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A PRECERAMIC BURIAL SITE AT MALMOK (ARUBA)

SUMMARY

Forty skeletons were excavated at Malmok in 1989. They proved to belong to a preceramic (archaic) group living in Aruba in the first half of the first millennium A.D. The total number of dead buried at Malmok was 60 - 70.

The dead had been buried in a specific posture. A red coloring agent and shells played an important role in the burial ceremonies. Most graves had a covering of large stones, partly projecting above the surface. They functioned as grave markers. Circa 10% of the dead had been buried under (or on top of) a large sea turtle carapace. Sex and age at death could be ascertained for the majority of the adults.

The Malmok site is not a midden area, although a small, shallow midden is situated just north of the burial area. This area functioned as cemetery or formal disposal area. It is striking that formal disposal areas emerge at the end of the preceramic period in other parts of the world too. They are interpreted as an expression of "territoriality", an increased residential stability associated with economic changes (Chapman, 1981: 76).

INTRODUCTION

Aruba is the most westerly of the three Dutch islands in front of the Venezuelan coast. This coast is within visual distance at 30 m. Aruba is the smallest of the 3 islands at 190 km² (Curaçao 444 km²; Bonaire 288 km²). Aruba is an autonomous part of the Kingdom of the Netherlands at present, formerly being one of the Netherlands Antilles. The nearest island is Curaçao at 78 km. This island is situated 70 km from the mainland.

Both Aruba and Curaçao are semi-desert islands with a xerophytic vegetation (Haviser, 1987). Aruba is even slightly drier than Curaçao: precipitation averages at 567 mm a year on Curaçao and at 425 mm on Aruba. The latter island has 52 rainy days a year, the former 69 (De Palm, 1985: 269). November and December are the wettest months on both islands, March-April are dry.

In spite of the semi-desert environment, both islands have been inhabited for considerable periods by small wandering groups with a fishing-gathering technique of food acquisition (for datings, see below), and by large sedentary groups with an agricultural base during the later Precolumbian period. These later groups made pottery of the Dabajuroid style; they lived in well-organized, large villages at Santa Cruz, Tanki Flip, and Savaneta in Aruba, and in San Juan and De Savaan in Curaçao among others. The reader is referred to Haviser (1987) and Versteeg (1989) for topographical information and more details on the ceramic period groups of these islands.

This paper primarily discusses the results of an excavation of the preceramic

Malmok site in NW-Aruba. Dating results on Canashitu, a related preceramic site in the central part of the island (see Versteeg, 1989: 21), and some data on preceramic sites on Curaçao are included in this paper.

The Canashitu site was discovered by A.D. Ringma, an amateur-archaeologist who had previously excavated and documented Precolumbian burials in Hato (Curaçao). He excavated 5 burials in Canashitu in Aruba in November 1950 (Wagenaar Hummelinck, 1959). The skeletal remains were sent to Holland, where Tacoma (1959) studied the physical-anthropological aspects. Some of the bone material of these Canashitu skeletons was dated at the C-14 laboratory in Uppsala (Sweden) during the present study. S.J.Gould collected and dated some shells from Canashitu (Gould, 1971).

The Malmok site was discovered even before Canashitu: according to an inhabitant of near-by Westpunt, burials were found at Malmok as early as 1942, when the leeward coast of the island was provided with military strongholds in view of feared German U-boat attacks. A human skeleton was uncovered when a primitive bulldozer collected sand at Malmok. The sand-collecting activities were stopped immediately. The burial was associated with the Indian population of the island, probably on the basis of the non-European posture of the dead. Tales on "ghosts at Malmok" are known on Aruba from that time on (pers. comm. Simon Kelly).

These tales induces the Curaçao amateur-archaeologist Chr.J.H. Engels to ask a friend, J.W.M. Diemont, to excavate some Malmok skeletons for him in 1966. Engels was interested in the stature of the Indians: tales on "Indian giants" on Aruba and Curaçao were reported by 16th century discoverors of the islands (Engels, 1970). Diemont excavated two skeletons at Malmok. Evidence was found during the present excavation that a few complete skeletons and a number of skulls were excavated at Malmok by W.V(isser?) in 1968. Sixteen skeletons were subsequently excavated by E.H.J. Boerstra in 1972. A short report was published (Boerstra, 1973).

A decision was made in 1988 to excavate Malmok again as:

1. No comprehensive report on the previous excavations had been published by the excavators.
2. The physical-anthropological remains and documentary evidence of the previous excavations are scanty.
3. The Malmok site is threatened with destruction from 1990 on by development works.
4. An inspection of the site suggested that many untouched graves still were *in situ* (Versteeg, 1988).

The present investigation was carried out by the author and J. Tacoma, physical anthropologist of the University of Amsterdam. Physical anthropological observations could be done *in situ* as Tacoma participated in all field activities in 1989. Only two Malmok skeletons were studied before 1989 by a physical anthropologist (see Engels, 1970). Tacoma studied during the present field campaign the skeletal remains¹ of 3 Malmok individuals that were stored in the Archaeological Museum Aruba. Three experienced field assistants of this museum participated in the project, which was carried out between 1 June and 7 August 1989.

The Malmok site is situated at a distance of 200 m (S) - 300 m (N) from the sea, parallel to a former *saliña*, a salt-lake (Figs. 1A, 1B). The site shares its sandy

subsoil with the salt-lake. Limestone is found below the sand in the site; this limestone surfaces just west of the Malmok site. It is part of the Lower Terrace Formation, which is quaternary in age. It was formed during a period of rising sea level (deglaciation). The limestone became - and later stayed - emerged by the subsequent lowering of the sea level and tectonic uprising. Rainfall and seawater influx are the main factors that determine the size and salinity of the *saliña*.

Although the area is mostly composed of limestone, debris of quartz-diorite (batholith) and diabase (belonging to the oldest formations on Aruba) can be found scattered here and there. These older formations can be considered as outcrops that border the limestone formation. Such a diabase outcrop is found northeast of the Malmok site. Some of the Malmok burials are covered by rocks from this outcrop (see below). An interesting feature is the fresh- to brackish-water well found ca 1 km east from the site. A possible explanation is that it is situated at the border zone of the limestone formation and the batholith. The main source for this fresh-water is rainwater.

THE CEMETERY AT MALMOK

Forty buried individuals were excavated in 1989: 31 are adult individuals, 5 are children, and 4 are very incomplete adult individuals². Some information is available from the earlier excavations: for instance the exact location of 58 graves is known (see Table 1). Physical anthropological information (at least sex and approximate age at death) is known of 36 adult individuals. The information on the children is limited to the approximate age at death.

There is evidence for the total number of dead buried in prehistory at Malmok. Sixty individuals have been excavated up to 1989 (Table 1). It is highly improbable that more individuals were excavated³. Most of the site was checked for unnoticed burials at the end of the field season in 1989. The results of this check suggest that only a very low number of skeletons still may remain in the soil undiscovered. The available evidence indicates that not less than 60 and not more than 70 individuals were buried in prehistory at Malmok⁴.

A small shell midden (A in Fig. 1B) is situated just north of the burial area. This stretches over a length of ca 200 m and a breadth of ca 50 m parallel to the *saliña*. The most northerly grave is situated 25 m southeast of the shell midden. Most graves are found scattered over the area but several clusters of graves occur. One cluster is found in the north area of the site (B in Fig. 1B); it comprises 7 burials, of which the burial pits border to one another. A similar cluster of 10 graves occurs in the south part of the site (C in Fig. 1B). Most other clusters - between 2 and 5 burials in association - are situated near cluster C in Fig. 1B.

The top section of nearly all graves consists of large limestones. Some graves of cluster B in Fig. 1B have large dark-colored diorite stones. The number of stones varies from 1 to 5 for one burial. If one stone is used it is situated on top of the pelvis. Some graves have large numbers of smaller limestones (see Fig. 6). Complicated stone arrangements cover some of the burials: one large limestone has been placed horizontally on top of the middle part of the body and 4 similar stones have been erected vertically around the central one (see Fig. 3). This arrangement was covered with sand in such a way that the top of the 4 vertical stones projected 5 - 10 cm above the actual surface. The burials in the flat section of the site and in

the small low dunes and their relation to the present surface suggest that the landscape essentially was the same in prehistory as today.

The stones have been placed without doubt as burial markers as Engels (1970) already suggested. Boerstra (1973) stresses the relation between the covering stones and the burials. Probably all 20 burials excavated in 1966, 1968, and 1972 were covered with large stones. The intensive search for all graves, in 1989, yielded four graves without a stone association (see above and note 6).⁵

The origin of the limestones is the limestone plateau situated some tens of m. west of the site. Stones such as found in the graves are not found on the plateau; they can, however, be hammered loose from the plateau in the shape such as found in the graves. Their size varies from ca 10 x 5 x 5 cm to 80 x 60 x 25 cm. Their weight varies from ca 1 to 25 kg. The diorite dark-colored stones of the north cluster are heavier. This stone species is found in a natural outcrop northeast of the site at a few hundred meters distance.

Some graves are associated with sea turtle carapaces. Such a carapace of a size of ca 80 x 120 cm covered one of the burials (Figs. 6, 7, and 8). Below the carapace a central horizontal stone was found and a circle of large and smaller surrounding stones. A male adult of 25 - 35 years old was buried under the stones. Another carapace covered a woman, older than 45 years. A large diorite stone was situated on top of the carapace. The third sea turtle carapace associated burial was set up in a different arrangement: a similarly large carapace had been installed on a specially prepared platform in the sandy subsoil at a depth of ca 60 cm. This carapace was found flat side (female turtle!) down, curved side up in the soil. The dead body of a woman, older than 45 years, had been put on top of the carapace. This burial is one of the 4 without stone associations. This old woman suffered from a humpback (Pott's kyphosis). The sea turtles probably were caught when they came to the beach to lay eggs. A large sandy beach stretches southward at ca 1 km distance from the site. Sea turtles may have been an important protein source for the preceramic fisher-gatherers of these islands. Boerstra also mentions burials with sea turtle carapace associations⁶. Circa 10% of all Malmok burials have sea turtle carapaces above or under the buried dead.

Shells were found in 25 or the 40 burials excavated in 1989. No less than 43 shell species occur in the graves. *Astrea tuber*, *Cittarium pica*, *Melongena melongena*, *Murex pomum*, *Natica canrena*, *Nerita tessalata*, *Strombus gigas* (many juveniles of this species), *Thais deltoidea*, *Tonna maculosa* are the species occurring most. In some graves 2-4 shells of one species were arranged in a north-south line in the burial pit. For all the shell species found in the graves see Versteeg and Tacoma (1990).

Nineteen individuals excavated in 1989 had large quantities of red dye at the top or back part of the skull. The origin of the red coloring agent still is in study. The occurrence of "red ochre" in the graves excavated in 1972 is mentioned by Boerstra (1973). He does not mention the number of graves with such a red coloring agent. Quantitative data of the 1989 investigation suggest that ca 50% of the dead in Malmok were colored red during the burial process.

The orientation of most of the Malmok individuals is: head east, legs west (19 indiv.). One individual is oriented head west, legs east, 4 head north, legs south, 6 head south, legs north, and 6 individuals had a different orientation. A striking aspect of the orientation is the 90° angle between a male dead and the nearest female dead: for instance: the male dead of Fig. 2 was found head east, legs west.

The south side of the burial pit met the north side of another burial pit in which a female adult was found, orientation head south, legs north⁷.

The dead were buried in three postures: in a crouching position on the right side (right side of the body down, left side of the body up). Nineteen dead were buried in this position (cf. Figs 2 and 4). Sixteen dead were found on the left side, also in a crouching position (cf. Fig. 8). One child and one adult male had a different posture: they were lying supine, legs flexed; they are buried next to each other too, albeit at some 10 m distance. Another child younger than 1 year, is buried ca 6 m from this male adult. All three dead were buried in an east-southeast to west-northwest line. Both children were buried head southeast, legs northwest. These data suggest a relationship between the man and the two children.

The majority of the dead (27 individuals) proved to have at least one hand at the front of the head: usually this hand is grasping the forehead. This hand was found in the area of the chin in a few isolated cases. Some dead have both hands at the front of the head. None of the hands near the skull was registered in 10 burials (see Figs. 4 and 8; for a burial with hand at the chin fig. 2). Observations on hand-head relation was possible in 37 burials.

Eighteen female adult and 18 male adult individuals were studied by Tacoma (this volume; Versteeg and Tacoma 1990). The average age at death of the female group is slightly higher than that of the male group (slightly above 35 years for the females; slightly under 35 years for the males)⁸. A relatively large number of females died during young adulthood, probably related to death caused by childbirth (Tacoma, this volume). Once, however, an age of ca 25 years was reached, most women lived to a relatively high age, i.e. older than 33 years (cf. Table 2).

The length of the Malmok individuals was calculated by Tacoma cf. Genoves (1968), see Tacoma (this volume). Average male stature is 156.9 cm (max. 163 cm; min. 151 cm). Average female stature is 148.9 cm (max. 155 cm; min. 145 cm). Two shorter females were excavated in 1989: one suffered from a humpback; the other from dwarfism. Their stature was 137.5 cm and 135 cm. They were excluded from the stature calculations⁹.

Important conclusions were possible on the shape of the skull of the Malmok population, and in general on that of the preceramic population of Aruba and Curaçao. Measurements of the relatively well-preserved specimens indicate that the Malmok population was dolichocran (relatively long skull), hypsicran ("high" in respect to the length), and acrocran ("high" in respect to the breadth). The Malmok population shares these general traits in skull shape with the other documented preceramic populations of Aruba and Curaçao (cf. Tacoma, this volume: Tacoma in: Versteeg and Tacoma, 1990; Tacoma, 1965; Tacoma, 1959). This specific skull shape is striking as compared to that of the later, ceramic, Dabajuroid population of the islands: they have relatively wide skulls (brachy- to hyperbrachycran).¹⁰

Dentition of the Malmok population is well-documented: the complete dentition of 24 individuals could be listed and studied by Tacoma. The dentition is characterized by shovel-shaped incisors, a strong masticatory apparatus, a low level of occurrence of caries, a relatively low number of individuals (6) suffering from pre-mortal loss of teeth (25%). The strong masticatory apparatus of the Malmok population is striking: molars of two individuals demonstrated a well-worn tilted plane of attrition: crowding had pressed these molars in a position tilted in respect to the rest of the mandible (Tacoma in: Versteeg & Tacoma, 1990).

Apart from the caries, Pott's kyphosis, and dwarfism discussed above,

pathological evidence from the skeletal remains is limited to 3 individuals older than 33 years who suffered from arthrosis in shoulder and/or hip joints (Versteeg and Tacoma, 1990).

Eight burials contained incomplete skeletons. A shall content was found in these graves comparable to the other burials, and the usual stone arrangement covered them. Part of the skeleton of 4 individuals still had the normal anatomical coherence, but either the lower part (legs, and in some cases also pelvis) or the upper part (skull, arms, thorax) was missing. Age at death and sex still could be determined from the remaining part of the skeleton.

The skeletal remains of the 4 other individuals missed any anatomical coherence. One of these individuals had been reduced to a large number of splintered bone fragments. Three other burials were characterized by a brittle texture of the bone material, which consisted of only remains of arms and legs. The texture of the bones differed from that of the other 37 burials excavated in 1989. The brittle texture suggests that the bones were exposed to heat or an extreme drying process. These graves also had the usual stone covering and shells associated with the buried remains.

If the "brittle" remains are indeed the result of a heating or drying process, the best explanation is a complex burial ritual of these individuals in prehistory. Such a ritual can have consisted of a secondary or "double" burial or, if it is a primary burial, the flesh and muscles were removed (or rotted away) before the remains of arms and legs were buried. The heating or drying of the bones must have occurred before the (final) burial.

The most probable explanation of the situation in which the 5 other discussed burials (splintered skeleton, and 4 incomplete skeletons, but anatomical coherence) was found is a disturbance of the graves either in prehistory or in (sub)recent times. It was difficult to draw pertinent conclusions from field observations as the result of digging activities was extremely difficult to distinguish in the uniform soil colors at Malmok. The soil had light colors from the surface to the lower layers because of the sparse vegetation and the lack of midden material from any period of time in the area of the burials.

DATING OF THE MALMOK BURIALS

Six datings are available at present that date the Malmok burials¹¹. Three are the result of C-14 dating of shell samples in the Groningen laboratory. The shells were associated with 3 burials excavated in 1989. The other 3 samples are collagen from dental elements of Malmok individuals excavated in 1972. They were dated in the laboratory of Uppsala (Sweden) by an accelerator dating method. Conventional radiocarbon ages and ages corrected for marine reservoir effect (correction factor 400 y.) are given in Table 3. The corrected ages are a better approach of the real age of the samples (pers. comm. G.J. van Klinken). Datings of modern and pre-nuclear bomb shell samples from Aruba are carried out at present to obtain a correction factor as precise as possible for the shell samples. As a consequence of this small changes in the results of the shell samples are possible in future. No calibrated ages are given for these samples. The results of the collagen datings are calibrated cf. the computer program of Van der Plicht and Mook (1988) with a 95.4% confidence level.

The information available at present suggests that the burial activities at Malmok

ook place between 1700 and 1500 BP (ca 300 - 500 AD). More datings will be available on short notice. Stable isotopes in bone collagen are studied at present by G.J. van Klinken (1990) to reconstruct the diet of the preceramic population of Aruba, in addition to the radiocarbon dating program.

SHELL MIDDEN

A small, oval shell midden of 20 m (N-S) x 15 m (E-W) is situated north of the burials. The midden proved to be extremely shallow: shells reached a depth of ca 10 cm only in the centre of it. A shell from a test pit in the centre was dated. The result confirms that the midden and the burial activities are related. Fourteen of the shell species found in the graves also occur in this midden (Versteeg and Tacoma 1990).

The midden (see A in Fig. 1B) obviously represents a number of activities of limited extent. It is not the result of long periods of occupation. Most probably small groups camped just east of the midden during periods of burial activities (and related ceremonies), i.e. at most for a few days.

Heavy equipment (a "grader") was used to scrape the surface east of the shell midden. No traces of soil discolorations as a result of posts of huts were seen at any level.

RELATED SITES

Five Indian burials were excavated at Ceru Canashitu in Aruba by A.D. Ringma in 1950. The excavated bone material, the notes and drawings of this relatively well-documented investigation were published by P. Wagenaar Hummelinck (1959) and Tacoma (1959). It is most interesting to compare the drawings made by Ringma (Wagenaar Hummelinck 1959: 89-90) with the data of the Malmok burials.

Ringma excavated one cluster of 4 burials, C1 - 4, and C5 at a distance of ca 5 m. from the cluster in a limestone abri. No stones are described to have been found on top of the dead bodies, but skeleton C5 was associated with a large limestone rock. Ringma's drawing shows also large limestone rocks near the cluster of 4 burials, in particular near C1. The dead were buried in a crouching position (two on the left side, and two on the right side). It is interesting to note that C2 and C3 were buried under an angle of 90°. Such a burial of two individuals at an angle of 90° were determined as a man and a woman at several locations at Malmok. Unfortunately only the sex of Canashitu C2 is known (male). Ringma commented on C3 "it seems to be a short person".

Three of the Canashitu dead have one hand at the head, in a similar arrangement as the majority of the Malmok dead were found. Especially C5 was buried in a posture similar to that found in Malmok.

Collagen from a molar of C1 excavated in 1950 by Ringma was dated by accelerator dating in the Uppsala Laboratory during the present investigation. The result is 2210 ± 95 BP (Ua-1501). It dates the Malmok burials as a slightly older group than the Malmok burials. The shape of the Canashitu skulls ("high" in respect to breadth; see Tacoma, this volume) is another argument to associate the Canashitu burials with the Malmok ones.

Some pottery sherds were found in the Canashitu abri. They are interpreted as

the result of later activities: one of the large villages of the ceramic period was situated at Santa Cruz near to the Canashitu site. Gould (1971) collected some shells at Canashitu from "a very inhomogeneous deposit of shells artificially concentrated at the base of a slope". Dating results with a wide range resulted from these shells¹².

Wagenaar Hummelinck (1959) stresses the similarities between 2 sites where Ringma excavated burials in 1950: the discussed Canashitu site in Aruba and the Hato site near the north coast of Curaçao. Ringma also excavated skeletons in a crouching position having one or both hands at the skull at Hato (Wagenaar Hummelinck 1959: 85). This posture, the limestone abri at Hato, and some physical-anthropological details as shovel-shaped incisors and skull shape (ibidem: 86) suggest that Hato is a site strictly comparable to Canashitu.

Haviser (1987: 174) ascribes Hato to the ceramic period on the basis of sherds found in the abri. The present author suggests that the posture of the dead, the limestone abri, and the physical anthropological evidence are indicative of a preceramic period site. The pottery sherds are described, as at Canashitu, to have been found *in the abri*, not *in the graves*.

Haviser (1985; 1987) excavated 4 preceramic burials at St. Michielsberg in Curaçao. The similarities between Malmok and St. Michielsberg are evident: the lower part of the bodies are covered by large limestones, the posture of the dead, a sea turtle association (Haviser 1987: 65). The dead are buried in a small cluster at similar distances as in Canashitu and Malmok.

Differences exist too: the St. Michielsberg burials are situated in a preceramic midden on a slope of a hill and the St. Michielsberg datings are older than those of Malmok and Canashitu: ca 3800 BP as compared to ca 2200 - 1600 BP for the Aruba sites.

The common characteristics of the preceramic Aruba and Curaçao sites - the posture of the dead, the association with limestone (2 sites in limestone abris and 2 sites where burials are covered by limestone rocks), the high skull shape (high as compared to the breadth and length: cf. Tacoma, this volume, passim, but especially the last paragraph of the paper) - suggest one group with a long-standing cultural continuity between ca 4000 and 1500 BP on these islands. The hiatus between the preceramic and ceramic periods on Curaçao as observed by Haviser (1987: 82) can be filled in partially now. The data available at present suggest that groups with preceramic lifestyle lived on the islands off the Venezuelan coast from ca 4500 - 1500 BP.

FORMAL DISPOSAL OF THE DEAD

The Malmok site has a primary function of cemetery. It is the result of communal as opposed to individual burying activities: such activities are described as formal disposal of the dead.

Such formal disposal areas have been studied in western Europe: they emerge for the first time in the late mesolithic period. A large number of graves have been found in the Tagus valley in Portugal, at several locations in southern Brittany in France, at Vedbeak in Denmark (Chapman 1981), and at Skateholm in Sweden

(Larsson 1984).

According to Chapman (1981: 80): formal disposal areas "will emerge in periods of imbalance between society and critical resources. Such imbalance may arise in many ways, but in all cases society perceives the spatial and/or temporal variation in important resources to have approached a critical level and devises new mechanisms to regulate access to these resources. The emergence of territorially based descent groups is a response to this process and the new social order may be symbolized to the community at large by the use of formal disposal areas, through which a permanent claim to the use and control of critical resources is established by the presence of the ancestors."

Chapman bases his conclusions for a large part on ethnographic studies of Saxe and Gall (1977) of the Temuan of Malaysia. Their observations are: "Prior to the second world war land was owned communally by villages, there was no shortage of land nor any restricted resources and no formal disposal of the dead in cemeteries. Since that time important changes have occurred: land has become increasingly scarce, there have been shortages of critical resources (e.g. forest), population has increased and wet rice cultivation has been introduced on limited areas of suitable land. As a result there have emerged supra-household 'proto-lineages' and the formal disposal of the dead in cemeteries" (Saxe and Gall 1977; Chapman 1981: 74). Studies of Goldstein (1977, 1981) support the conclusions of Saxe and Gall.

In a similar way the people who buried their dead at Malmok in the late preceramic period may have used a formal disposal area to stress their relationship with resources in north Aruba that were vital to the, such as the sea turtle beaches, the marine shellfish resources (some graves contain precisely elements of these resources!) or the nearby freshwater wells.

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NOTES

* This paper differs considerably in text and title from the first draft read during the Congress in July. Please only quotations from this final draft!

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1. These were excavated by Boerstra in 1972.

2. A few of the 31 adult skeletons were not found complete. For these incomplete skeletons, however, sex and age of death could be determined. This proved not to be possible for the 4 very incomplete skeletons.

3. The locations of the pre-1989 excavations were still visible in the fields. A map of the 1972 excavations is in the archives of the Archaeological Museum Aruba. The information corresponds closely to the field measurements. Engels (1970) is very

clear on the point that Diemont did not excavate more than 2 skeletons. S. Kelly informed us that no skeletons were removed in 1942.

4. The complete southern half of the burial site (between the 220 and 120 m lines in fig. 1B) was removed in layers of 10 cm by heavy equipment (a "grader") after the excavation of all burials visible from the surface. Only a few burials were found at a lower level. These were excavated. The northern part of the burial site was not checked by the machine for unnoticed burials. Even if twice as many burials in this area were not seen from the surface, still the total number is not higher than 70. It is more probable that this number is between 60 and 65 than between 65 and 70.

5. It is possible that the stones were removed between the burial activities and 1989. Havisser (1987) suggests that stones covering one of the St. Michielsberg burials, were removed by such post-depositional processes.

6. A. van der Blik informed the present author that two burials excavated in 1972 were associated with sea turtle carapaces. Five Malmok burials in total had such sea turtle carapace associations. One of the other 1989 burials probably contained bones of the skeleton of a sea turtle (Versteeg & Tacoma, 1990).

7. Compare the burials from Canashitu (Wagenaar Hummelinck, 1959: 90). Here also one individual (C2, a male) is oriented at 90° in respect to a nearby buried small individual.

8. This figure is obtained by taking averages for each age category.

9. The average female stature is 147.2 cm, if they are included.

10. It is sure that the typical skull shape of the preceramic individuals is not the result of artificial deformation of the head (Tacoma, this volume).

11. Two shell datings are too young to be acceptable. Eight datings in total were obtained. All will be published in Versteeg & Tacoma (1990).

12. One dating, 1685 ± 115 BP may be related to preceramic activities in Canashitu. The other, younger, datings probably are indicative of the later, ceramic, use of this terrain. It is possible that all 3 results still need a correction for marine reservoir effect.

Table 1.

Individuals excavated at Malmok 1942-1989. This table includes 5 children excavated in 1989. The physical anthropological information on this group is limited to approximate age at death and some information on dentition.

excavated	1942	1966	1968	1972	1989	total
excavated individuals		2	2	16	40	60
exact location of burial known	?	?	2	16	40	58
physical anthropological information		2	-	3	36	41

Table 2.

Age at death of the Malmok adults, 18 males and 18 females (after Tacoma in: Versteeg and Tacoma, 1990). Age categories cf. Brothwell, 1981.

age categories	17-25 y.	25-35 y.	33-45 y.	ab. 45 y.
no of females	4 (22%)	2 (11%)	8 (44.5%)	4 (22%)
no of males	3 (16.5%)	6 (33%)	6 (33%)	3 (16.5%)

Table 3.

Radiocarbon datings on Malmok burial site					
Field no Malmok:	Lab. no.	material	conv.radio- carbon age	ages corrected for marine reservoir-effect	calibrated ages cf.V.d. Plicht & Mook
F. 139	GrN-16836	shell	2390 \pm 150 BP	1990 \pm 150 BP	
F. 114	GrN-16833	shell	2175 \pm 85 BP	1775 \pm 85 BP	
F. 119	GrN-16834	shell	2035 \pm 80 BP	1635 \pm 80 BP	
B	Ua-1341	collagen	1740 \pm 110 BP		50 - 550 AD
6	Ua-1542	collagen	1520 \pm 100 BP		260 - 680 AD
15	Ua-1340	collagen	1515 \pm 105 BP		250 - 680 AD

Table 4.

Radiocarbon dating of shell from Malmok midden. N.B. small changes are possible in the corrected age as a result of reseach to a more precise value of the marine reservoir effect for Aruba.				
Field no Malmok	Lab.no.	Material	conv. radio- carbon age	ages corrected for ma- rine reservoir effect
pit 1	GrN-16832	shell	2345 \pm 140 BP	1945 \pm 140 BP

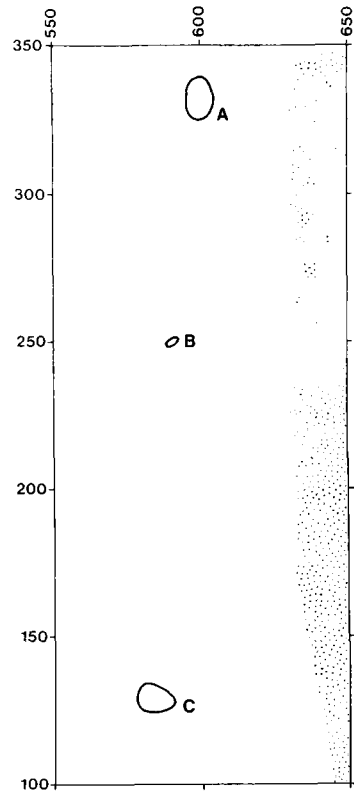
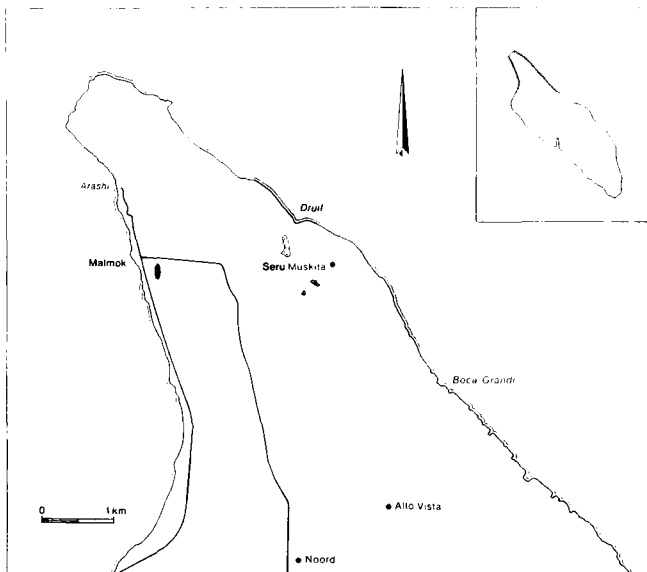


Fig. 1A.(left) Map of north Aruba. Malmok site.
 Fig. 1B.(right) Map of Malmok site. A = shell midden
 B = north cluster of 7 burials
 C = south cluster of 10 burials
 grey area = "Saliña"

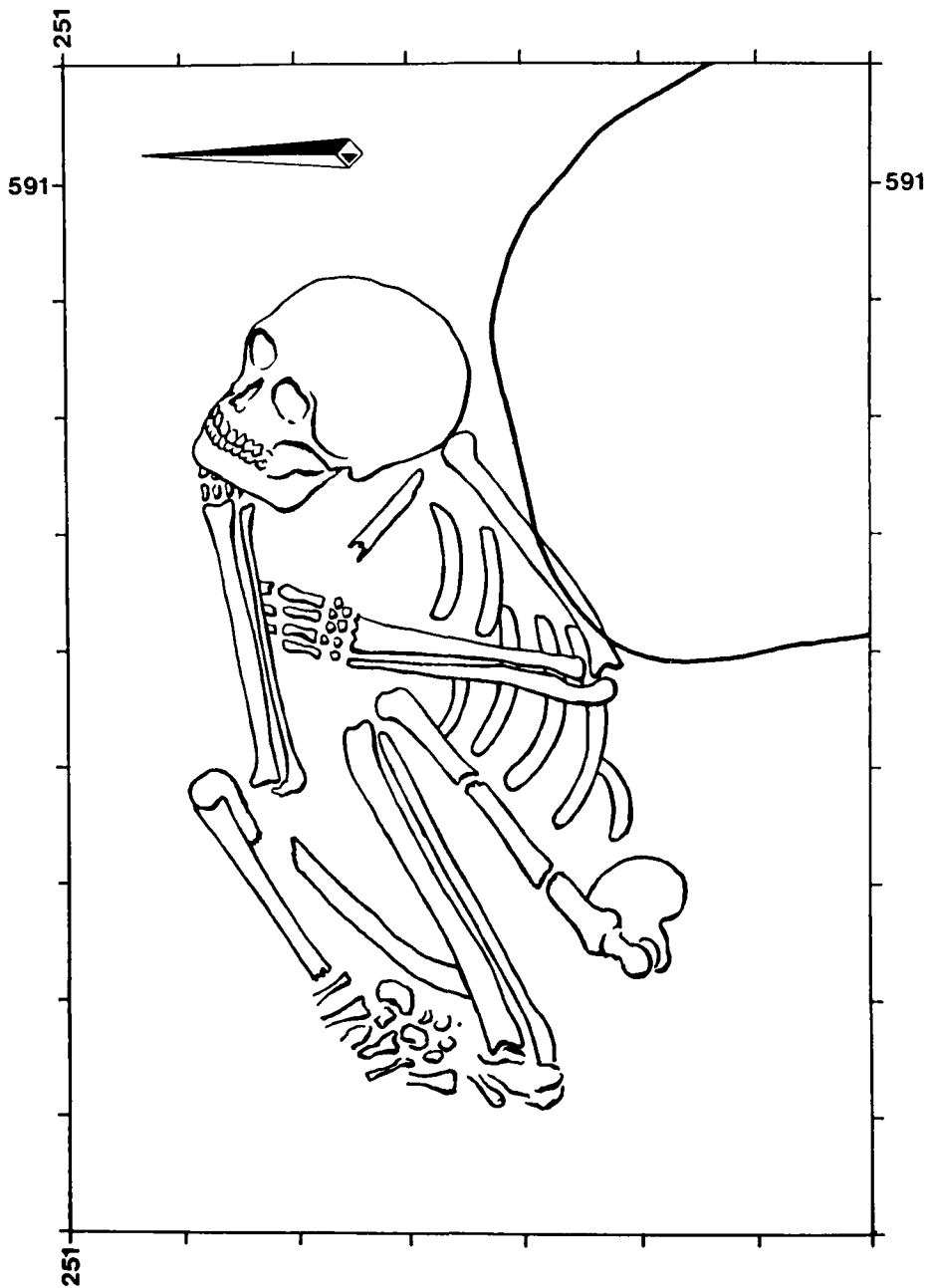


Fig. 2. Skeleton excavated in the north cluster B. (fig. 1B). The large limestone, visible at right, is associated with this 20-25 y. old male and a female adult buried at a 90° to the right. The hand near the chin is typical for the Malmok burials. The numbers (251, 591) are meters of the grid system (cf. fig.1B). This skeleton is part of the permanent exposition of the Archaeological Museum Aruba.

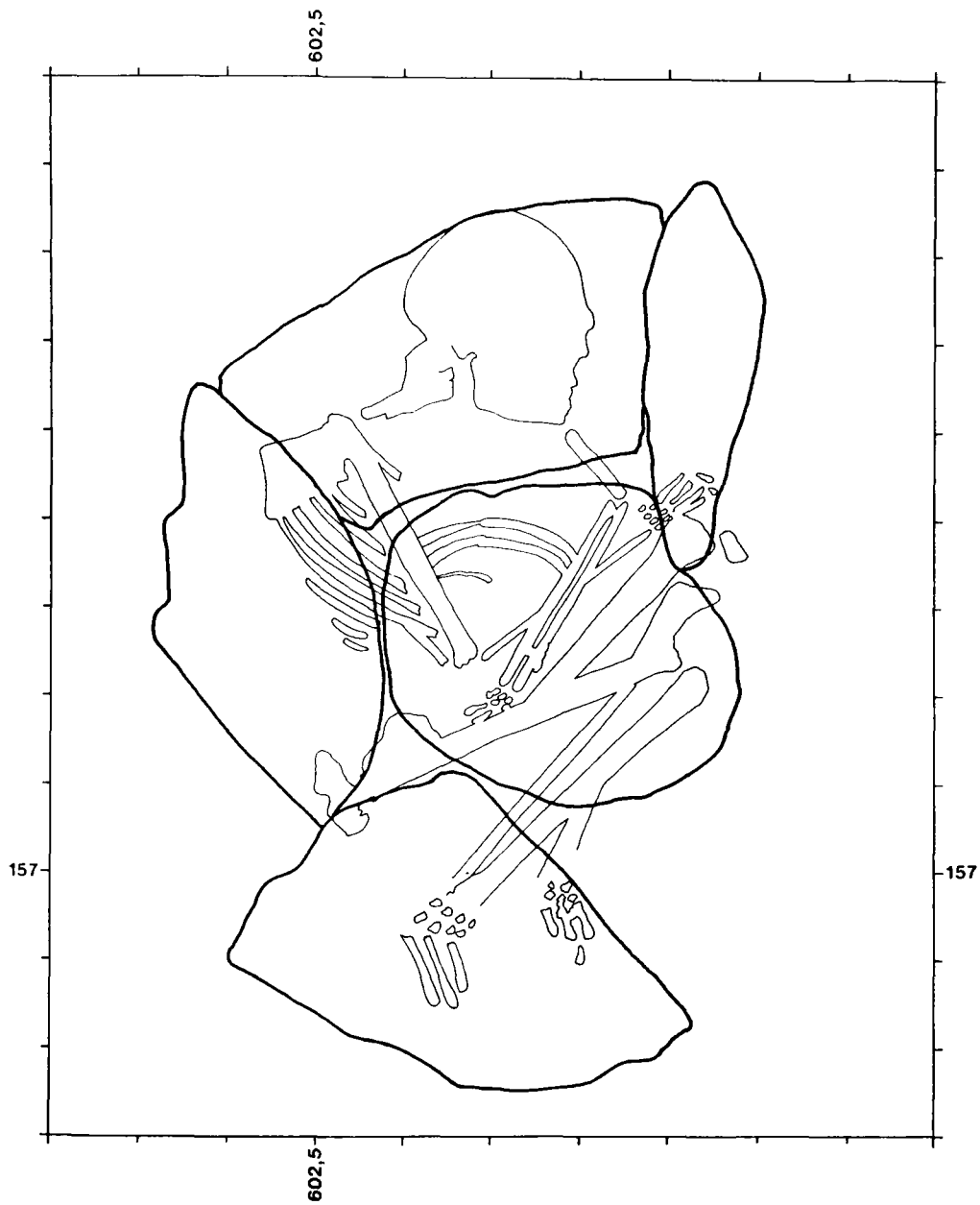


Fig. 3. This burial is covered by a flat limestone and 4 large vertical limestones. Only the top of the 4 vertical stone projected above the surface. This burial is situated in the south area of the site, north of the south cluster C in fig. 1B. See for the skeleton fig. 4.

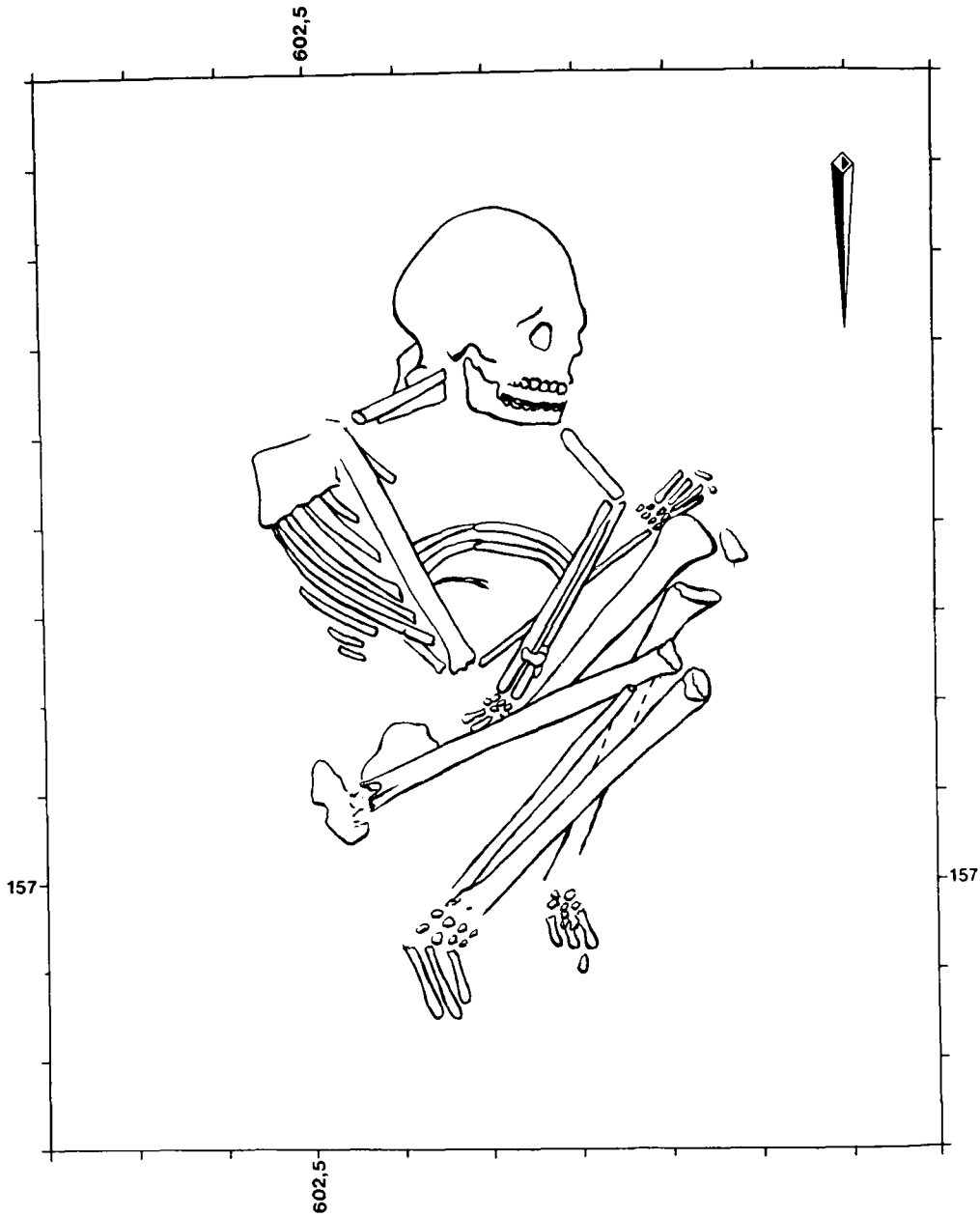


Fig. 4. This individual, a man who died at an age of 33-45 y., has an orientation head south, legs north. Large amounts of a red colouring agent (ochre?) was found at the back side of its head. This fig. shows the skeleton of the stone arrangement of fig. 3.

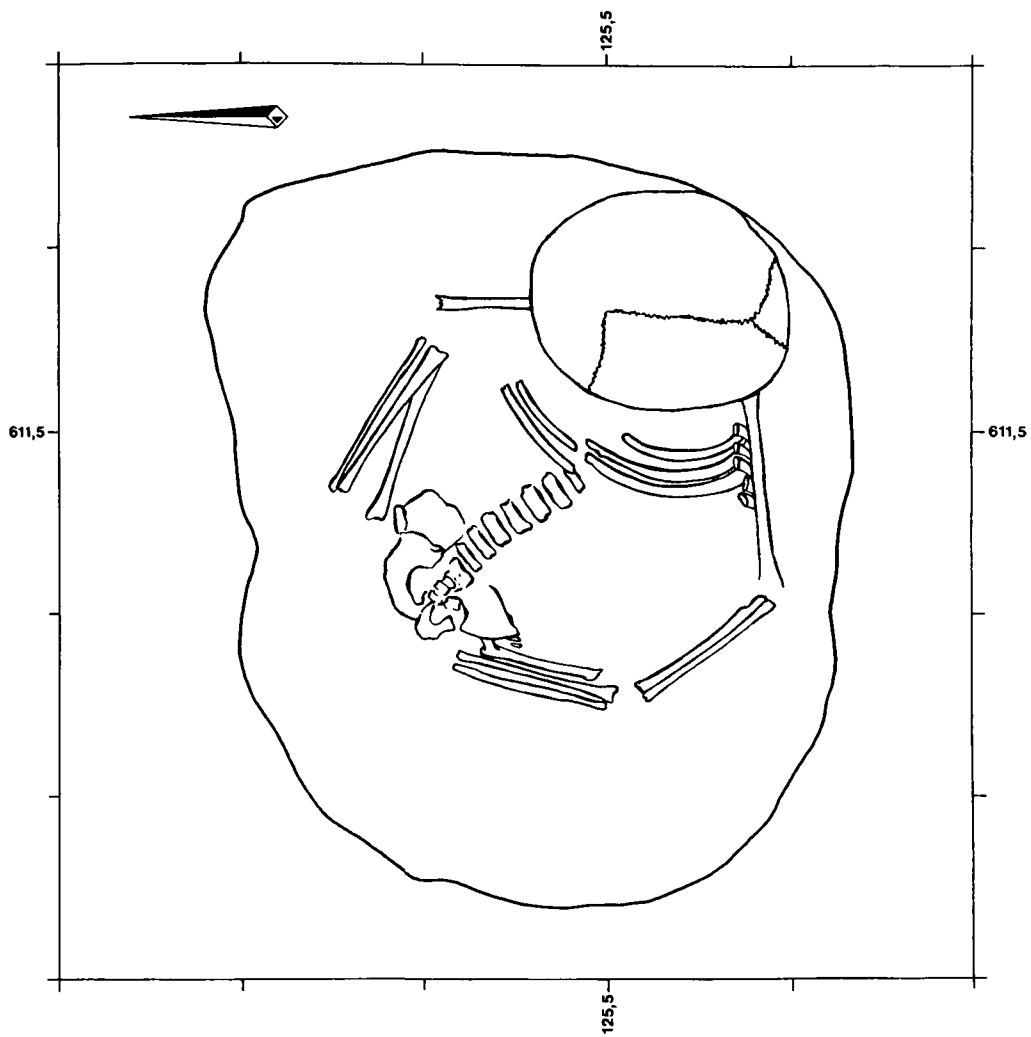


Fig. 5. Child in the age category 2 - 5 years old. This child was buried supine. Only one male adult was buried in the same posture. The child had a thick crust of a red colouring agent at the top of the skull.

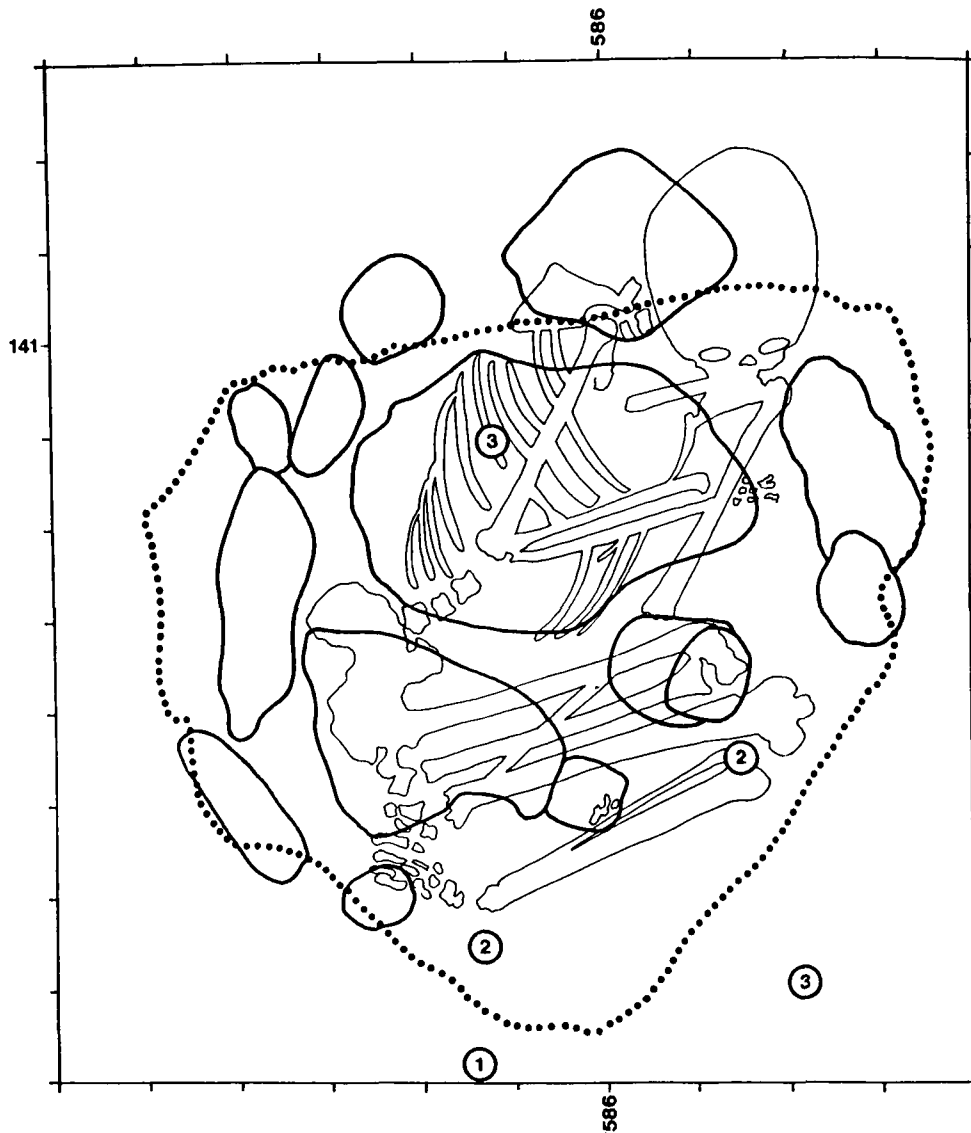


Fig. 6. Burial of a male adult under a sea turtle carapace (dotted line; for the carapace see fig. 7.). Under the carapace a large central limestone is situated, surrounded by a large number of smaller stones. The numbers 1-3 give the position of three species of shells, associated with the skeleton.

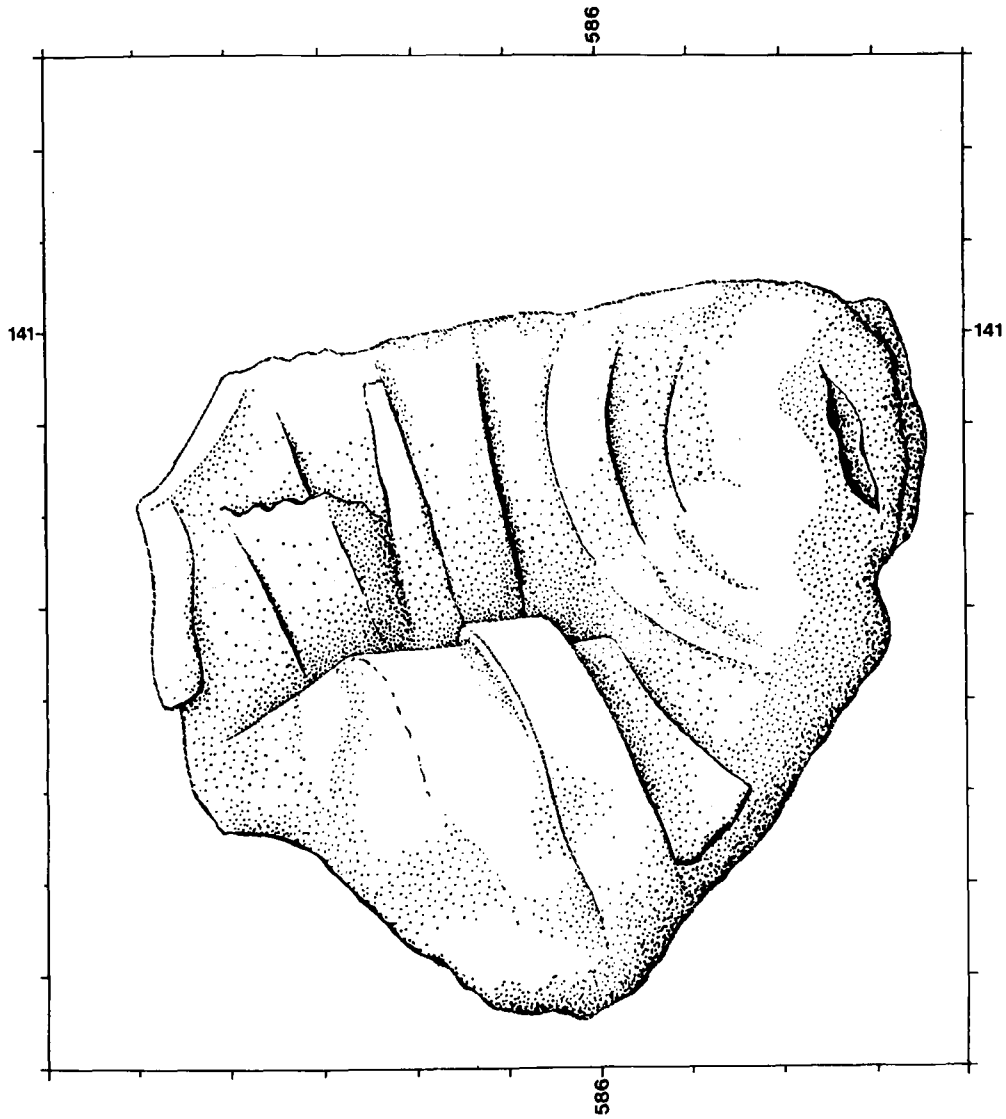


Fig. 7. Sea turtle carapace of the burial of fig. 6-8. It was found on top of a stone arrangement in a circle. The skeleton was found under the stones.

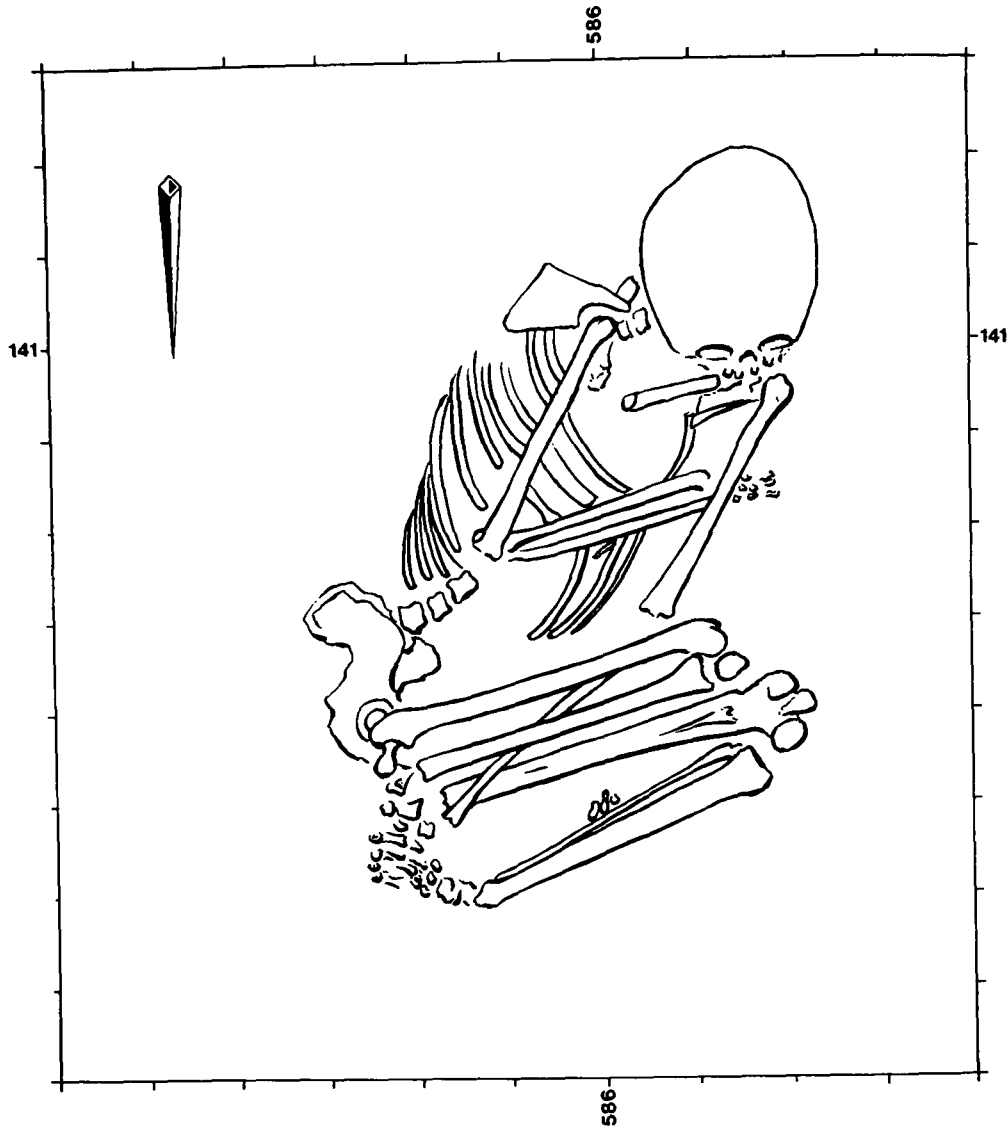


Fig. 8. Skeleton of a male, who died in the age of 25-30 years. The orientation of this burial is NO (head) - SW (legs). This man had a stature of 159 cm. A red colouring agent was found at the top of his head. This burial was covered by a circle of stones (fig. 6). On top of the stone circle a large sea turtle carapace was situated (fig. 6 and 7). Shells of 3 species were found in the burial pit at the level of the skeleton.