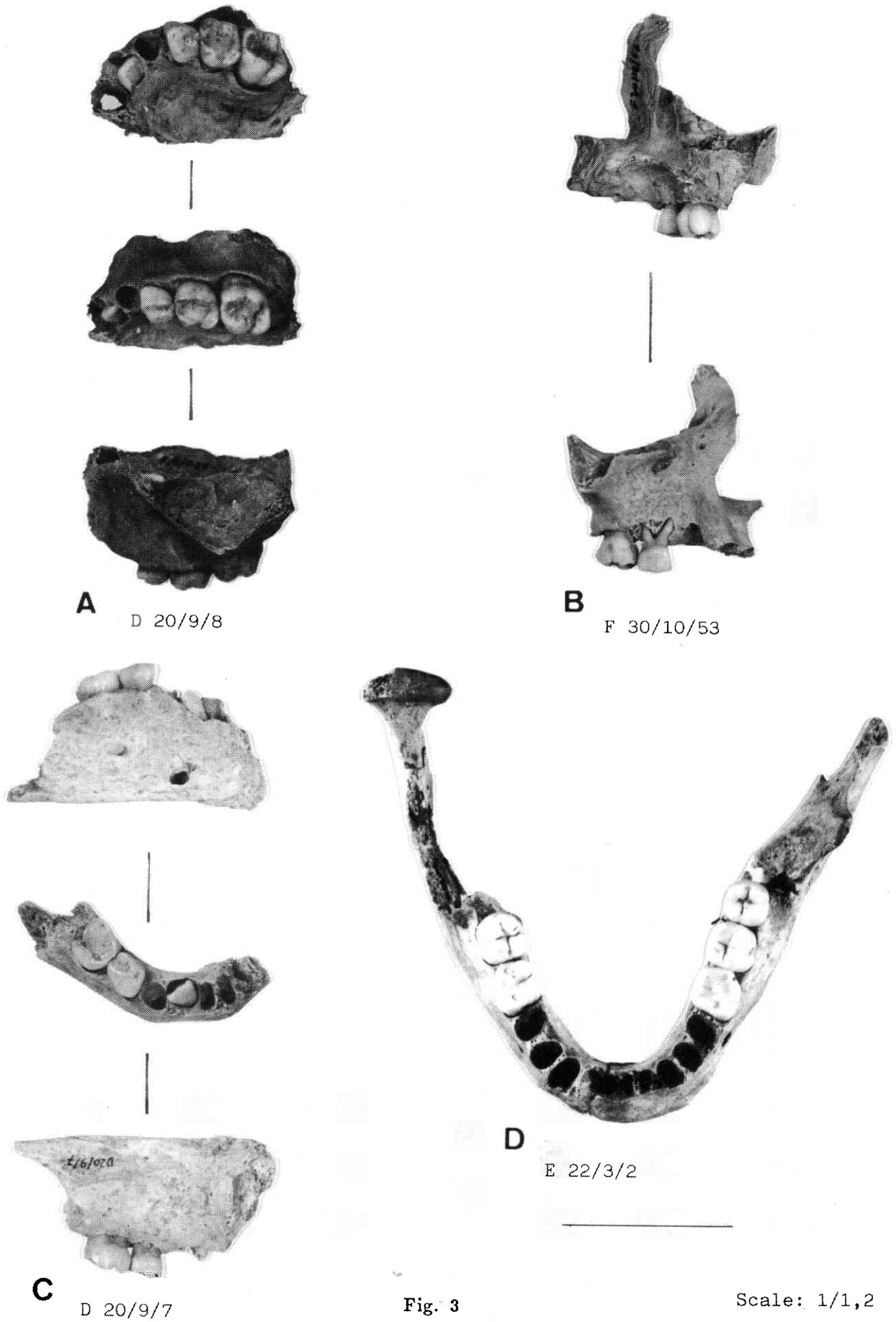


Fig. 3

Scale: 1/1,2

at the occlusal side, as well as a certain constriction at the cervical side. The significance of the enamel hypoplasia will be discussed below.

The age of death of the individual in question can be deduced from the developmental stage of the dentition; it can be estimated at approximately 3 years.

Boschmans 1 (fig. 4 E)

One incomplete upper right quadrant (1) of an adult dentition, the frontal part of the median suture of which has been preserved and the dorsal part of the palate lost *post mortem*. Starting from the median line, we have identified :

- The *alveolus* of the permanent incisor (11), lost *post mortem*.
- The permanent second incisor (12), canine (13) and first premolar (14), with attrition values of 3+, 4 and 3+ respectively.
- The *alveolus* of the permanent second premolar (15), lost *post mortem*.
- The permanent first and second molars (16, 17) with attrition values of 3+, 4 and 3+ respectively.
- The permanent third molar (wisdom tooth or *dens sapiens* (18), attrition 2.

Based on the attrition values of Brothwell's (1981) modified and supplemented age/attrition scale, the age at death can be placed in category 25-35 (b), approximating 30 years. The slightly advanced alveolar resorption supports the estimate. (It is certain that this *maxilla* fragment cannot belong to one of the *mandibulae* that will be presented later).

Boschmans 2 (fig. 4 F)

One incomplete and severely damaged (*post mortem*) upper left quadrant (2) of an adult dentition, the complete palate of which has been lost. Starting from the median line, we have identified :

- The *alveoli* of the permanent second incisor (21), the canine (23) and the first and second premolar (24, 25) the rounded edges of which indicate a rather substantial alveolar resorption.
- The *alveolus*, nearly filled up by bone regeneration, of the permanent first molar (26) lost *ante mortem*; the bone structure is characteristic.
- The rest of the *alveolus* of the permanent second molar (27) only the palatal root of which was in situ at death; during life the buccal *radices* had most probably lost contact with the alveolar bone because of excessive resorption, a phenomenon frequently observable in old dentitions.
- The *alveolus*, nearly filled up by bone regeneration (like 26) of the permanent third molar (28) lost *ante mortem*.

It is quite evident that the maxillary fragment belong to an older individual of at least 50 years of age.

(It cannot be excluded that this fragment might belong to mandibular fragment F 28/8/137, which will be discussed below).

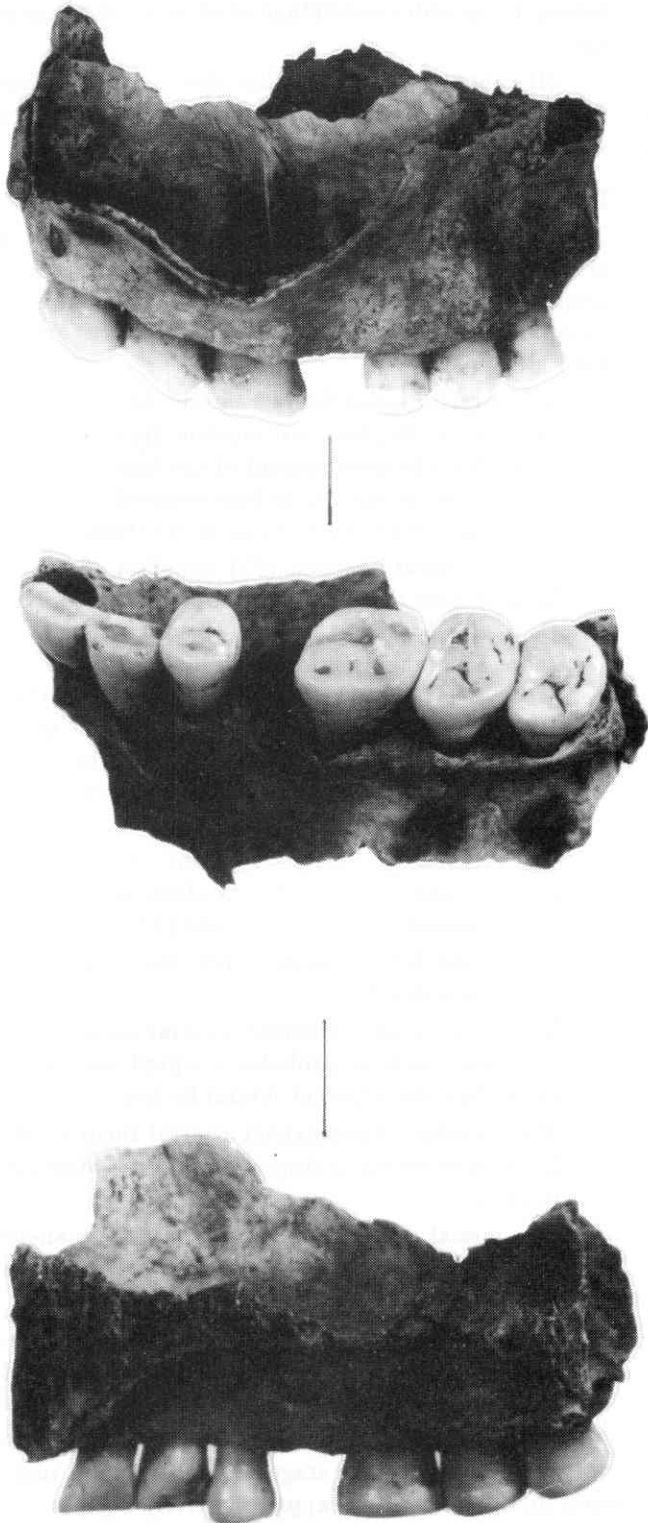
D 20/9/7 (fig. 3 C)

One fragment of a child's *mandibula* consisting of a larger part of the right quadrant (temporary 8, permanent 4) and a smaller part of the left quadrant (temporary 7, permanent 3). From left to right, we have identified :

- The mesial part of the *alveolus* of the permanent first molar (46), lost *post mortem*; its shape indicates that the development of the tooth was still incomplete; it may have just erupted, but definitely not up to the occlusal or functional level.
- The temporary second (85) and first (84) molars; because these teeth cannot be removed from their *alveoli*, it cannot be checked whether their successors (the permanent premolars 45 and 44) are present; but it seems very probable that they are. The temporary molars show some attrition, 85 in particular; together with the moderate alveolar resorption around them this indicates they had only functioned for a few years.
- The *alveolus* of temporary canine (83) lost *post mortem*, and, underneath, its obviously unerupted permanent successor, canine (43).
- Permanent lateral incisor (42), maybe erupted just before death.
- The *alveolus* of permanent central incisor (41) lost *post mortem*, probably erupted somewhat more than the adjacent lateral incisor.
- The *alveolus* of permanent central incisor (31) lost *post mortem*; its stage of eruption is identical to (41).
- The mesial part of the *alveolus* of permanent lateral incisor (32) lost *post mortem*; its stage of eruption is identical to (42).
- The loose permanent first molar (36), the associated alveolar bone of which has been lost *post mortem*. The development of the roots amounts to approximately one third.

The developmental stage of the dentition indicates an age at death of approximately 5 years.

It has been checked whether this *mandibula* fragment might belong to one of the maxillary fragments mentioned above, in particular those of the 3 and 7 year old individuals. Even taking into account that there may be some differences between the developmental stages of *maxilla* and *mandibula* in the same individual, it seems very unlikely in this case. The stage of development of the dentition of this 5-year



E

Boschmans 1

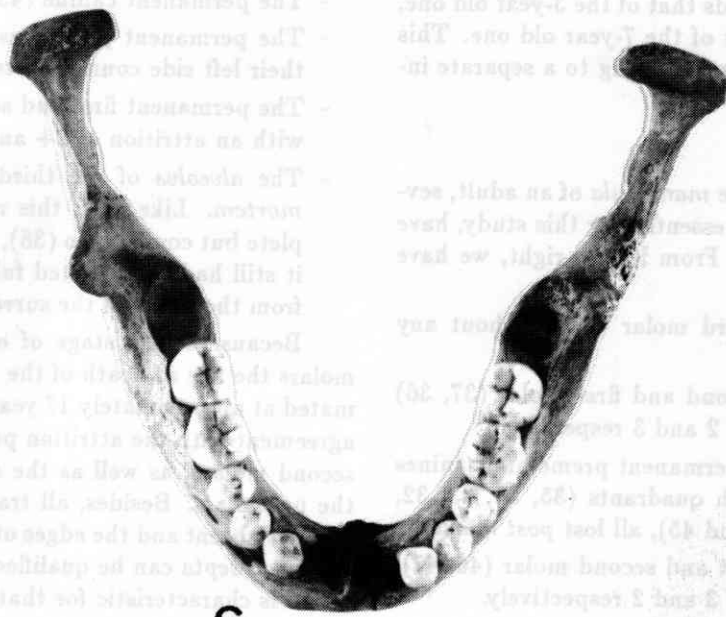


F

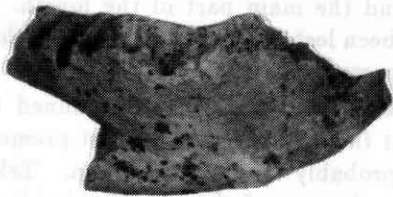
Boschmans 2

Scale: 1/1

Fig. 4



G E 22/3/1



H F 28/8/137



I F 30/10/63

Scale: 1/1,2

Fig. 5

old child definitely exceeds that of the 3-year old one, but does not match that of the 7-year old one. This fragment must consequently belong to a separate individual.

E 22/3/2 (fig. 3 D)

One nearly complete *mandibula* of an adult, several parts of which, non-essential for this study, have been lost *post mortem*. From left to right, we have identified :

- The permanent third molar (38), without any attrition (1).
- The permanent second and first molar (37, 36) with an attrition of 2 and 3 respectively.
- The *alveoli* of the permanent premolars, canines and incisors of both quadrants (35, 34, 33, 32, 31, 41, 42, 43, 44 and 45), all lost *post mortem*.
- The permanent first and second molar (46, 47), with an attrition of 3 and 2 respectively.
- As to the third molar (48), neither the tooth nor the *alveolus* is present. There are three possibilities in view of the surface of the alveolar bone. Either (48) had not yet erupted, or it had been lost *ante mortem*, or it had never been present, i.e. congenitally absent. Taking the height of the alveolar bone into account and the 'empty' bone beneath the surface, visible because of a fracture, most weight will be given to the hypothesis that it was congenitally absent.

According to Brothwell's (1981) age/attrition scale the age at death of this individual can be estimated as being in category 18 - 25(a), approximately 20 years. This can be confirmed by the slight alveolar resorption around the teeth and the accordingly sharp edges of the *alveoli* and the interdental *septa*.

E 22/3/1 (fig. 5 G)

One nearly complete *mandibula* of an adult (quadrants 3 and 4) several non-essential parts of which have been lost. From left to right, we have identified :

- The *alveolus* of the permanent third molar (38) lost *post mortem*; its shape indicates that its root formation was still incomplete. A slight discoloration of the distal point of contact with (37) suggests that (38) might have just erupted to the functional plane.
- The permanent second and first molars (37, 36), with an attrition of 2 and 2+ respectively.
- The permanent second and first premolars (35, 34), with hardly any traces of attrition (1).
- The permanent canine (33), attrition 2+.
- The *alveoli* of the left and right permanent incisors (32, 31, 41, 42), all of them lost *post mortem*; the *alveoli* are severely damaged, but still assessable.

- The permanent canine (43), attrition 2+.
- The permanent premolars (44, 45), identical to their left side counterparts, attrition 1.
- The permanent first and second molars (46, 47), with an attrition of 2+ and 2 respectively.
- The *alveolus* of the third molar (48) lost *post mortem*. Like (38), this molar was still incomplete but contrary to (38), there is no doubt that it still had not erupted fully, as can be deduced from the shape of the surrounding alveolar bone.

Because of the stage of eruption of both third molars the age at death of the individual can be estimated at approximately 17 years. This is in complete agreement with the attrition patterns of the first and second molars, as well as the absence of attrition in the premolars. Besides, all traces of alveolar resorption are absent and the edges of the *alveoli* and the interdental *septa* can be qualified as being razor-sharp, which is characteristic for that age.

F 28/8/137 (fig. 5 H)

One rather undistinguished fragment of an adult *mandibula*, consisting of a small part of the third quadrant and the main part of the fourth. All the teeth have been lost *post mortem* and only the *alveoli* have been preserved.

The description can thus be confined to mentioning that the right permanent first premolar (44) was most probably lost *ante mortem*. Taking the shallowness of some of the nearby *alveoli* into account, it seems quite evident that several other teeth might have been on the verge of being lost before death as well.

An estimate of the age of death of this individual is rather precarious, but an age of at least 50 seems a justifiable guess.

The fragment might very well belong to a previously presented maxillary fragment, i.e. Boschmans 2.

F 30/10/63 (fig. 5 I)

One fragment of a *mandibula* of a young individual, consisting of a part of the left quadrant (deciduous 7, permanent 3) and the right quadrant (deciduous 8, permanent 4). From left to right, we have identified :

- The mesial part of the *alveolus* of the still unerupted permanent lateral incisor (32) lost *post mortem*, and only an indication of the *alveolus* of its temporary predecessor (72).
- The remains of the *alveolus* of the temporary central incisor (71) with, underneath, the *alveolus* of the permanent central incisor (31) lost *post mortem*.
- The *alveolus* of the still unerupted permanent central incisor (41) lost *post mortem*; because of

post mortem damage to the alveolar bone, no *alveolus* of its temporary predecessor (81) can be assessed.

- The still unerupted permanent lateral incisor (42) and the *alveolus* of its temporary predecessor (82), lost *post mortem*.

The development of this dentition indicates an age at death of approximately 5 years. After checking, it is evident that this fragment cannot belong to one of the maxillary fragments (F 30/10/53 and D 20/9/8), which means that it belongs to a separate individual.

The separate teeth

Loose teeth found out of any skeletal context in an excavation also contain relevant information, though not to the extent of (fragments of) dentitions with both the alveolar bone and teeth.

After identifying the 16 fully developed teeth as belonging to permanent dentitions, it could easily be verified that they did not belong to the previously investigated fragments of the individual adult dentitions.

Since these fragments only represent parts, and sometimes only small parts, of the complete dentitions, it cannot be excluded that some of the sixteen teeth — possibly all of them — may in fact belong to the parts that have not been preserved.

For practical reasons, the information provided by the teeth has been summarized in a table similar to the registration form (with the right and left sides reversed) (fig. 6) described above.

In the 'identification' row, it can be seen that the 16 teeth in question consist of 6 incisors, 5 canines, 4 premolars and 1 molar; their distribution within the quadrants is also clear from this row.

In the 'radix (-ices)' row, the + and - are used to indicate whether the development of the root(s) is complete (an important point with respect to age).

The 'attrition' row refers to the degree of occlusal wear, according to Brothwell's (1981) modified and supplemented age/attrition scale.

In the 'hypoplasia' row the +, ± and - are used to indicate the presence of 'pronounced' or 'moderate' or the absence of hypoplastic traces respectively.

With respect to 'caries', the presence or absence of tooth decay is represented by + and -.

In the 'age' row, a mere approximation of the age at death is given, based on the attrition value. The distinction 'up to 18' (a), 'from 18 to 35' (b) and '35 and older' (c), must be taken as a very relative estimate.

The 'special features' row and if necessary further rows can be used in the case of an exposed pulp

cavity (by attrition or caries) for example, or of an atypical form of attrition, a fracture of the crown (ante or *post mortem*), a congenital deformity of the crown, etc.

DISCUSSION

On the basis of the results of the analysis of the remains, it can be concluded that we are dealing with at least 8 individuals. It must be emphasized that this is a minimum number, as is suggested throughout the analysis of the various fragments and separate teeth.

However it must be born in mind that no definite palaeo-odontological evidence can be adduced with respect to the presence of a greater number of individuals.

The 8 individuals we can identify with certainty are :

- 4 children. Age at death approximately 3, 5, 5 and 7 years.
- 4 adults. Age of death approximately 17, 20, 30 and 50 years.

As the presence of more adults can be deduced from other skeletal evidence, the preliminary minimum number of 8 individuals must certainly be re-considered and revised. Indeed, if all 12 axes found during recent excavations (Buelens, 1987) are attributed to adults, then we can reckon with a minimum number of $4 + 4 + 12 - 4 = 16$ individuals.

Actually, quite apart from the number based on dental evidence, the minimum number of individuals certainly amounts to 12, even if it is impossible to determine the age of death on the axes. Though the evidence with respect to age is rather limited, it seems obvious that child mortality was high. This phenomenon has often been observed among other, identically investigated, human populations of the past. Mortality rates of 25 up to even nearly 50 percent are no exception (Pot, 1988; Pot, de Groot and van Rooijen, 1989; Pot and de Groot, 1989).

The dental remains excavated at Sinsin may be considered as a random sample of dentitions of the former occupants of the cave. Though the number of teeth is relatively small, it is still remarkable that no evidence at all of caries can be observed. With all due reserve, the absence of tooth decay can be considered as a reflection of a food pattern favouring proteins (hunting, fishing) rather than carbohydrates (agriculture). This could perhaps be confirmed by other archaeological evidence.

	RIGHT								LEFT							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
UPPER																
Spec. features																
Age		c	c	b	b	b	b	b								
Caries		-	-	-	-	-	-	-								
Hypoplasia		+	-	+	-	-	-	-								
Attrition		4+	5	2	2+	3-	3-	3-								
Radix (-ices)		+	+	+	+	+	+	+								
Identification		1	1	1	1	1	1	1								
Identification	1															
Radix (-ices)	+				+											
Attrition	5				2+											
Hypoplasia	-				-											
Caries	-				-											
Age	c				b											
Spec. features																
LOWER																

Fig. 6 : The loose teeth : information table.

Hypoplasia of tooth enamel, i.e. more or less pronounced pits and grooves, must be considered as 'scars' resulting from interruptions in the enamel growth, thus at a very early age. The phenomenon manifests itself as a consequence of more or less severe disturbances in the general metabolism of the human organism caused by illness and/or malnutrition.

The presence of these dentition 'scars' seldom seen in the western world of today, is a reflection of general health during childhood.

In earlier populations it can often be related to the mean age at death (Pot, 1988; Pot, de Groot and van Rooijen, 1989). Apart from several (see fig. 6, hypoplasia : 5 teeth) of the 16 separate teeth with moderate hypoplasia, only one individual, the 3-year old F 30/10/53, shows a serious hypoplastic permanent first molar. The position of the hypoplastic pits and the clearly visible constriction in the enamel indicate that a severe metabolic disturbance took place in the individual in question at the age of approximately 2 years. The developmental stage of the molar (and the rest of the dentition) reflects an age at death of probably 3 years. There seems to be a definite connection here between illness and, shortly afterwards, death.

In general terms, the presence of hypoplasia in this population can be qualified as rather moderate; however it must be borne in mind that many teeth were lost *post mortem*, and several of them may have been affected as well. The number of teeth with hypoplastic traces only represents a minimum.

CONCLUSION (E.W.)

Eight individuals were identified through the dental remains studied here (4 juveniles + 4 adults), with two of them most probably not belonging to the group originally buried here (see further on).

Taking into account the other bones found during Bequet and Buelens' excavations, up to twenty-seven individuals (4+2+9+12) could, in fact, have been buried here. Some of the bones must belong to the individuals identified through palaeo-odontology, so the actual number of persons buried in the Trou del Leuve cannot yet be established. But even if there were only sixteen burials (4+2+12-2), they are numerous enough relative to the amount of grave-goods. Fifteen pins for sixteen dead does not seem extravagant, but we do not know if they were evenly divided. The fact is that all dead are equal, but some are more equal than others (the reader will excuse us for playing with George Orwell's last Commandement in "Animal Farm") and the golden hair-ornaments found in the cave show that there was at least one privileged individual buried at Sinsin.

The temptation may exist to identify the 50-year

old individual as the most important member of the group, but we have nothing to prove this. If indeed we are dealing with (a) privileged burial(s), it is a matter of surprise to see that one of the children buried with him (them) was suffering from hypoplasia, possibly showing that it was underfed (or merely weaned too early ??). Again, nothing shows whether this child was actually buried in the cave and not offered as a human sacrifice, a practice which is obviously part of Bronze Age ritual. The hearths with mixed animal's and children's bones excavated in the Galerie des Grandes Fontaines in Han-sur-Lesse (Mariën, 1982) certainly point to the existence of activities of a sacrificial nature in our own regions, too.

A HYPOTHESIS

We cannot relate any specific burial to any particular burial-gift found in the Trou del Leuve, though we must stress the probable connection of two *mandibulae* (E 22/3/1 and E 22/3/2) with a nondescript bronze rod and the previously mentioned fragment of a sickle and part of a decorated bronze cup (Warmenbol, 1985 : 21), all of which were found under a big stone near the entrance to the cave.

We can in fact contemplate the possibility of there being two kinds of human remains and two sorts of deposits scattered over the floor of the cave. On the one hand these would be primary burials, with the bones jointed and intact; these would be concentrated in the first 'room' together with their grave-goods, mainly or exclusively ornaments deposited in position and undamaged.

On the other hand, there would be secondary burials (sacrifices ?), with the bones disjointed and deliberately broken; these would be concentrated in the 'vestibule' (Bequet, 1885 : 302) with no ornaments but all kinds of other objects associated with them (offerings ?), deliberately destroyed. This situation is somewhat more complex than expected.

We can take the latter as being related to the former and, in fact, we cannot explain the former without explaining the latter. What is needed is a global study of cavities and caverns in use during the Bronze Age in order to determine the multiple purposes that they were used for. Just how elaborate the ritual use of caves can be is exemplified by such sites as the Grotte de Fontanguillère in Rouffignac-de-Sigoulès, in Périgord (Chevillot, 1981, 1989), the Grotte de Rancogne, near Vilhonneur, in Poitou (Guillien, 1968, 1970; Gomez, Gruet and Pautreau, 1988), and the Trou de Han, in Han-sur-Lesse, in Famenne. All three sites feature an underground river (and one inevitably thinks of the Styx as a term of comparison).

Just how elaborate Bronze Age ritual was in the Trou del Leuve in Sinsin is a matter of further study, with particular reference to human bones, including those found by A. Bequet and described by L. Dollo. Considering the results of the palaeo-odontological approach, the potential of a full study must be obvious, or at least we hope so.

Bibliography

- BEQUET, A., 1883. Caverne sépulcrale du Bel Age du Bronze à Sinsin (Namur), *Annales de la Société archéologique de Namur*, 16 : 227-248.
- BEQUET, A., 1885. Une caverne sépulcrale du Bel Age du Bronze à Sinsin, *Bulletin de la Société d'Anthropologie de Bruxelles*, 3 : 294-303.
- BOSCHMANS, A., 1975. Waarnemingen in de grot "del Leuve" (Sinsin), *Hona*, 10 (2) : 23-27.
- BROTHWELL, D. R., 1981. *Digging up bones. The excavation, treatment and study of human skeletal remains*. Oxford, Oxford University Press, 208 p.
- BRULET, R., 1972. Boucles d'oreilles de Sinsin. *Archéologie*, 2 : 62-63.
- BUELENS, M., 1986. Twee menselijke onderkaken uit de Trou de la Louve te Sinsin. *Axis*, 18 : 27-33.
- BUELENS, M., 1987. Onderzoek van de menselijke beenderen uit de grafrot "Trou del Leuve" te Sinsin. *Axis*, 19 : 1-15.
- BUELENS, M. and POT, Tj., 1989. Paleo-odontologisch onderzoek op beenderresten, Kronenburgstraat, Antwerpen. *Bulletin van de Antwerpse Vereniging voor Bodem- en Grotonderzoek*, 1 : 34-42.
- CHEVILLOT, Ch., 1981, *La Civilisation de la fin de l'Age du Bronze en Périgord*. Périgueux, Editions Médiapress, 216 p., 200 pl.
- CHEVILLOT, Ch., 1989. *Sites et cultures de l'Age du Bronze en Périgord*, Périgueux, Editions Vésuna, 2 vol., 256 and 370 p.
- DE LAET, S.J., 1982. *La Belgique d'avant les Romains*. Wetteren, Editions Universa, 793 p.
- DESITTERE, M., 1968. *De Urnenveldenkultuur in het gebied tussen Neder-Rijn en Noordzee (Periodes Ha A en B)*. Brugge, De Tempel, 2 vol., 158 and 142 p.
- DOLLO, L., 1885. Discussion. In : Bequet, A., Une caverne sépulcrale du Bel Age du Bronze à Sinsin, *Bulletin de la Société d'Anthropologie de Bruxelles*, 3 : 298-299.
- GOMEZ, J. GRUET, M. and PAUTREAU, J.-P., 1988. La période du Bronze final IIB - IIIa en Centre-Ouest. In : Brun, P. et Mordant, C., *Le Groupe Rhin-Suisse-France orientale et la notion de civilisation des Champs d'Urnes. Actes du Colloque international de Nemours 1986, Mémoires du Musée de Préhistoire d'Ile-de-France*, 1 : 517-524.
- GUILLIEN, Y., 1968. Informations archéologiques. Circonscription de Poitou-Charentes. *Gallia Préhistoire*, 11 : 318-323.
- GUILLIEN, Y., 1970. Informations archéologiques. Circonscription de Poitou-Charentes. *Gallia Préhistoire*, 13 : 369-370.
- MARIËN, M., 1970. *Le Trou de l'Ambre au Bois de Wérimont, Eprave*. Bruxelles, Musées Royaux d'Art et d'Histoire, 273 p.
- MARIËN, M., 1982. Fouilles à la Grande Fontaine à Han-sur-Less (XVIIème siècle et Champs d'Urnes). *Archaeologica belgica, Conspectus MCM-LXXXI*, 247 : 31-35.
- PERIZONIUS, W.R.K. and POT, Tj., 1981. Diachronic Dental Research on Human Skeletal Remains Excavated in the Netherlands. In : Dorestad's Cemetery on "the Heul". *Berichten van de Rijksdienst voor het Oudeidkundig Bodemonderzoek*, 31 : 369-413.
- POT, Tj., 1977. Paleo-pathologisch en archeo-anthropologisch gebitsonderzoek bij schedelmateriaal van de Tellem (Mali). *Nederlands Tijdschrift voor Tandheelkunde*, 84 : 249-257.
- POT, Tj., 1988. Het gebitsonderzoek van het grafveld St. Janskerkhof 1984. In : Boekwijt, H.W. and Janssen, H.L., *Kroniek bouwhistorisch en archeologisch onderzoek*. 's Hertogenbosch, Vrienden van 's Hertogenbosch : 125-149.
- POT, Tj., de GROOT, H.L. and VAN ROOIJEN, C.A.M., 1989. *Het Sint Jobs Gasthuis (1504-1818) te Utrecht. Een deelonderzoek van het opgegraven skeletmateriaal van het kerkhof. Opgraving Nieuwe Daalstraat 1980-'81*. Utrecht, Dienst Volkshuisvesting, Afd. Monumenten, 40 p.
- POT, Tj. and de GROOT, H.L., 1989. *Graven en begravenen in Utrechtse grond, van circa 1200-1800*. Utrecht, Dienst Volkshuisvesting, Afd. Monumenten, 42 p.
- RAEPSAET-CHARLIER, M.-Th., 1972. La stratigraphie du Trou del Leuve à Sinsin (Namur). *Annales de la Société archéologique de Namur*, 56 : 5-96.
- WARMENBOL, E., 1983. Sinsin (Nr.) : Trou del Leuve. *Archéologie*, 1 : 20-21.
- WARMENBOL, E., 1984. Sinsin (Nr.) : Trou del Leuve. *Archéologie*, 1 : 20-22.
- WARMENBOL, E., 1985. Sinsin (Nr.) : Trou del Leuve. *Archéologie*, 1 : 21-22.

- WARMENBOL, E., 1987. Occupation du Trou del Leuve à Sinsin, du Bronze final aux Temps Modernes. *In* : Cahen-Delhay, A., De Lichtervelde, C. and Leuxe, F., *L'archéologie en Wallonie 1980-1985. Découvertes des Cercles Archéologiques*. Namur : 259-262.
- WARMENBOL, E., 1988. Le groupe Rhin-Suisse-France orientale et les grottes sépulcrales du Bronze final en Haute Belgique. *In* : Brun, P. and Mordant, C., *Le Groupe Rhin-Suisse-France orientale et la notion de civilisation des Champs d'Urnes. Actes du Colloque international de Nemours 1986, Mémoires du Musée de Préhistoire d'Ile-de-France*, 1 : 153-163.
- WARMENBOL, E., 1991. L'âge du Bronze en Haute Belgique. Etat de la question. *Annales de la Société archéologique de Namur*, 66 : sous presse.
- Workshop of European Anthropologists, 1980. Recommendations for age and sex diagnoses of skeletons. *Journal of human Evolution*, 9 : 517-579.

Authors' addresses : Myrjam BUELENS
7/2, Timmerdonckstraat
B-2650 Edegem (Belgique)

Tjeerd POT
35, Tolsteegplantsoen
NL-3523 AL Utrecht (Pays-Bas)

Eugène WARMENBOL
7, Korte Brilstraat
B-2000 Antwerpen (Belgique)

Manuscrit reçu le 27 octobre 1990