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PADDEPOEL, EXCAVATIONS OF FRUSTRATED TERPS, 200 B.C. – 250 A.D.

(Pls. I–VIII; Figs. 1–78; Plans I–XXV)

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I. ACKNOWLEDGEMENTS

On 20 May 1964 Ir P. Bügel, architect at Groningen, informed the *Biologisch-Archaeologisch Instituut* (BAI), Groningen State University, that sherds were being found in the course of preliminary work on the new development scheme at Paddepoel. The find-spot will be called site Paddepoel I (fig. 1 : I). The sherds date from the beginning of the Christian era.

A few years previously the Paddepoel area had attracted the attention of archaeologists for the first time, when surveyors of the *Stichting voor Bodemkartering* at Wageningen (Stiboka: Netherlands Soil Survey Institute) discovered a group of settlement sites at a distance of about 700 m to the north-west of site I. These sites were hardly visible at the surface. They will be referred to as Paddepoel II and III (fig. 1 : II, III).

The new finds made by Mr Bügel strengthened the already existing intention to investigate these settlement remains. Excavations were started on 1 June 1964 and lasted until 3 November 1964; they also included a fourth site which was discovered when the work was in progress: Paddepoel IV *ca.* 2 km to the north-west of Paddepoel III (fig. 1 : IV).

The Institute's director, Professor H. T. Waterbolk, entrusted me with the direction of the excavations. The field work was carried out by H. Praamstra and K. Klaassens, who were assisted for some time by J. Klein and H. Zwier, all members of the Institute. Miss J. D. Ruiter, Miss W. M. Timmers and Mrs J. M. Swart-Poelman, student assistants at the Institute, also took part in the excavation.

The plans were prepared for publication by Mr Praamstra and Mr Klein. The drawings of the pottery were made by H. J. Bloklander, H. M. C. de Kort, W. A. van der Sluys, and H. van Zomeren, draughtsmen of the *Rijksdienst voor het Oudheidkundig Bodemonderzoek* at Amersfoort (ROB). The photographs were made by A. Luttmer, *Centrale Fotodienst* of the Groningen University, and S. J. A. Kuppens, ROB.

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The finds resulting from the excavations have been included in the archaeological collection of the *Groninger Museum voor Stad en Lande* at Groningen.

II. THE PADDEPOEL AREA (fig. 1)

The Paddepoel area forms part of a relatively low-lying region situated to the north-west of Groningen town. The name itself denotes the soggy character of the terrain. De Vries gives the following interpretation of the word Paddepoel: "watery land, a pool for the greater part of the year, belonging to Pada" (whoever Pada may have been)¹. The suggestive etymology "toads pool" does not seem to merit consideration. In recent times, until the latest town expansion, the Paddepoel area was considered to be bordered by the north-western limit of the town, Paddepoelsterweg, Van Starkenborghkanaal, and Reitdiep. The original limits may have been slightly different, since the Van Starkenborghkanaal, which was dug around 1930, is a recent feature in the landscape, while the field-name Paddepoel goes back at least to the 13th century².

Paddepoel covers the area where the moraine ridge called the Hondsrug disappears under marine sediments. This narrow sandy ridge formed an important land-route during pre- and protohistoric times connecting the south-eastern part of Drente with the north-western part of the clay district of the province of Groningen. The Hondsrug was bordered on its eastern side by the valley of the river Hunze, on its western side by the river Aa. The two rivers flowed into one another near

Harsens, a short distance to the north of Paddepoel, and from there ran in north-westerly direction to reach the sea near the present-day village of Pieterburen. They constituted, so to speak, the prolongation of the land-route formed by the Hondsrug and linked the terp area of north-western Groningen with the Drente plateau. The Hunze flowed east of Paddepoel. The Aa, however, cut right across it, and our settlement sites were situated on or at a very short distance from that river (fig. 1).



Fig. 1. Sites Paddepoel I-IV and their environment.

Both rivers have changed course since the Roman period and have been canalized. Fig. 1 gives an impression of the possible situation during the Roman period, though it obviously cannot be reliable in detail³. It is clear that the Paddepoel area must have been of some importance as the junction of important water- and land-routes.

Paddepoel forms part of the *knikklei* region. *Knikklei* is a sticky clay with unfavourable qualities which was deposited in a quiet and brackish environment during the Late-Roman/Early-Medieval transgression period (between *ca.* 300 and 700 A.D.) along the inner edge of the Old Salt Marsh landscape in the northern part of Groningen province. In the Paddepoel area as in many other places, the *knikklei* rests upon Old Salt Marsh sediments which were deposited before the Roman period. The two clay sediments are often separated by a marked vegetation horizon representing a period of regression between the Pre-Roman and Late-Roman/Early-Medieval transgression period. This is also the case in Paddepoel. During the Medieval transgression period from about the 12th century onwards the *knikklei* landscape was rejuvenated with a brackish clay cover⁴. Remnants of peat are present in Paddepoel on the diluvial sand below the marine sediments⁵. At a short distance to the west and south of the site we find the *knikklei* covering the outer edge of the peat which separates the clay district of Friesland and Groningen from the sandy regions of Drente. Since *knikklei* is largely a post-Roman deposit, in Roman times, the site must have been situated at the very edge of this peat area⁶. The edge of the peat had undoubtedly been influenced by the marine deposits of the Old Salt Marsh.



Fig.2. Cadastral map of the Paddepoel area (former situation).

THE TRACES*

III. PADDEPOEL I (figs. 1–4, plans I–V)

Situation

Site Paddepoel I lies in the southern part of the Paddepoel area (fig. 1, 2) at the junction of two modern streets, Hagedisstraat and Ossehoederstraat (fig. 3). It was here that Mr Bügel found the sherds that provided the immediate inducement to start the Paddepoel excavations. The site seemed to be slightly higher than its immediate surroundings – this might be explained as a result of habitation – but the condition of the terrain prevented obtaining absolute certainty on this point. Road building activities had already damaged the site considerably. The street beds for Hagedisstraat and Ossehoederstraat had been excavated and filled with sand, sewage drains were being dug alongside them, and the site was littered with building materials and heaps of soil. There was, during the first three weeks of June 1964, only time for a small rescue excavation. The data resulting from it have remained, of necessity, very incomplete.

Three excavation trenches, numbered 1 to 3, were cut: one on either side of Hagedisstraat, and the third parallel to it (fig. 3). Trench 1 measured *ca.* 10 × 8 m. Trenches 2 and 3 were narrow: *ca.* 5 × 35 and 5 × 26 m respectively. Furthermore, a trench starting from the north-eastern corner of trench 1 traversed the river Aa at right angles.

Trench 1 was excavated in three levels: *a* at *ca.* 0.10 m + N.A.P., level *b* at *ca.* 0.10 m — N.A.P., level *c* at *ca.* 0.25 m — N.A.P. The third level had not yet reached the natural; there was no opportunity to draw a complete fourth level. As a makeshift narrow trenches reaching to *ca.* 0.7 m — N.A.P. were laid in front of the sections. In these narrow trenches traces may well have been overlooked: *e.g.* of the three trenches or post-holes visible in section G (square 6), only one appears in the drawing of the fourth level.

Two levels were drawn of excavation trench 2, the depths equalling those of levels *b* and *c* in trench 1. The two levels drawn in excavation trench 3 correspond approximately to levels *a* and *b* in trench 1.

*N.A.P.: Nieuw Amsterdams Peil (Amsterdam Ordnance Datum).

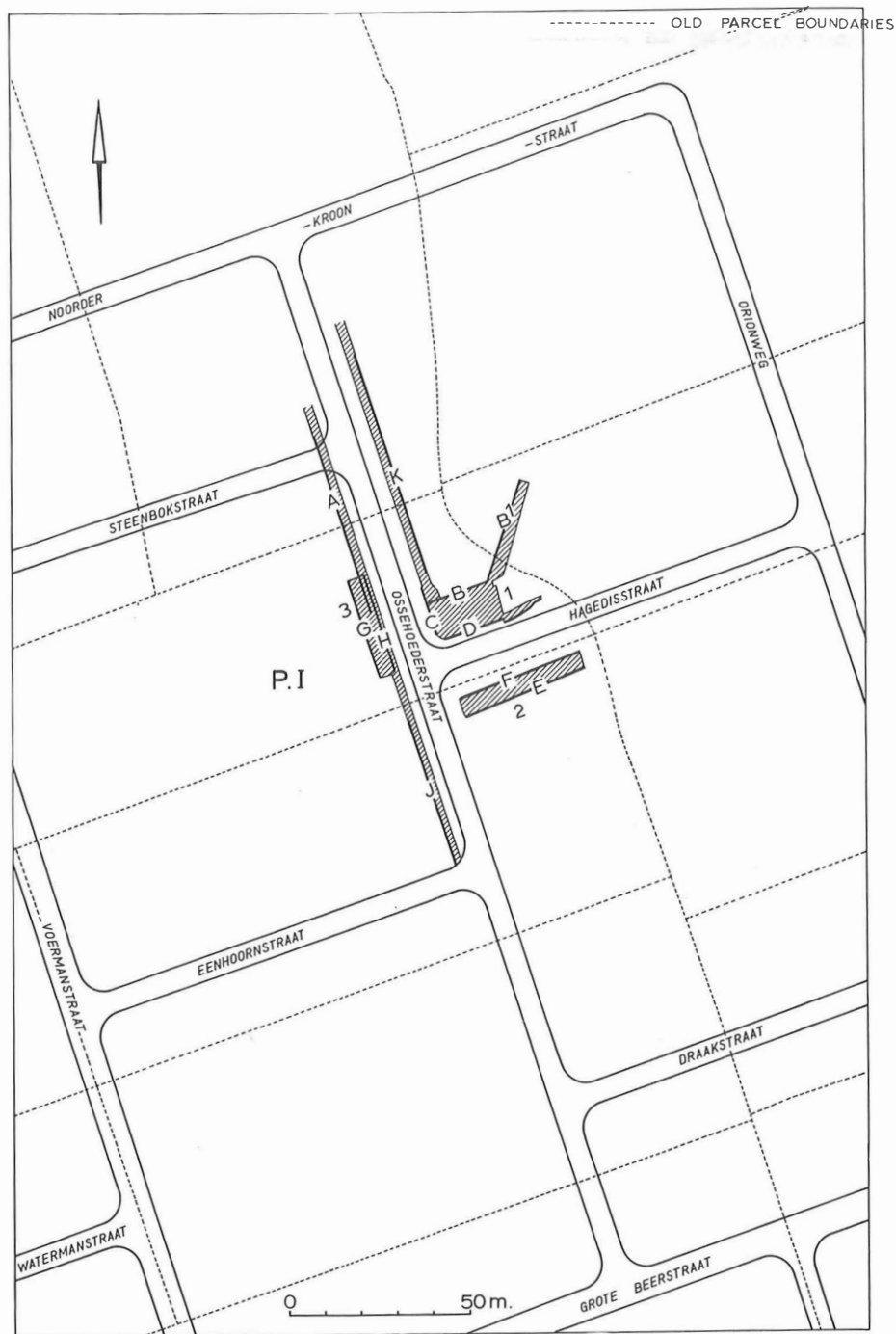


Fig. 3. Paddepoel I: location of excavation trenches and sections.

Trenches 1–3: the levels (plans I–V)

The most prominent feature in excavation trench 1 was a ditch running NNE–SSW (from squares I/J–5 to G/H–7) at right angles to the river Aa. This ditch first betrayed its presence in level *b*. In this level, as well as in level *c*, the eastern edge of the ditch stood out especially clearly. It cut through the original surface (*cf.* p. 199) into the natural. The lower part in particular contained sherds. Its width at the level of the old surface amounted to *ca.* 4–5 m. Section B showed a depth of 1.70 m below the old surface, section D of 0.90 m. In section D it appeared flat-bottomed, whereas its curious shape in section B suggests that the left (western) half of the ditch was redug to a deeper level during the period of habitation.

The following traces found in excavation trench 1 correspond to the ditch as far as their directions are concerned.

In the deepest level *d*:

A rectangular pit (storage-pit?) in square H–5 (0.90 × 1.90 m, depth below old surface 1.50 m?), the long axis parallel to the ditch.

Another rectangular pit (storage-pit?) in squares F/G–5 (0.70 × 1.60 m, depth below old surface 1.00 m, at right angles to the ditch).

A narrow trench, *ca.* 1.00 m wide, with U-shaped section and filled with peaty material, which runs parallel to the ditch in square H–5 and probably turned to the west in squares G–6/7.

These traces were not yet visible in the higher level *c*. The same holds true for the round pit surrounded by a circular trench in squares G–4/5. It measured 1.60 m in diameter, had a depth of 1.50 m below the old surface and was filled with dung.

Level *b* showed a rectangular patch of yellowish clay with a darker, grey centre (squares F/J–5/7; width 8 m, length at least 8 m). In the south-eastern corner its edge was bounded by what seemed to be a narrow trench. Although the patch had the same direction as the ditch it cannot be of the same date, because it partly overlay the ditch. The rectangular patch may perhaps be considered to indicate the place where a building had stood, but no clear traces of this house have been found. However, three post-holes were observed in squares H–5/6 which might be vestiges of a more or less important building: a granary? In level *a* there is a concentration of finds in this area.

In all levels the zone to the east of the ditch presented a particular aspect: alternating dark and light bands which run parallel to the direction of the ditch.

In the uppermost level *a* of excavation trench 1 appeared two narrow ditches which are clearly later than the traces described above. These ditches were also quite differently oriented: the one running approximately WSW–ENE was cut by the

other, which had a NW–SE direction, as well as by a rectangular pit, which was likewise oriented NW–SE (squares G/H-6; 1.00 × 1.80 m).

A ditch was also present at the western end of excavation trench 2 (section F: squares G/H; section E: squares H/J). It ran WNW–ESE, at right angles to the ditch in excavation trench 1. It was *ca.* 5 m wide at old surface level and flat-bottomed at *ca.* 1.00 m below old surface. The lower part was filled with humic, partly peaty material.

A small part of another ditch was observed at the extreme south-eastern corner of excavation trench 2. This ditch probably ran parallel to the one in trench 1.

Both ditches and a number of narrow trenches (maximum width 1.20 m) running parallel to the one or other ditch belong to the earliest traces in excavation trench 2. One NNE–SSW trench crossed the excavation trench in squares J/K; it became faintly visible in level *c*. Two trenches of the same direction ended in squares M/N-12. Three or four with WNW–ESE direction stopped short of the latter in squares M/N-11/12. All these trenches had a V-shaped section and a depth of *ca.* 0.80 m below old surface.

At the western end of excavation trench 2 a narrow trench with rounded bottom, again repeating the directions of the ditches, described a right angle. It already appeared in level *b*, and cut across the filling of the WNW–ESE ditch.

Also in excavation trench 2 a few traces with divergent directions appeared; these are apparently later than the other trenches. Two narrow trenches ran parallel to the narrow WSW–ENE ditch of excavation trench 1. A narrow trench running N–S in squares K/L may be the continuation of the NW–SE trench in excavation trench 1.

At both ends excavation trench 3 cut ditches. The ditch at its southern end (section H: square 8; section G: squares 7/8) is the continuation of the one found at the western end of excavation trench 2. It reached *ca.* 1.20 m below the old surface into the natural and was more or less flat-bottomed. Its filling contained some peaty material.

The ditch at the northern end of excavation trench 3 ran at right angles to the one at the southern end, *i.e.* parallel to the ditch in excavation trench 1 and to the one at the eastern end of excavation trench 2 (section H: square 2; section G: squares 2/3). It had a depth of *ca.* 1.50 m below the old surface and a somewhat rounded bottom. Its humic filling was stratified.

Inside the ditches, levels *a* and *b* showed the south-western corner of a probably rectangular patch of yellowish clay. Between patch and ditches there was a zone of varying aspect. Particularly in squares 3–5 of level *b* this zone consisted of the

characteristic alternation of dark and light bands following the direction of the ditch, as had also been observed in the eastern part of excavation trench 1. The few post-holes found in the area within the ditches did not provide a meaningful configuration.

The continuation of the late WSW–ENE ditch, which was found in excavation trench 1, crossed trench 3 in square 6 of levels *a* and *b* and was accompanied in level *a* by a parallel trench crossing square 4.

Trenches 1–3: the sections (plan V)

The sections of trenches 1–3 presented the following main features. At a level of some 0.40–0.50 m below N.A.P. a blackish humic layer or vegetation horizon, generally between 0.10 and 0.20 m thick, represented a fossil land-surface, which showed only very slight undulations. It is termed original or old surface because it was from this surface that habitation started. At several places the layer was bipartite, the upper part being lighter and more greyish in colour than the blackish lower part. Underneath the habitation, in the areas between the trenches and ditches, the layer appeared in general to be undamaged. The layer was topped with a thin band of peat in section D squares J/K. The yellow natural clay below the blackish vegetation horizon had a high phosphate content, where it had been influenced by the habitation.

A complex of habitation layers, reaching a maximum thickness of at least 0.80–0.90 m, rested on top of the old surface.

Outside the habitation proper, the old surface was covered with a *ca.* 0.30–0.50 m – thick layer of sticky, greyish natural clay which became extremely hard and full of shrinkage cracks when it dried out. This layer of natural clay could best be studied in section J, which had not been influenced by the habitation. Here, the sticky clay was covered at approximately N.A.P. level by a second black vegetation horizon representing a second fossil land-surface. The clay layer tapered off against the side of the habitation layers, as can be seen at the left (western) end of section E. According to Stiboka specialists the sticky greyish clay possesses characteristics of the so-called *knikklei* deposited during the Late-Roman/Early-Medieval transgression, and the second vegetation horizon represents a regression period after the same transgression. The layer of clay sediment on top of the second vegetation horizon in section J proves that our site was influenced by the sea for a second time. This probably took place during the Medieval transgression period when the *knikklei* landscape was rejuvenated (*cf.* p. 193).

It cannot be established whether the clay deposit of the Medieval transgression wedged itself out against the sloping sides of the habitation layers, as the earlier *knikklei* had done, or covered them completely, also in the central areas where the habitation layers were thickest. The reason for this is as follows: All sections apart from a few, which had been damaged by recent building activities, showed an upper zone of brittle, brownish clay 0.20–0.40 m thick. In section J this brownish zone immediately below the modern turf-line was found above the second vegetation horizon on top of the *knikklei* and coincided more or less with the Medieval clay deposit; in this case, the zone may be considered as a separate layer. The brownish colour of the upper zone is not original, but is probably due to recent tillage and desiccation. The original aspect of the Medieval clay layer appears in the section through the bed of the river Aa (section B¹; see below). In that section the Medieval deposit was thick enough for the bottom part to remain unaffected by secondary influences and change; it presented a greyish colour and did not differ very much from the earlier *knikklei*. Therefore, the upper, brownish zone of section J may be described as an individual layer (*i.e.* the Medieval clay deposit) which lost its original aspect owing to secondary influences. In other sections however, it may be nothing more than a zone of secondary influence and not a separate layer at all; the brownish zone is certainly not everywhere identical with the Medieval clay layer. Particularly at the places where the brownish upper zone covers thick habitation layers (e.g. sections B, E, H), it remains uncertain whether there has ever been a deposit of Medieval clay, as it is possible that here only the upper habitation layers have become blurred by secondary influences. At some places where the habitation layers did not reach great thickness, fragments of the second vegetation horizon seem to have been preserved below the brownish zone, *e.g.* above the ditches in sections E (left part) and G (right part).

Section B¹, A, and K cut across the river Aa, the first one at right angles. One may note that this river, which in recent times has shrunk to a boundary ditch, had once been vastly more imposing. The original bed was at least 12 m wide and at its maximum some 2 m deep (section B¹). The depth was established by borings in section B¹. As appears from sections B¹ and K the western bank at the side of the settlement was steep, whereas the eastern bank sloped much more gently. Moreover, the western bank had cut into the habitation layers (section B: extreme right corner; section K: square 2), which proves that the river was active during or after the period of habitation. A few sherds were found in the filling of the river-bed. Probably shortly after the period of habitation came to an end the river started to silt up. The process of silting up must have been arrested for some time because about half way up the filling a *ca.* 0.10 m – thick bluish-black vegetation horizon has developed (section B¹ and K). In the central part this horizon lay 0.50 m below N.A.P. level. In

section B^I it here had a peaty character. The horizon rose from the centre towards the periphery until in section K (left part) it was cut at N.A.P. level by the upper zone of brownish clay. In section B it extended over the filling of the ditch belonging to the settlement and tapered out against the highest part of the habitation layers.

Below the vegetation horizon, there was a uniform filling of bluish clay in section K (right or northern part) and a sequence of clay layers in section B^I (right or northern part), which indicates a gradual silting up in several phases probably separated by periods of rest. The deepest layer, which occurred only in the central part, was of bluish clay, then came a layer of greyish clay with brown speckles betraying a vegetation of rushes and reed (0.20–0.30 m), then a layer of clean greyish clay (0.20–0.30 m), and immediately below the black horizon another greyish clay layer with brown speckles brought about by vegetation (0.20–0.30 m).

The silting up had continued after the interruption represented by the black vegetation horizon. A division of the horizon in the central parts into two dark bands with clay in between, visible in both sections B^I and K, showed that this silting up was at first a slow and interrupted process. Afterwards, a layer of greyish clay with a maximum thickness of 0.50 was deposited. This clay showed all characteristics of *knikklei*. On top there was the familiar upper zone of brownish clay.

In our opinion the black vegetation horizon in the river bed is to be equated with the comparable horizon on top of the *knikklei* in section J. This implies that the sediment below the vegetation horizon in the river bed has to be related to the first clay deposit (= *knikklei*) in section J. The fact that the vegetation horizon was situated at a lower level in the river bed than in section J, and that there are differences in appearance between the underlying clay layers in both sections, can be explained by the exceptional conditions that prevailed in the river bed. The clay layer above the vegetation horizon in section B^I is thought to represent the Medieval transgression, notwithstanding the *knikklei*-appearance of its basal part. This basal part preserved the original aspect and the whole sediment between vegetation horizon and modern turf-line is considered to be one deposit. The apparent division into two layers, a greyish and a brownish one, is the result of secondary change in the upper zone.

The conclusion is that most of the silting up of the river bed took place during the period of the Late-Roman transgression.

A silted-up river bed also occurred in section A. As in the case of the river-beds in sections K and B^I, all that remained of the river was a modern ditch. Its appearance was different from that of the river-beds in sections K and B^I in that it did not show the vegetation horizon. As far as could be established, its filling below the top zone of brown clay (preserved only in the middle part of the section to the

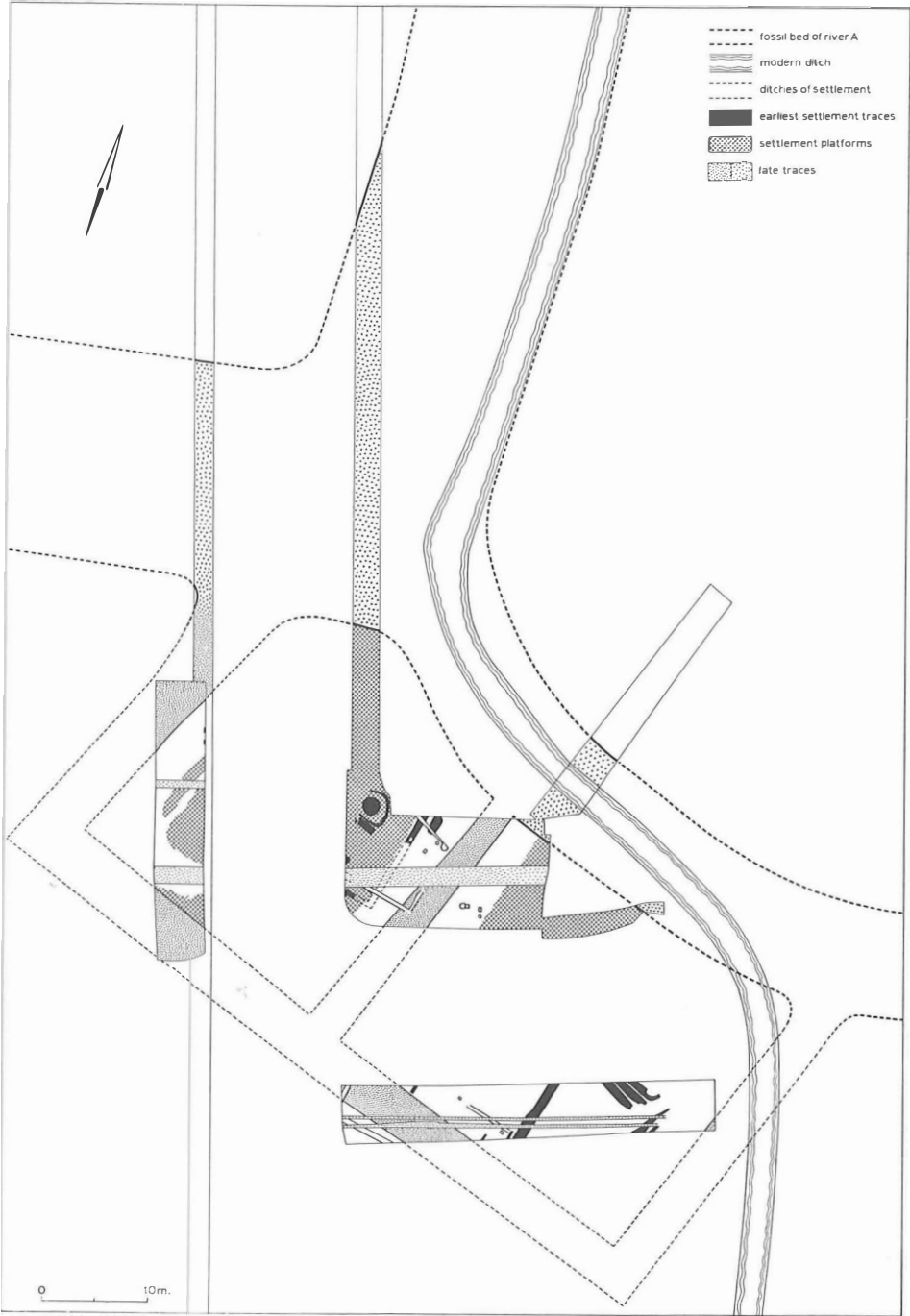


Fig. 4. Paddepoel I: schematic reconstruction of settlement pattern.

right of the modern ditch; elsewhere destroyed by sewer trench) consisted of a uniform greyish clay which was darker in the lower part of the filling than higher up. We are unable to date this filling or even to say whether it was deposited in one or in two periods.

It may be noticed that the position of the river bed in section A is inconsistent with the course of the fossil bed of the river Aa found by Stiboka. The latter turns to the north exactly at the site of Paddepoel I (fig. 1). Therefore, the bed in section A must be a branch of river Aa as found by Stiboka, possibly even its earlier or later main course. If it was a branch, the bed in section K must lie approximately at the junction. The present evidence is not strong enough to solve the problem. However, at some time during the Roman period or shortly afterwards the river Aa must have changed course (*cf.* pp. 192-3).

The level of the modern turf-line varies between 0.10 m (section J) and 1.00 m above N.A.P. (section K: left or southern part). The terrain of the dwelling site proper still seemed to be somewhat higher than its immediate surroundings, but much of the original difference in height between settlement and surroundings has become blurred by the later clay deposits.

The sections give following additional information about the habitation layers. They show in the first place that the settlement did not extend much further to the north and south than the area covered by our excavation trenches. There were no traces of habitation in section J, nor in sections A, K, and B¹ north of the river bed. Its extension to the east and west remains unknown but may not have been very great.

The sections demonstrate furthermore that the ditches encountered in the excavation levels belonged to the earliest features of the settlement. In some sections it was abundantly clear that they had been dug from the original land-surface beneath the habitation layers: sections G, H, E (western ditch) and F. In others they seemed to come from a somewhat higher level: sections B, D and E (eastern ditch). This does not mean, however, that the latter ditches were later, but the phenomenon can only be explained in the following way.

The central part of section D was taken up by an almost textureless accumulation of clay. In fact, this clay looked so "clean" that at first we thought it to be a natural deposit. Similar accumulations of clay, but this time showing faint traces of sods, were present in the middle part of section H and at the extreme eastern end of section F. They were also found, this time without clear traces of sods, in section B to the left of the ditch and in the southern part of section K where the river Aa had encroached upon it. We interpret these accumulations of clay or clay-sods, which at some places were 0.80 m high, as raised platforms which had been constructed in one operation and are therefore so clean. They must have carried farm buildings,

but these would not let themselves be caught by our excavation trenches.

The flanks of the platforms were characterized in the sections by successions of sloping layers, which were anything but clean and consisted of dark-coloured polluted clay. The layers sloped down into the filling of the ditches and represent successive stages in the use and growth of the platforms. The sides of the platforms with their sloping layers as they appeared in the sections correspond to the banded zones that could be observed accompanying the ditches in the excavation levels; the platforms themselves to the yellow patches found within the banded zones (particularly in trench 3).

Apparently, the ditches which had been dug from the original surface remained open, at least partly, for some time during the period in which the platform was used, until eventually they became filled up with soil slipping down the side of the platforms. In level *b* of excavation trench 1 a narrow trench forming a right angle and situated above the filling of the ditch was observed in squares G/H-6/7. If the supposition that this trench betrays the location of a building is correct, it follows that the habitation continued for some time after the ditch had been completely filled up, and that during the later phases of habitation the area where the ditch had been was used as building ground. At the western end of excavation trench 2 (levels *b* and particularly *c*) a narrow trench describing a right angle cut across the filling of another ditch (section F: left corner).

The remaining narrow trenches which run parallel or at right angles to the ditches belonged to early phases of settlement. Some like the ditches themselves started from the original land-surface (section B: square H; section C: square 6; section F: squares K/M; section E: squares J/K and M; section H: squares 2/3); others started somewhat higher (section F: square M; section E: square M). Most of them are probably contemporaneous with the ditches. The possibility cannot be excluded that some were even earlier. Section C and, less clearly, section B showed that at least a few of these trenches are earlier than the clay platforms; this also applies to the two rectangular pits and the round pit found in excavation trench 1 level *d*.

Of the ditches with divergent directions found in the higher levels of the excavation trenches, the two WSW-ENE ones appeared to be covered by the upper zone of brownish clay (section G: square 6; section H: squares 6 and 4; section C: square 6; section K: square 4). The only deduction which can be made from this is that these two ditches cannot be very recent. They may belong to a late phase in the period of occupation, but on the strength of the existing evidence it is equally possible that they are later than the settlement. The oblique ditch, cutting across one of the WSW-ENE ditches in excavation trench 1, and its probable continuation in excavation trench 2 (squares K/L) proved to be of recent date, even though its filling contained sherds: in sections B and E it was seen to cut through the upper zone of brownish clay.

Conclusions

Most of the traces and features found at site Paddepoel I have the same direction, WNW–ESE, or the opposite. This is an argument in favour of a continuous development of the settlement. Moreover, it is clear that the period of occupation must have covered a fairly considerable lapse of time. At least three successive stages or phases are to be distinguished in the occupation of the site.

There is evidence of a first phase of settlement (phase *a*) directly upon the old land-surface, a so-called *Flachsiedlung*: the narrow right-angled ditch and the pits observed in excavation trench 1, level *d*. The broad ditches may have already existed during this phase, but it is more probable that they have to be attributed to the next one. Phase *b* saw the building of the clay platforms within the ditches. The third phase (*c*) started when the ditches had become silted up and built over.

The more conspicuous features of the settlement have been illustrated in the schematic plan given in fig. 4. It shows that there were two platforms as well as the extension of these platforms with their “striped” flanks surrounded by the ditches. The available data are too few to allow a completely reliable reconstruction of the settlement during the platform phase. The north-western platform seems to have been rectangular measuring some 20 × 30 m at its base. The reconstruction of the shape of the other platform presents a difficulty because, curiously enough, there were no clear traces in sections E and F. The narrow trenches shown in fig. 5, some of them apparently earlier than the platforms, are too incomplete to give a recognizable pattern. The narrow trench found in excavation trench 1, level *b*, represents the third phase of the period of occupation. The WSW–ENE ditches point to a possible fourth phase. The illustration furthermore shows all that is known about the course of the river Aa (*cf.* pp. 192–3).

The trenches and ditches with divergent WSW–ENE directions perhaps come from a fourth phase of occupation. In that case, the change of directions hints at a break in the development of the settlement. They may still belong to the Roman period but they can also be later. Stratigraphy provided no clues for making a choice between the two possibilities. As seen above, the stratigraphic evidence proved that the oblique ditch (or ditches) was of recent date (p. 204).

IV. PADDEPOEL II (figs. 5–8, plans VI–XV)

Situation

Paddepoel II was situated about 700 m to the north-west of Paddepoel I, and at a short distance to the south of Paddepoel III (fig. 5). The site was near the spot where today Jupiterstraat crosses Neptunusstraat. At the beginning of the excavation the area was still used as a hayfield and untouched by building operations. With some difficulty a number of small, low elevations could be discerned in the long grass (plan VI). A northern group was separated from a southern one by a distance of *ca.* 125 m. The former was to be site Paddepoel III, which will be described in the next section; the latter became Paddepoel II. A very low rise was present on the western side in the interval between Paddepoel II and III.

The site Paddepoel II comprised two oblong or roundish elevations lying side by side, separated by a modern field-ditch. The eastern and bigger one was more or less oblong; its maximum diameter was some 75 m. It had two summits separated by a modern NE–SW ditch, which rose to *ca.* 0.50–0.80 m above the present surface, which lay at a level varying between N.A.P. and 0.30 m + N.A.P.

The second elevation to the west of the one just described had a roundish shape; it measured some 30 m across and rose to a height of *ca.* 0.60 m + N.A.P. (plan VI). It lay slightly isolated from its bigger eastern neighbour and in modern times the two had become separated by a field-ditch running NW–SE. However, as the distance between both is very small, there can be little doubt that they had once belonged together and had formed one coherent whole. The contour lines suggested that this had been a complex structure composed of three individual hillocks which had grown together: a southern mound of oblong shape with NW–SE direction to the south of the NE–SW ditch, a similar one on the north-eastern side and the western elevation of more roundish form to the west of the NW–SE ditch (plan VI). However, the pattern shown by the contour lines is perhaps not absolutely reliable because of the modern field-ditches cutting across the elevations.

Operations at this site had to be limited to little more than a small trial excavation (fig. 5). The bigger, eastern elevation was sectioned by two long and narrow trenches, intersecting at right angles at the place of the north-eastern individual height.

The longer trench (1) was laid out parallel to the northern edge of the modern NE–SW ditch; it was *ca.* 128 m long and *ca.* 1.50 m wide at the bottom, the other trench (2) ran perpendicular to it and consequently had NW–SE direction; it measured *ca.* 1.50 × 47 m. These trenches were dug down into the natural in one operation; only the bottom level was drawn. At the junction of both trenches a larger

area (trench 3) was uncovered. This trench was excavated in four levels (*a–d*); the fifth level was only partially drawn (*e*). At the highest level (*a*) it measured *ca.* 26×25 m. After the first level had been drawn the northern part of the trench had to be left to the road builders, who had reached our site and could not be persuaded to wait any longer. The trench was reduced to an area of 18×26 m. The southern part of the eastern elevation to the south of the field-ditch was left unexcavated. Outside the elevation a trench of *ca.* 2.80×64 m was dug in prolongation of trench 2 to connect Paddepoel II with Paddepoel III: excavation trench 5. The roundish elevation to the west of the bigger one, on the other side of the modern NW–SE ditch, was investigated by means of a trial trench (4) of *ca.* 8×40 m, which was excavated in three levels (*a–c*).

Naturally, the results of an excavation of this limited size do not allow us to build up a complete picture. As we see it, there is little point in giving a detailed description of the individual traces that were discovered. We will confine ourselves to trying to trace the main lines of the evolution which had taken place at the site.

Trenches 1–3: the levels (plans VII–XI)

The most conspicuous feature of the highest level (*a*) of excavation trench 3 was a rectangular patch found in squares Z/A^c–60/64. The patch was neatly outlined and oriented approximately WNW–ESE. It was 8 m wide and more than 17 m long; the complete length is unknown, as its eastern end remained unexcavated. Part of the southern edge (squares A^b/A^c) was marked by a zone of greyish clay-sods. For the rest the patch consisted of soil of very mixed composition. Inside the patch a number of post-holes were observed. Towards the western end there was an oblong patch of red-burnt clay, which represented the last trace of a hearth. The post-holes and in particular the hearth characterized the rectangular patch as the site of a farm-building. At a deeper level (*b*) the zone of sods along the southern edge became clearer and more regular; a similar zone followed the northern edge. The area within these zones showed alternating dark and light bands running parallel to the long axis of the patch; moreover, there were a few post-holes. A basalt-lava quern was found at the western end (find no. 152). Still deeper (level *c*) a trench about 1 m wide and partly filled with dung, became visible between the two zones of sods. Section B (square 63) showed it to be flat-bottomed. In level *d* all traces of the house had disappeared, except for a fragment of the ditch and a single post-hole (square A^a/A^b–61).

The available evidence is incomplete; a detailed reconstruction of the ground-plan of the house is not possible. But this much is clear, that it was a long-house of

the familiar three-aisled type with two rows of heavy posts supporting the roof and probably divided in the breadth into living-quarters with fire-place and byre with cattle-stalls. Fig. 6, in which all post-holes found in the different levels have been combined, shows that the bigger holes line up in two rows which stand from 2.50

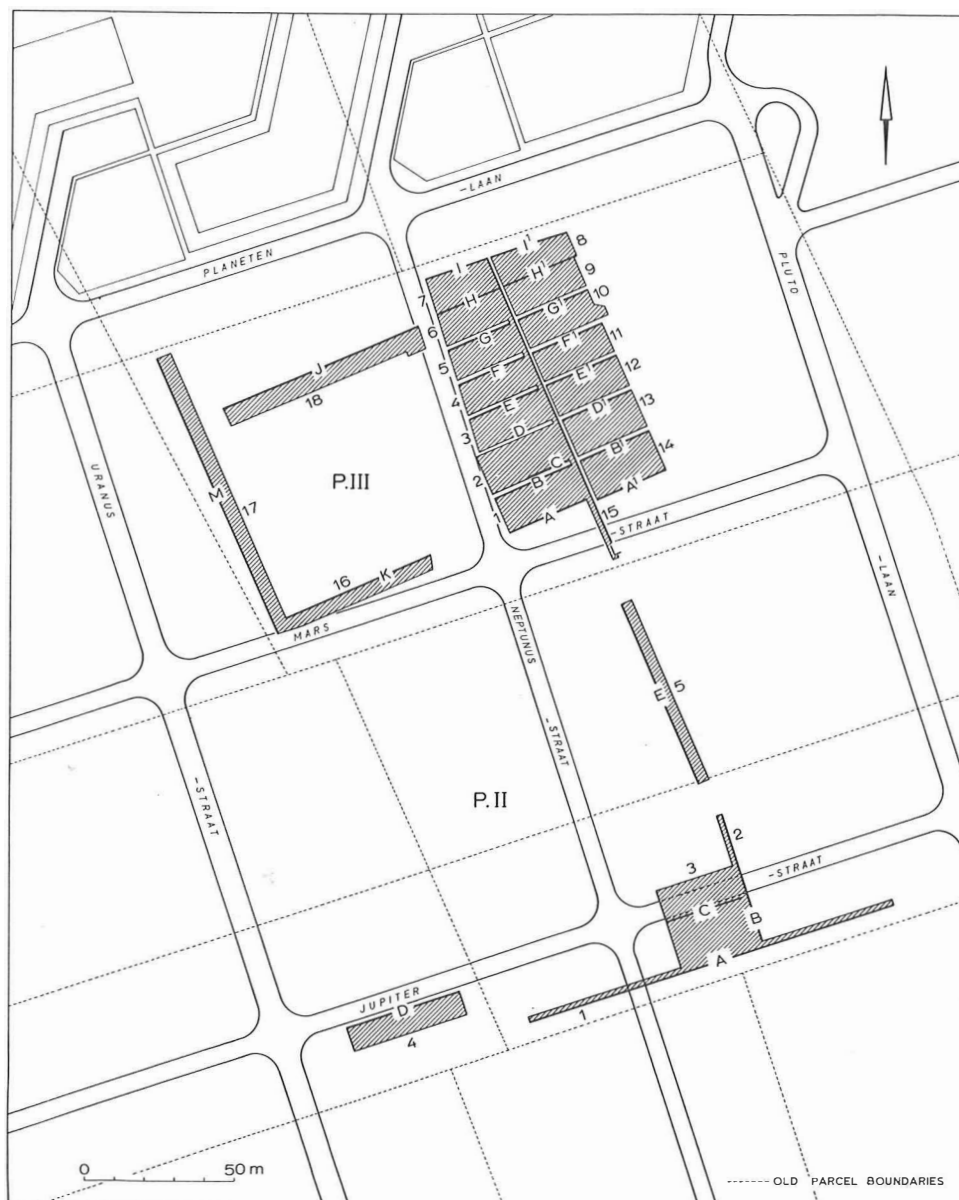


Fig. 5. Paddepoel II and III: location of excavation trenches and sections.

to 3.00 m apart. As the side-aisles may have been 1.00 to 1.50 m wide, the total width of the house was between 5.00 and 6.00 m. The walls had left no clear traces. They must have stood where the zones of sods were observed.

Another observation to be made is that all the traces preserved cannot belong to one ground-plan. There are too many post-holes. In level *a* the fire-place, *i.e.* the living-quarters, was situated at the western end. The ditch found in level *c*, however, may have been a feature of the byre. If it did belong to the house, it must have functioned as a drainage-trench (*Jaucherinne*), though a drainage-trench running along the long axis of the byre – instead of two trenches on both sides of a central gangway – is without parallels among the three-aisled farm-houses of the Roman period in the northern part of the Netherlands. As far as our evidence goes, the

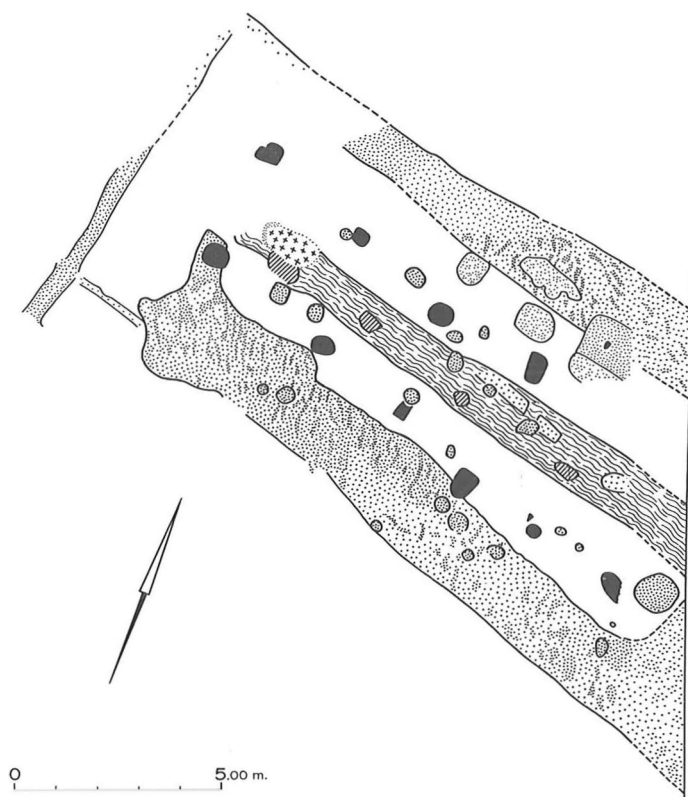


Fig. 6. Paddepoel II: farm building in squares A^a/A^c-61/64.

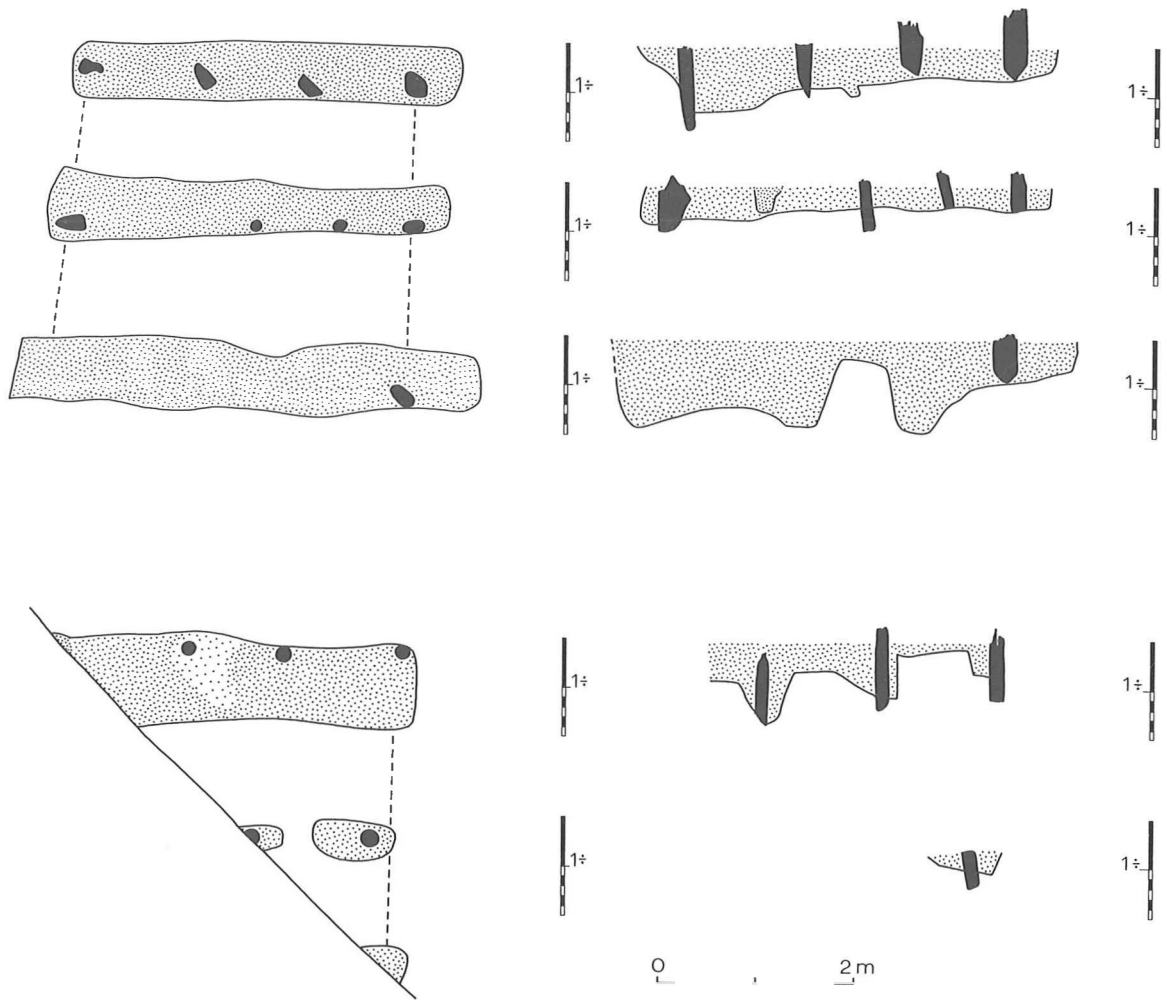


Fig.7. Paddepoel II: granaries in squares A^b/A^c-64/65.

building plot was used more than once and at a later stage the house was rebuilt in reverse order.

The rectangular house plot “dominated” the other traces discovered in the northern and eastern part of excavation trench 3. In level *a*, bands and patches of different colours and composition followed the contours of the rectangular plot on the outside. They can be compared to the “striped zones” found on the flanks of the platforms in Paddepoel I. A 6 m-long row of tiny post-holes which ran parallel with the plot’s southern edge at a distance of about 8 m (squares Z/A^a-63/64 probably formed part of a fence surrounding the premises during one of the later phases of settlement.

The south-western corner of excavation trench 1 showed an individuality of its own. Here, the features had a SSW-NNE direction. There was also a concentration

of post-holes which, however, did not show a clear configuration. Particularly in level *b*, the features in squares W/Y-63/64 suggest that the south-western corner constituted the end of a second house plot, which was set at angle to the first one. Lower down, in levels *c* and *d*, a trench filled with dung and humic material appeared. It ran SSW–NNE from square W-64 towards the ditch in square Y-62 and was similar to the trench found beneath the other building in squares A^b/A^c-61/62.

In levels *c* and *d*, a pattern of ditches became visible. One of the bigger ditches, which was partly filled with dung and humic material, followed the southern edge of the north-eastern house plot: from squares A^a/A^b-65 to Z-62 where it turned off slightly to the west. Two ditches branched off in SSW direction and surrounded the area where we supposed the second house plot to lie (squares W/X-61/63 and Y/Z-63/64). As was shown by excavation trench 2 (squares 60/61), the northern edge of the north-eastern house plot was also bounded by a ditch. In levels *d* and *e* two more ditches were to be seen underneath the north-western extremity of this house plot: one running N–S in squares Z/A^a-61/62, the other NE–SW in squares Y/A^a-61/62. They do not fit very well into the pattern formed by the other ditches.

In the zone between the north-eastern house plot and the ditch along its southern edge a series of trenches and a few roundish or rectangular (storage?) pits were discovered (squares A^a/A^c-63/65). These first appeared in level *c*. The trenches were 4 to 5 m long and had contained posts of oak-wood. Apparently four posts had stood in each trench; in some cases the ends of the posts had been preserved. At Paddepoel III, similar trenches occurred in groups of three, each group representing a granary. On this evidence, the six or eight trenches found at the site under discussion come from at least two granaries which cannot have stood simultaneously in view of the fact that two trenches were observed to be overlapping (squares A^b/A^c-64/65). This constitutes an indication for a protracted use of the building plot.

The traces found on the bottom of the narrow trenches 1 and 2 add little to our knowledge. The ditch in trench 1, squares A^b/Aⁱ, was probably the continuation of the one found in trench 2, squares 60/61, which followed the northern edge of the house plot. More to the north, part of a parallel ditch was observed (trench 2: square 58).

Trenches 1–3: the sections (plan XV)

The original surface was situated between 0.10 and 0.50 m below N.A.P. It appeared underneath the settlement as a greyish to blackish humic layer which often had the considerable thickness of about 0.20 m and sometimes showed an irregular underside (section A: squares A^c–A^e). Below the settlement layers the original

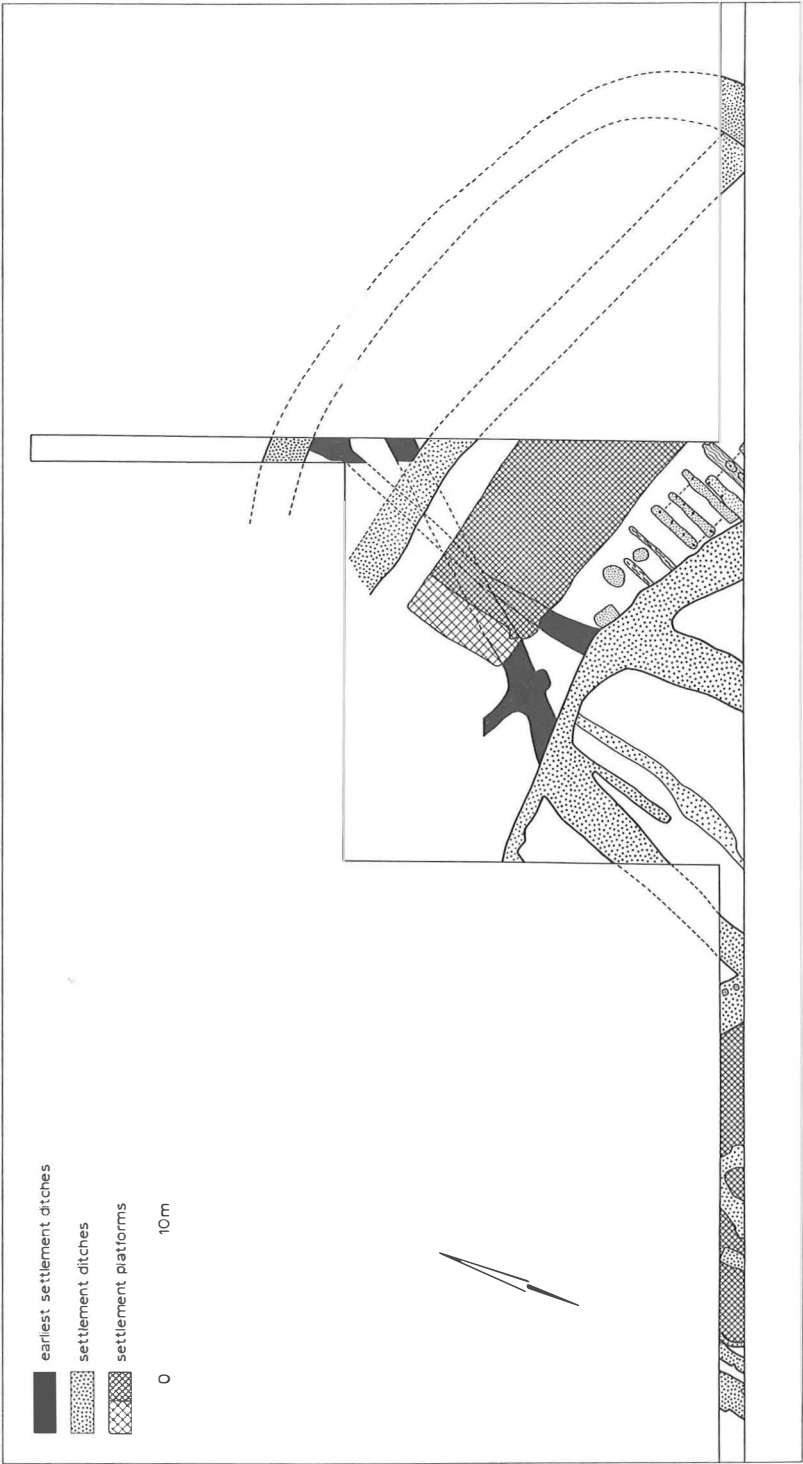


Fig. 8. Paddepoel II: schematic reconstruction of settlement pattern.

surface had been influenced by the habitation and its aspect had been changed. Moreover, where the habitation layers were thick the original surface was lower; thus, we have to assume that it had been pressed down slightly by the weight of the settlement. Outside the settlement or on its fringe, the surface showed as a thin, blackish, humic layer not more than 0.10 m thick. Here the original aspect had been preserved.

The habitation layers reached a maximum thickness of *ca.* 1.00 m, excluding the brownish upper zone of 0.30 to 0.40 m below the modern turf-line, already familiar from Paddepoel I. On the edges of the settlement natural clay deposits were observed, as in Paddepoel I (section A: eastern end in particular; section B: northern end). A layer of greyish clay resting upon the original surface, itself topped by a second blackish vegetation horizon, wedged out against the rising habitation layers. We take it to represent the Late-Roman transgression (*knikklei*). The second vegetation horizon sagged where it passed the outer ditches (section A: squares M/N and eastern end; section B: northern end); apparently, these ditches were not filled up completely. It started slightly above N.A.P. level at the ends of the sections and could be followed over some distance on the flanks of the habitation layers until it became blurred by the brownish top zone. The clay found above the second surface was probably deposited during the period of the Medieval transgression. This deposit appeared as a greyish clay in the depressions over the outer ditches where it had preserved its original aspect. Elsewhere it had become absorbed into the brownish top zone (cf. pp. 200); it may not have covered the highest parts of the settlement.

The most conspicuous features of the habitation layers were the earth platforms. The north-eastern platform was most clearly observed at the southern end of section B, where it showed as an accumulation of clay sods with sloping sides which had been preserved to a height of *ca.* 0.70 m; it was cut by what was possibly the drainage ditch of the house. The northern part of section B showed a series of ditches. The southernmost one of these (squares 60/61), which was partly filled with dung, is probably the same as the ditch found in section A, squares A^h/Aⁱ. We take it to have been the northern boundary ditch of the platform, during at least the initial stage of the platform's existence. It had been dug from the original surface; only in section B did its southern edge seem to cut through the platform, but this can be explained in the same way as in Paddepoel I (cf. pp. 204).

The next two ditches in section B (squares 58/59) were probably somewhat earlier. They had been dug from the original surface and continued two ditches found in excavation trench 3 level *e*, which were covered by the edge of the platform (section C: squares Z/A^a). Their relation to the platform remains uncertain. Most probably they have nothing to do with it but belong to an earlier settlement

phase. The fourth ditch in section B (cutting the third one: squares 57/58) and those more to the north might represent the platform's northern boundary ditches during the later stages of habitation. This would imply a gradual expansion of the platform in a northern direction. However, real proof is lacking: the eastern part of section A did not provide clear evidence in support of this view. A ditch along the western side of the platform has not been found.

The north-eastern platform has also been observed in the eastern part of section C. In squares A^b/A^c a comparatively thin layer of sods some 0.20–0.40 m thick rested upon the original surface, which showed traces of earlier activities preceding the deposition of the sods. The layer of sods ended in square A^a above the filling of the early ditch which has been mentioned above. Apparently, it was part of the sod accumulation found in the southern part of section B which must have formed the core of the platform.

The house which had stood on top of the platform had also left its traces in section C. These traces consisted of the drainage ditch starting from the top of the layer of sods and cutting through it, a series of alternatively light and dark horizontal bands, and two groups of post-holes. The post-holes had been dug from different levels. The dark bands represented successive floors of the house. Many details remain obscure. For instance, it is difficult to explain the absence, in the section as well as in the deepest level of trench 3, of post-holes belonging to the lowest house floors. But it is clear, that the section offers further evidence of the protracted use of this area as a building plot.

In section A, the platform appeared in another guise: an elevation formed by layers of different composition, confined between two ditches (squares A^c/A^g). The layers between the ditches sloped down in both directions, the earliest ones towards the ditches, the later ones into the filling of the ditches and even across them. A clear example of a late layer covering the already silted-up ditch is the layer of burnt clay covering the western ditch in squares A^a/A^c . It is probable that section A cut the platform at its eastern end: traces of the core of sods or of the house were not present. The trenches of spicaria present in squares A^b/A^c clearly belong to an early phase.

Section A revealed the existence of a second nucleus of habitation more to the west. Its centre lay in squares M/T, where it showed its presence by the accumulation of clay sods occurring in square O (probably part of the core of a platform) and particularly by the sloping layers and the many pits and ditches. The ditches in squares M/N and T/U may represent its boundaries.

The zone between both nuclei did not seem to have been used so intensively, for traces of activity were less plentiful. Nevertheless, these were not completely lacking: *e.g.* dark band on low accumulation of clay sods in squares W/Y, drainage ditch in square V. The traces found in the south-western corner of excavation

trench 3, levels *a* and *b*, which indicated that the area in question had been used as a building plot at one time, have been mentioned on page 210. It may be that the intermediate zone was brought into use during a later phase of the settlement period when the two already existing nuclei tended to become fused by gradual expansion.

Trenches 4 and 5 (plans XII–XV)

Excavation trench 4 proved the low western elevation to be another nucleus of habitation. This appears from the presence of post-holes and pits in the excavation levels and the sloping layers and bands in the eastern half of the section. As far as could be established, the direction of the settlement traces was approximately NNW–SSE. A curious feature was the round pit lined with stones in squares B/C–58/59, which may have been an oven; it must be rather late as it was found immediately below the brownish top zone and probably dates from after the period of settlement.

The picture presented by trench 5 was completely different. Here, in the low-lying area between the sites Paddepoel II and III, there had been no settlement activity of any importance. Only a few ditches were caught in the trench. The two natural clay deposits separated by the second vegetation horizon covered an almost undamaged original surface. The second vegetation horizon was broken, probably by desiccation or ploughing.

Conclusions

Three nuclei of habitation were discovered in our trenches. At these places material had accumulated and three elevations had developed, which until recently, betrayed their presence at the modern surface by only a slight rise in the contour lines (plan VI).

Originally, the difference in height between land-surface and habitation nuclei had been much more marked, but subsequent transgression had to a large extent reduced these differences and smoothed the existing relief.

The elevations had been the dwelling sites proper. They were the platforms which carried the farm-buildings. The north-eastern one is better known than the other two. It appears to have had a rectangular shape and to have been bounded by ditches at its northern and southern sides. Its core consisted of clay sods which had been piled up in one operation. Apparently, the intentionally built core had been low; afterward it was gradually extended and raised. It is difficult to establish how far this was due to haphazard accumulation of refuse or to planned expansion. One

may possibly compare the evolution of the house sites established by Bantelmann at Tofting (*cf.* p. 229). On top of the north-eastern platform had stood a three-aisled farm-house, which had been rebuilt several times. Granaries had been sited on the southern slope of the platform. The house plot, as it appeared in the highest level of excavation trench 3, stretched well beyond the sod core of the platform. Consequently, the house represented by this plot must have belonged to a late phase of settlement when the original boundary ditches of the platform had already silted up.

The site must have been inhabited for a long period. Too little is known, however, to follow the evolution of the settlement in detail, or to attempt a subdivision of the period of settlement into phases. Curiously enough there are few indications of settlement upon the original surface itself. The two early ditches in trench 3, level *e*, with their continuation in trench 2, squares 58/59 and 60, may point to a *Flachsiedlung* phase. The second evolutionary stage was probably the raising of low individual platforms, which in later phases gradually became fused.

V. PADDEPOEL III (figs. 5, 9–16, plates I–IV, plans VI, XVI–XXI)

Situation (fig. 5)

Paddepoel III lies at a distance of about 125 m to the north of Paddepoel II. The terrain to be excavated had not been disturbed by building activities. Today, the area is covered by Marsstraat and Neptunusstraat.

The site consisted of three low elevations (plan VI). Two were lying close together on the eastern side: they were oblong and had a length of *ca.* 50 m; the long axis of

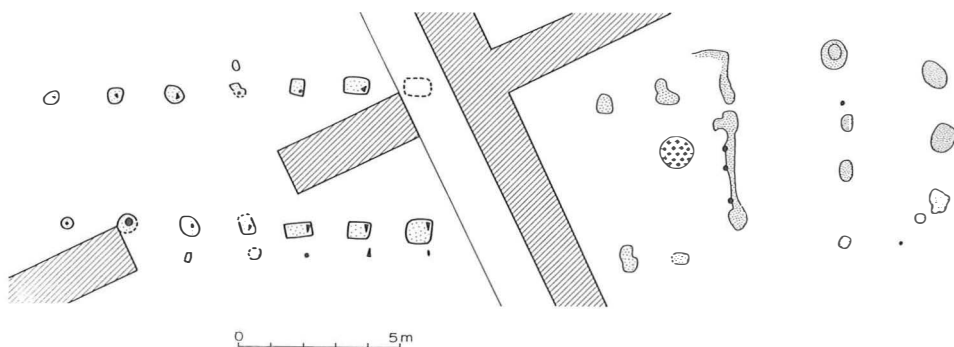


Fig. 9. Paddepoel III: farm building in squares Z/A^e-21/24.

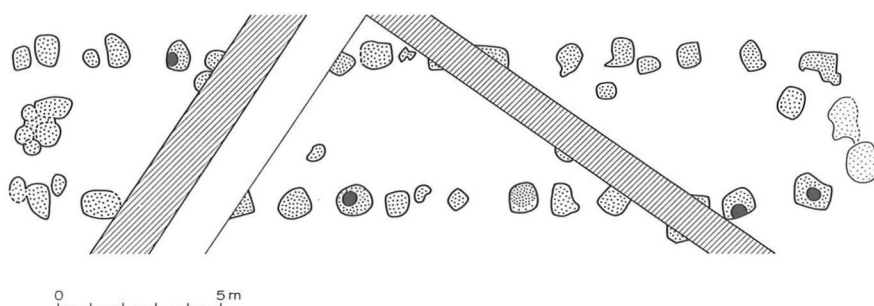


Fig. 10. Paddepoel III: farm building in squares Y/A^d-6/11.

the southern one was oriented approximately W/E, that of the other elevation NE-SW. The third one, about 50 m to the west, was bigger. It seemed to be composite and to consist of two or perhaps three individual mounds. It was cut by a modern ditch. All the elevations were slightly lower than those of Paddepoel II. The highest point was 0.60 + N.A.P., which is 0.30–0.60 m above the modern surface.

The two eastern elevations have been investigated completely (plan VI). The excavation started with a narrow trial trench (15), which had an approximately N-S direction and cut through the centres of both mounds; this trench was dug down into the natural in one operation. On both sides seven broad trenches were opened, varying from 24 to 28 m long, and from 10 to 14 m wide: trenches 1 to 14. Some of these trenches were excavated in three levels and some in four: levels *a*–*d*. Trenches 1–15 provided one N–S and eight W–E sections (the ninth W–E section (C) has not been drawn completely): sections A–L. The part of the western elevation to the east of the modern ditch was explored by means of N–S trench 17 (section M); the intermediate area was searched by means of two W–E trenches: 16 and 18 (sections K and J). The latter trenches were sunk into the natural in one operation; only their bottom levels have been drawn.

Trenches 1–15: the levels (plans XVI–XIX)

Here also, exactly as in Paddepoel II, the individual mounds marked the nuclei of the settlement, the places where the principal buildings of the settlement had stood. Two house plots were visible in level *a*: squares Y/A^d-7/11 and Y/A^e-20/24. In the northern plot the post-holes of a house which had stood in NE-SW direction could be seen.

The southern plot showed as a rectangular patch of yellow clay with dark core; its position was W-E. Post-holes were present only at the eastern end, together with a hearth. In levels *b* and *c* two clear-cut rows of post-holes appeared underneath the western part of the patch. The situation found in level *a* resulted from a long and complex evolution which can be traced in some detail. We will start from the bottom.

Ditches were the most striking features of level *c*. They belonged to different settlement patterns which overlay and thus succeeded one another. Two patterns were visible in level *c*; the third and latest appeared most clearly in the higher excavation levels *b* and *a*. We also refer the reader to figs. 14-16, in which an attempt was made to group the major elements of the settlement into succeeding settlement patterns.

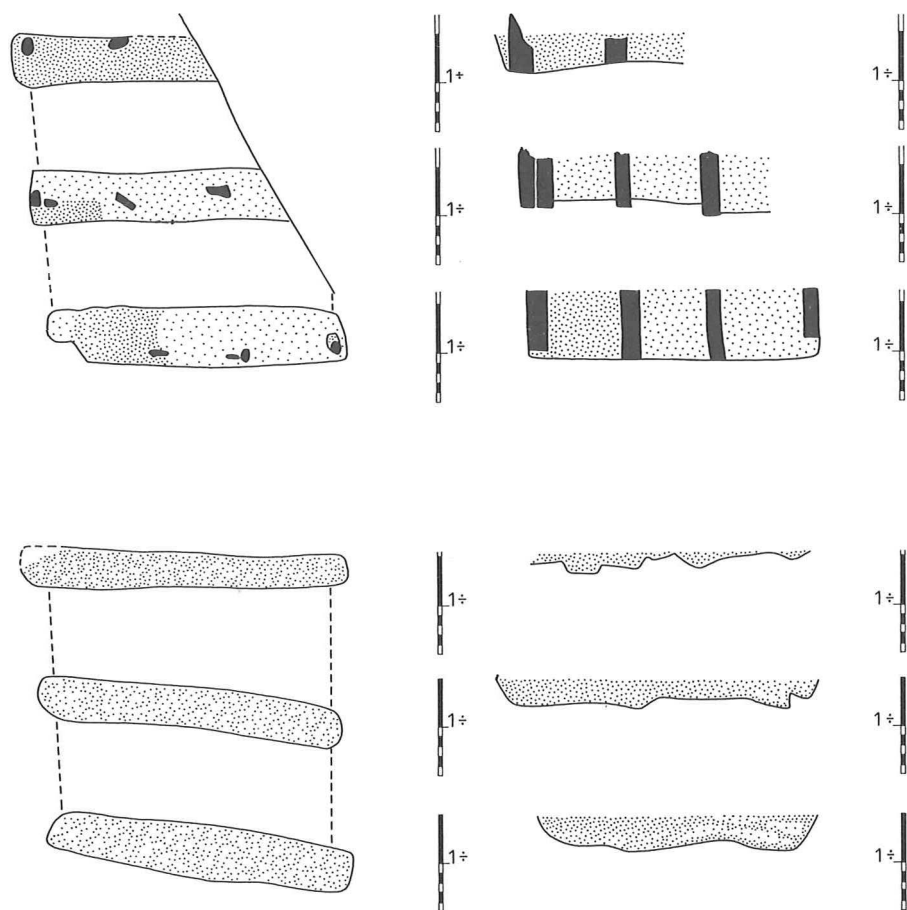


Fig. 11. Paddepoel III: granaries in squares X/Y-22/24.

Settlement pattern I

The earliest pattern (in fig. 14) consisted of the following elements:

- a.* A roughly square enclosure of *ca.* 20 × 20 m within the ditches in squares Y/A^f–16/25. In squares A^e/Aⁱ–20 a ditch branched off to the east.
- b.* The northern side of the square enclosure was joined by a roundish enclosure with an internal diameter of 12–15 m in squares X/A^b–10/16 and a probably rectan-

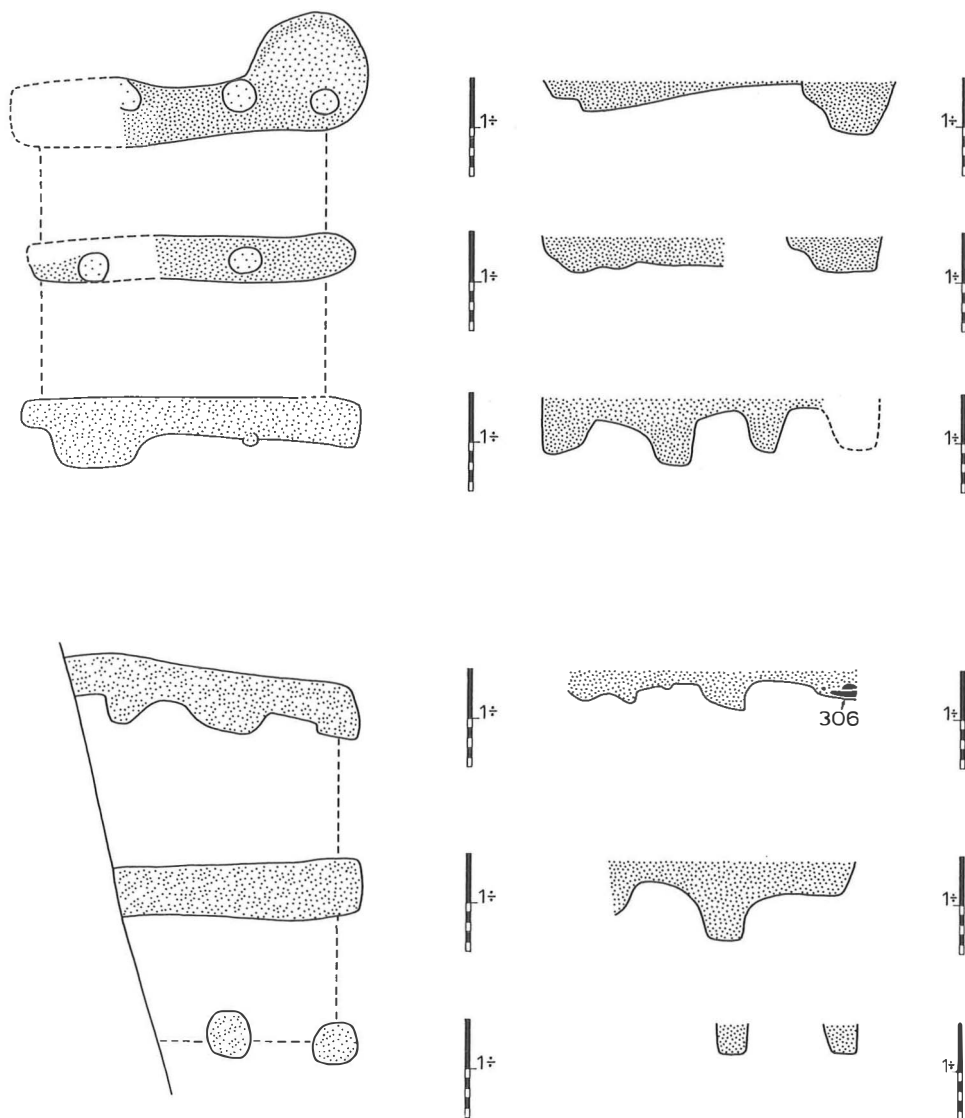


Fig. 12. Paddepoel III: granaries in squares Y/A^a–23/25.

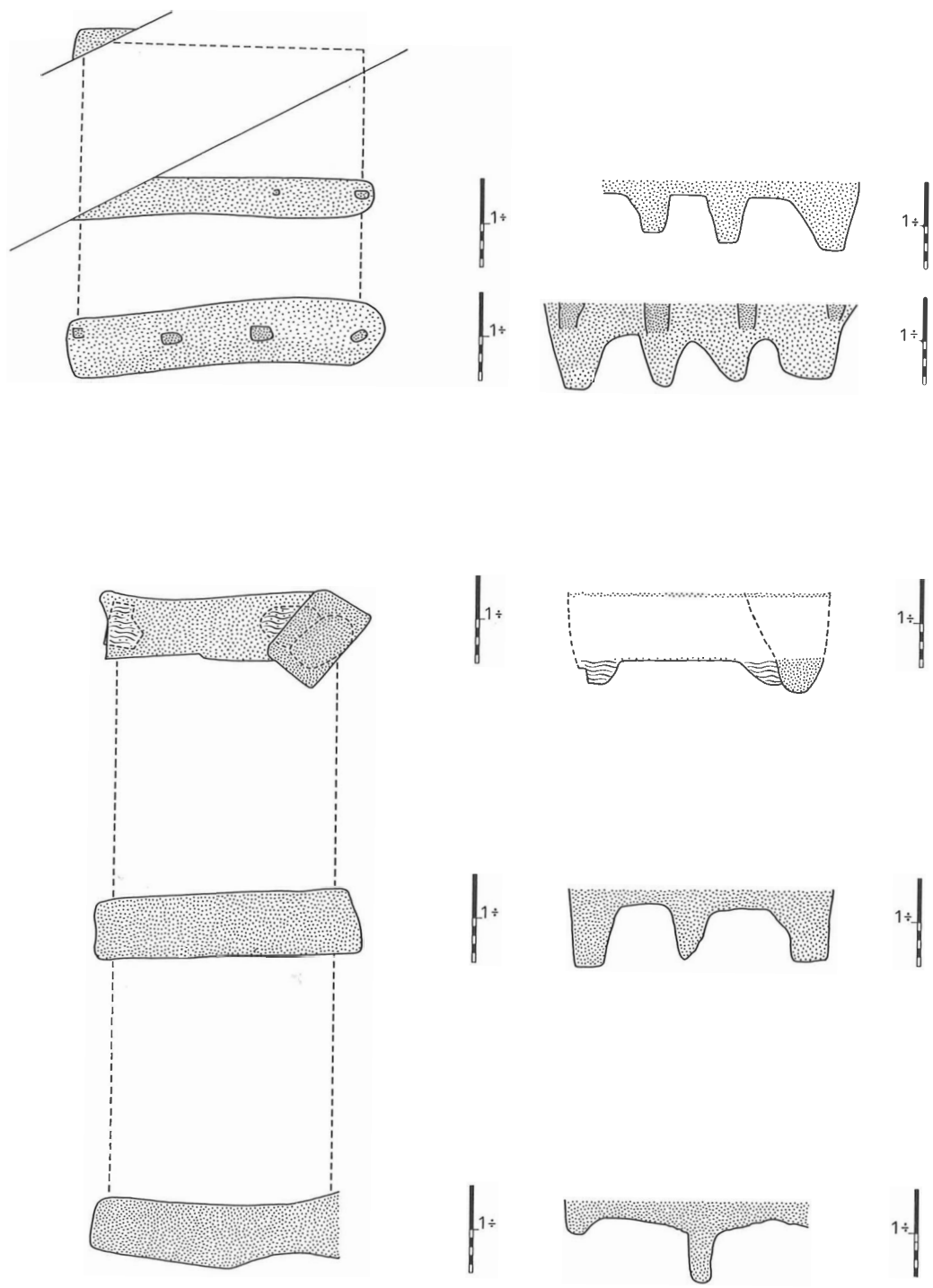


Fig. 13. Paddepoel III: granaries in squares Z/A^a-13/14 and A^c/A^d-20/21.

gular one in squares $A^a/A^f-13/18$. In the centre of the circular enclosure, there were three trenches, *ca.* 3 m long and placed at intervals of *ca.* 2.50 m, which had contained two or three posts each (fig. 14). It probably was some kind of granary. Between the round and the rectangular enclosures a *ca.* 3 m-wide strip bordered by ditches led in a northern direction: from squares A^b/A^c-15 towards $A^f/A^h-4/5$.

c. To the right of the narrow strip two narrow, rectangular plots measuring *ca.* 4×30 m within the ditches were found (squares $A^d/A^i-5/4$). On the left side a rectangular plot measuring *ca.* 12×26 m within the ditches occurred; it seemed to have been divided lengthwise into two (squares $Z/A^f-4/11$). A triangular enclosure in squares $Y/A^b-4/12$ connected the latter with a second narrow strip bordered by ditches (squares $X/Y-4/12$); this one ran approximately NNW–SSE and was *ca.* 4 m wide.

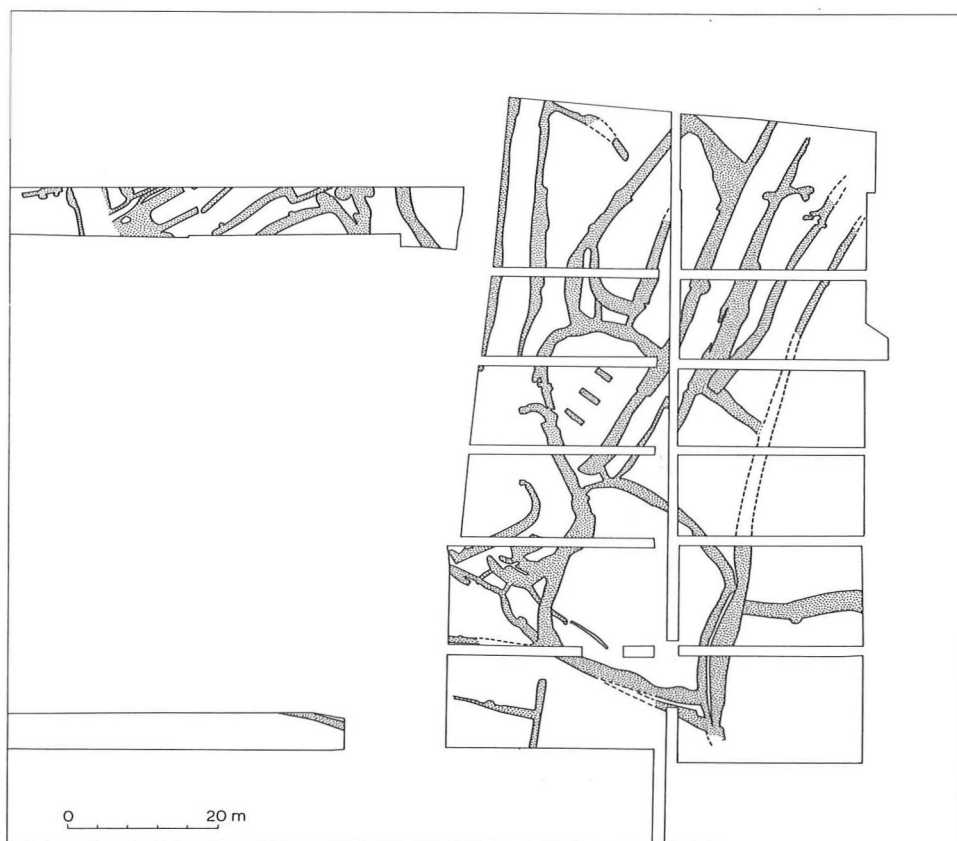


Fig. 14. Paddepoel III: settlement pattern 1.

d. It is clear that this earliest pattern stretched farther to the west. In any case, most of the ditches in the eastern part of excavation trench 18 belonged to it. Opposite these were some U-shaped ditches situated west of the square and the roundish enclosures, in squares V/Z-14/19.

The direction of the ditches of this settlement pattern showed a gradual turn from N-S in the eastern part towards WNW-ESE on the western side. The different elements seemed to pivot around a centre outside our excavation trenches; somewhere in square Q/V-12/20. The dwelling site proper was probably situated in this centre.

Apart from the possible granary within the roundish enclosure no traces of buildings belonging to this settlement pattern have been found in the excavated area. The U-shaped ditches in squares V/Z-14/19 may perhaps be considered as the south-eastern border ditches of the house plot. The adjacent roundish enclosure would then have accommodated the accessory granary. For the remaining plots or enclosures, which do not contain any settlement traces, we can offer no other explanation than that they were fields or meadows. The latter interpretation is the more probable because the results of pollen analysis are unfavourable to the interpretation of these plots as fields while plough-marks are lacking (p. 158). The two narrow strips could be interpreted as pathways leading through the pastures towards the centre.

Settlement pattern 2

The main characteristics of the second pattern (in fig. 15) which succeeded the first one were:

a. A house plot at the southern side in squares Z/A^d-20/24. The house had stood approximately W-E. In level *c* two rows of post-holes, in which the ends of the posts of oak-wood had been preserved, represented the roof-supporting timbers of the house. One of these posts (find no. 332) gave a C¹⁴ date of 175 ± 35 B.C.7. The house had been a three-aisled building. The rows of roof-posts – nearly 12 m long – consisted of eight pairs. The total length of the house must have amounted to *ca.* 15 m. The intervals between the pairs of roof-posts were 0.90–1.00 m wide; the span amounted to *ca.* 4 m. The roof-posts were triangular in horizontal section; they were dressed timbers made from a tree-trunk by wedging. The post-holes had already been visible in excavation level *b*. The first faint traces of them had appeared in level *a*. No wall-posts were found. In level *b* three posts, triangular in horizontal section, stood opposite the easternmost roof-

posts of the southern row at a distance of *ca.* 1 m. They must have supported the wattle-and-daub walls dividing the cattle-stalls, which we have to assume in both side-aisles. These posts were probably situated half-way between roof-posts and wall. This implies that the house has had a total width of 7 or 8 m.

On the northern and southern sides the house plot was bordered by a ditch. The western end was open. The eastern end of the house plot in its earliest stage seems to be indicated by a line running NNW-SSE in squares A^c-22/23. It may be that the ditch with the same direction in squares A^d/A^e-22/24, which we have attributed to the earlier settlement pattern, remained in function for some time during the earliest stage of the following one. The ditches to the north and south of the house, however, were extended at a later date in an eastern direction.

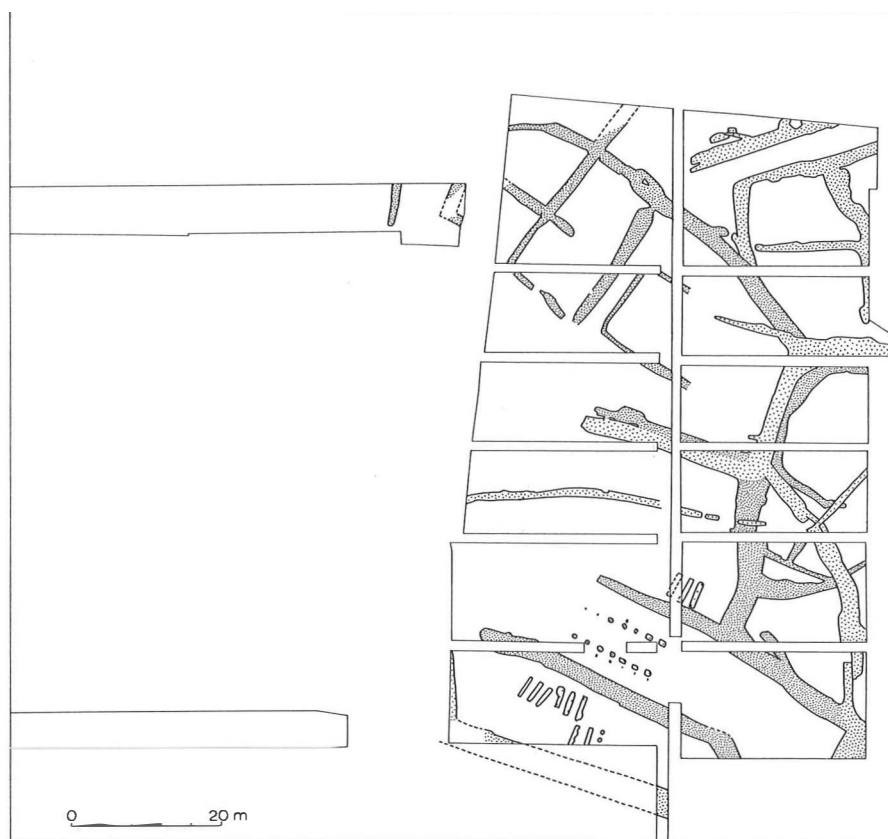


Fig. 15. Paddepoel III: settlement pattern 2.

b. The area to the south of the house plot contained many settlement traces. A concentration of post-holes was present in squares V/X-22/24 and in squares Z/A^a-23/24. These post-holes did not form a clear-cut configuration; they may have belonged to more or less flimsy rectangular structures: sheds. Four groups of three trenches containing four posts each were the remains of twelve-post granaries (fig. 11-13). Where the ends of the posts had been preserved these appeared to be of oak-wood. A square trench in squares Z/A^a-24/25 (see also level *b*) probably represented another type of outhouse. Furthermore there were a few pits: rectangular ones in squares V-24, W/X-24, X-25, A^c/A^d-25; a roundish pit in square W-22. Not all these traces belonged to the same period. A few of them will have been contemporaneous with the second settlement pattern, but it cannot be established which these were. The granary in squares W/X-22/3 and the outhouse in squares Z/A^a-24/25 are certainly later. A post of the granary in squares W/X-22/3 (find no. 331) was dated by the C¹⁴ method to 20 ± 95 B.C.⁸

It is difficult to decide whether the ditch found at the southern end (squares V/X-25) has to be attributed to the earliest stage of the second settlement pattern or to a slightly later one. It ran parallel to the southern ditch of the house plot and seemed to enclose the area with outhouses.

c. At the northern side a square area measuring *ca.* 20 × 20 m confined on the house plot (squares Z/A^f-15/21). Three sides were bordered by a ditch. The western side was open. A twelve-post granary had stood in the south-eastern corner; behind it lay two roundish pits.

d. Adjoining this was another approximately square enclosure (squares Y/A^g-8/16). It measured *ca.* 16-26 × 27 m inside the ditches. The ditches were interrupted in the south-western corner. Within the enclosure an incomplete square or rectangular trench was found (squares A^a/A^c-10/13).

e. From the eastern boundary ditch of the two enclosures mentioned under (c) and (d) a number of ditches started towards the east.

f. A rectangular enclosure was situated to the west of the one described under (d) (squares X/A^b-5/11). It measured 10 × 18 m inside its ditches, which were filled up with dung. Two small enclosures of uncertain shape bordered the western side.

The second settlement pattern had much in common with the first. It showed the same shifting orientation. It also gave the impression of pivoting around a centre more to the west. This centre must have been situated mainly outside the excavated area because the western ends of excavation trenches 3 and 4 were almost empty of

traces. The enclosures in the northern and eastern parts repeated those found in corresponding positions in the earlier pattern. They certainly had the same function: fields or meadows(?).

The major difference between the excavated parts of both patterns was that the second one contained a proper dwelling site. It is probable that the occurrence of a house during the period of the second pattern in the excavated area was caused by extension or removal of the hypothetical nucleus of settlement more to the west. The western part of trench 2, behind the house, contained a remarkable number of post-holes and pits. The post-holes did not form a definable configuration. Nevertheless, they indicated that this area had been a dwelling site in the strict sense.

A few ditches at the eastern side seemed to represent a later extension of the second settlement pattern. Some ditches had been redug: squares $A^a/A^e-15/16$; $A^f/A^j-12/15$. The southern ditch running from square V-25 towards A^e-27 may have belonged to the original lay-out of the second pattern.

Settlement pattern 3

The third settlement pattern can best be studied in the higher excavation levels (*a* and *b*). In general, the ditches and other elements did not go down into level *c*.

a. In the northern part of the excavated area an irregular pentagonal enclosure replaced the smaller enclosures of the preceding patterns. The south-eastern corner had been determined by two earlier ditches: squares $A^a/A^f-15/16$, $A^f/A^g-13/16$. The enclosure had been a farmyard. The farmhouse had stood in its centre in an approximately NNE–SSW position. A granary had stood next to the north-eastern corner of the principal building.

The traces of the house consisted of about fifteen pairs of large post-holes placed in two rows (level *a* end *b*). The two rows lay *ca.* 4 m apart; the intervals between the pairs of post-holes varied between 1 and 2 m.

The post-holes were filled up with yellow clay. In some of them dark post kernels were visible. We consider the two rows of post-holes to represent the roof-posts. No wall-posts were visible. The dimensions of the building will have been *ca.* 8 × 26 m.

The site of the granary could be recognized by three broad trenches filled with yellowish clay in level *a* and by two post-holes in level *b* (squares $A^d/A^e-8/9$). The trenches were *ca.* 5 m long and had probably contained three or four posts each (fig. 16). Another square patch of yellowish clay in level *a* squares $A^d/A^e-7/8$ could denote an earlier or later granary.

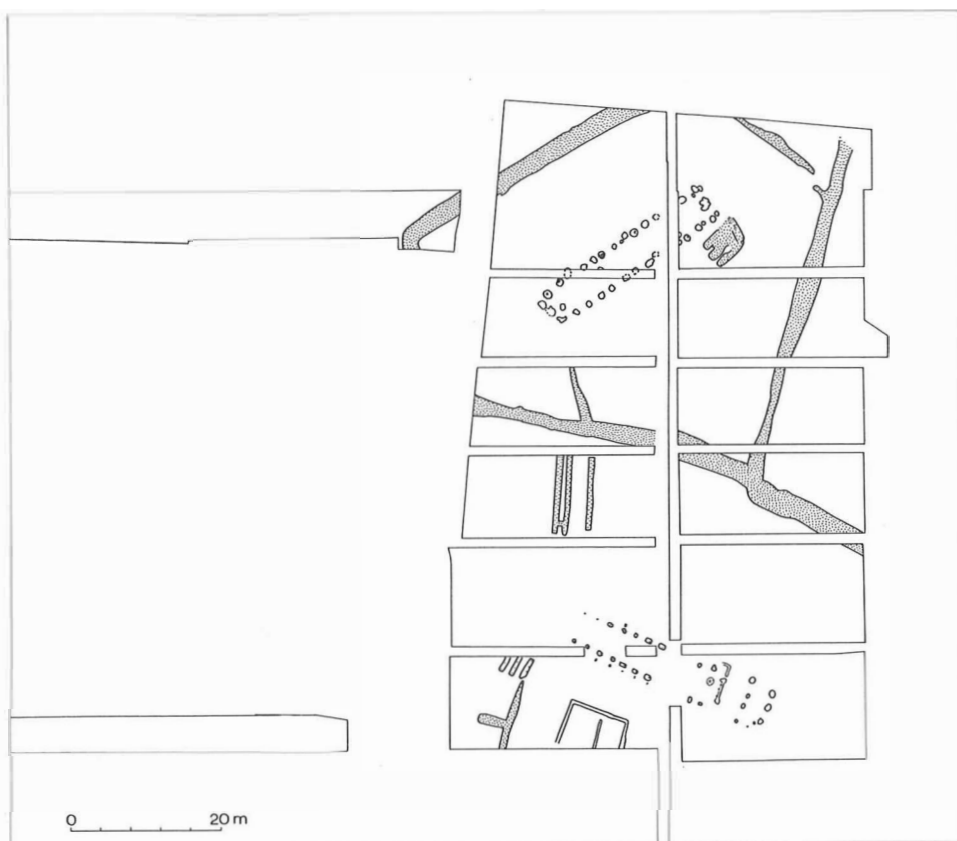


Fig. 16. Paddepoel III: settlement pattern 3.

b. The southern house had survived. In level *a* a narrow trench marked *the*, or more precisely *an* eastern front wall of the house (squares $A^d/A^e-23/24$). To the west of this wall there were a fire-place (square A^d-23) and a few post-holes. Some of these post-holes were laying in line with the rows of roof-posts which were to be seen in levels *b* and *c* (square $Z/A^b-21/23$) but were not yet visible in this level. The middle part of the house plot appeared as a rectangular patch of yellow clay with a dark core. A group of post-holes in the extreme north-western corner of the house plot (squares $Y/Z-20/21$) may also have belonged to the house.

In level *b* another eastern front wall of the house appeared: the row of post-holes in squares $A^e/A^f-23/25$. A square patch of sods in squares $Z/A^a-18/19$ could indicate the site of a granary or some other kind of outhouse. A configuration of post-holes in squares $Y/Z-20/21$ seemed to represent a four-post granary.

In levels *a* and *b* the area to the south of the principal building was full of traces of granaries and sheds. Some of these will have belonged to the settlement pattern

under discussion: *e.g.* the granary in squares X/Y-22/23 and the square trench in squares Y/A^b-24/25. But a certain attribution was impossible.

Post-holes and pits in squares W/Y-19/21 pointed to building activities in the area to the west of the house.

c. The ditch in squares V/Aⁱ-17/18 cannot have been of any importance; it has not been observed in section L. It was a late element of this settlement pattern. Perhaps it points to a rectification of the boundary between the two farmyards.

The close connection between the third and the second settlement pattern is unmistakable; the one evolved from the other. The house plot in the southern area which had formed part of the second pattern remained in use. The northern house plot of the third pattern was a new addition. It occupied an area where fields or meadows had previously been. The boundary between the two farmyards was determined by a ditch of the second pattern. The radial disposition of the houses suggests a centre more to the west and outside the excavated area.

Trenches 16–18: the levels (plan XVIII)

Trenches 16–18 revealed many ditches. The data are too incomplete to make a reconstruction of the settlement pattern. Some of the ditches, especially those in the eastern part of trench 18, certainly belonged to the first settlement pattern encountered in trenches 1–15.

The middle part of trench 17 (squares 10–20) showed a concentration of narrow ditches, pits, and post-holes. They represented another settlement nucleus in this area. The traces belonging to this nucleus were oriented NW–SE and NE–SW.

Trenches 1–15: the sections A–I, L (plans XX–XXI)

The sections provided much additional information. They showed that the original surface below the habitation layers was situated 0.40 to 0.60 m — N.A.P.

It seemed to be intact only at a few places: in the eastern half of section E¹ and at the western end of section A¹. There it appeared as a blackish vegetation horizon of *ca.* 10 cm thick containing sherds. In the other sections, the greater part of the original surface had been destroyed by pits and ditches, but also where it had been preserved it had changed. Here, in the stretches between the ditches, the original surface layer was mostly less “taut” and level; its colour was not blackish but more grey or brownish; it often was thicker than the untouched original surface. At some places the underside of this layer was crenated (section F: squares W/X; G: squares

Z/A^a; F¹: squares A^c/A^d; L: northern half). The change of the original surface will have been partly due to the coming and going of people, the trampling of cattle and the traffic of carts.

At the places where the two houses had stood, the accumulation of settlement material had been considerable. In sections B-B¹, F-F¹, G-G¹, H-H¹, and in section L, squares 20-25 and 5-15, the settlement layers were sometimes about 1 m thick. The settlement layers sloped down from these highest points. In the depression separating both elevations the accumulation of material had been slight: section E-E¹. In this depression, as well as at the outer ends of some sections, a natural deposit of greyish clay was found on top of the settlement layers: sections E¹: squares A^f-Aⁱ; F¹: squares A^g-Aⁱ; G¹: squares A^h-Aⁱ; H¹: square Aⁱ. It was covered by a black vegetation horizon which sloped up against the settlement layers dividing this first natural deposit from a second one, which had similar characteristics. This second vegetation horizon (the first vegetation horizon was the original surface) was visible at the outer ends of almost every section. It dipped down into the filling of the latest ditches. The presence of the second clay deposit could clearly be established in section E-E¹, at the western ends of sections A, F, H, and I, and at the eastern ends of sections D¹, F¹, G¹, H¹. As at Paddepoel I and II, the sections were capped by a brownish top zone (*cf.* pp. 200, 213).

All the ditches of the first and second patterns started from the level of the original surface. Many of the ditches found in the northern part of the excavated area were filled with dung. Some ditches of the third pattern had been dug from higher levels and cut through earlier settlement layers: in particular, the ditch running from square A^f-17 to square Aⁱ-5. The second vegetation horizon dipped down into these ditches and they were partly filled with the clay of the second deposit. Consequently, they had not been filled up completely when the settlement was abandoned.

The house plots were characterized in the sections by the greater thickness and variegated aspect of the settlement layers: section L: squares 20-25 and 5-15; G: squares Y-A^b; H¹: squares A^e-A^f. The construction or growth of the northern platform cannot be followed in detail. Apparently the platform was made from different materials: lumps of almost clean clay (section G: squares Y/Z; H¹: squares A^e-A^g) but also from material belonging to earlier settlement layers. Post-holes of the house were observed in section G: squares A^a-A^b. They had been dug from the highest level and appeared immediately below the brownish top zone. Section H¹ coincided with two other post-holes of the house, but only the bottom parts of these holes were visible in the section: square A^d. There were no clear traces of the house floor: the dark line in section G: squares Z-A^a slightly below N.A.P. level (?).

The southern house platform was partly built of clay sods. Sods or at least accumulations of yellow clay could be observed at the eastern end of section C, at the eastern end and in squares Y/Z of section B, and at the western end of B¹. Section

B^I also showed the gradual extension and heightening of the platform towards the east. A first slope was faintly visible at the division between square A^c and A^d. Against this incline rested an accumulation of sods which sloped down towards the inner side of the ditch in square A^e. Later sloping layers covered the filling of the ditch. This situation is in accordance with the observations made in excavation level *c* and section L: squares 20–25. A line in squares A^e–22/24 of level *c* marked the end of the platform in its first stage. In section L we found a very thin layer of yellow clay resting upon the original surface, which showed some influence of earlier activities itself. This thin clay layer must be the very end of the platform in the first stage. It was covered by a layer of bluish soil, some 0.20–0.30 m thick, which had a structure reminiscent of sods: probably the trodden down slope of the earliest platform. On top of this came a *ca.* 0.40 m thick layer of yellow clay, which may be compared to the first accumulation of sods in section B^I, and represents the platform in its second stage.

Inside the house itself the platform was hollow. In the hollow there was a succession of alternating dark and light bands which must represent successive floor levels, the dark bands representing the floors proper and the yellow bands being the clay used to renew the habitation surface: section B: squares Z–A^b; C: squares Y–A^b. Exactly the same situation was met with in section B: squares 61–64 at Paddepoel II (*cf.* pp. 105). Comparable floor levels were also observed above the post-holes of the granary in section B: square X.

In its earliest stage the southern house platform seems to have been very low, possibly not higher than *ca.* 0.30 m. However, the post-hole of the house visible in section B (square A^a) does not necessarily denote the original height of the platform. It was just grazed by the section and may not have been caught completely. In fact it probably started from a somewhat higher level; the first traces of the post-holes already appeared in excavation level *a*, not far below N.A.P. level. The evolution of this platform may have been more or less comparable to the one found by Bantelmann at Tofting⁹. Here, the starting point was a house with a slightly raised floor and with earthen banks outside the walls. The platform came into existence by a gradual raising of the floor and banks. A similar evolution from Flachsiedlung to dwelling on platform is also probable for the north-eastern house plot of Paddepoel II.

Section B presented another difficulty in that the relation between the ditch in squares X–Y and the platform did not emerge clearly. The ditch seemed to be earlier, whereas the situation found in excavation level *c* suggested it to be contemporaneous. The explanation may be that the part of the ditch which appeared in the section was, in fact, earlier, whereas the part that belonged to the house stopped short just in front of the section, at a point in line with the westernmost postholes of the house and the end of the northern ditch.

Trenches 16–18: the sections J, K, and M (plan XXI)

Sections J and K appeared to lie outside the settlement nuclei. The settlement traces found in these sections were confined to ditches which all started from the original surface, apart from two ditches at the eastern end of section J, which cut through earlier layers and belonged to the second pattern. Most of the others, especially those in section J, formed part of the first settlement pattern. A few ditches, into which the second vegetation horizon penetrated may have belonged to the latest phase of occupation: section J: squares I–J; section K: squares M–O. Considerable accumulation of settlement material had not taken place. The occupation layer, as far as it was visible between the ditches, had an average thickness of *ca.* 0.20 m. It was greyish in colour and seemed to be a “worked-through” layer in which the original surface had been included: arable (?!). Originally, the old surface had been a thin black horizon. Small remnants had been preserved immediately beside some of the ditches.

Section M presented a strong contrast. In its central part (squares 9–19), it showed an accumulation of settlement layers more than 0.50 m thick, the layers sloping down at both sides. It was clear that this part of the section cut through yet another settlement nucleus, which had been raised in the course of prolonged occupation. We have to compare this site to the other two house plots of Paddepoel III more to the east which had also grown into low platforms as the result of a gradual process. The kernel of the platform in section M seemed to be situated in squares 11–17. A layer of yellow clay in squares 10–11 followed by a layer of brownish clay in squares 8–9, both with sloping outer sides, marked its gradual extension towards the north. At the southern side something like a mantle of brownish-grey clay in squares 17–19 was observed. The post-holes and pits found in the excavation level of trench 17 confirmed that the area had been inhabited. The platform sealed a brownish to greyish layer from which a great number of ditches started. Layer and ditches can be compared to those found in sections J and K, and might suggest that agriculture preceded habitation in this area. At the extreme northern end of section M, the original surface appeared intact as a thin black line. Here, there were absolutely no traces of human activity.

In all three sections the level of the original surface was around 0.50 m below N.A.P. Only at the southern end of section M and the western end of K did the original surface rise to about N.A.P. level. The thin occupation layer in sections J and K was sealed by two natural clay deposits separated by the already familiar second vegetation horizon. At the western end of section J, a third vegetation horizon was found just above the second. The upper horizon had been broken: by desiccation rather than ploughing. In section M, the first deposit was only present at the northern end; the vegetation horizon could only be recognized where the occupation

layers were thinning out, that is, outside and on the slopes of the platform. The altitude of the second vegetation horizon varied from *ca.* 0.20 m below to *ca.* 0.20 m above N.A.P. The upper part of the second deposit and the highest layers of the platform in section M had become lost in the brownish top zone.

Conclusions and questions

It is clear that the three settlement patterns described above represent three successive periods of occupation. The evolution of the settlement continued uninterruptedly throughout these three periods. For periods II and III this needs no further argumentation as the connection between the two corresponding patterns is very close. The connection between the first and the second pattern (period I and II) is demonstrated by the fact that the southern ditch of the house plot of pattern II occupied the same position as a period I ditch. Moreover, both earlier patterns have the same directions and, as far as can be established, the northern parts of both patterns had the same function.

All traces found of period I have a *Flachsiedlung* character: they descend from the original surface. No dwelling site proper was found. It may have lain outside the excavated area: somewhere in squares Q/U-15/20 (?). The only traces of a building belonging to period I are the three rectangular pits in squares Y/A^a-13/14; they probably represent a granary. If a house had existed outside the excavated area, its site was abandoned before being raised like the house plots of periods II and III.

The settlement of period II was also virtually a *Flachsiedlung*. At this time, a principal building together with its outhouses was erected in the excavated area. In its initial stage the platform on which this house was built must have been very low. Only gradually, in the course of periods II and III did it attain a height of about 1 m. During period III a second house came into existence; the second house plot was also raised. The excavated part of the settlement ended its evolution as two farmyards raised on two platforms separated by a depression. Unfortunately, no details of the construction or growth of the platforms could be established, but the main lines of the development stand out very clearly. The elevation more to the west, the eastern edge of which is cut by trench 17, must be the result of a similar process.

The principal buildings were of the three-aisled type. Their plans are, however, incomplete; no details have been obtained (fig. 9-10). More is known about the outhouses (fig. 11-13). There were different types, most of them, if not all, probably being granaries. A four-post configuration, roughly square with sides of 3 m, occurred in

squares Y/Z-20/21. A rectangular (?) trench in squares Y/A^a-24/25 of ca. 6(?) × 8 m could represent some kind of building. The post-holes in squares V/X-22/25 do not form a comprehensible configuration. A granary ground-plan formed by three trenches containing three or four posts each was found seven times with a possible eighth: excavation level *a*, squares A^d/A^c-7/9; level *c*, squares Z/A^a-13/14, A^c/A^d-19/20, X/A^a-22/25. One of them (square Z/A^a-13/14) measured ca. 3 × 8 m; the others were approximately square with sides between 3 and 4 m long.

The greater part of the pattern of period I and also part of that of period II consists of square or rectangular enclosures without traces of habitation. Their interpretation remains difficult. There is a fair chance that they were meadows, but the evidence is inconclusive.

It may further be asked whether there existed any direct connection between the settlement traces found at Paddepoel II and those of Paddepoel III. The question is difficult to answer owing to the incompleteness of the excavations, but as far as can be seen the answer must be in the negative. The distance between Paddepoel II and III is great (c. 100 m). There were practically no traces in trench 5 connecting both sites. At first sight, the arrangement of the houses of Paddepoel II and III suggests a radial lay-out, but some of the farm buildings, for example the southern one of Paddepoel III, had their byre turned to the inside of the "ring".

The settlement layers were covered by or imbedded in two natural clay deposits separated by a vegetation horizon: the Late-Roman/Early-Medieval and Medieval transgressions (cf. pp. 199-204).

VI. PADDEPOEL IV (figs. 1, 17, plans XXII-XXV)

Situation

On the 1st of October, a farmer's son brought us a basket full of human skeletal remains. The bones had been turned up by a dragline one or two days earlier. We went to look for the dragline and found it still at work on the site where the bones had been discovered. The machine was cheerfully digging off a small oblong *terp* of ca. 55-85 m situated about 2 km north-west of Paddepoel III on the southern bank of the Van Starkenborghkanaal. At the southern side more than half of the *terp* had already been levelled to below the surface of the surrounding area. The north-western part had been lowered by about 0.50 m. Only a small fragment at the north-eastern side was as yet untouched. The clearance work was being carried out by order of Groningen University preliminary to constructing a cyclotron. We

were told that the bones had come from two skeletons. It was also rumoured that a pot or urn had been among the finds from the same spot. Within a few hours after our departure, five other skeletons were discovered and destroyed by mistake: somewhere in squares H/J–3/4. The dragline was now moved to another spot, and we obtained permission to carry out a small excavation.

In contrast to the elevations of Paddepoel I–III the *terp* of Paddepoel IV rose well above the modern surface. Its summit reached a height of 1.80 m + N.A.P. The surface level of the area immediately south of the *terp* varied between 0.20 and

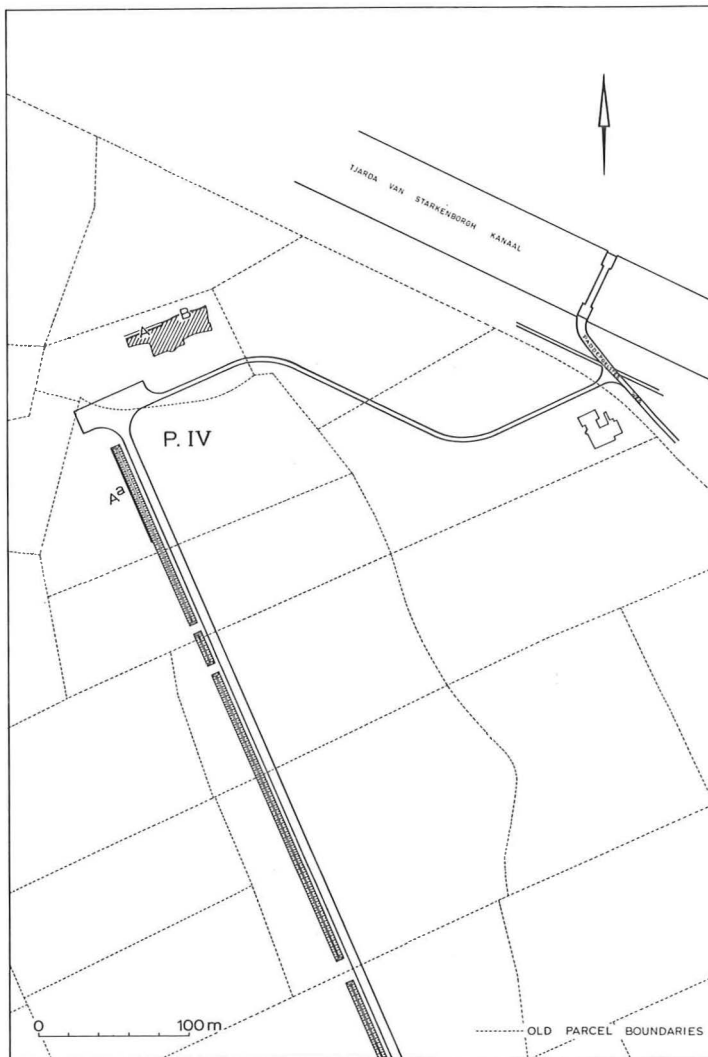


Fig. 17. Paddepoel IV: location of excavation trenches and sections.

0.50 m + N.A.P. The terrain to the west and east of the *terp* was somewhat higher and, moreover, rather undulating (plan XXII).

The *terp* of Paddepoel IV was probably not the only settlement site in this area; other elevations could be observed in the vicinity. At a distance of *ca.* 300 m from Paddepoel IV, there was an elevation rising to 0.80 m + N.A.P. situated at the southern edge of a narrow and shallow depression to the south-west of the *terp*. Some 500 m to the south of our *terp* lay another elevation, its summit also *ca.* 0.80 m above N.A.P. level. It is striking that both elevations were connected with Paddepoel IV by sinuous ditches, the only curved ditches found in the area. These are probably remnants of an old system of watercourses, which may have been connected with the fossil Aa-course observed at Paddepoel I (*vide* pp. 200–1 fig. 4).

Our excavation could not be more than a small and incomplete rescue operation. The major objective was to establish date and character of the graves, as well as to gain insight in the structure of the *terp*. A small area of about 10 × 25 m was cleaned and drawn near the spot where the skeletons had been discovered: excavation level *a*, 0.45–0.60 m + N.A.P. The area of excavation was afterwards extended at a slightly deeper level: excavation level *b*, 0.10–0.35 m + N.A.P. It was situated approximately below the point where the top of the *terp* had been. At the northern edge of the excavated area the remaining fragment of the *terp* offered an fine opportunity to study it in section: section A and B. To the west of our excavation the western wall of a newly cut ditch provided another free section: section A^a.

The excavated area: the levels (plan XXIII–XIV)

Two groups of traces appeared in the excavated area: graves and settlement traces.

Fifteen or seventeen graves were found in the excavation. Together with the seven graves known to have been destroyed by the dragline this adds up to a total of at least 21 or 23. Others may have disappeared unnoticed before the beginning of the excavation. A small round pit in square H–5 may be a cremation grave. It was lying in a group with several inhumation graves; its filling contained charcoal and a few splinters of calcinated bones, probably of a human foetus or baby¹⁰ (find no. 344). Thus, the cemetery was possibly a mixed one. The information given by the workmen that they had found a complete pot points in the same direction. The cremation grave in square H–5 gave a surprisingly early C¹⁴-date: 535 A.D.¹¹.

All graves were found within a circular patch of yellowish clay: diameter 18 m (squares F/J–2/6). The clay in the patch was clean and at some places looked almost natural. However, in squares F/H–3/4 a sod structure could be observed and the

natural was established at *ca.* 0.30 m below excavation level *b*. The circular patch can be explained as the base of an artificial elevation and, as there were no other traces than the graves which can be attributed to it, the elevation must have been constructed to form a raised cemetery. The graves found in the excavation were all lying in peripheral parts of the patch. Their bottom levels varied between N.A.P. and 0.30 m + N.A.P. If we accept a minimum depth of the graves of *ca.* 0.75 m, the surface of the elevation was situated at *ca.* 1.00 m + N.A.P. at the edges. In the centre it was certainly somewhat higher and this explains why no graves appeared here in the level of excavation: they did not reach deeply enough for that and must have been destroyed together with the higher layers of the terp (*cf.* the five graves destroyed in squares H/I-3/4: p. 233).

Most of the graves are oriented: the head of the body at the western end of the grave. Two are S–N graves. The graves were mostly *ca.* 2.00 m long and *ca.* 0.60 m wide. Two exceptionally large graves occurred in squares G/H-6. They had contained coffins and measured *ca.* 0.70–1.00 × 2.60 m. The southern one seemed to cut through two (?) earlier graves. If indeed there were two graves underlying the latter, these must have been small: children's graves. The small pit in square F-4 is a child's grave; the one in square H-6 may be a fragmentary adult's grave or a child's grave. Eight graves had contained wooden coffins: their dimensions, as far as these could be established were: *ca.* 0.40 × 1.80, 0.50 × 1.80, 0.50 × 1.60, 0.60 × 1.80, 0.50 × 2.00 (?), 1.00 (?) × 2.00 m. Twice were skeletal remains found without traces of a grave pit: level *b*, squares G/H-3 (skeleton lying on its side) and level *a*, square I-3 (skull).

The state of preservation of the skeletons differed from grave to grave. Skeletal remains were collected from seven graves: find no. 292, 296, 334, 335, 336, 339, 343 (*cf.* pp. 288–94). In one case an omission was made in not collecting the bones: grave in squares G/H-3. In the remaining graves recoverable skeletal remains have not been found. Skeleton 296 is male, no. 292 probably female; in the remaining cases the sex has not been established. Skeleton 336 is of a young child between five and twelve years old. The other skeletons are of adults ranging in age from eighteen to more than fifty years¹⁰.

Grave gifts were almost completely absent. One grave provided a fragment of iron: find no. 342.

It is impossible to establish the original number of graves, nor can the structure of the complete cemetery be reconstructed. The excavated graves fall into two groups, but it is probable that graves in the centre of the cemetery between the two groups had disappeared before the excavation (*cf.* p. 233). Of the two S–N graves one was isolated, the other lay near the centre of the round patch. In cemeteries of this type the S–N graves are often relatively deep. The density of the graves was great, especially in the southern group where a few overlap.

The most important feature among the settlement traces were two parallel rows of large post-holes: squares F/N-3/5. They ran E-W and were 6 m apart. The post-holes were placed in pairs opposite each other at intervals of *ca.* 2 m. The rows consisted of at least eleven but probably fourteen pairs. The northern row was *ca.* 29 m long; the three easternmost post-holes had no opposite numbers in the southern row, but this can be explained by the fact that the level of excavation here was too deep. The holes reached between 0.20 and 0.40 m below excavation level *b*. They cut through the cemetery – a post-hole cuts a grave in square I-3 – and if we are right in assuming that the surface of the raised cemetery lay at the level of 1.00–1.50 m + N.A.P. must have been at least 1.00–1.50 m deep. In some post-holes a post-kernel could be observed. The westernmost post-hole in the southern row contained the bottom part of a post of oak-wood (find no. 298: roundish post with diameter of 0.20–0.30 m). This post gave a C¹⁴-date of 745 ± 45 A.D.¹².

The posts which had stood in these holes probably represent the two rows of interior roof-supports of a large three-aisled building. Excavation level *b* was too deep to find the shallower holes of the wall-posts. In excavation level *a* a fragmentary row of shallow post-holes was observed at a distance of *ca.* 2 m to the north of the northern row: squares L/N-3/4. These post-holes were accompanied on the northern side by a narrow dark band, which could be followed farther to the west until square I-2. In excavation level *b*, band and post-holes had disappeared but a sharp line had taken their place. South of this line – inside the house – the structure of the soil was rather uniform, outside it it was most varied; in squares H/K-2/3 a zone with charcoal and burnt clay ran parallel to the building. It is clear that the northern wall of the building was situated about 2 m outside the northern row of roof-posts: its location is marked by the shallow holes and the narrow band – possibly the filling of a drain to catch water from the roof – visible in excavation level *a*. In squares K-2/3 of the same excavation level, a zone of clay sods was observed running perpendicularly towards the house wall; the narrow dark band showed an opening where the sod zone reached the wall. The sods may be interpreted as the pavement of a street which came up to the house-door. The building, side-aisles included, was *ca.* 10 m wide. This great width is an argument in favour of a Medieval date (*cf.* p. 273). We have no evidence of the building's function but may assume that it was a farmhouse.

The remaining traces comprised a square pit in squares O-5/6 (depth: 0.20 m — N.A.P.), a rectangular pit too large to be a grave (depth not noted) in squares F-3/4, and some ten roundish pits. Three of the latter were sectioned. The one in squares H/I-2 was 2.10 m in diameter in excavation level *b*. At about 0.30 m further down it narrowed to *ca.* 1.00 m and its shaft reached to below 2.80 m — N.A.P. (plan XXV)! It was probably a well, but traces of a wooden revetment or some other kind of casing have not been found. Its filling was findless and consisted of humic clay. The

pit in squares J-3/4 was also very deep and had vertical sides (plan XXV). The lower part of the filling was humic clay beneath a layer of dung. The roundish pit in square N-4 was shallower. In the filling of the pit in squares K-2/3 five segments of a spoked wheel were found together with a sherd of *Kugeltopf* pottery (fig. 20). The beech-wood segments still formed a circle but the oak-wood spokes had broken off (*cf.* p. 240; find no. 341). The wheel was found at *ca.* 0.10 m — N.A.P. The pit was much deeper; there was no time to dig beyond 1 m below the wheel; at this depth the bottom had not been reached. It was probably a well. The position of the wheel remains remarkable. Wheels are often found at the bottom of a well, while this one lay high up in the filling: secondary intrusion? The pit in square J-5 contained two planks, one of them standing in an oblique and the other in a vertical position; this pit has not been sectioned as our time was up and consequently it has not been established whether the planks formed part of a well revetment or had slipped in with the filling of the pit.

The sections (plan XXV)

Section C lay outside the area of settlement; traces of human influence were rare. It showed an old land surface indicated by a *ca.* 0.10 m-thick, black vegetation horizon. Underneath the vegetation horizon and sometimes separated from it by a thin layer of greyish clay there was a 0.20–0.30 m-thick layer of brownish humic clay. At the southern end of the section the old surface was situated at approximately 0.40 m — N.A.P. It sloped up in northerly direction until it reached N.A.P. level at a distance of 14 m from the northern end of the section. After 4 m it started to slope down again into the bed of a small river or creek, where it split up into three or more superimposed thin bands separated by yellowish clay. It ended at 7 m from the southern edge of the bed. Underneath the thin black bands on the bottom of the bed the filling consisted of brownish humic clay. The part of the bed which was cut by the section showed a gradual slope towards 1 m below N.A.P. level at the northern end of the section.

In the southern part of the section, a 0.50 m-thick layer of greyish clay interlarded with thin, horizontal sandy bands covered the original surface. It wedged out against the natural levee forming the southern bank of the river but reappeared in the river-bed. This deposit was capped by a second vegetation horizon at approximately N.A.P. levee. The second vegetation horizon broke off before it reached the natural level and was only faintly developed in the river bed. Deposit and covering vegetation horizon can be put on a line with the corresponding phenomena observed at Paddepoel I–III. The fact that here, at Paddepoel IV, the clay deposit is less heavy

may be explained by the proximity of a watercourse, from which the sedimentation started.

On top of the second vegetation horizon rested another deposit which is already familiar from the other Paddepoel sites. It consisted of sticky greyish clay and was present throughout the section; it also filled the upper part of the river bed. Its upper part had been transformed into a brownish top zone of 0.20–0.40 m thick. The modern surface lay at 0.20–0.60 m + N.A.P.

Three ditches (or pits?) in the southern part of the section indicate human activities. The northernmost one had been dug from the second vegetation horizon and was filled with clay of the second deposit. It could date from the period of the *terp*. The middle one seemed to start from the same level, but the situation was not completely clear. It had a uniform but somewhat darker filling. The southern ditch had a similar filling but as it cut through the second clay deposit it is certainly later than the northern ditch.

River-beds were also present in section A (squares L–O), B (squares C–H) and E–F. Though absolute proof is lacking, the three beds appearing in these sections probably belonged to the same watercourse, that had been observed in section C (plan XV).

Section A showed a bed of 1.30 m maximum depth below N.A.P. level and *ca.* 10 m wide. This may be somewhat more than the actual width of the stream, as the section seemed to cut at a slight angle. The deepest part of the bed was filled with humic clay. A few thin, dark horizons descended from both sides along the slopes, a feature which testifies to phases of stagnation in the silting up of the stream bed. The upper part of the filling consisted of clay interlarded with thin layers of sand. This upper filling could only be observed in squares G–H, where it lay between 0.20–0.40 m — N.A.P. and 0.30 m + N.A.P.; elsewhere it had been disturbed by the settlement layers of the *terp*. By virtue of its character this clay filling with its sandy inclusions can be compared to the first deposit present in section C, notwithstanding the fact that in section C the first deposit did not rise above N.A.P. level. The division between natural deposits and *terp* was not always easy to define. Generally the base of the *terp* was found at approximately N.A.P. level. Only at the eastern end of section A did it rise slightly higher, that is, if our observations were correct.

Section B had comparable features. The stream-bed in the eastern part was filled in much the same way as the one in section A. Here, the base of the *terp* was even more difficult to establish. We think it lay at about N.A.P. level; if this were so, the bottom layer between N.A.P. and 0.40 m + N.A.P. was exceptionally clean. The fine horizontal stratification occurring in this layer in squares L–O looked like natural silt layers, but they could also have been sods. A similar stratification was observed in the filling of the pit (or ditch?) in squares H–I. Section E–F

was too small to provide certainty about the relation between *terp*, or in this case cemetery, and stream bed. It was clear that the cemetery was laid out after the bed had silted up.

The settlement layers of the *terp* occurring in sections A and B yielded little information. The total height including the brownish top zone amounted to *ca.* 1.60 m above the river-bed: modern *terp* surface in section B at 1.30–1.50 m + N.A.P. (upper part missing in section A). The layers situated above 0.20–0.30 m + N.A.P. contained many brick fragments, especially in the western part of section B. A pit or ditch was observed in section B, squares H–I. It must belong to the earliest features of the settlement, but it could not be established with certainty whether it was dug from N.A.P. level or from a slightly higher level; its continuation at the eastern end of section A seemed to originate in a much higher level. Its position and also its relation to the cemetery has not become clear.

Conclusions and problems

A probably mixed cemetery consisting of cremations (?) and practically findless S–N and W–E graves was found below the original summit of the small *terp*. There was reason to assume that the cemetery was a raised one constructed of clay sods. This type of mixed cemetery is usually attributed to the seventh and eighth centuries. The somewhat surprising C¹⁴ date of the cremation grave² might indicate that the Paddepoel cemetery had started already in the sixth century. Comparable Early-Medieval raised cemeteries are known from other sites in the clay district of Groningen: *e.g.* Godlinze¹³. The presence of the raised cemetery at Paddepoel IV also explains why subsequently the top of the *terp* came to be situated at this point: here the settlement layers overlay the mound of the preceding cemetery.

The settlement traces comprised pits, wells, and post-holes of a large farmhouse, probably three-aisled.

Outside the settlement proper the two natural clay layers separated by a vegetation horizon which were also present at the other Paddepoel sites were again encountered. Cemetery and *terp* overlay a silted-up river-bed. The relation between the filling of the bed and the clay deposits of section C could not be established with absolute certainty. To judge from its character, the filling has to be equated with the first deposit; but in section A (eastern end) the upper side of the filling seemed to lie at a higher level than would be expected were this so. Two possibilities remain: either the upper part of the filling was less natural than it seemed to be (*cf.* section B: p. 238), or the second deposit also preceded *terp* and cemetery. The former explanation may be considered more probable.

W.A. van Es
THE FINDS*

VII. WOOD¹⁴

A. Felloes of spoked wheels (figs. 18–20)

Two fragments of a felloe segment of a spoked wheel were found at the northern end of the western trench of the granary in Paddepoel III squares Z/A^a–25 (fig. 18: 306). The felloe is made of oak-wood; it had two spoke holes and at either end a peg-hole (one end broken off); it is wedge-shaped in section; length 40 cm, width 11.5 cm, greatest thickness 5 cm, diameter holes 3 cm.

A fragment of a disc-shaped object of alder-wood was found with the felloe segment (fig. 18: 306). It had a hole at one end; length 40 cm, width 17 cm, thickness 4.5 cm, diameter hole 3 cm. It may perhaps be interpreted as part of a solid wheel.

Five segments forming a complete felloe of a spoked wheel were discovered in a deep pit, probably a well, in Paddepoel IV squares K–2/3 (fig. 19–20: 341; cf. p. 237). The segments are made of beech-wood; the ends of the spokes preserved in six of the holes and the pegs used to join the segments are of oak-wood. The segments have two spoke holes each and a peg hole at either end; the distances between the spoke holes vary from 21 to 25 cm on the inner edge; wedge-shaped section: length *ca.* 58 cm, width 9.5–11.5 cm, greatest thickness 5–6 cm, diameter of holes *ca.* 3 cm.

B. Wooden vessels (Pls. V–VIII, figs. 21–24)

Ten fragments representing at least four wooden vessels were found by Mr J.K. de Boer on 27 February 1965 in the course of building operations in the immediate vicinity of the excavated area at Paddepoel III (without find no.)¹⁵. All vessels were unfinished: hemispherical rough-outs for round bowls comparable to those found at Wijster and Feddersen Wierde¹⁶, and a straight-sided, round rough-out with lenticular base. In all cases the material used is maple-wood.

Rough-out 1 (fig. 21; Pl. V). Hemispherical rough-out for bowl; diameter at rim 27.5 cm, height 11.4 cm, thickness of wall at rim 2.6 cm. Relatively shallow internal hollow; thick truncated-conical knob with a basal diameter of 12 cm

*The finds have been included in the collection of the *Groninger Museum voor Stad en Lande* (GM) at Groningen. The numbers in the illustrations of this article are the find numbers of the excavation; the same numbers are used in the museum as inventory numbers.

left standing in centre. Almost complete (three fragments); damage at rim and upper part of internal knob.

Outside and inside show clear traces of dressing. Outside has more or less square to rectangular or polygonal chop-marks of varying dimensions arranged in curved rows.

Inside is characterized by straightsided vertical marks on wall and sides of central knob; those on wall mostly subdivided by horizontal cuts. Also here variation in dimensions: marks on sides of knob are narrower (*ca.* 1.5–3.5 cm) than on wall (*ca.* 3–4 cm).

Marks on the rim difficult to see because of the grain.

Rough-out 2 (fig. 22; Pl. VI). Rather flat, round rough-out with straight sides and sharply set-off, lenticular base for bowl or trough; diameter at rim 28 cm, height 9 cm, thickness of wall at rim 2.8 cm, thickness of bottom 5.5 cm. Shallow internal hollow.

Broad, truncated-conical knob with small hole in middle of top surface left standing in the centre; diameter at base 11.2 cm, at top 9 cm. More than half has been preserved (two fragments).

Outside and inside show clear traces of dressing. Chop-marks on sides of central knob and on inner and outer sides of wall consist of vertical strokes of varying width. As in rough-out 1 strokes on inside of wall are broader (*ca.* 4 cm); these are also subdivided by horizontal cuts. Marks on upper side of knob and on rim are the same kind but less well preserved because running parallel to the grain of the wood.

Bottom has rows of squarish to rectangular or polygonal chop-marks.

Rough-out 3 (fig. 23, Pl. VII). Two fragments fitting together of a rough-out of same type as no. 1; height *ca.* 12 cm, thickness of wall at rim 2.6 cm. Upper side of internal knob has small hole in centre.

Form and arrangement of the dressing marks are comparable to those of rough-out 1 (Pl. V).

Rough-out 4 (fig. 24; Pl. VIII). Fragment of the central part of a rough-out similar to no. 1. Internal knob broken off.

Two rim fragments (fig. 24) of similar rough-outs may have belonged to nos. 3 or 4. Thickness of wall at rim *ca.* 2.5 cm.

The rough-outs are vessels in the very first stage of working. A block of maple-wood has been dressed into a preliminary shape, probably by means of an adze. The adze was used according to a fixed technique. The convex planes on the outside, or the bottom in the case of no. 2, were dressed by inflicting short strokes in neat rows running parallel to each other across the surface. The inside was hollowed by scooping out a circular “trench” with V-shaped section, concentric with the edge.

The hollowing was probably begun at the outer edge of this trench; here the strokes were directed vertically or, more precisely, obliquely downwards; the horizontal subdivision of the strokes along the outer wall of the trench points to repeated chopping. The inner walls of the trench – the sides of the central knob – were probably scraped off in long upward strokes. Long strokes were also used to dress the outside of no. 2. In our opinion, a lathe cannot have been used at this stage. The small holes in the centre of the upper side of the central knobs (nos. 2 and 3) may point to the use of a compass to draw the circles of outer edge and trench.

The evidence provided by comparable finds, *e.g.* from Wijster and Bolleveen near Taarlo, shows that the rough-outs were left to soak for some time after this first phase of working.

C. Miscellaneous wooden objects

Apart from a few irregularly shaped pieces of worked wood, the remaining wooden objects consisted of:

Fragment of a plank of oak-wood, length 42 cm, width 19 cm, thickness 2 cm (Paddepoel I, no. 23).

Fragmentary disc with central hole of oak-wood, diameter 12 cm, thickness 1 cm, diameter hole 2.5 cm (without find no.).

Peg with cylindrical head of oak-wood, length 10 cm, length head 5 cm, diameter head 1.5–3 cm, diameter end 1.1–2.2 cm (without find no.).

Two chips fitting together of oak-wood, length 9 cm, width 5 cm, thickness 0.8 cm (Paddepoel III no. 241).

Pointed lower parts of roof-posts of oak-wood of the southern house at Paddepoel III (no. 332).

Pointed lower parts of posts of oak-wood of the granary in Paddepoel III squares W/X–22/23 (no. 331).

Pointed lower part of a post of oak-wood of the house at Paddepoel IV (no. 298).

Pointed lower part of a post of oak-wood, length 17 cm, diameter 6 cm (Paddepoel III, no. 287).

Pointed piece of oak-wood, length 12 cm, diameter 3 cm (Paddepoel III, no. 244).

Two pointed lower parts of posts of alder-wood, length 20 and 13 cm, diameter 5 and 4.5 cm (Paddepoel I, no. 121).

Furthermore, there were a few branches of oak (Paddepoel III, no. 306), birch (Paddepoel II, no. 170), alder (Paddepoel II, no. 170; III, no. 214), elm (Paddepoel II, no. 188), and willow (Paddepoel III, no. 218).

VIII. METAL

Finds of metal objects were extremely scarce. Apparently the clay soil was unfavourable to the preservation of metal.

Some of the graves at Paddepoel IV must have contained iron grave-gifts, but all that remained of these were a rusty stain of a few irretrievably corroded scraps of iron: stain of rust along left upper-arm in S–N grave in square G–3, three small iron fragments (no. 342) from fragmentary W–E grave in square H–6.

Two iron nails found in a pit at Paddepoel I (no. 41) must be of recent date: found in association with modern sherd. A horse shoe from Paddepoel III (no. 230) is also modern. Paddepoel IV yielded a knife of probably Medieval date: stray find (no. 293; fig. 26).

Evidence of metal industry, such as iron slags, is lacking. In other northern Dutch settlements dating to the same period but situated on the sandy soils, iron slags occurred frequently: *e.g.* Dalfsen, Wijster.

The most interesting metal object found in the excavation is a Roman enamelled disc-brooch (fig. 25: no. 285). It was found at Paddepoel III in a pit of irregular shape (square X–14, level *c*) which might be a vestige of the bottom part of a period III ditch. The Paddepoel brooch is practically identical to the specimen discovered at Wijster¹⁷. It has a diameter of 2.8 cm. The brooch is badly damaged; almost half of the plate has broken off, the needle-catch is damaged, and the needle has disappeared.

This type of enamelled brooch dates from the late 2nd/early 3rd century A.D. It is of relatively frequent occurrence in the north-western Germanic area¹⁷.

IX. STONE

Unworked erratic boulders of northern origin were encountered in large numbers at Paddepoel I–III, whereas they have not been found at site IV.

Their presence at sites I–III is not astonishing as erratic boulders occur in abundance in the immediate vicinity: at the end of the moraine ridge of the Hondsrug¹⁸. They have probably been used for several purposes, such as the construction of hearths, pavements, and ovens, or as cooking stones. Apart from the oven (?) at Paddepoel II, which may, however, be of rather recent date (*cf.* p. 215), no boulders have been found “in situ”.

Stone implements are rather rare (only found at Paddepoel I–III). Apart from

basalt-lava querns imported from the Mayen area, they consist of a quern, a lap-stone, and a few whetstones. Most of the whetstones are made of foreign material; the remaining artefacts are made from boulders which may have been collected nearby⁹.

Querns of basalt lava (figs. 27–29)

Approximately thirty fragments of querns of basalt lava were found at Paddepoel I–III. Most fragments are of soft, porous light-grey material which can be identified as Mayen basalt lava. One is of soft and porous yellowish material (no. 130), another is of a much harder greenish rock (no. 100).

An almost complete specimen (no. 152) and a large fragment (no. 172) represent upper stones of a rimless *Pendelmühle* type. They have concave upper and under-sides, a central hole, and an oblique perforation in the side. A small fragment (no. 150) shows part of the oblique hole in the side. Three fragments (no. 151) can be recognized as parts of a rimless upper stone, probably of the same type as the preceding one. The same probably holds true of no. 57 (not illustrated): one concave side, the other side damaged. Two flat and thin fragments (nos. 91, 160; not illustrated) may also come from upper stones. Two large fragments (nos. 195, 208), which have one smooth, convex side and one irregular side, must belong to under stones. There is only one fragment of an upper stone with rim (no. 37). This is, moreover, the only fragment to show grooving: oblique grooving on the upper side, vertical on the lateral surface. It cannot be decided whether it belonged to an oscillating rotary quern or to a completely rotating quern²⁰. The (greenstone) fragment (no. 100; not illustrated) represents a very thin under (?) stone. The remaining fragments are too small to be identified.

The basalt-lava quern fragments from Paddepoel have been studied by Harsema. We refer to his publication for further particulars²¹.

Rotary querns (fig. 30)

The large fragment of gneiss¹⁹ showing part of a cylindrical hole (no. 194) must have belonged to the under stone of a rotary quern. The complete shape has been reconstructed in fig. 30. The hole lies slightly off-centre and in accordance with this one outer edge of the upper side (left in the longest section) is less worn down and less smooth than the rest of the upper surface. The type can be compared with Curwen's

“Beehive” querns which, just like the Paddepoel specimen, belong to the Early-Roman period²². Curwen assumed that this type was especially used by Roman soldiers which also appears from the alternative appellation: “Roman legionary querns?” In the case of the Paddepoel quern, however, Roman influence is improbable as it was made of local material.

Whetstones (fig. 31)¹⁹

Paddepoel II en III yielded six whetstones or fragments of whetstones of fine-grained sandstone: nos. 130, 139, 149 (2), 194 (grey sandstone) 125, 135 (pink sandstone). These specimens of foreign material are neatly shaped with the exception of the thick specimen 125: elongated with sub-rectangular or oval section. One large and also neatly shaped whetstone is made of granite; this may have been collected from the boulder-clay (no. 308). The other whetstones made of rocks occurring in the local boulder clay are irregularly shaped. It is difficult to make out whether they have been shaped intentionally: nos. 46 (pink granite), 59 (amphibolite), 91 (?), 195, 276 (leptite), 277 (diorite). The neatly dressed, sub-rectangular block of granite no. 150 seems to be an artefact, but its function is not completely clear: a rubber?

Lapstones (fig. 31)¹⁹

Small boulders of ovoid shape, which occurred in the boulder-clay, were probably collected for use as lapstones. Five were found at Paddepoel II and III: nos. 149, 194 (pink sandstone), 170 (pegmatite), 160, 166 (granite). Only one (no. 149) shows clear dents of use at both ends. The lapstones have been found in the context of the settlement and consequently belong to the Early-Roman period. The few parallels from Wijster could not be dated with accuracy²³.

Flint

Flint is very rare. Only three brownish fragments were found; none is an artefact.

X. WHEEL-MADE ROMAN POTTERY FROM PADDEPOEL I–III

The number of pottery sherds is overwhelming. However, complete pots or fragments which are sufficiently large to allow a reconstruction of the complete pot shapes are very rare. The finds from Paddepoel I–III belong to the same period. Those from Paddepoel IV are much later. Both groups are described separately.

The bulk of the material from Paddepoel I–III consists of hand-made ware. Imported wheel-made provincial-Roman pottery is not completely absent but is extremely rare.

a. *Terra sigillata* (fig. 32)

1. Fragment of wall of decorated bowl Drag. 37 (no. 215). Surface dull brown-red; red paste; rather soft bake. Decoration vague and carelessly executed; much worn down. Trier; probably style of Dubitatus or related potter. Date: 3b (?)²⁴.
2. Fragment of wall of decorated bowl Drag. 37 (no. 90). Surface dull red-brown; orange-red paste; rather soft bake. Decoration: fragment of lower part of lower *Randfries* Ricken R 30 of 31. Rheinzabern: Cerialis VI. Date: ca. 150–250 A.D.
3. Fragment of footstand of bowl Drag. 37 (no. 3). Surface lustrous, brown-red; pinkish-red paste; rather soft bake. East Gaulish? Date 2nd century?
4. Squarish “playing chip” cut out of the wall of probably a decorated bowl Drag. 37 (no. 53). Surface dull brown-red; pinkish-red paste; rather soft bake. Decoration much worn: hind legs of bear Ricken T 54; part of double medallion Ricken KB 75–7. Rheinzabern: Comitialis V or Attilus. Date: ca. 150–250 A.D.
5. Rimsherd of dish Drag. 31 (no. 43). Surface lustrous red-brown; paste red; rather soft bake. East Gaulish? Date: 2nd century.
6. Fragment of wall and base of dish Drag. 31 (no. 229). Surface lustrous brown-red; paste red; rather soft bake. East Gaulish? Date: 2nd century.
7. Rimsherd of cup Drag. 33 with externally concave wall (no. 54). Surface black and paste grey by secondary burning. 2nd century.

b. *Terra nigra*-like pottery (fig. 33)

1. Rimsherd of large pot with marked shoulder/neck transition, high neck and horizontally bent-out rim; vague zigzag groove on neck (no. 270). Surface slightly rough; paste light-grey with dark-grey sliib; soft bake.

2. Lower part of cup; small hole in centre of base (no. 147). Surface smooth; paste dark-grey with light-grey slab on outer and inner sides; soft bake²⁵.
3. Lower part of pot on low protruding foot (no. 5). Outer surface smooth and black, inner surface rough and grey; paste black with relatively large tempering ingredients; hard bake.
4. Sherd of small thin-walled pot (no. 1). Surface grey and smooth; paste grey; rather hard bake.

c. Rough pottery (fig. 33)

1. Base of coarse, heavy-walled pot (no. 138). Surface rough and greyish brown; paste light-brown with grey core; rather soft bake.
2. Sherd of orange pottery with rough outer and inner surfaces; paste orange; hard bake: Roman? (no. 139).

A large handle with two longitudinal grooves on the outer side of soft, staining, orange pottery is probably not Roman (medieval or later? no. 139).

XI. HAND-MADE POTTERY FROM PADDEPOEL I–III

The classification of the hand-made pottery types found at Paddepoel I–III corresponds in many respects to the one employed in describing the Wijster material but it proved to be impossible to use exactly the same terminology for both complexes.

I. Medium-sized cups (figs. 34–37)

IA. Wide-mouthed, carinated cup with broad shoulder and very short rim (fig. 34–35).

The rim is mostly thickened and often has a more or less triangular section. The shoulder is straight. Two large fragments show a rather shallow and slightly convex belly (nos. 82/3, 203). The form of the base is not known: the curve of the lower part of fragments 82/3 and 203 suggests a narrow base or even a foot. One sherd has a large handle on the shoulder (no. 128).

The sherds are usually thin-walled. The paste of the characteristic sherds is extremely fine: the tempering ingredients are small (pounded stone and sand?); the outer and inner surfaces have been carefully smoothed and sometimes even polished, and are dark-grey to lustrous black in colour; the paste is rather soft baked, the ware feels soft and silky. Some sherds, particularly nos. 1 and 128 with handle, are harder baked and, as far as the paste is concerned, are comparable to type IB.

The type is rare.

IB. Wide-mouthed cup with narrow shoulder and straight bent-out neck (fig. 36).

The one complete specimen (no. 247) has a narrow flat base and a straight-sided rather shallow lower part. Characteristic is its sharp profilation, particularly the sharp transition from belly to shoulder. Side by side with this carinated variety occurs another form with a more rounded shoulder (*e.g.* nos. 1, 6, 35, 132, 148 *etc.*); some sherds belonging to this category suggest a rather deep lower part (*e.g.* nos. 94, 130, 132).

The neck is mostly thickened: typical of most rimsherds is the long drawn-out neck with a section in the shape of a narrow elongated triangle or circle segment. In some cases the neck is hardly thickened at all and the section has an approximately uniform thickness (*e.g.* nos. 130, 138). Short necks with definitely triangular section form a small minority (*e.g.* nos. 3, 35).

Fragment 148 has a handle on the shoulder. The rim of the large specimen 1 is decorated on the outside with fingertip impressions. Other decoration is absent from our rimsherds. The few sherds, however, with an ornamental pattern C2 may be attributed to cups of this type.

The two small complete cups 142 and 253 are atypical but show some relationship to the type under discussion.

The fabric of these sherds is very characteristic. The paste is stone tempered; the tempering ingredients are often visible at the outer and inner surfaces, which then feel like sand-paper. The only exception to this rule is the atypical rimsherd no. 35 with thick triangular section, which is of the ordinary soft ware tempered with vegetable ingredients. The remaining sherds are hard baked and often thin-walled. The surface is mostly carefully smoothed. The colour is grey or black, only occasionally brownish or yellow. It is a ware of outstanding quality.

Detached Bases

Detached bases, which in view of their size and also very often their fabric could well belong to cups of types IA and IB or to small bowls of type IVB, occur in the following varieties:

- a. Narrow flat bases or narrow bases with very low protruding foot (fig. 37: two upper rows).
- b. Low convex feet (fig. 37: third row).
- c. Low solid feet (fig. 37: fourth row).
- d. Hollow feet (fig. 37: bottom row).

II. *Dolia* (figs. 38–39)

There is no clear evidence of the bucket-shaped dolium of type Wijster IIA reminiscent of the Harpstedt urn: perhaps one sherd (no. 246)?

Tall bucket-shaped pots with high shoulder and bent-out neck of type Wijster IIB did occur. Two complete pots represent this type (nos. 42, 173). A third one is related (no. 105). The difference between these *dolia* and the bowls of type IVC and particularly IVD is small: it only concerns the shape of the body. In fragmentary condition no distinction can be made between bowls and *dolia*. Therefore, it is impossible to establish the frequency of the type.

A few sherds correspond in profile and paste to type IIIA (nos. 3, 45 (2), 143 (2), 145, 149, 209, 214, 230, 289). However, they come from wide-mouthed pots of which the complete shape is not known: bucket- or bowl-shaped (fig. 39: two bottom rows)?

III. Narrow-mouthed pots (figs. 40–42)

IIIA. Narrow-mouthed pot with slender, biconical, flat-based body and straight, sharply bent-out neck (fig. 40).

Three varieties can be distinguished in the shape of the neck: short to medium-long with triangular section, short to medium-long with parallel-sided section, long drawn-out with parallel-sided section. The rim is sometimes drawn out into points (nos. 130, 143, 149). A plain or notched ridge may mark the base of the neck.

The complete and very characteristic pot no. 287 has two large angular handles on the shoulder.

Paste and bake show the same characteristics as in type IB. Three atypical specimens are of the usual *terp* ware (nos. 148 (2), 246).

IIIB. (fig. 41) Two sherds have a slightly curved neck, its base set-off by a plain or notched ridge (nos. 125, 143).

IIIC. (fig. 42) A few complete pots indicate that there existed a narrow-mouthed variety of types IVC, D, and probably also E. General shape, paste, and bake are identical; the width of the mouth is the only point of difference. It is often difficult to establish the width of the mouth from the sherds; no attempt has therefore been made to separate type IIIC from IVC-E.

IV. Wide-mouthed bowls with neck or rim (figs. 43-60)

IVA. Wide-mouthed bowl with flat-based globular body and short thickened-and-faceted rim (figs. 43-46).

The type is very rare. It is represented only by two characteristic rim fragments (nos. 164, 176). These have an elegant rim with slightly curved outer side and sharply faceted upper and inner sides (no. 176 has a handle). They further show a simple geometric decoration arranged in one or more zones around the body, particularly around the upper part. The most conspicuous elements of the decoration are hatched triangles and zigzag- or net-patterns formed by groups of oblique grooves. A few wall sherds with this kind of decoration, particularly no. 251, can be attributed to pots of this type.

The paste of these sherds is fine and can be compared to that of type IA.

Two or three rim sherds can be considered as derivatives of the type under discussion (nos. 130, 144, 151). The faceting of the rims is less sharp, the decoration degenerated, and the paste different (comparable to that of type IB).

Faceted rims occur also on larger and coarser bowls. In these two varieties of rim occur: very short and heavily thickened (fig. 43, lower part), more elongated and less thickened (fig. 44). These sherds can be considered as transitional forms between types IVA and IVC, and between types IVA and IVD. Bake and paste are the ordinary kind, that is to say the same as in types IVC-E.

IVB. Small bowl with flat-based, globular, sometimes more egg-shaped body and very short, mostly thickened rim (figs. 47-49).

The type is closely related in shape to type IVC and may be considered as a smaller and finer variety of that type. There is also an obvious relationship with type IVA, as appears especially from the occurrence of geometric ornaments (nos. 7, 133, 271). No. 163 has combed (*Kammstrich*) ornament. We find one (or more?) handle(s) at the rim and one example with a knob on the shoulder.

Paste and bake are usually of the same quality as in types IA and IVA. Black and greyish colours predominate over yellowish shades. The "silky" ware is the rule; only a few atypical sherds are of the "sand-paper" ware as described under type IB.

Make and size give the type a character all its own.

IVC. Bowl with flat-based, globular or egg-shaped body and short, thickened neck or rim (figs. 50–53).

The distinguishing feature is the thickened rim. In its most characteristic form the rim is very short and clearly thickened. The upper side of the rim may be flattened and sharply set off against the inner side reminiscent of the thickened-and-faceted rims mentioned under type IVA; when this occurs the rim is triangular in section (*e.g.* nos. 148, 238, 320 in fig. 50). The section can also be more rounded (*e.g.* no. 320 with “*streepband*”).

A second variety has a somewhat longer, drawn-out rim which could be called a short neck. These rims are less carefully shaped and less thickened. They have a more or less segmental section and often show transitional forms leading on to types IVD and E (*e.g.* nos. 59, 126, 129, 218, 304, 320 in figs. 51, 52).

Handles placed at the rim occur frequently; as a rule they probably came in pairs. The profile of the handles is mostly rounded, sometimes angular. Knob-handles placed on the shoulder are rare: *e.g.* nos. 195 (fig. 53), 320 (knob surrounded by four round impressions; fig. 50). No. 88 has a horizontal protuberance at the rim.

The lower part of the pot is often roughened. As far as can be judge from the fragmentary material, the difference between bulbous and egg-shaped body is insignificant.

Several ornamental patterns are found on pots of this type.

Impressions at the rim (pattern B1a) are common; more than 20 % of the rim sherds are decorated in this way. Impressions on top of the rim (pattern B1b) occur seldom: less than 0.5 %. The remaining patterns are also very rare: *streepband* (pattern C9; *ca.* 1 %), painted ornament (pattern E; less than 1 %), round impressions in a row at the base of the neck, in triangle formation on the shoulder or at the base or on top of the handles (patterns B2–4; less than 0.5 %).

Bake and paste of these pots are characteristic of the usual *terp* pottery. They are rather soft baked and show a wide range of variety in colour, surface treatment, and composition of the paste. Colours vary from yellow, brown and pink to grey and black. The outside has been smoothed but usually not very carefully; intentional roughening (*Schlickung*) of the lower part is usual. As a rule, the paste has been tempered with vegetable ingredients, but small lumps or particles of stone and pounded sherds have also been used.

IVD. Bowl with flat-based, globular or egg-shaped body and bent-out neck with parallel-sided section (figs. 54–56).

The difference from the preceding type is small; only the shape of the neck is different. In its most characteristic form the neck is straight and rigid with parallel-sided section; the upper side of the rim is often flattened and slightly broadened.

The neck can be rather long. In many cases the distinction between types IVC and D is vague. Transitional forms between IVD and E also occur.

Handles are found at the rim; knob-handles on the shoulder.

The lower part of the post is often roughened. Variety and frequency of the ornamental patterns is the same as in the preceding type.

Bake and paste are also comparable to those of type IVC.

IVE. Bowl with flat-based globular or egg-shaped body and curved neck (figs. 57–59).

The shape of the neck is again the distinguishing feature. Rather long necks, neatly curved and clearly set off from the shoulder, present the characteristic form; curved shorter necks also occur. In most cases, the upper part of the neck (the rim) is rather sharply everted and the curve of the neck is not fluent but crooked in a characteristic way. The rim, particularly of the specimens decorated with *streeband*, is often more or less faceted. Atypical specimens form the transition to type IVD. When the neck is short, it may come to resemble type IVC.

Handles were placed at the rim or on the shoulder, probably mostly in pairs. They have a rounded but sometimes angular profile. The lower part of the pot can be roughened.

Decoration of pattern B1a (impressions at the rim) is less frequently found than in the preceding types (*ca.* 12 %); pattern B1b (impression on top of the rim) is as rare as in types IVC and D. Impressions in triangle formation (pattern B3) and painted ornament (pattern E; *e.g.* on the complete pot 183), hardly ever occur. *Streeband* ornament (pattern C9), which was exceptional in types IVC and D, is clearly the most common decoration in type IVE (*ca.* 15 %).

Paste and bake do not show characteristic differences from those of types IVC and D. The *streeband* pots, however, are mostly of relatively good quality.

IVC–E. Miniature copies (fig. 60). A few very small pots are rather successful miniature copies of types IVC, D and E.

V. Plates (figs. 61–62)

VA. Plate with straight or slightly curved sides (fig. 61).

The shape of the rim shows three varieties: the rim is occasionally rounded (*e.g.* no. 204); usually, it is flattened and slightly broadened; in some cases the rim is definitely thickened and profiled (*e.g.* nos. 122, 128).

The sides may be more or less straight but generally they are slightly curved. A good representative of the latter variety is the complete plate no. 122; it has one handle placed at a short distance below the rim.

Decoration is rare: two fragments (nos. 208, 225) are decorated with painted ornament (pattern E).

The definition of type Paddepoel VA covers both types Wijster VA and B. The fragmentary nature of the Paddepoel material prevents an accurate identification. As far as can be judged, most of the rather common Paddepoel VA sherds are more related to type Wijster VB than to type Wijster VA.

Most of the plates are ordinary *terp* ware. However, beautiful polished and black specimens comparable in these respects to types IA and IVA also occur (*e.g.* nos. 108, 122, 199).

VB. Small plate or bowl with short, steep sides (fig. 62).

The type, which is very rare at Paddepoel, is comparable to type Wijster VC. Four characteristic specimens have perforated bases (nos. 128, 159, 289, without no.; *cf.* p. 254). The miniature plates 40 and 216 are exceptional; the triangular no. 216 resembles the “ladles” (*cf.* p. 255).

Paste and bake are those of the *terp* ware.

VI. Straight-sided cups (fig. 63)

The large fragment no. 321 represents a deep cup with steep, straight sides. It has a knob-handle at the rim; the possibility is not excluded that the complete pot had more than one handle.

The type is closely related to type VA. It is difficult to distinguish between rimsherds belonging to the two types. A few rimsherds with apparently steep sides could be attributed to type VI (*e.g.* no. 190 with perforated knob-handle). Two miniature cups have been included here (nos. 89/90, 187). Type VI was very rare.

Paste and bake show no special characteristics.

VII. Neckless bowls (fig. 64)

Wide-mouthed neckless bowl with flat-based globular body. Most sherds which can be attributed to this rare type show a slightly thickened rudimentary rim. On account of this characteristic the type may be considered as a (degenerated) variety of type IVC. The relative frequency (*ca.* 15 %) of decoration pattern B1a (impressions at the rim) points in the same direction. Paste and bake are of the usual kind (*terp* ware).

Paddepoel type VII is paralleled at Wijster by type VIIB2. The common Wijster type VIIB1 (bowl with unthickened inverted rim) is represented at Paddepoel by

one characteristic rimsherd only (no. 139 – wrongly numbered 129 in fig. 64). This sherd belongs to the “sandpaper” ware described under type IB. A few miniature bowls in *terp* ware also show inverted rims (nos. 128, 133, 145).

VIII. ‘Cheese-moulds’ (fig. 65)

The term “cheese-mould” devised by Boeles suggests a plausible explanation of the function of the type but there is no positive proof. A typical cheese-mould resembles a cup and saucer: a shallow, steep-sided bowl is fixed on a flat, projecting, circular base; the area of the base falling inside the bowl is perforated by one or more holes; the edge of the base can be turned up; one or two handles connect the edge of the base and the rim of the bowl.

This conspicuous type is very rare at Paddepoel. Complete specimens have not been found at our sites²⁶. The type is represented by ten or thirteen fragments. Eight rim fragments, two of them decorated with fingertip impressions on top of the rim, come either from plates or from cheese-moulds; in the latter case the bases of these cheese-moulds had rather high, upstanding rims: nos. 1, 125, 128, 130 (2 spec.), 133, 138, 140. Also three fragments of bowls with perforated bases belonging to type VB can be mentioned under this heading: nos. 128, 159, stray find without no. (fig. 62). Two of these fragments have handles, one decorated with a streak of brownish paint (pattern E). Their bases are pierced by one or more holes.

IX. Lids (figs. 66–67)

Fragments of heavy, flat, circular lids are numerous. The lids had a central knob-handle: mostly large and conical with horizontal perforation. The upper side can be decorated with groups of parallel, shallow and broad grooves often ending in fingertip impressions. In many fragments, the edge is set off with a row of fingertip impressions; sometimes it is marked by a groove. About 30 % of the fragments is decorated.

The lids were mostly rather coarse and thick and often large (diameters up to 25 cm and more). The paste is of the usual kind (*terp* ware); colours vary from greyish to yellowish and pink.

Two small lids are exceptional: nos. 148, 284. They are of thin-walled smooth, hard-baked, stone-tempered, blackish-grey pottery. One is decorated with incised geometric ornament.

A flat circular disc with large central hole surrounded by a funnel-shaped collar and broken-off handle comes half-way between lid and cheese-mould (no. 329): a funnel?

Fragments probably of a similar object are present under no. 148.

X. 'Ladle' (fig. 68)

Paddepoel III yielded an almost complete deep, oblong "ladle" with fragmentary projection at the rim (handle?): no. 208. Outside and inside are smooth and yellowish in colour; the pottery is fine, tempered with tiny particles of stone. A fragment of a similar object is present under the same number, a doubtful fragment under no. 253²⁷.

Parallels are known from Sneek²⁸ and Oosterend (Fr.)²⁹. The function is uncertain: these objects have been explained as ladles, drinking cups, or lamps.

XI. Soft pottery (figs. 69–71)

Numerous fragments of soft-baked clay occur among the finds from Paddepoel I–III. They fall into the following groups.

XIA. Irregular and mostly small fragments which do not provide any clue as to their original function. Some of them probably belonged to coarse pots such as those mentioned under B. Curiously enough, there are only one or two fragments of wall plastering, recognizable by the characteristic twig impressions.

XIB. Rims and parts of the walls of big soft-baked, very thick-walled pots (fig. 69).

Unfortunately, the fragments are too small to permit a reconstruction of the complete shape of the pots; moreover, the material is too crumbly to preserve sharp breaks. The pots were built up of clay rings, as is most clearly demonstrated by the many sherds with hollow or convex horizontal breaks. The walls are mostly between 3 and 5 cm thick, one sherd is even 5.4 cm thick. As far as can be deduced, they come from big, round troughs with steep sides. Some sherds suggest a very large diameter for these troughs. The biggest wall fragments are *ca.* 16 cm high, giving the trough a total height of at least 20 cm: nos. 234, 279, both near the bottom judging from the thick underside. The rims are rounded or flattened; they can also be decorated with fingertip impressions on top. Two rim sherds show oblique or horizontal perforations but it is not certain whether these sherds come from pots of the type under discussion: nos. 145, 194. A heavy handle decorated with fingertip impressions is mentioned in this connection: no. 148. Bottom sherds have not been recognized among the fragments, which is remarkable. Some fragments have a curious appearance, they almost look like slags. The clay has become partially porous and spongy by heating, as in a secondary burnt pot sherd. At some places the outside – and/or inside – shows blisters and holes and a greenish glaze. Usually, the material is extremely soft-baked, much softer than ordinary pottery. Often the

paste is somewhat porous: the vegetable tempering ingredients disintegrated when the pot was baked and left tiny holes. Apart from vegetable ingredients small stones and probably also sherd-grit were occasionally used as tempering materials. Colours range from grey to yellow and pink.

XIC. Rings of the same soft-baked pottery as described under B (fig. 70).

The type is represented by six fully identified fragments: nos. 29, 35, 88, 127, 130, 143. The rings had an outer diameter of under 15 cm; they vary from 3.3 to 6.3 high. The outer side is almost vertical, the inner side shows mostly a definite slope from top to bottom. Consequently, the thickness of the wall is considerably less at the rim than at the base, and the fragments have a characteristic triangular section. The rims are more or less rounded. When the base has broken off, the distinction between rims of types B and C is not always easy seen, but the following rim fragments may be attributed to rings of the type under discussion in view of their small diameter and sloping inner sides: nos. 1?, 8, 59, 126, 130, 144, 194, 206. Four rims of the latter group are decorated on top with fingertip impressions. There are three curious standing rings of normal *terp* pottery: nos. 73, 147, 186.

XID. One rim fragment (no. 149), and perhaps a second (no. 150), seems to represent a very heavy, flat, round or oblong plate (fig. 69). The low rim of no. 149 is ornamented with fingertip impressions. A rim fragment with fingertip impressions along the edge (no. 148) may come from a heavy lid (*cf.* p. 254).

Two heavy fragments with overhanging rim cannot be identified: nos. 129, 194.

XIE. Two fragments (no. 35) come from a curved, probably circular clay bar with pentagonal section (fig. 70). Another fragment might be part of a straight bar with square(?) section: no. 279 (fig. 70).

XIF. Three wall fragments are decorated with round impressions: nos. 58, 93 (fig. 69).

XIG. Square or rectangular, perforated clay slabs (fig. 71).

The slabs are very soft-baked. No complete specimens have been preserved. The largest fragment (no. 186) has one straight side intact, the three others have been broken off; it measures *ca.* 13 × 16 cm. Another large fragment of *ca.* 13.5 × 14 cm (no. 244) has also part of one edge preserved. The complete slabs must have been square or rectangular; the thickness varies between 1.8 and 3 cm. The perforations are placed in irregular rows: they are *ca.* 1.5 cm in diameter. One side of the slabs is flat. On the other side, the perforations are surrounded by an irregular collar as if the holes have been pushed through with a stick from one side when the

clay was still wet. In the case of no. 286, the side with the collars has deep rounded furrows between the rows of perforations. In the remaining fragments, the space between the collars is flat.

There is one fragment of an unperforated clay slab with up-standing rims: no. 320. A fragment of a box-like (?) object of clay has been burnt secondarily: its end is covered with green glaze.

Two clay fragments with undulating outer side, one with perforations, may be mentioned in this connection: nos. 132, 209.

We think it probable that many if not all of the objects described above played a role in the process of salt-making. Perforated clay plaques similar to those from Paddepoel were found at De Panne in Belgium and are now considered together with many other objects, among them clay cylinders, fragments of evaporation pans, and clay "nails", to indicate a salt-making industry³⁰. The Paddepoel fragments mentioned under B and perhaps also D can be interpreted as fragments of evaporation pans, although they might also be explained as parts of hearths, such as the Ezinge clay hearth which is on display in the exhibition of the Groningen Museum. The clay cylinders and nails find no parallels at Paddepoel, but we have clay rings and bars – G and E – instead. This could be due to differences in the methods of salt-making practised at the two sites.

In his recent study Nenquin gives a survey of the many different methods of salt manufacture used in prehistory. Some of these, such as the winning of natural salt deposits or the evaporation of the water of brine springs do not come in for consideration for self-evident reasons as far as the Paddepoel area is concerned. Also the sea was too far away to suppose a technique based upon the washing of sea-sand or the direct evaporation of sea water, methods which are probable for a coastal site such as De Panne. There is, however, another method which might fit the Paddepoel conditions and which is, moreover, known to have been used in our coastal regions in recent times. This one is based upon the use of the ashes of saliferous plants or salt-impregnated peat.

At the time that our settlements were occupied, salt-impregnated peat could probably be found in the neighbourhood, in the transitional zone between clay and peat³¹ (*vide* p. 193). Moreover, it appears from Dr Van Zeist's botanical research (*vide* p. 282) that saliferous (saline) plants were present in the Paddepoel area at the time when our sites were inhabited. Consequently, ingredients necessary for this method of salt-making could be obtained in the vicinity.

The technique is described at some length by Nenquin, who points out that containers with perforated base, *e.g.* wooden basins or pots, were used in the process³². Pots with perforated bottom were also present among the De Panne finds. Pot bases with central perforation occur regularly in the northern Dutch *terp* area. At

Paddepoel they form a proportion of *ca.* 1.25 % (*ca.* 45 specimens) of the total number of pot bases³³. There is usually only one hole in the centre of the bottom. Bases which have more than one perforation are extremely rare. It may be that the Paddepoel clay rings (G) have to be explained in combination with these perforated vessels^{33a}. They give the impression of being standing-rings for pots, which seems odd at first sight as all our pots stand firmly on perfectly flat bases. However, the rings may have been used to place a perforated pot filled with peat ash and a filtering layer of straw on top of another vessel which caught the brine solution. A few fragments of curious standing-rings (?) are mentioned in this connection: nos. 73, 147, 186.

We put forward this hypothesis of a salt industry at Paddepoel with reservations. Decisive evidence in the form of the characteristic cylindrical supports of evaporation pans or moulds for salt-cakes, such as were found at Bos- en Gasthuizerpolder near Leiden and Santpoort³⁴, is still lacking.

XII. Spindle whorls (fig. 72)

Spindle-whorls do not occur as frequently as one might expect. There are three different types, all of hand-made pottery. Their paste and colour display the same range of variety as the hand-made pots. Most of them have a carefully smoothed surface, particularly those of the sharply profiled type C.

XIIA. Disc-shaped spindle-whorls (fig. 72: upper row).

Flat, disc-shaped spindle-whorls are rare.

A rather large group of discs cut out of pot sherds are mentioned in this connection. The function of these discs remains uncertain. About half of them have a central perforation and could have been used as spindle-whorls: the others are solid. Perhaps the most plausible explanation is that they were gaming counters. The majority are carefully shaped with neatly cut and often somewhat rounded sides; more irregular shaped specimens also occur. The perforation is usually more or less conical; it was commenced from the inside of the sherd or from the outside. In one case (no. 116) the perforation has not been completed: it was begun from both sides: the two holes are not exactly opposite each other and are placed slightly off-centre. Two discs were cut from decorated sherds (nos. 130, 195). Diameters vary between *ca.* 3 and 8 cm.

XIIB. Bulbous or biconical spindle-whorls (fig. 72: bottom row).

The shapes of the spindle-whorls attributed to this type vary from rather flat or bulbous to clearly biconical. The difference from the preceding type is not always sharp.

XIIC. Conical spindle-whorls (fig. 72: upper row, left).

These are neatly modelled and carefully smoothed; they have a bevelled under edge.

XIII. Loom-weights (fig. 73)

The loom-weights are of hand-made pottery. Paste and colours are the same as those of the hand-made pots.

XIIIA. Disc-shaped loom-weights (?) (fig. 73).

Three or four flat clay discs with central perforation might be considered as loom-weights, but this interpretation remains doubtful: nos. 1 ?, 100, 128, 234. They do not constitute a definite type and differ considerably in shape and dimensions. The ring-shaped type of loom-weight as found at Wijster (type XIIA) does not seem to occur.

XIIIB. Conical loom-weights (fig. 73).

Conical loom-weights are the most numerous. Most of them have a more or less regular conical shape with round base and horizontal section. A more angular, four-sided pyramidal model is also found (no. 96). The perforation is horizontal or slightly sloping. There may be a shallow impression on the top.

The hemispherical loom-weight no. 143 does not belong to this type; it is, in fact, unique. It has a vertical perforation ending in two holes at the upper end.

XIIIC. Triangular loom-weights (fig. 73).

Clay slabs in the form of equilateral triangles with holes in the corners are not uncommon. They are often explained as net-sinkers, which can also hold true of the ones found at Paddepoel.

XIV. Ornamental patterns (figs. 74–76)**XIVA. Area Patterns.****XIVA.1. Intentional roughening (*Schlickung*).**

This way of “decorating” the lower part or body of pots was widely practised, particularly on types IVC, D and E.

XIVA2. Scratched Patterns (fig. 74).

Fine, closely spaced grooving (*Besen- or Kammstrich*) is rare (type IVB: fig. 47: no. 163). More often the lower part of a pot was decorated with widely spaced grooves. Several varieties occur: regular or irregular vertical distribution of the grooves; criss-cross distribution. As far as can be judged, this kind of ornament occurred on bowls of types IVC, D, and possibly E. Furthermore, a characteristic specimen of this pattern is found on a narrow-mouthed variety of type IVC (fig. 51: 135).

XIVA3. Impressions as covering Ornament (fig. 75: two upper rows).

Not more than eight sherds are decorated with over-all patterns composed of impressions (*Gruben, Tupfen, Einstiche*). It is impossible to associate this decoration with a particular pottery type.

XIVB. Zonal Patterns composed of Impressions.

XIVB1a, b. Impressions at or on the rim.

Milled rims, the impressions placed on the outside of the rim (pattern B1a), occur frequently in types IVC and D; in types IVE and VII they are also fairly common. Moreover, pattern B1a is a feature of type II dolia. It is by far the commonest type of ornament found among the Paddepoel material. The impressions belong to different categories: *Gruben mit seitlichem Wulst*, incisions, etc.

Impressions on top of the rim (pattern B1b) are extremely rare: types IIA?, IVC-E, VII?

XIVB2. One or more rows of Impressions below the rim (fig. 75: three middle rows).

The pattern is very rare. It occurs a few times on types IVC-E, once on the inside, sometimes in combination with B1a. The base of the neck seems to be the usual place.

XIVB3. Impressions in Triangle Formation (fig. 75: three bottom rows).

This pattern also is extremely rare. It occurs on types IVC-E, sometimes in combination with B1a. It is usually found on the shoulder.

XIVB4. Impressions on the handle or just below the base of the handle (fig. 75: bottom row, right)

Another rare pattern, found on types IVC-E, sometimes in combination with pattern C1.

XIVC. Zonal Patterns of Linear Ornament.

XIVC1. *Streepband* Ornament (fig. 76).

In its usual form the pattern consists of three sharp grooves divided by narrow ridges marking the base of the neck; there may also be one, two, or four grooves. The Dutch word *streepband* means “zone of grooves”. Twice, the pattern is combined with a zigzag frieze consisting of three grooves placed on the shoulder (type IVD; fig. 55: no. 284). One pot (type IVC; fig. 52: no. 320) is decorated on the shoulder with pairs of vertical grooves starting from the *streepband* zone and ending in round impressions; the rim of this pot is decorated with pattern B1a; its body is roughened. Impressions on or around the handles (pattern B4) can occur in combination with *streepband*.

Pattern C1 occurs on types IVC and D; it shows a marked preference for type IVE. Together with patterns B1a and E it is one of the more common types of ornament.

XIVC2. “Tree” Pattern (fig. 76).

This decoration belongs to cups of type IB, where it was placed on the upper part of the body just below the shoulder.

When it occurs in small fragments it is difficult to distinguish from pattern C3. Eight sherds can be attributed to pattern C2: only one (no. 214) clearly represents a real “tree” pattern; the remaining sherds show more simplified and degenerated forms (*e.g.* nos. 2 and 5: *cf.* type Wijster IB3).

XIVC3. Geometric Ornament (fig. 76).

This simple kind of geometric decoration consisting of hatched triangles and zigzag or net patterns formed by groups of oblique grooves is characteristic of types IVA and B. It was placed on the body, which it covered almost completely. The pattern is rare.

XIVD. Plastic Ornament.

Plastic ornament is restricted to the ribs, which sometimes encircle the base of the neck of types II and III.

XIVE. Painted Ornament (fig. 76).

Painted ornament belongs to the more common types of decoration together with patterns B1a and C1. It occurs in dots and strokes of brownish or violet colour, particularly on pots of types IVC and D but also on types IVE and VA. It may be found all over the body, on the rim and handles or even on the inside.

XII. DATE OF THE POTTERY FROM PADDEPOEL I-III (fig. 77)

The few Roman sherds which can be dated with any degree of precision belong to the 2nd and the first half of the 3rd centuries.

The hand-made types show greater chronological differences, although practically none of them can be dated with any accuracy. Those types which allow a more or less close dating are invariably rare and in some cases probably foreign types.

Type IA is probably mainly a 1st-century type though it may continue for some time into the 2nd century. Arguments for this are typological: the very broad shoulder and short, mostly thickened rim³⁵. The shape of the rim, bake and paste can be compared to those of type IVB which is considered as a derivate of type IVA. Types IA and IVB are therefore probably contemporaneous and later than IVA. On the other hand, type IA is typologically earlier than IB. Two pots from elsewhere (Wierhuizen, Ezinge) illustrate the complete type (fig. 35).

Type IB can be paralleled with Wijster types IA and B. The difference between Wijster IA and B is small. Wijster IA is best considered as a transitional form between Paddepoel IA and Wijster IB. The tendency shown by Wijster type IB to develop a long drawn-out neck with segmental section is also marked among the sherds attributed to Paddepoel type IB. Schmid calls the type under discussion *Trichterschale* and dates it to the 2nd century. He also observes the tendency of the neck to become longer and steeper towards the end of the *Trichterschale* evolution.

This shape of the neck is also characteristic of Schmid's *Trichternapf* which belongs to the 3rd century². A date of Paddepoel type IA in the 2nd and 3rd centuries, particularly the period between 150 and 250 A.D., does not need further corroboration.

It should be observed that Wijster variety IB₃, which Schmid³⁶ recognized as an "Uslarien" influence, does not occur among the Paddepoel sherds. Our material is exclusively coastal in character³.

The complete pot no. 287 and most of the sherds attributed to type IIIA represent the classical Eddelak type. These narrow-mouthed pots with their angular profile have a rather long, straight, bent-out neck; a pair of handles can be found on the shoulder and a ridge may mark the base of the neck. They belong to the late 2nd and early 3rd centuries. The specimens with short neck (*e.g.* nos. 138, 139, 148) are probably earlier and may date to the 1st or 2nd centuries. During the 3rd century the type becomes less angular. This stage in the evolution is perhaps represented by two sherds (nos. 125, 143)³⁷.

The outstanding features of the few typical IVA sherds are a thickened-faceted rim and geometric ornament; the beautiful black polished pottery is also characteristic. Thickened-and-faceted rims are good chronological pointers; they indicate the transitional phase between the Late-La Tène and Early-Roman periods: perhaps the years between 50 B.C. and 50 A.D.³⁸ The similarity which exists between Paddepoel IVA and an early type from the Feddersen Wierde is further proof that the former dates to the period around the beginning of our era³⁹. The date of the Feddersen Wierde type is based upon the evidence of brooches. It is attributed by Schmid to a pottery province stretching along the coast of the North Sea from the mouth of the Weser to Jutland.

There is a striking similarity between Paddepoel IVA and its counterpart from the Feddersen Wierde in the quality of the pottery, its general shape, and the character of the decoration. Of course, the decoration also closely resembles the so-called Frisian-geometric ornament, but both styles are not exactly identical. Particularly the ornament of the Ruinen-Wommels III bowls, the latest bearers of Frisian-geometric decoration, seems to be rather different. Compared to this the affinity between the ornament found on Paddepoel IVA and on the Feddersen Wierde pots is certainly more marked. For the moment, however, it is useless to go into further detail as long as a complete survey of Frisian-geometric patterns is lacking. Moreover, the gap of about two hundred years which according to the current chronology exists between Ruinen-Wommels III and Paddepoel IVA, argues against a close relation between these two types. The rim of Paddepoel nos. 164 and 176 is somewhat more slender than the rim of the Feddersen Wierde specimens, which might point to a slightly earlier date.

Type IVA is very rare at Paddepoel and may for that reason be considered as a foreign intrusion. Parallels from elsewhere in the northern part of the Netherlands are also few and far between. There is a good parallel from Ezinge, which has a handle on the shoulder (fig. 45: 7) and one from Zeijen (fig. 46)⁴⁰. A beautiful specimen of type IVA is known from Raard near Dokkum⁴¹. It had one or possibly two handles at the rim. In addition, three smaller bowls can be attributed to the type: one with a handle at the rim from Antum near Ezinge (fig. 45 : 3), a similar cup from Hoogeteintum (fig. 45 : 2) and a handleless specimen with lid from Valkum near Winsum in Groningen (fig. 45 : 6). The specimens from Ezinge, Raard and Hoogeteintum introduce an ornament of pendant arcs between groups of horizontal grooves. A rim sherd from Tzum⁴² and one from Cornjum⁴³ have very short faceted rims comparable to Paddepoel nos. 130 and 151. The ornament of the former sherd consists of zigzag grooves; the latter has pendant arcs below horizontal grooves. These sherds lead over to Paddepoel type IVB. A rim sherd from Arum⁴⁴ is decorated with groups of oblique grooves and has a short parallel-sided rim; it should be attributed to type Paddepoel IVB. A rim sherd from Haren

near Groningen with very short thickened rim and decoration of hatched triangles on the shoulder also belongs to type IVB⁴⁵. Finally, a sherd from Vries near Zeijen shows the net-ornament found in type Paddepoel IVA⁴⁶.

The Dutch representatives of the type are not only few in number, they also come from a limited distribution area which comprises Oostergo in Friesland (Cornjum, Raard, Hoogebeintum), the north-western part of Groningen (Paddepoel, Ezinge, Antum, Valkum), and the north-western fringe of the sandy soils of Drente (Zeijen, Vries). Only one sherd is known from Westergo on the other side of the Middelzee (Tzum) and this sherd is not very typical. As the number of finds from Westergo in the Fries Museum is great, this underrepresentation of the type in Westergo does not seem to be a coincidence. On the other hand, the absence of comparable finds in the eastern part of Groningen reflects the poor state of research in that area. Wierhuizen near Appingedam, the only site in eastern Groningen where up until now a systematic excavation took place, yielded a beautiful footed bowl which may be regarded as a variety of the type under discussion (fig. 45 : 8). It has an almost identical counterpart in a pot from Wehnen near Oldenburg⁴⁷. Comparable finds are known from Ezinge (fig. 45 : 4) and the Weser-Elbe region⁴⁸. The two beakers from Wierhuizen and Wehnen bridge the gap between the Middelzee-Hunze area and the Weser-Elbe region.

The dating of type Paddepoel IVA to the end of the 1st century B.C. or the beginning of the 1st century A.D. is based on good arguments. The type shows strong ties with the Weser-Elbe region; its rarity in the north of the Netherlands suggests that it represents an influence from the eastern part of the coastal zone on the western half of the coastal area, especially the region between Weser and Middelzee.

Faceted rims are also found on coarser pots which, as far as their other characteristics are concerned, particularly their manufacture and general shape, belong to types IVC or D. Good parallels occur at other sites in the northern part of this country, for example, at Ezinge, but everywhere in the northern Netherlands such faceted rims are relatively rare. They are very common in the lower Elbe region, but it should be kept in mind that thickened-faceted rims are a general characteristic of the period around the beginning of our era and were distributed over a large area comprising the whole eastern and western Germanic territory⁴⁹. However, it is probable that in the north-western part of the distribution area including the northern Netherlands faceted rims represent an influence from the eastern section of the coastal zone.

The date of the coarse Paddepoel sherds with thickened-faceted rim must be the same as that of type IVA: end of the 1st century B.C. and beginning of the 1st century A.D. The more elongated variety, such as fig. 44: no. 263, may be compared to some sherds attributed to *Keramikgruppe 2* at Einswarden, which is among the earliest types from that site and belongs to the La-Tène D period⁵⁰.

Type IVB is closely related to IVA and at the same time it is a smaller version of type IVC. The fact that it derives from type IVA points to a date in the 1st century A.D., though the possibility cannot be excluded that it continues for some time into the 2nd century. As far as can be established, most sherds attributed to type IVB come from bowls with globular body. A few sherds, however, suggest a shallower, cup-like model: for example, no. 201.

A complete specimen of this kind with shallow body, rounded shoulder, and very short, slightly thickened rim is present at Ezinge (fig. 49). Its ornament, especially the pendant arcs, is related to the geometric decoration found on IVA bowls; on the other hand, there is a close connection with the ornament of 2nd- and 3rd-century IB cups (*Trichterschalen, -näpfe*)⁵¹. The relationship to Paddepoel type IA is manifest from the shape of the rim. The Ezinge cup and Paddepoel type IA are obviously contemporaneous and can be regarded as the 1st-century forerunners of the 2nd-century IB cups. Such a double origin of the IB cups is the more probable as they show two varieties: one with rounded shoulder, the other with carinated profile.

Types IVC, D, and E are closely related in overall shape. The distinction rests upon differences in the shape of the neck or rim, but there exist all kinds of intermediate forms, and the attribution of the individual sherds to one or other of the three types is often difficult. In general, the sherds attributed to these types come from wide-mouthed bowls with globular or egg-shaped body. Inevitably, however, our groups IVC–E contain some sherds which, in fact, belong to two other types. These are the bucket-shaped dolia of type II and the narrow-mouthed pots of type IIIC. Both the dolia and the narrow-mouthed pots are represented among the Paddepoel material by a few complete specimens. The distinction from types IVC–E is only possible in complete pots or large fragments. As the Paddepoel material is very fragmentary no attempt has been made to distinguish between types IVC–E and II and IIIC.

It should be added that this group of types constitutes the bulk of the Paddepoel pottery complex. They belong in bake, paste, and shape to the usual pottery from the *terp* region of the northern Netherlands.

Type IVE has the oldest roots. It is the typological successor of type Ruinen-Wommels III⁵². The essential feature is the curved neck, which is mostly rather short and generally has a separately bent-out rim. A small number of sherds with longer necks are even reminiscent of Ruinen-Wommels I and II: fig. 58: nos. 139, 140, 144, 147, 148, 151, 214, 231, 230. The manufacture of these sherds is also different from the average IVE pottery; they are stone tempered and blackish in colour. Those few sherds which show the characteristic tripartite Ruinen-Wommels

II profile, which is in fact a Jastorf-C profile, can be compared to Einswarden, *Keramikgruppe* 1. The average S-curved profile of Paddepoel type IVE is matched by *Keramikgruppe* 4 of Einswarden. Both Einswarden types date to the La-Tène D period⁵⁰.

The bent-out rim of some Paddepoel IVE sherds is faceted; this applies particularly to those sherds decorated with grooves around the base of the neck (*streepband* ware). This observation is in complete agreement with the generally accepted view that *streepband* pots with S-curved profile continued into the 1st century A.D.⁵³. The type remains viable at least until the middle of the century, as appears from its occurrence among the finds from the Roman castellum of Valkenburg⁵⁴, which is said to have been founded in 42 A.D.⁵⁵. On account of their concentration in the Dutch province of Friesland *streepband* pots are considered as a typical Frisian ware. The distribution area stretches along the western coast of the Netherlands as far south as The Hague⁵⁶, where this pottery represents the Frisian expansion of the period at about the beginning of the 1st century A.D.⁵⁷; in eastern direction it stretches until the Feddersen Wierde. In the eastern part of this vast area, particularly in the coastal zone across the Weser, *streepband* sherds are rare and foreign intrusions. Just like the pots of Paddepoel type IVA they indicate contacts between the western and eastern parts of the coastal zone during the late-La-Tène and early-Roman periods: type IVA represents an eastern influence upon the western part, to which the eastern distribution of the *streepband* ware forms the Frisian reply.

Whereas most authorities agree in confining the lifetime of the *streepband* pottery to the period around the beginning of the Christian era (*ca.* 50 B.C.–50 A.D.), Waterbolk suggests that it started as early as 200 B.C.

The existing C¹⁴ evidence seems to be in agreement with this early dating. The evidence consists of two recent dates. One is from a settlement layer at Grijpskerk near Groningen, which contained a few IVE sherds with *streepband* decoration among many sherds belonging to Paddepoel types IVC–E: 230 ± 65 B.C.⁵⁸. It may date the beginning of the Grijpskerk settlement and perhaps the *streepband* sherds as well, although there is no absolute proof that the *streepband* sherds are among the earliest pottery from the site; the expected age of the settlement was “200 B.C. to A.D. 100”⁵⁸. The second C¹⁴ date comes from Paddepoel itself: a part of the earliest farm-building of Paddepoel III, squares Z/A^d–20/24, gave a date of 175 ± 35 B.C. (*cf.* p. 222). The house belongs to the second settlement pattern and its date forms a *terminus-ante-quem* for the beginning of the occupation of the site which must have taken place around 200 B.C. Again, we have no absolute proof that IVE sherds with *streepband* decoration were present from the start, but this seems plausible. Type IVE as a whole is certainly one of the earliest pottery types in the Paddepoel complex. The few sherds with tripartite profile in particular remind us of early (Ruinen-Wommels II) types, although they can also be compared to La-

Tène D forms found at Eindhoven. As far as the present evidence goes, we have to accept that pots with IVE profile, and probably also the *streepband* ornament, had a long life.

The S-curved profile came into existence at the end of the Zeijen culture (Ruinen-Wommels I and II); it is in fact considered as the distinctive feature of the Proto-Frisian Ruinen-Wommels III ware. If the date of 400 B.C. for the end of the Zeijen culture be accepted⁵⁹, this means that bowls with Ruinen-Wommels III necks were used over a period of at least four centuries; Eindhoven pottery group 4 shows that they were still in use during La-Tène D. The "Frisian" geometric ornament and the *streepband* decoration both occur on this long-lived pottery type but in different periods. One must also assume that there have always been pots without decoration; perhaps undecorated specimens were the rule. As far as we can see, there is no convincing evidence to restrict the geometric decoration to the period between 400 and 200 B.C.; it may well have continued after that date. Nor is it self-evident that the *streepband* ornament followed immediately after the geometric decoration; a gap between both is not impossible. The typical *streepband* bowl with curved IVE profile often has a faceted rim; moreover, in many cases the neck shows an obvious tendency to become rigid and this trend leads over towards type IVD. In our view, these secondary features are characteristic of the transitional period between the Iron Age and the Roman period.

The most conspicuous elements among the sherds attributed to type IVD are those with rather long and stiff, bent-out neck. The rim is mostly carefully flattened; some are decorated with *streepband* ornament. There is no doubt that these characteristic IVD sherds evolved from the *streepband* bowls of type IVE. Therefore, a date in the 1st century A.D. is most probable. Further evolution within type D probably led to a shortening of the neck and particularly a softening of its contours. Occasionally the rim developed a short protruding lip. It is not possible to date this general and obvious form with precision; it continued to be used until the end of the Roman period and probably after⁶⁰.

The most characteristic components of type IVC are the short thickened rims, particularly those with sharp-cut section. It is difficult to establish whether these rims really derive from the thickened faceted rims of the end of the Iron Age and the beginning of the Roman period. More probably both forms were parallel phenomena⁶¹: the former predominated in western Germanic areas, the latter in eastern regions. These short rims may be dated roughly to the end of the 1st century B.C. and to the 1st century A.D. The sherds with somewhat longer, drawn-out neck with more or less segmental section are typologically later⁶². They may have first appeared during the 1st century A.D. but they undoubtedly continued into the 2nd and perhaps even the 3rd centuries.

Types V and VI allow a wide range of dating. They occur from the beginning of

the Iron Age until late in the Roman period. Only the VA variety with thickened rim can be pin-pointed to a well-defined period: Late-La-Tène/Early-Roman⁶³. Apart from one uncertain specimen (fig. 64: no. 139 – wrongly numbered 129), the characteristic curved-sided bowl of Wijster type VII B₁, which occurred so frequently at Wijster, is conspicuous by its absence at Paddepoel. This long-lived type does not seem to belong to the usual pottery of the *terp* district⁶⁴. Paddepoel type VII is comparable to Wijster type VII B₂; it may be considered as a variety or degenerated version of types IVC or D.

The date of the remaining types cannot be fixed with accuracy.

The results which have been gained so far concerning the chronology of the Paddepoel types are summarized in fig. 77⁶⁵.

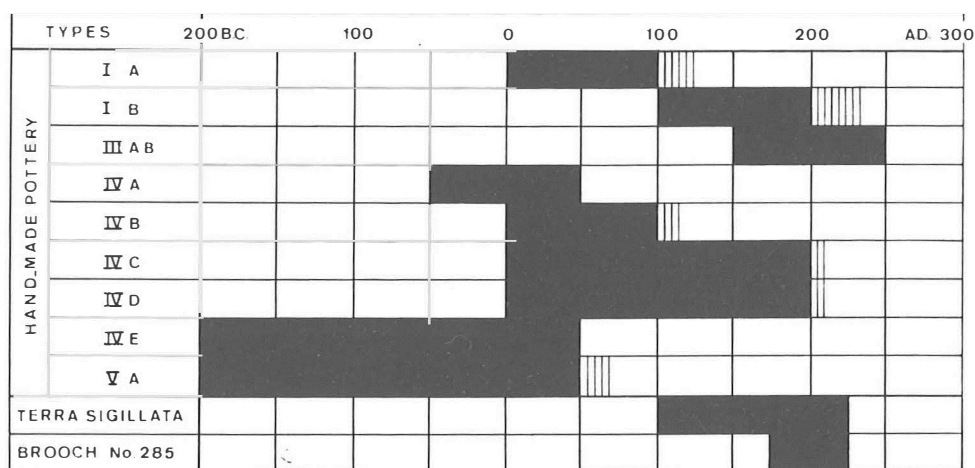


Fig. 77. Paddepoel I-III: absolute chronology of the finds.

The frequency of the pottery types is presented in table 1, which gives the absolute numbers and the relative frequency expressed in approximate percentages of the sum total of types I–X, for each of the three sites separately⁶⁶. Two things are remarkable. Firstly, the chronologically best defined types, IA, B, IIIA, B, IVA comprise extremely few specimens; the disproportion in frequency between types IVC–E and all other types is enormous. Secondly, one observes a discrepancy in the frequency of some types at Paddepoel I on the one hand and Paddepoel II and III on the other, whereas the two latter sites are almost exactly congruent. This concerns the three frequently occurring types IVC–E in particular and in a less significant way also types IB, IVA, and IX. Type IVE, which is undoubtedly the earliest of the three types IVC–E, is clearly underrepresented at Paddepoel I. The distribution of *streeband* ornament (C₁) over the three sites shows an identical

TABLE I. FREQUENCY OF THE FINDS FROM PADDEPOEL I-III

		number			approximate percentage		
type		P. I	P. II	P. III	P. I	P. II	P. III
<hr/>							
Hand-made ware							
Pots	IA	8	1	11	<0.5	<0.5	<0.5
	IB	20	4	16	1	<0.5	<0.5
	IIIA, B	13	8	29	0.5-1	0.5-1	0.5-1
	IVA	0(+14)	3(+25)	3(+29)	0(0.5-1)	<0.5(2)	<0.5(0.5-1)
	IVB	24	11	47	1-1.5	1	1-1.5
	IVC	671	525	1593	36	43	43
	IVD	873	406	1312	46.5	33.5	35
	IVE	87	158	522	4.5	13	14
	(IVC-E)	(1631)	(1089)	(3427)	(87)	(90)	(92)
	VA	33	16	46	1.5-2	1-1.5	1-1.5
	VB	2	1	4	<0.5	<0.5	<0.5
	VI	9	9	9	<.05	0.5-1	<0.5
	VII	12	7	12	0.5-1	0.5-1	<0.5
	VIII	7	3	11	<0.5	<0.5	<0.5
	IX	86	40	77	4.5-5	3-3.5	2
	X	—	—	3	0	0	<0.5
		1866	1210	3724	100	100	100
<hr/>							
Soft pottery	XIB-D	19	8	28	1	0.5-1	0.5-1
	XIE	2	—	1	<0.5	0	<0.5
	XIG	—	3	7	0	<0.5	<0.5
<hr/>							
Spindle-whorls	XIIA	—(9)	—(2)	3(24)	(0.5)	<0.5	<0.5(0.5-1)
	XIIB	2	—	5	<0.5	0	<0.5
	XIIC	1	1	5	<0.5	<0.5	<0.5
<hr/>							
Loom-weights	XIIIA	2	—	2	<0.5	0	<0.5
	XIIIB	5	8	15	<0.5	0.5-1	<0.5
	XIIIC	1	2	6	<0.5	<0.5	<0.5
<hr/>							
Ornament	A2	37	15	42	2	1-1.5	1-1.5
	A3	4	3	1	<0.5	<0.5	<0.5
	B1 ^a	357	195	798	19	16	21.5
	B1 ^b	10	8	18	0.5	0.5-1	<0.5
	B2	2	—	7	<0.5	0	<0.5
	B3	5	4	13	<0.5	<0.5	<0.5
	B4	8	6	12	<0.5	0.5	<0.5
	C1	20	38	144	1	3	3-3.5
	C2	5	1	2	<0.5	<0.5	<0.5
	C3	2	5	14	<0.5	<0.5	<0.5
	E	34	30	56	1.5-2	2-2.5	1.5

TABLE I. FREQUENCY OF THE FINDS FROM PADDEPOEL I-III (CONTINUED)

	type	number			approximate percentage		
		P. I	P. II	P. III	P. I	P. II	P. III
Roman ware							
	a	5	—	2	<0.5	0	<0.5
	b	2	1		<0.5	<0.5	<0.5
	c		—	3	0	0	<0.5
Basalt-lava querns							
		9	11	12			
Whetstones							
		3	3	8			

trend. Type IVC is also less well represented at Paddepoel I than at Paddepoel II and III, while type IVD is strongly overrepresented at Paddepoel I. Moreover, at Paddepoel I type IVD is more numerous than type IVC, whereas at the other sites the proportion is reversed. Although in the case of types IA, B, IIIA, B and IVA the absolute numbers are too small to give significant results, the trend seems to be that the earlier types are underrepresented and the later types overrepresented at Paddepoel I. This leads to a conclusion concerning the relation between types IVC and D. Both types undoubtedly overlap, but type IVD apparently went on for a longer period or became more frequent at a later time than type IVC. In other words: type IVC probably reached its peak during the 1st century A.D., type IVD during the 2nd and part of the 3rd centuries.

As the absolute number of the undated types is too small, table 2 does not assist in solving the problem of their chronology. The overrepresentation of type IX at Paddepoel I might lead to the conclusion that the lids do not belong to the earliest types; but this is not in agreement with the stratigraphical evidence.

There is one point on which Paddepoel II and III show a considerable difference: the frequency of notched rims (ornament Bra). As this is the only divergence, it may be ascribed to chance influences. The average percentage of notched rims for Paddepoel II and III agrees with the figure calculated for Paddepoel I. This probably means that notched rims occurred throughout the greater part of the period of habitation in approximately the same frequency. It may be that notched rims were not yet in common use during the earliest phase of habitation, which is best represented at Paddepoel II and III. The relative rarity of notched rims on type IVE points in that direction (*cf.* p. 252). They certainly became much more frequent —

20% of the rims of types IVC and D are notched – during the 1st century A.D. and remained so until well into the Late-Roman period; the pattern is still frequent at Wijster. The percentage found for painted ornament (E) is probably too low because the traces of paint are often very vague and therefore easily overlooked.

The composition of the Paddepoel find complex does not provide good possibilities of corroborating or refining the chronology which has been worked out in the preceding pages. The reason for this lies in the almost complete absence of reliable find associations. The bulk of the material was found in the excavation levels and could be classified as stray finds. Really “closed” associations from pits are few in number. The associations from ditches are considerably more numerous, but for self-evident reasons these are not very reliable.

Stratigraphy is not very helpful either: the excavation levels cut through the habitation levels in an absolutely arbitrary way and no correlation can be made between them; consequently, finds from different habitation levels (that is, periods of habitation) are found in one and the same level of excavation. Moreover, the complex of successive layers is rather thin. Therefore, the succession of finds in successive levels of excavation provides at best an indication of the relative chronology of the pottery types.

The following stratigraphical observations could be made: in each of the three sites, the few Roman sherds and the rare sherds of the late hand-made types IB and III are almost exclusively restricted to the upper excavation levels and late settlement features. Most of the remaining types are present through all levels from the earliest settlement features onwards. Types IV C, D and E do not show significant stratigraphical differences. This might perhaps be considered as an indication that IV C and D started before the Roman period in contrast to what we assumed on p. 265, but given the vague distinction between these three types and the unreliable stratigraphical situation the evidence is far from convincing. It can neither be deduced with certainty from the stratigraphical evidence that types IV C–E continued to be used until the end of the period of habitation, although this is probable at least for type IV D. At a site like Paddepoel, where habitation continued for a rather protracted length of time, obsolete types may intrude in later levels. Only types IA, VIII, and X have not been found in the lowest levels or in the earliest settlement traces. However, as these types are rare, this is no absolute proof that they start later than the others.

Horizontal stratigraphy does not offer further possibilities either. At Paddepoel I and II the excavated areas are too small. At Paddepoel III most types, particularly types IVC–E, are fairly equally distributed over the excavated area. Compared to the rest, the late types (Roman, IB, III) have a more or less peripheral distribution; type IA occurs only around the southern house. On the whole, however, the distribution of the different types does not show significant discrepancies.

XIII. POTTERY FROM PADDEPOEL IV

A. Wheel-made Medieval pottery

1. (fig. 78). There are six sherds of Pingsdorf pottery: one of them is a rim sherd which fits together with two other sherds, and one has a cylindrical spout (nos. 293, 295). The rim fragment belongs to a wide-mouthed globular pot with or without foot, a type which is to be dated to the late 12th century⁶⁷. The ware has a yellow to grey colour and is decorated with violet-coloured painted ornament. The rim fragment shows the mark in paint of the three middle fingers of the potter's hand.

2. Three sherds belong to grey or brownish *Steingut* of the 14th and 15th centuries. Another *Steingut* fragment, the splayed foot of a jug of Siegburg(?) ware, was found in the highest layer of Paddepoel I.

B. Hand-made pottery**I. *Kugeltopf* (fig. 78).**

The neck shows three varieties: straight with unthickened rim; curved with slightly broadened rim; curved with moulded rim.

Two fragments of standing-rings represent the *Kugeltopf* variety with foot (nos. 293, 340).

The paste is hard baked and stone tempered: the tempering ingredients may be rather coarse. Colours are grey, brown, or blackish. The fragment of a long solid handle probably comes from a handled ladle⁶⁸.

The total number of rim sherds is about eighty; four additional rim sherds were found in the upper layers of Paddepoel I and III. All sherds are stray finds collected from the excavation levels, except for two rim sherds found in a ditch (no. 297). The absence of real associations prevents establishing whether a chronological difference existed between the three rim types described above.

II. Shallow bowl of *Kugeltopf* ware (fig. 78).

The rim is flat and slightly broadened; it may be bevelled towards the inside. The bottom was probably flat. One fragment (no. 293) has a broken-off projection at the rim: a handle?

The hand-made pottery from Paddepoel IV, particularly the *Kugeltopf* sherds with moulded rim, may be attributed to 12th and 13th centuries, a date which agrees well with that of the Pingsdorf sherds.

XIV. DATE OF THE SITES

Paddepoel I–III must belong to approximately the same period since the same pottery types occur at each of the three sites.

Differences in the frequency of the types make it probable, however, that the habitation started somewhat later at Paddepoel I than at Paddepoel II and III. The C¹⁴ evidence dates the beginning of the habitation period to about 200 B.C. The earliest house of period II at Paddepoel III is dated to 175 ± 35 B.C.; a granary, which is stratigraphically later than the house (it overlies the ditch surrounding the house) but certainly not one of the latest features of the settlement, provided a date of 20 ± 95 B.C. (*cf.* p. 224). The end of the habitation period cannot be fixed precisely, but the finds suggest a date of roughly between 200 and 250 A.D. They do not enable us to date accurately the successive phases of habitation which have been distinguished from the settlement traces.

Paddepoel IV must date from a later period. The settlement traces found at this site may be associated with the *Kugeltopf*, Pingsdorf and later pottery: *i.e.* the actual *terp* of Paddepoel IV may have started during the 12/13th century. The raised cemetery is earlier than the settlement. It is a so-called mixed cemetery which has many parallels in the clay district of Groningen and Friesland. This type of cemetery belongs to the Early Middle Ages: 7th to 9th centuries⁶⁹.

The available C¹⁴ datings seem to be rather too early. The cremation grave in the cemetery is dated to 535 ± 35 A.D., the house on top of the cemetery to 745 A.D. (*cf.* p. 236). A difference of date of two or three hundred years between house and cemetery is quite acceptable, but on the evidence of the finds the settlement at Paddepoel IV, as far as it was found in the excavated area, cannot have started before the 11th century.

XV. SUMMARY

During the period between June and November 1964 the *Biologisch-Archaeologisch Instituut* of Groningen University excavated four sites in the Paddepoel area to the north-west of Groningen town: Paddepoel I – IV (chapter I).

The Paddepoel area is situated at the end of the moraine ridge the Hondsrug, between the rivers Aa and Hunze. These rivers constituted water routes connecting the sandy soils of Drente and the north-western part of the clay district in the province of Groningen: they continued the land route formed by the Hondsrug. The area lay on the inner edge of the Old Salt Marsh, at the transition with the peat region separating clay district and sandy soils. The end of the Hondsrug is the only point where clay and sand were in direct contact (chapter II).

Paddepoel I–III are settlement sites dating from the later part of the Iron Age and the Early-Roman period: between *ca.* 200 B.C. and 250 A.D.

These settlements were probably founded directly upon the flat surface (*Flachsiedlung* phase). Later on, the houses were raised upon low rectangular earth platforms surrounded by ditches (platform phase). The platforms were gradually expanded and in the course of this process adjacent platforms became fused. This evolution can best be followed at Paddepoel III, where the excavations have been more extensive than at the other sites. The small enclosures belonging to the earliest Paddepoel III settlement patterns were probably pastures. The lay-out of the excavated part of the settlement of Paddepoel II and III suggests a radial arrangement of the principal buildings, but there is no sufficient proof that Paddepoel II and III formed a coherent whole in process of becoming one *terp*. The principal buildings were three-aisled farmhouses; they were accompanied by outhouses, such as granaries (chapters III–V).

The economy of the settlements was agrarian; probably mainly based on cattle-breeding, but agriculture was practised as well (appendices I and IV). A few Roman sherds point to trade connections.

The date of the settlements is derived from two C¹⁴ datings and an analysis of the finds: mainly hand-made pottery. The pottery types are almost exclusively coastal in character. Most of them are of local make and compare very favourably with the usual *terp* pottery from the northern part of the Netherlands; a few may be imports from the Weser-Elbe region. An interesting group of soft-baked pottery types might be connected with salt extraction (chapters VII–XII, XIV).

The earliest feature of Paddepoel IV is an intentionally raised, Early-Medieval cemetery of the “mixed” type with inhumation graves of different directions and cremations. The cemetery is covered by a Medieval and later settlement: a small

terp. Details of the evolution of this settlement remain unknown (chapters VI, XIII, XIV).

One of the most interesting results of the excavation is the information obtained about the relation between habitation and natural environment. The settlements of Paddepoel I–III were founded on the clay deposits of the Pre-Roman transgression in a Salt Marsh environment. A long time before the beginning of the habitation period, the Pre-Roman transgression had passed its prime. The influence of the sea had decreased and was very small or absent during the period of habitation. The ditches of the settlement of Paddepoel III, periods I and II, held water which was fresh or only slightly brackish. The Late-Roman/Early-Medieval transgression arrested the evolution of the settlements and prevented them from becoming real *terps*. The diatoms contained in the sediment of the Late-Roman/Early-Medieval transgression show a strong increase of the sea influence in the Paddepoel area; the activities of the sea during this period were in fact much greater than they had been at the end of the Pre-Roman transgression. The conditions in the Paddepoel area were worse than elsewhere in the clay district, where the existing settlements could survive: here, in Paddepoel the surface of the Pre-Roman sediment lay at 0.50 m below N.A.P. level. The Early-Medieval cemetery of Paddepoel IV was raised on the sediments of the Late-Roman/Early-Medieval transgression at a time when the sea went through another regression period, as appears among other things from the analysis of the diatoms. The settlement of Paddepoel IV developed during the period of the Medieval transgression when the *knikklei* landscape was rejuvenated (chapters II–VI, appendix III).

POSTSCRIPT

This article was written in 1967/8. In recent years the geological evolution of the clay region in the province of Groningen has been studied by Drs W. Roeleveld, *Instituut voor Aardwetenschappen* of the *Vrije Universiteit* at Amsterdam. The interesting results of his investigations will probably make a revision of our conclusions concerning the relation between habitation and natural environment necessary.

Amersfoort, January 1971.

XVI. NOTES

¹ De Vries 1946, 180-1. The following information was received from H. Halbertsma, ROB.

The excavated sites are spread over a region, west of the former Hunze-river. This region was probably called "Enenser hemmerik" (Cartularium of Selwerd, 1428; comp. *Bijdragen tot de Geschiedenis en Oudheidkunde, inzonderheid van de provincie Groningen*, X, 1878, p. 118, note 1).

The "Enenser hemmerik" or "hamrik" covered the territory of the hamlet Enens. Now the site of Enens is not quite certain because this toponym was no longer used since the 15th century. Obviously it has been the deserted "wierde" or dwelling mound, to day known as "Paddepoel". This is not correct while "Paddepoel" originally was attached on the marshy fields in a very vast area around Enens – even from Harsens near Adorp up to the forelands of Groningen at Selwerd.

This very old name has something to do with the Dutch "poel" = English "pool", but nothing with the Dutch "pad" = English "toad". The first time Paddepoel is mentioned in the 13th century chronicle of the Premonstratensic abbey of Wittewierum, written by abbot Menko: "de Padapale venientes" (*Kronijken van Emo en Menko*; *Werken Hist. Genootschap*, III, 1866, p. 206).

W. de Vries, *Groninger plaatsnamen*; Groningen 1946, p. 180-181, interpreted this toponym as "Swamp, belonging to Pada". We don't believe this explanation is right. "Pada" or "pade" means itself "boggy land". It survived until our days in the villages Oldeholtspade and Nijeholtspade, on the south-east border of the Dutch province of Friesland. These names speak for themselves.

South-west from the West-Frisian village Hoogwoud, not far North from Alkmaar, extended a vast swamp, that protected the territory of the West-Frisians from Holland proper. Once, when it was frozen, the Earl of Holland, William II, the so called Roman King, tried to cross it on horseback to attack Hoogwoud. He was however slain by the Frisians. Since that days – 1256 – this region was called, till our days, "Koningspade" = "The King's Swamp".

² Westerhoff 1869, 104; Kooper 1939, 129.

³ The Roman period course of the river Aa through the Paddepoel can be recognized in the meandering fossil river-bed discovered by the Stiboka surveyors (fig. 1). Traces of this river-bed still exist in the shape of curved field-ditches, whereas the remaining cadastral boundaries consist of rectilinear ditches. Part of the original river-bed is called Blauwborgstertocht on the 1:25000 topographic map 1962. Van Giffen and Praamstra (1962, afb. 1) consider that the part found in Paddepoel was connected with the curved section of the Reitdiep between Donghorn and the Plantsoenbrug in Groningen town. To the north of the area surveyed by Stiboka, the stream, according to Van Giffen and Praamstra, continued its course under the modern Selwerderhof cemetery, where no soil survey was made, until it emerged at Selwerd; from that point it turned away in south-western direction to include a fragment of a river-bed discovered along the Penningdijkje just to the west of the cemetery. One may ask whether the pattern of ditches to the north of Selwerd does not suggest a more north-western course passing east of the farmstead Hunzeroord until it joined the Hunze (= Selwerderdiep) east of the terp Enens which is situated ca. 1 km to the south-east of Wierum, ca. 500 m to the east of the Reitdiep and ca. 500 m to the north of the Van Starckenborghkanaal (cf. Westerhoff 1869, 92; Boeles 1873, 118, note 1). In that case the last part of the river would coincide with the municipal boundary of Noorddijk. But apart from that, the course sketched by Van Giffen and Praamstra is quite plausible, at least for the Early-Roman period. Our excavations have shown that it silted up after that period and degenerated into a ditch during the Late-Roman transgression (cf. p. 201). Perhaps, the main stream then shifted its course westwards in about the line of the present Reitdiep between Donghorn and some distance south of Dorkwerd.

⁴ L.A.H.de Smet 1965, *De bodem van Groningen*, Wageningen 9–13, 46; L.J.Pons 1965 in: *De bodem van Nederland*, 27–31; *Atlas van Nederland* 1963, Den Haag, map IV–1.

⁵ Kooper 1939, fig. 11: section 1. The peat was found at a depth of 6 m at site Paddepoel III in a boring made by Dr. L.H. Bruins and Mr. T.C. van Hoorn in 1964.

⁶ L.A.H.de Smet 1964, De vorming van de kust van Groningen in verband met de geologisch-bodemkundige opbouw, *Groningse Volksalmanak*, rubriek Groninger Oudheden 7, fig. 3.

⁷ GrN 5592: 2125 ± 35 B.P.

⁸ GrN 5591: 1970 ± 95 B.P.

⁹ Bantelmann 1955, Abb 7, 3; T. 40; cf. Van Giffen 1963.

¹⁰ Cf. Appendix V.

¹¹ GrN – 5461: 1415 ± 30 B.P.

¹² GrN – 5590: 1205 ± 45 B.P.

¹³ Van Giffen 1918–20b, 42, 81.

¹⁴ The identifications of the woods were made by Drs. W.A. Casparie, BAI (cf. Appendix II).

¹⁵ The wooden vessels have been preserved by the alcohol-ether method in the laboratory of the ROB, Amersfoort.

¹⁶ Van Es 1967, 133.

¹⁷ Van Es 1967, 143, 146, Fig. 69, no. 1074. A similar brooch was found in a 3rd/4th century settlement at Gross-Jena near Halle (Bicker 1936).

¹⁸ Underneath the modern cemetery 'Noorderbegraafplaats' near Paddepoel I the upper part of the boulder-clay, which here lay at a relatively high level, has been eroded. In this way a 'beach' of boulders was formed which may have lain at the surface at the time when sites I–III were inhabited; at present it is covered by a few decimetres of young clay. This information was received from Dr G. J. Boekschoten (Geologisch Instituut Rijksuniversiteit Groningen). It is probable that the clay covering the boulders layer was deposited during the Late-Roman/Early-Medieval transgression period, which would explain the absence of boulders at Paddepoel IV.

¹⁹ The kinds of stone used for the artefacts were determined by Dr G. J. Boekschoten. He considers it probable that most implements were made of local erratic boulders (cf. note 1) and adds: 'It is striking that the soft limestone (much softer than granite, sandstone, and leptite) which is common at this spot does not occur at all among the collection of artefacts. Boulders like the 'lapstone' no. 149 have not been shaped by man but by the action of waves. Leptites are rare in the boulder-clay but the possibility that they were collected there cannot be excluded. The fine sandstone, however, seems to me to be imports. Although fine-grained sandstones may occasionally occur in the boulder-clay these look different. Their origin could not be established.' Cf. also: Harsema 1967, 151*.

²⁰ Crawford & Röder 1955, Fig. 1, types 4–6.

²¹ Harsema 1967, 145–9.

²² Curwen 1937, Fig. 26, 28.

²³ Van Es 1967, 151.

²⁴ Identification by W. J. van Tent, ROB, Amersfoort. The attribution of this sherd to Dubitatus is based on the following considerations:

'Ovolo: Fölzer 938 = Arentsburg 89 = Gard R 3, R 25.

This ovolo occurs on rather early ware of Censor and Dexter of Trier (Gard R 3), but infrequently and then usually with bead-row below it (cf. e.g. Fölzer T. 15: 6, 21; 16: 7; Arentsburg Afb. 83: 18 (= no. 2021); ORL 8 (Zugmantel), T. 27: 1, 2, 6). If the bead-row below ovolo Fölzer 938 is missing on sherds which are attributed to Censor or Dexter, this attribution is either incorrect (cf. Oelmann T. 7: 2, probably from mould Gard T. 20: 1 with stamp Dubitatus F), or at least uncertain (cf. Oelmann T. 7: 1; Fölzer T. 17: 4 with tree and spear characteristic of Dubi-

tatus ware from Trier; Fölzer T. 18: 18). This ovolo is frequently found on Dubitatus ware from Trier but never with bead-row below (*cf.* Gard T. 20-3). The upper part of the eggs and tongues has disappeared. This is an indication that the bowl was made in a much used mould.

Bird: Oswald 2341A = Fölzer 685 = Arentsburg 339 = Gard T 126.

The type is used according to Oswald by Dexter, according to Gard by Dubitatus, both Trier potters.

Arcs: Fölzer 809 = Arentsburg III-191 = Gard K 47.

Tree: Arentsburg V-240 = Gard P 41.

Support of tree: Fölzer 766 = Arentsburg IV-169 = Gard P 59, 60.

Support of arcs: Gard V 43 = Fölzer 795 (upside down) = Arentsburg V-209.

Shell: Gard T 173.

For more or less comparable style *cf.* Gard T. 21: 6 (Dubitatus group).⁷

²⁵ For complete shape *cf.* Van Es 1967, Fig. 82-3.

²⁶ For complete cheese-moulds *vide* Boeles 1951, Pl. 29: 12, 14, 16.

²⁷ Another ladle was found by Mr. J. E. Musch on 24 May 1965 near Paddepoel II.

²⁸ Elzinga 1962, Fig. 9: 10^a; Afb. 9.

²⁹ Boeles 1951, Pl. 29: 11; Boeles mentions German parallels: p. 534.

³⁰ Mariën 1952, Afb. 350; Nenquin 1961, 93-5.

³¹ Such a situation was recently observed by Mr. T. C. van Hoorn of Ulrum, near Ranum, municipality of Winsum (Gr.). A section showed that here the top of the diluvial boulder clay was situated at 2.30 m — N.A.P. A peat layer rested upon the boulder clay and was covered by marine clay sediments. A silted up watercourse had cut into the peat and the upper part of the boulder clay. On the natural levee of this watercourse lay two *terps* (base at 0.69 m + N.A.P.) which had been inhabited from the beginning of our era, if not earlier, until at least the Early Middle Ages. If the watercourse was active during the earlier part of the period of habitation (*i.e.* during the period that the Paddepoel sites were also inhabited), which is probable but not proved, the peat was accessible at low tide; at that time the low tide level was at 2.80 m — N.A.P. (Letter from Mr. Van Hoorn, dated 28 October 1968).

³² Nenquin 1961, 111, 117, 123.

³³ At Wijster perforated bases are rare: Van Es 1967, 283.

^{33^a} *cf.* *Westerheem* 1962, 7-12; 98-107; 1969, 283-6.

³⁴ Modderman 1960, 30-1.

³⁵ *cf.* Van Es 1967, 293.

³⁶ Schmid 1965, 20-3.

³⁷ Schmid 1965, 24; Van Es 1967, 303-6.

³⁸ Schmid 1957, 69; 1967, 16.

³⁹ Schmid 1958.

⁴⁰ The Zeijen pot was found in a settlement trench associated with three complete but undecorated pots of the same type (Van Giffen 1936, Afb. 19: 6-6^d; two of these pots are illustrated in our fig. 46). A few sherds were found in the same trench. One of these is a rim fragment of a pot with probably two handles on the shoulder and decorated with some kind of geometric ornament. It can be compared to *Henkeltöpfe* of the period around the beginning of our era from the Weser-Elbe region (Schmid 1965, 18; T. 2: 1-6). Thus, it has not only the same date but also the same connections as the type under discussion.

⁴¹ Rijksmuseum van Oudheden, Leiden, inv. no. a 1921/10. 34.

⁴² Fries Museum inv. no. $\frac{137}{16}$: *terp* De Botertobbe.

⁴³ Fries Museum inv. no. $\frac{20}{1087}$.

⁴⁴ Fries Museum inv. no. $\frac{226}{33}$.

⁴⁵ Groninger Museum inv. no. 1941/III⁵.

⁴⁶ Van Es 1957, Fig. 19: fourth row, left.

⁴⁷ Schmid 1965, 16, T. 1: 8.

- ⁴⁸ Schmid 1965, T. 1: 4, 9, 10.
- ⁴⁹ Schmid 1965, 18.
- ⁵⁰ Schmid 1957, 52, T. 5: 4–6; 1965, 32.
- ⁵¹ Schmid 1965, T. 8: 2, 6, 11; 9: 3, 6, 7; 10: 14. Van Es 1967, Fig. 99: 3, 7.
- ⁵² Waterbolk 1962, Abb. 31.
- ⁵³ Waterbolk 1962, 40; Schmid 1964, 2–6.
- ⁵⁴ Personal communication by Dr. W. Glasbergen, Amsterdam.
- ⁵⁵ Glasbergen 1965–6. At Schagen a *streepband* sherd was found in association with a fragment of Roman glass: end of 1st century A.D.? (Haalebos 1967, 194).
- ⁵⁶ Stuurman 1965; 1968. *Streepband* sherds were further found in a recent excavation at Rijswijk near Den Haag (excavation ROB; J. H. F. Bloemers).
- ⁵⁷ Van Es 1967 525–30.
- ⁵⁸ Van Giffen 1964; Vogel & Waterbolk 1967, 137–7.
- ⁵⁹ A recent C¹⁴ date of the earliest house at Ezinge, which belongs to the Zeijen culture, could point to a somewhat later date; 350 ± 65 B.C. (Vogel & Waterbolk 1967, 136).
- ⁶⁰ Van Es 1967, 307–8.
- ⁶¹ Von Uslar 1938, 55.
- ⁶² Early necks with slightly thickened segmental section can be found on a few *streepband* bowls: fig. 52: nos. 129, 130, 218, 394, 320. These are, however, rather atypical forms which might also be attributed to types IVD or IVE.
- ⁶³ Van Es 1967, 311–2.
- ⁶⁴ Van Es 1967, 313–5.
- ⁶⁵ cf. Van Es 1967, 324.
- ⁶⁶ Apart from those ornamental patterns which occur on the body of the pots, only rim sherds have been taken into account.
- ⁶⁷ For this type cf. Bruijn 1960–1, 488, Per. I (second and third from left). According to Mr. A. Bruijn our sherds were not made in the Brunssum and Schinveld area but in one of the German production centres making Pingsdorf pottery (personal communication).
- ⁶⁸ Dunning, Hurst, Myres, Tischler 1959, 59–60.
- ⁶⁹ Van Giffen 1918–9, 23; Van Es 1968, 20–1.

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APPENDIX I

W. VAN ZEIST

THE PALAEOBOTANICAL INVESTIGATION OF PADDEPOEL

(summary).

In the palaeobotanical study of Paddepoel about 115 species, belonging to various plant communities, could be determined. The house *terps* of Paddepoel were situated on the "high kwelder", the area which is flooded only once or at most a few times each year, during very high spring tides. Among the plants from the high kwelder represented in the samples examined can be mentioned: mud rush (*Juncus gerardi*), sea milkwort (*Glaux maritima*), sea plantain (*Plantago maritima*), and sea arrow-grass (*Triglochin maritimum*).

The high kwelder would probably have had a slightly undulating surface. On the highest places, not only salt marsh species would have grown, but also plants which are usually found in a freshwater environment, such as soft brome (*Bromus mollis*) and meadow-grass (*Poa trivialis/pratensis*). On the lowest-lying places of the high kwelder, fresh water would have accumulated, diluting the salt concentration not inconsiderably during the wet season. Among the plants which grew on these moist places were marsh spike-rush (*Eleocharis palustris*), hairy buttercup (*Ranunculus sardous*), and parsley water dropwort (*Oenanthe lachenalii*). Palaeobotanical evidence for grazing on the salt marshes is provided by the presence of autumn hawkbit (*Leontodon autumnalis*) and silverweed (*Potentilla anserina*) in the Paddepoel samples.

Along the water courses, vegetation consisting of reed (*Phragmites communis*), sea club-rush (*Scirpus maritimus*), sedges (*Carex* spec. div.), and a few other species would have been present.

As for crop plants, flax (*Linum usitatissimum*) and gold-of-pleasure (*Camelina sativa*) were grown for their oil-bearing seeds, and flax also because of its fibres. Cereals are represented by small numbers of seeds: hulled barley (*Hordeum vulgare*), emmer wheat (*Triticum dicoccum*), and millet (*Panicum miliaceum*). Since only naked *Avena* seeds have been preserved, it could not be determined whether wild or cultivated oat is concerned here. The possibility must be considered that emmer wheat, which is not salt-tolerant, was not grown locally, but that it was imported from the higher soils. One charred seed of celtic bean (*Vicia faba* var. *minor*) was met with.

Apart from those of crop plants, seeds of various weeds from cultivated fields could be isolated. The pollen samples studied from the so-called "arable soil" do

not in fact provide evidence for agriculture; the pollen spectra obtained point rather to grazing on the spot.

The activities of man and animals are also attested by the occurrence of seeds of plants which are common on heavily trodden places: greater plantain (*Plantago major*) and knotgrass (*Polygonum aviculare*). Furthermore, plants which grow on dungheaps, waste places, and roadsides are well represented: nettles (*Urtica urens* and *U. dioica*), goosefoot (*Chenopodium* spec. div.), orache (*Atriplex hastata*/*patula*), and black nightshade (*Solanum nigrum*).

[illegible]

[illegible]

Paddepoel IV

nr. 298:	post of medieval house	.	.	.	.	.	.	.	.	<i>Quercus</i>
341:	wheel,									
	5 rim segments	.	.	.	.	.	.	.	.	<i>Fagus</i>
	rim pins	.	.	.	.	.	.	.	.	<i>Quercus</i>
	spokes	.	.	.	.	.	.	.	.	<i>Quercus</i>
344:	charcoal from cremation	.	.	.	.	.	.	.	.	<i>Quercus</i>

APPENDIX III

W. GROENMAN-VAN WAATERINGE AND M. J. JANSMA

DIATOM ANALYSIS

A quantitative diatom analysis of two standard profiles (Paddepoel III-330 and Paddepoel IV-345) has been carried out, and the fluctuations in the percentages of the individual species have been diagrammed in the manner already long customary in pollen analysis.

The following results were obtained:

1. Prior to the earliest phase of occupation, a gradual decrease in the intensity of flooding, becoming practically zero in the phase of occupation. The diatoms are allochthonous (on the basis of the high percentage of broken specimens) except for a number of brackish-fresh and fresh-brackish species which could have lived in wet places on the high kwelder.

2. Between the earliest phase of occupation, encountered at Paddepoel I, II and III, and the latest occupation phase, found at Paddepoel IV, an increase in flooding; as may be concluded from the percentage of allochthonous marine plankton which is higher than it was toward the end of the preceding sedimentation phase.

3. At the time of the second occupation, a decline in flooding activity; which strongly increased thereafter.

A quantitative analysis of a ditch section from Period I at Paddepoel III (Paddepoel III-314) gave a picture quite different in character than the analysis of the two standard diagrams. In the latter, the diatoms were for the most part allochthonous, transported from elsewhere and deposited with the clay sedimentation, and in the occupation phases, when there was no clay deposition, a limited range of brackish-fresh to fresh-brackish diatom flora occurred in wet places in the high kwelder. In the ditch, however, a predominantly autochthonous diatom flora occurred, with a brackish to fresh-brackish character at the bottom and brackish-fresh to fresh higher up. The small quantities of marine to brackish-marine species are allochthonous. A sample from a ditch of Period II of Paddepoel III (Paddepoel III-315) gave a similar picture.

APPENDIX IV

A. T. CLASON

PRELIMINARY REPORT ON THE ANIMAL BONES FOUND AT
PADDEPOEL

Ca. 1560 identifiable bones were found, of which five were human, and the rest from slaughtered animals. Cattle were the most important, followed by the small ruminants, horse, pig, dog and domestic fowl.

No bones of geese, ducks or pigeons were found.

The number of horse bones is surprisingly high.

Taking into account the geographical situation of Paddepoel at the edge of the clay area just north of the higher lying wooded sand area, the number of pig – wild as well as domesticated – is very low.

Notable also is the absence of hunted animals such as red deer, elk, aurochs and birds.

A number of bones were worked into implements.

A more detailed account of the Paddepoel material will be given at a later date in a wider context.

List of identified bones

() worked bones

Mammalia			Number of bones
Canis familiaris	–	dog	15
Equus caballus L.	–	horse	136 (5)
Sus domesticus	–	pig	34
Sus scrofa L.	–	wild boar	1
Capreolus capreolus (L.)	–	roe deer	1
Bos taurus L.	–	cattle	1203 (18)
Capra/Ovis	–		165 (3)
Ovis aries L.	–	sheep	3
Capra hircus L.	–	goat	2
?	–	whale	(1)
Aves			
Gallus gallus dom. L.	–	domestic fowl	6
Mollusca			
Mytilus edulis L.	–	mussel	1

APPENDIX V

G. N. VAN VARK

A TENTATIVE INVESTIGATION OF THE SKELETAL REMAINS

Parts of the skeletons of 8 individuals were found, besides 9 separate bones or fragments of bones. The bones of one individual, no. 344, were cremated. The following list gives a broad picture of the total skeletal material:

Individual no. 292 :

Parts of humerus-, radius-, ulna-, femur-, tibia- and fibuladiaphysis.

Femur: caput.

Ulna: proximal epiphysis + small part of diaphysis.

Both tali.

Calcaneus.

Metatarsale I.

No. 296 :

Skull: right wall and region around foramen magnum is lacking.

Fragments of vertebrae, amongst which nearly complete epistropheus.

Scapula: region around collum.

No. 334 :

Skull: Fragments of as well neuro- as splanchno-cranium, including part of the mandibula with some teeth.

Fragments of vertebrae.

Part of femur- and humerusdiaphysis.

No. 335 :

Skull: Fragments of calvarium.

Fragments of vertebrae.

Radius: diaphysis.

No. 336 :

Skull: Fragments of calvarium.

Part of the dentition.

Fragments of costae.

No. 339 :

Parts of humerus-, radius-, ulna-, femur-, tibia-, fibuladiaphysis.

Caput femoris.

Proximal epiphysis + adjacent part of diaphysis of tibia.

Fragments of vertebrae and costae.

Some phalanges manus.

Part of o. coxae.

No. 343 :

Skull: Part of calvarium.

Fragments of mandibula.

Part of femur- and tibiadiaphysis.

Ossa cuneiformia.

No. 344 :

Cremated remains.

Altogether a small part of the skeleton, amongst which fragments of diaphysis of long bones. Very probably human. In that case it concerns a fetus or baby.

There is no reason to assume that more than one individual is involved.

Separate bones :

A. Femur (nearly complete).

B. Humerus.

C. Radius

D. Ulna.

E. Fragment of humerusdiaphysis.

F. Fragment of tibiadiaphysis.

G. Maxilla (nearly complete).

H. O. Zygomaticum.

I. Left half of calvarium.

J. Left half of mandibula.

As a supplement to the present archaeological study it seemed to be of interest to seek information about the age, sex, stature and morphological relationship of the sample. Where possible a multivariate approach was chosen. Unfortunately this could not be applied to the estimation of age, since we did not have appropriate reference material at our disposal.

Age :

The age limits given below are based on data from modern skeletal material. How far these limits are applicable to older material is not known. The age indications given below should not, therefore, be taken literally. These figures indicate only that the individuals concerned fall in the same biological-age class as individuals from a modern population having the chronological age mentioned.

The age limits are based on data from Spalteholz (1932).

No. 292 :

Union of proximal epiphysis of femur with diaphysis is complete:

Adult or mature.

General impression: older than about 50 years.

No. 296 :

Age indications practically identical with No. 292:

older than about 50 years.

No. 334 :

Suture closure completed. Severe wear of teeth. Both these data point to individual of adult or rather mature age.

No. 335 :

Diaphysis of radius shows characteristics of non-union: younger than 21 years. Suture closure is, however, in an advanced stage.

All skull parts have adult dimensions.

Conclusion: individual is presumably not much younger than 21 years.

No. 336 :

From its dimensions it is evident that the skeleton belongs to a child of 5 to 12 years.

No. 339 :

Non-union of proximal epiphysis of ulna: younger than 18 years.

Incomplete union of the epiphysis of the phalanges of the hand: 18 to 20 years.

Non-union of proximal epiphysis of femur: younger than 19 years.

According to these slightly contradictory data the individual would be about 18 years old.

Separate bones :

When using dia-epiphyseal union as a criterion, the femur, humerus, radius and ulna all belong to adult or mature individuals. The maxilla and mandibula belong likewise to individuals of these age groups.

Sex :

It was tried to determine the sex of the adult individuals by means of Discriminatory Analysis. The discriminant functions were computed with the aid of a reference series comprising 66 male and 62 female skeletons from a modern Amsterdam cemetery. The quality of the comparative material available did not permit sexing of No. 343 and the separate bones, with the exception of the ulna by discriminatory analysis.

It has been found previously by the present author that the variation between populations in respect to the parameters of the distributions of discriminant function scores of historic European populations amounts to about 5 %.

Consequently, errors due to variation in gross size between populations may be avoided by, on the one hand, classifying an individual as a female on the basis of distributions of scores with 5 % smaller parameters than those of the reference series and, on the other hand, by similarly increasing those parameters by 5 % on classifying an individual as a male.

The only remaining bias in the classification is then due to the variation in sexual dimorphism, but, as has previously been found by the author, this variation may be neglected in practice. A difficulty, naturally, is that in comparison with individuals belonging to known populations, an importantly larger percentage of individuals cannot be classified.

The results were the following:

No. 292 :

A discriminant function composed of 7 weighted measurements was computed.

The sectioning value separating the males and females of the reference population, \bar{D} , is equal to 63.37. The score on the function of individual No. 292 D_{292} is equal to 59.96, which is lower than $\bar{D} - 5\% = 60.21$. Consequently it is allowable to classify the individual on the basis of the 5 % smaller parameters.

The further computed probability based on the rectified parameter values that the classification is correct is, however, only 1.28 to 1.

Conclusion: the individual is more probably female than male. However, the classification cannot statistically be ascertained.

No. 296:

Function with 9 post-cranial measurements:

$$D = 78.53 \quad D_{296} = 87.99 : 12.819 \text{ to } 1 \text{ male.}$$

$$D + 5\% = 82.45 \quad : \quad 253 \text{ to } 1 \text{ male.}$$

Function with 6 cranial measurements: about the same result.

Practical conclusion: individual is certainly male.

No. 334:

Function with 4 measurements.

$$D = 31.74 \quad D_{334} = 33.05 : 3.67 \text{ to } 1 \text{ male.}$$

$$D + 5\% = 33.33 \quad : \quad 1.33 \text{ to } 1 \text{ male.}$$

Conclusion: no decision is possible.

Ulna D:

Function with 4 measurements.

$$D = 29.01 \quad D = 35.21 : 492 \text{ to } 1 \text{ male.}$$

$$D + 5\% = 30.46 \quad : \quad 115 \text{ to } 1 \text{ male.}$$

Stature

Here too the reservation holds that computations based on a modern population apply strictly speaking only to individuals from that population.

However, a reasonable accuracy will be obtained by increasing the reliability limits of the estimated stature mentioned below by about 2 cms.

The formulae for the estimation of the stature were taken from Trotter and Gleser (1952).

Since the regression formulae are very different for the two sexes, only individuals of whose sex we were certain were considered. Clearly a second restriction had to be that the stature could be estimated only of individuals of which a long bone in its full length had been found.

Consequently an estimation was feasible in only 2 instances, namely

1. for No. 292, where the stature S_{292} was estimated on the basis of the length of the femur according to the formula for male whites: 2.38_* (length femur) + $61.41 \pm 3.27 = S$. in cm.

Result: $S_{292} = 164.94 \pm 3.27$ cm.

2. for the ulna D.

Here holds (formula for male whites):

$S = 3.70_{*} (\text{length ulna}) + 74.05 \pm 4.32 \text{ cm.}$

Result: $S_D = 183.73 \pm 4.32 \text{ cm.}$

Morphological relationship

For the determination of a morphological relationship only the skull of No.296 could be considered, as comparative measurements from historically and geographically relevant material were only available for skulls.

The method used was the multiple Discriminatory Analysis by Mahalanobis (D^2).

The following series were used:

- 1. Skulls from row-graves near Hannover, dating from the Merovingian period (Hauschild, 1926).
- 2. Skulls from Farringdon street in London. Date *ca.* 17th century (Hooke, 1926).
- 3. Skulls from the row-graves from Bremen, dating from the 9th to the 14th century (Gildemeister, 1879).

Three different types are discriminated by Gildemeister. The first two are according to Gildemeister not uncommonly found in row-graves. The third is the so-called “Bataver” type. Their prescence should be attributed to immigration by Dutch Frisians.

- 4. Skulls from terps in the Frisian part of the Netherlands (Barger, 1912).
- 5. Amsterdam skulls of the 19th century (De Froe, 1938).
- 6. Skulls from Valkenburg near Leiden. Medieval (Salomé, 1963).

The results are given in the table below.

D²-TABLE (= 1000)

Group											
1. Row-graves, Anderten	♂♂	N =	41								
2. Farringdon	♂♂	N =	95	760							
3. Row-graves, Bremen (type I)	♂♂	N =	27	237	1020						
4. Row-graves, Bremen (type II)	♂♂	N =	19	2678	2811	2339					
5. Row-graves, Bremen('BataverTypus')	♂♂	N =	10	4983	4230	5097	1951				
6. Frisian terp skulls	♂♂ + ♀♀	N =	35	2998	3741	2752	1134	3945			
7. Amsterdam	♂♂	N =	87	4298	1540	4987	6283	5704	7958		
8. Valkenburg	♂♂	N =	223	2494	890	3204	4602	3822	6015	668	
9. Paddepoel No. 296	♂	N =	1	7984	7772	6845	7429	11.733	11.678	11.837	12.040
Group			1	2	3	4	5	6	7	8	

Although the D^2 values of the Paddepoel skull are strikingly higher than the others, it is not allowable to conclude definitely from the table that the skull does not belong to one of the other samples, as none of these values is significant.

$$\left(D^2 = \frac{N_A \cdot N_B}{N_A + N_B} \times \frac{2}{p}, \text{ where } p \text{ is number of orthogonally transformed variables} \right)$$

Here $p = 6 \times \frac{2}{6; \times 0.05} = 12.592$

On the other hand something of interest must be going on, since all Paddepoel values are high. On testing them together – which would require elaborate precautions the D^2 values are correlated – a significant result might be expected.

The striking result is that the Paddepoel skull is quite different from the other skull series, as its distances to other skull series represent by far the highest values.

A quite unexpected result, that raises the question, among others, as to whether the skull has been dated correctly. Its overall impression is an antique one. There is, for instance, a remarkable dolichocephaly and a “chignon occipitale” as is known from Cro-Magnon skulls.

The most deviant single measurement is the length of the frontal arch, which is exceptionally great.

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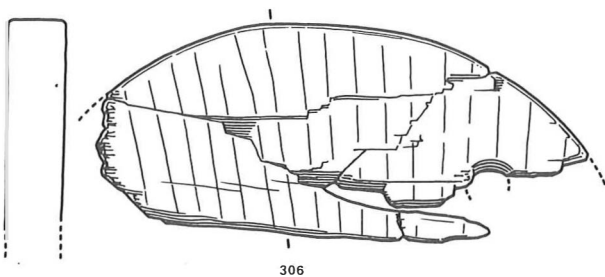
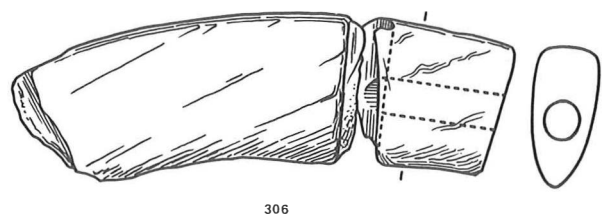


Fig. 18. Wooden objects: Paddepoel III. Scale 1:6.

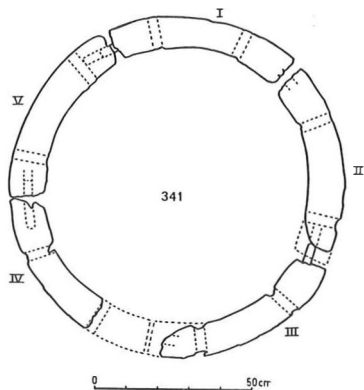


Fig. 19. Wooden objects: Paddepoel IV. Scale 1:24.

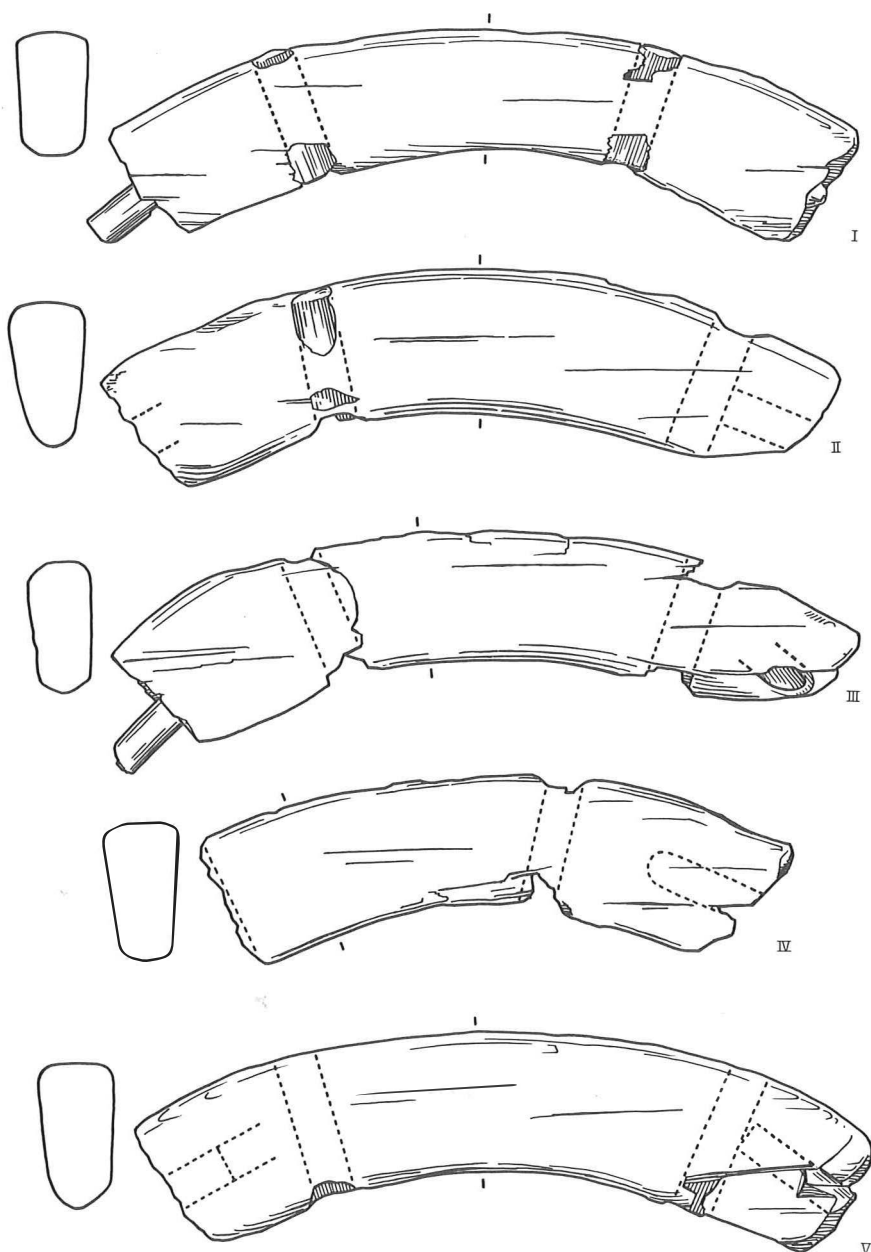


Fig. 20. Wooden objects: segments of felloe of spoked wheel of beech-wood, Paddepoel IV. Scale 1:6.

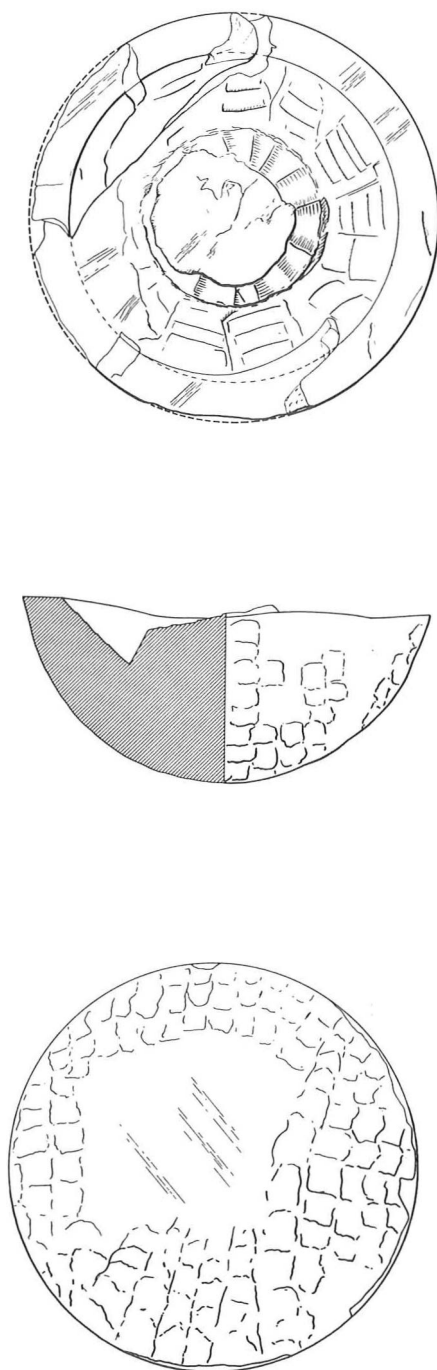


Fig. 21. Rough-out of bowl of maple-wood. Paddepoel III. Scale 1:5.

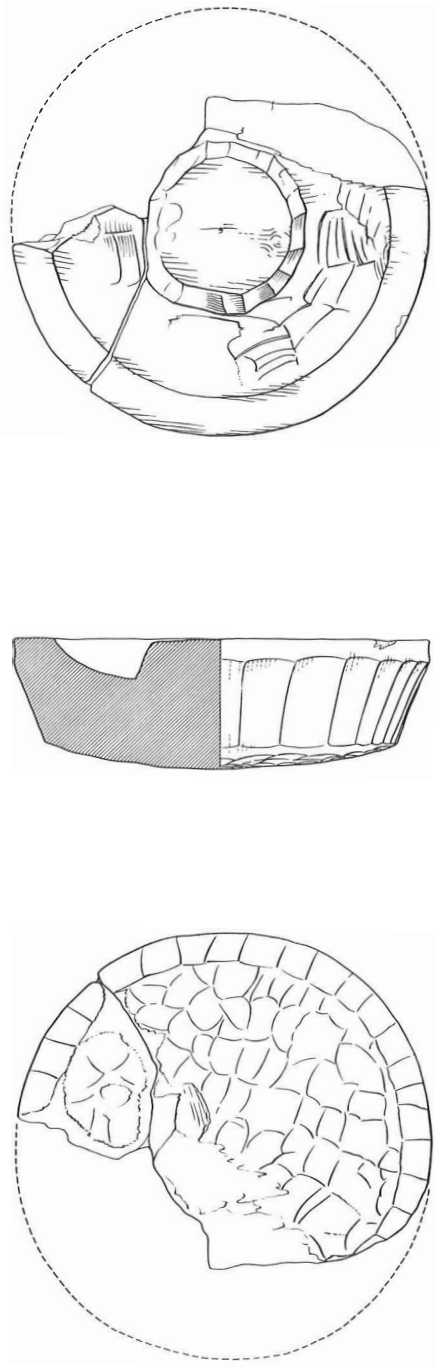


Fig. 22. Rough-out of bowl of maple-wood. Paddepoel III. Scale 1:5.

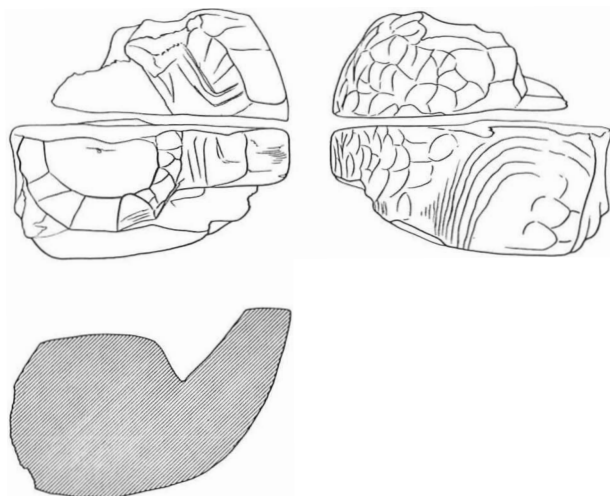


Fig. 23. Fragment of rough-out of bowl of maple-wood. Paddepoel III. Scale 1:5.



Fig. 24. Fragments of rough-outs of bowls of maple-wood, Paddepoel III. Scale 1:5.

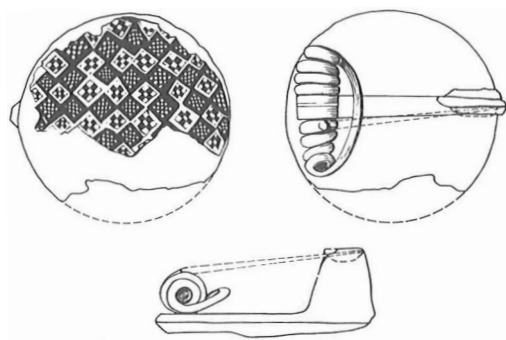


Fig. 25. Enamelled brooch. Paddepoel III. Scale 1:1

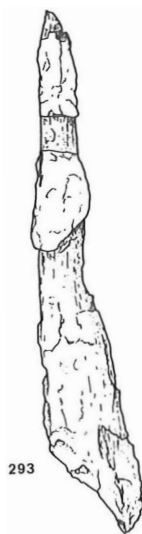


Fig 26. Iron knife. Paddepoel IV. Scale 1:3.

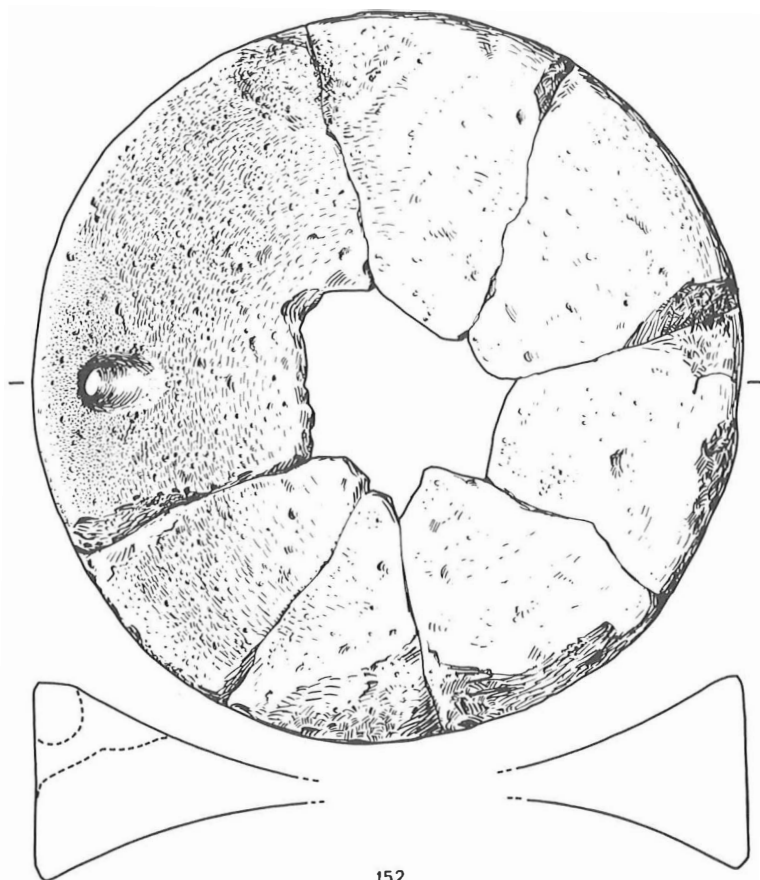
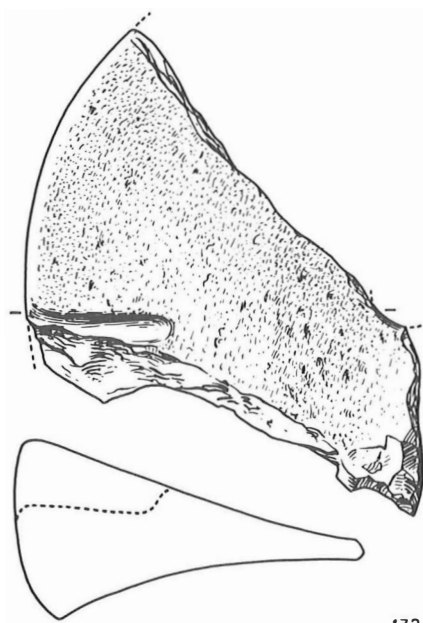
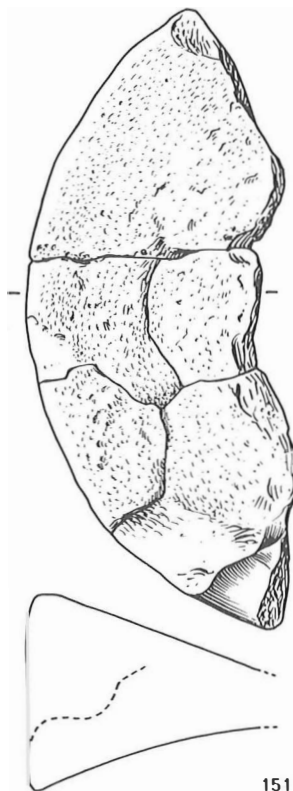


Fig. 27. Fragments of quern of basalt lava. Paddepoel I-III. Scale 1:4.



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Fig. 28. Fragments of querns of basalt lava. Paddepoel I–III. Scale 1:4.

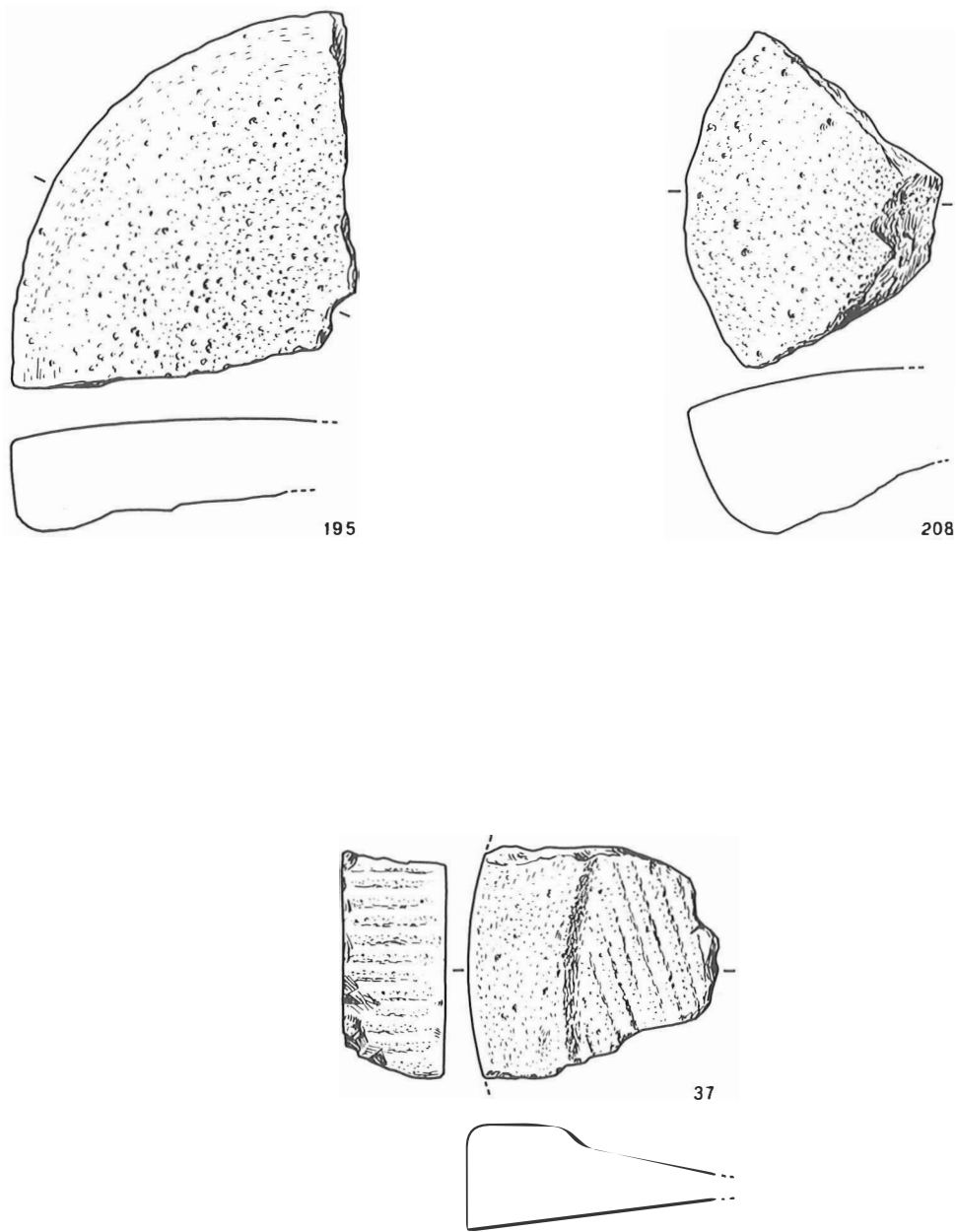


Fig.29. Fragments of querns of basalt lava. Paddepoel I-III. Scale 1:4.

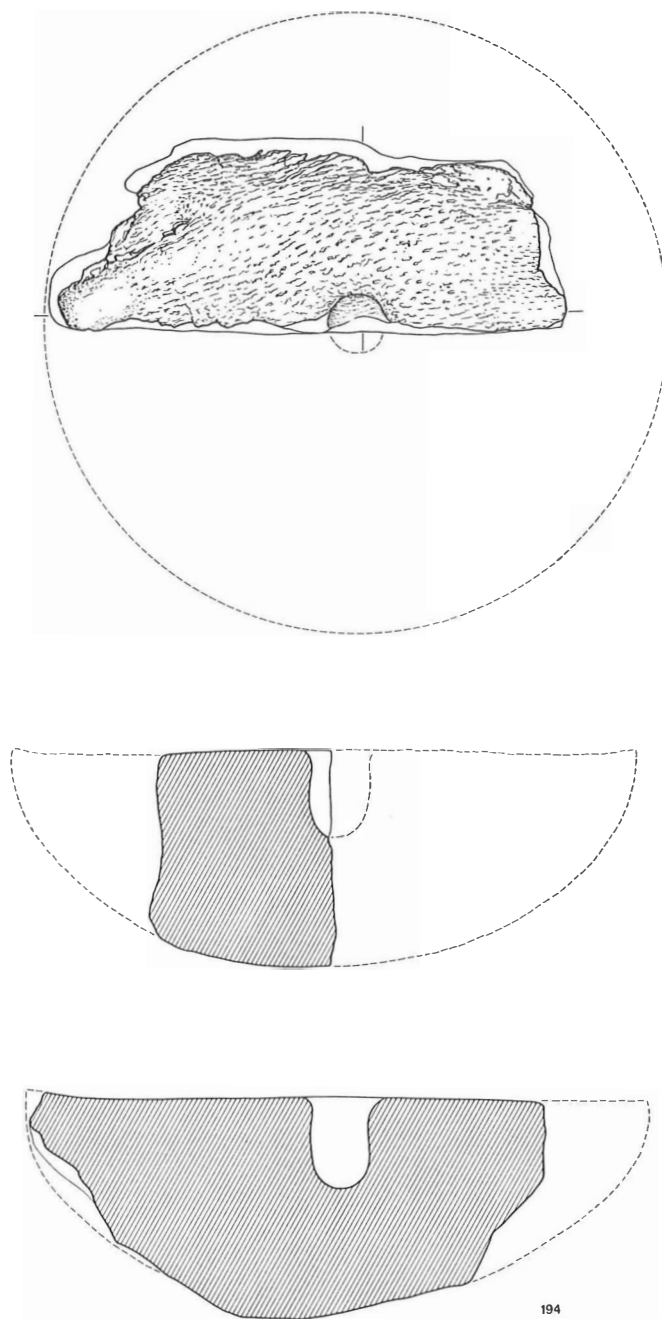


Fig. 30. Fragment of rotary quern of gneiss. Paddepoel III. Scale 1:5.

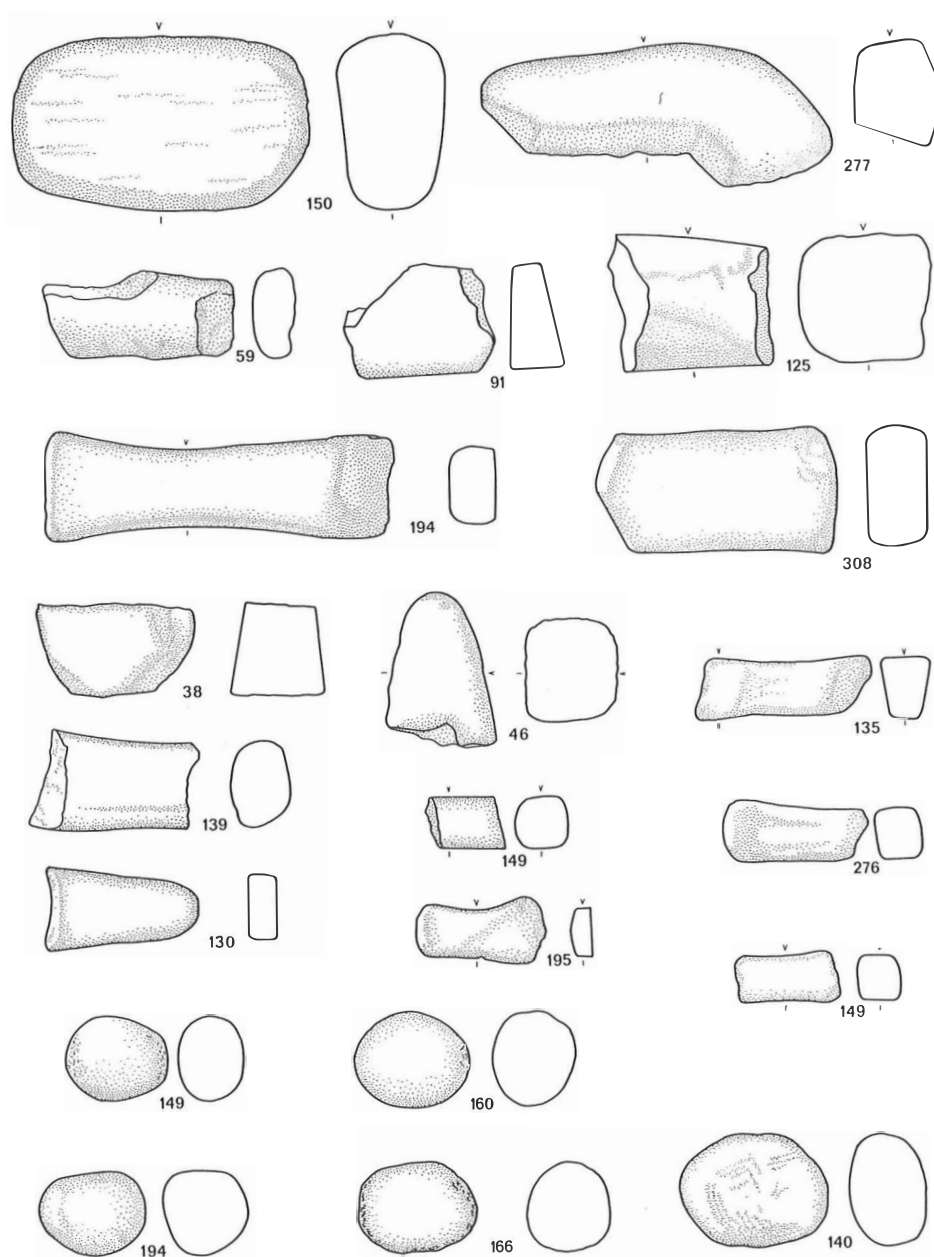


Fig. 31. Whetstones and lapstones. Paddepoel II and III. Scale 1:4.

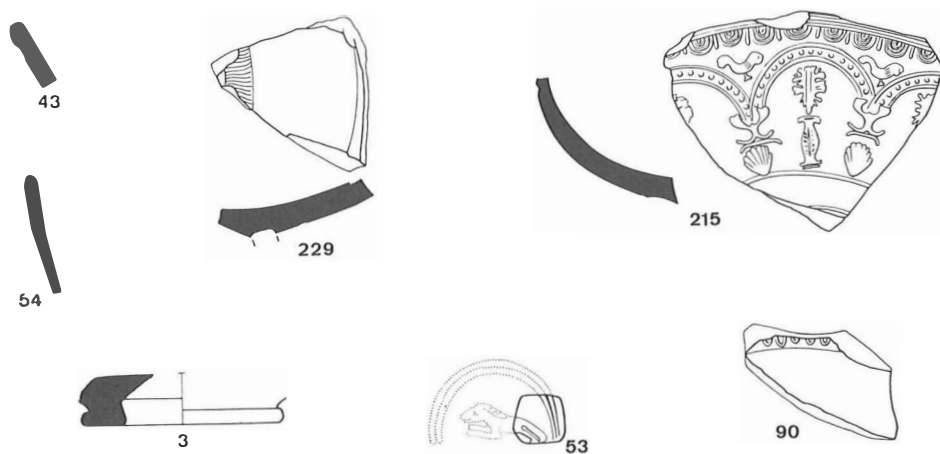


Fig. 32. Roman pottery: terra sigillata. Paddepoel I-III. Scale 1:3.

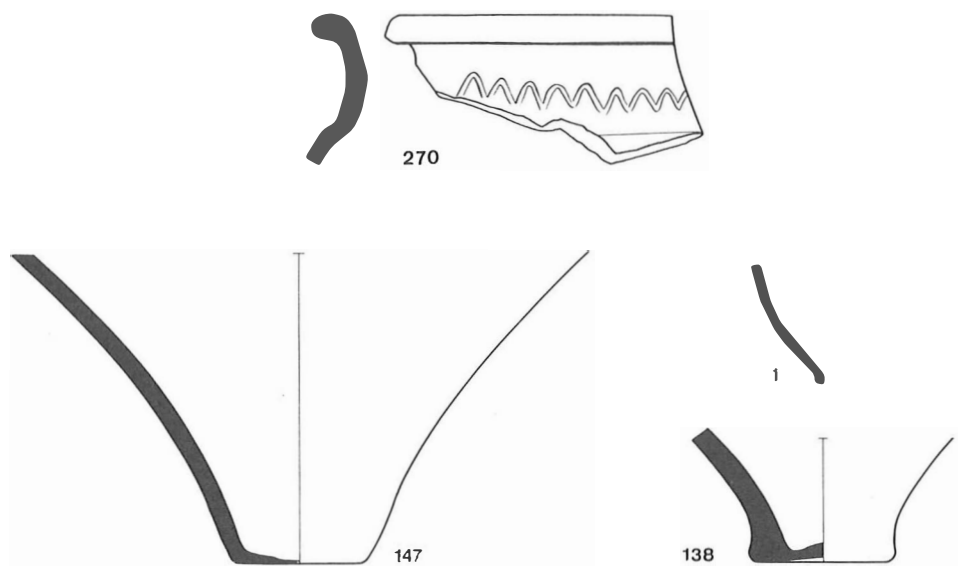


Fig. 33. Roman pottery: terra nigra-like pottery and rough pottery. Paddepoel I-III. Scale 1:3.

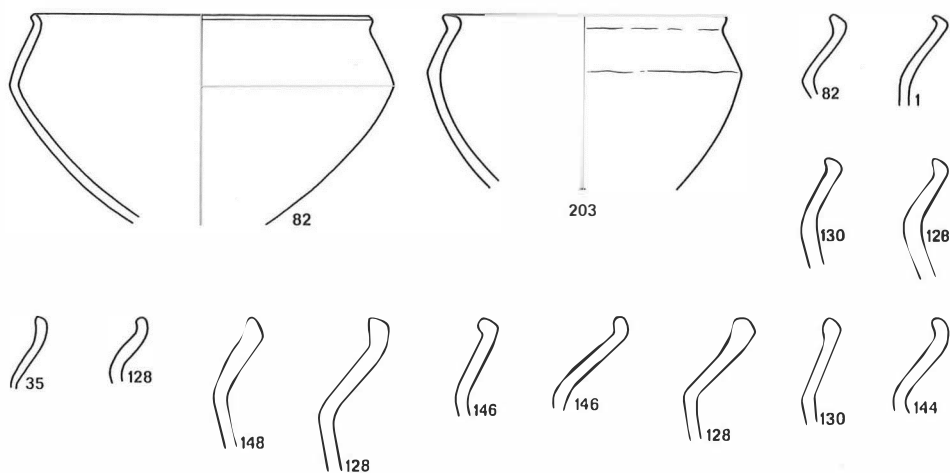


Fig. 34. Hand-made pottery: type IA. Paddepoel I-III. Scale 1:4.

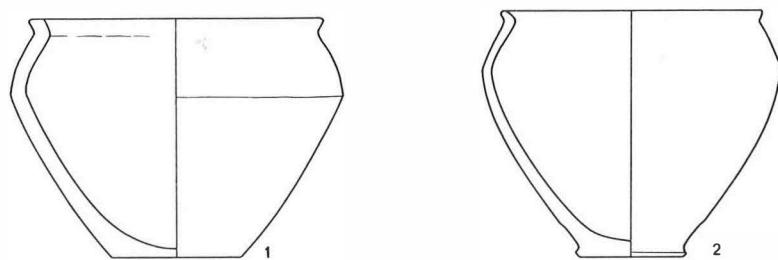


Fig. 35. Hand-made pottery: type IA. 1: Wierhuizen (GM 1923/VIII 2), 2: Ezinge (GM 1932/IV-XI 1144). Scale 1:4.

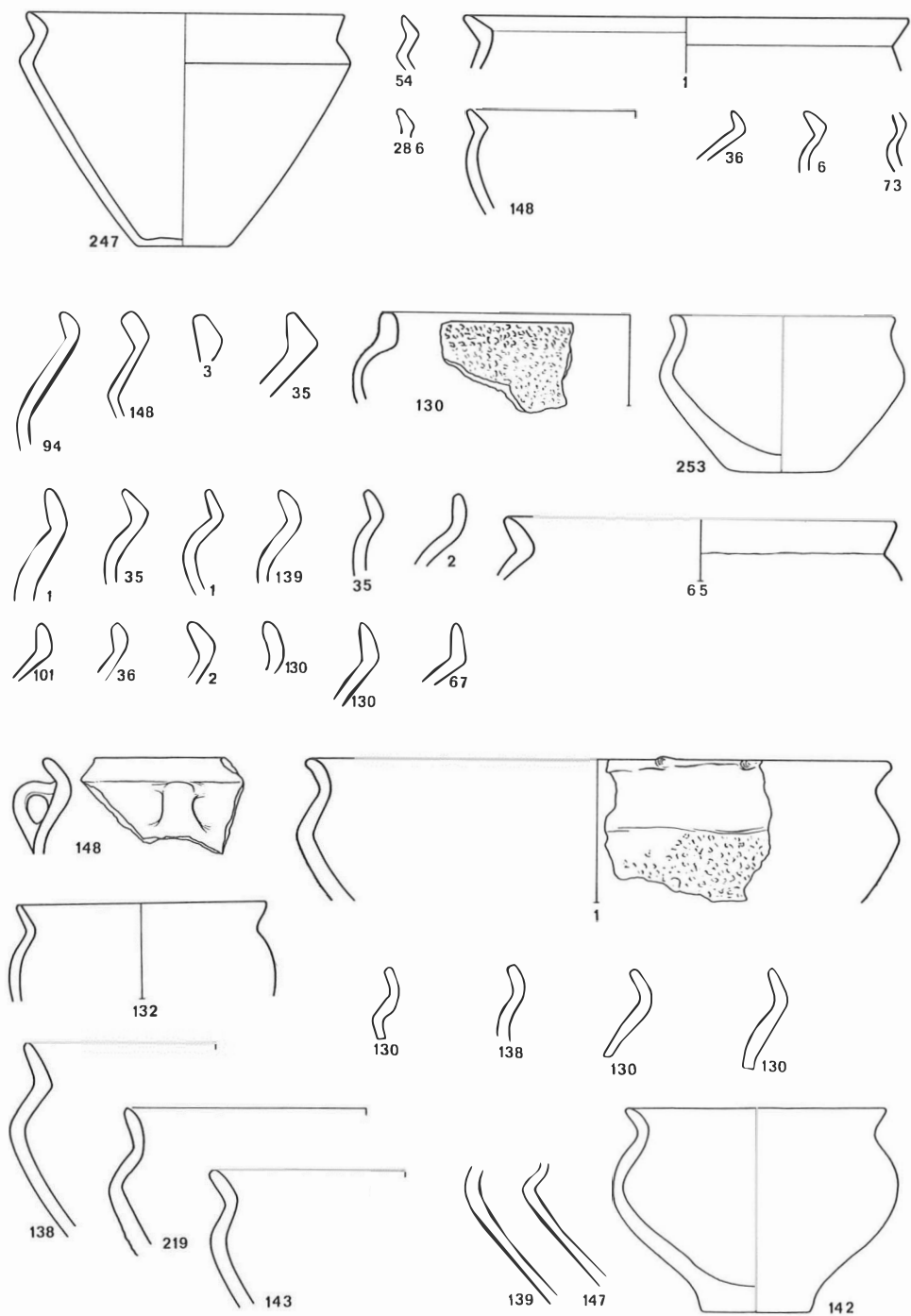


Fig. 36. Hand-made pottery: type IB. Paddepoel I-III. Scale 1:4.

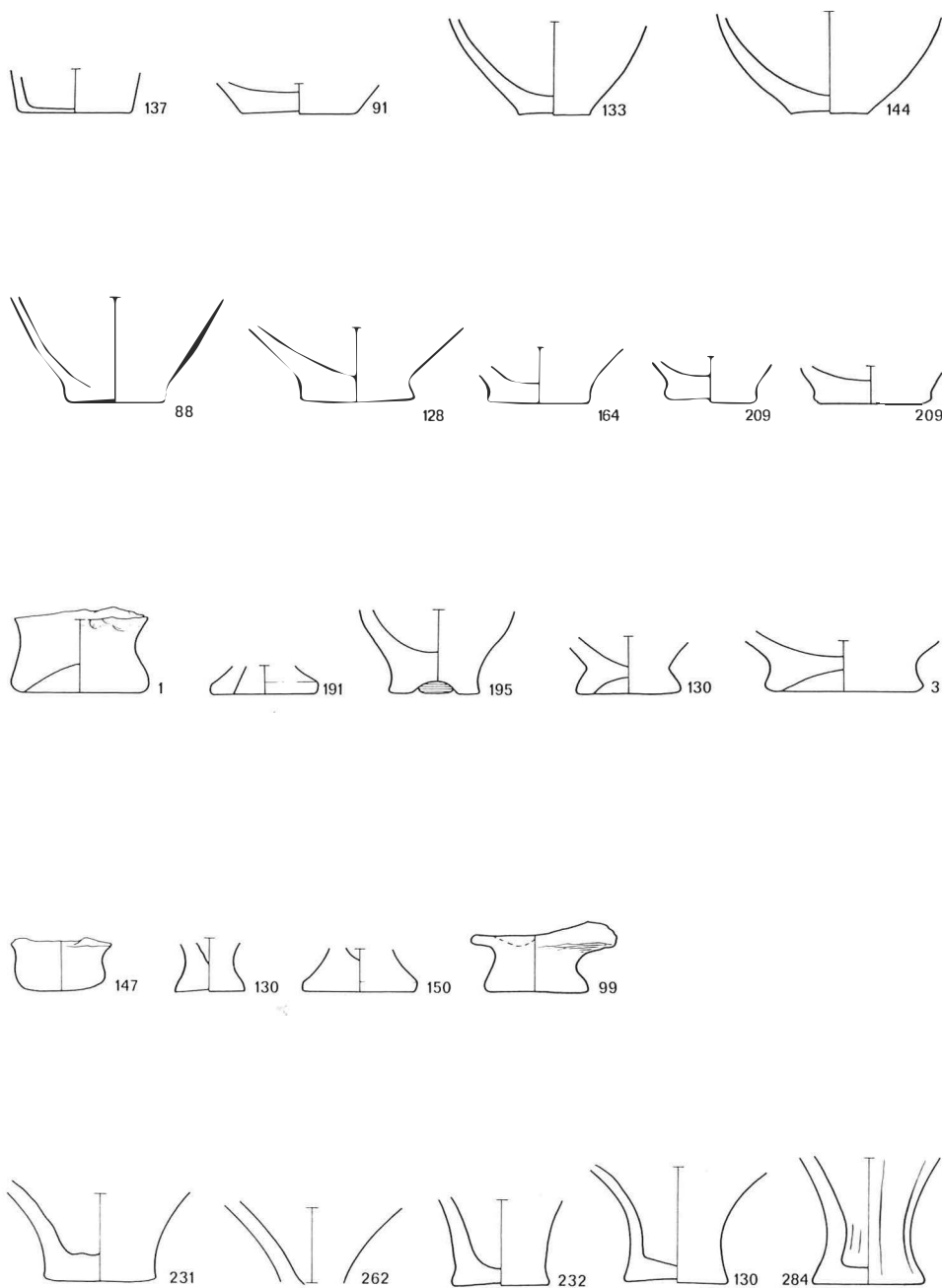


Fig. 37. Hand-made pottery: cup bases. Paddepoel I-III. Scale 1:4.

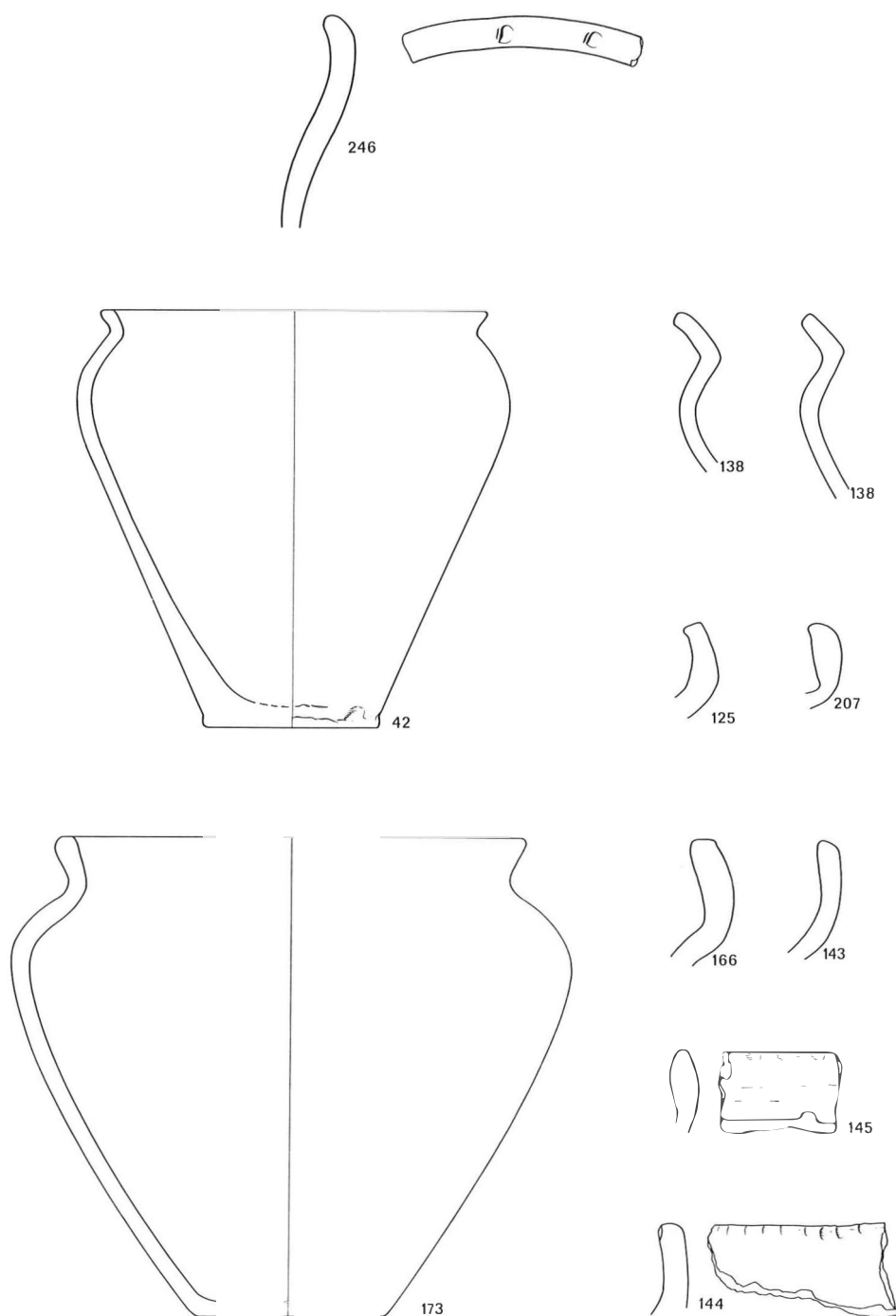


Fig. 38. Hand-made pottery: type II. Paddepoel I-III. Scale 1:4.

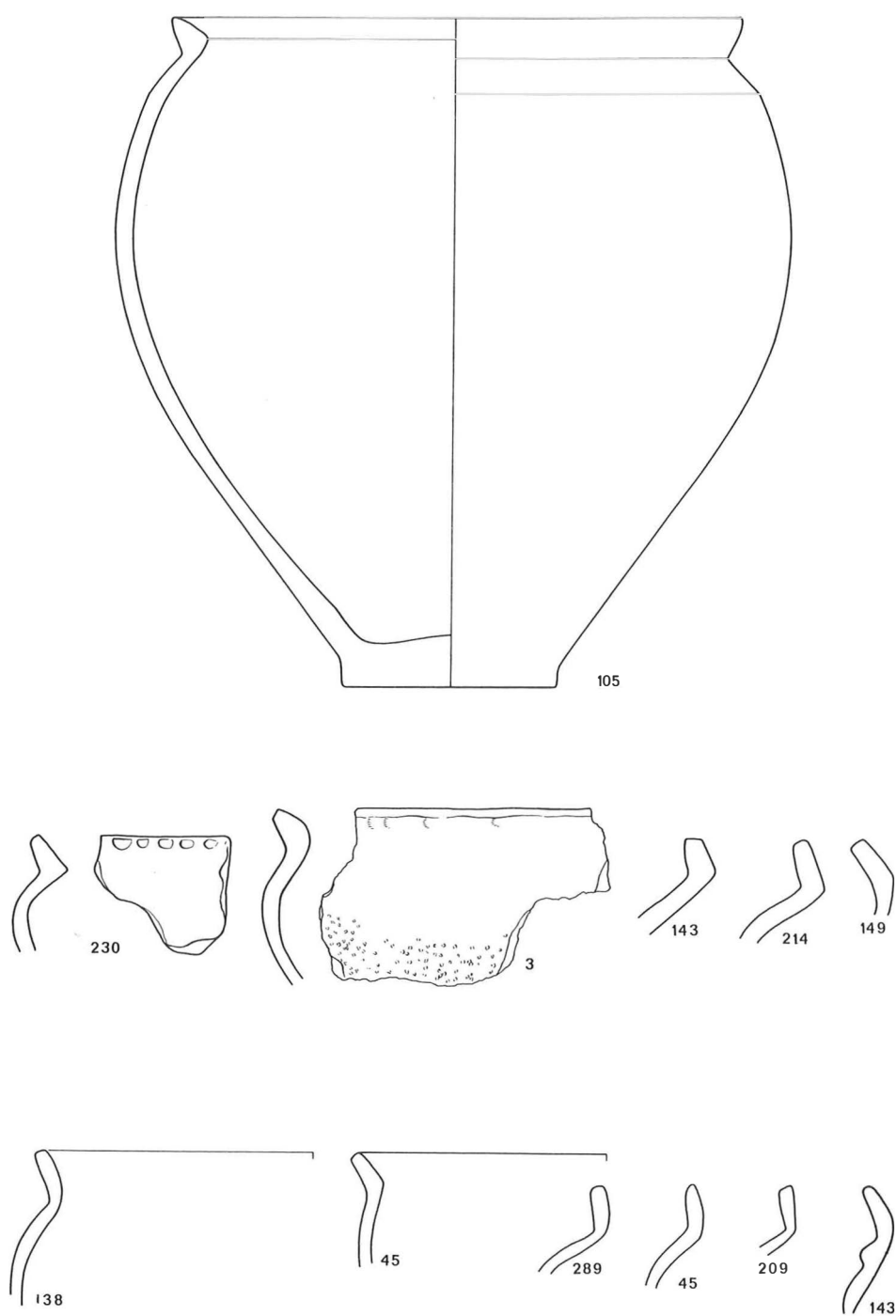


Fig. 39. Hand-made pottery: type II. Paddepoel I-III. Scale 1:4.

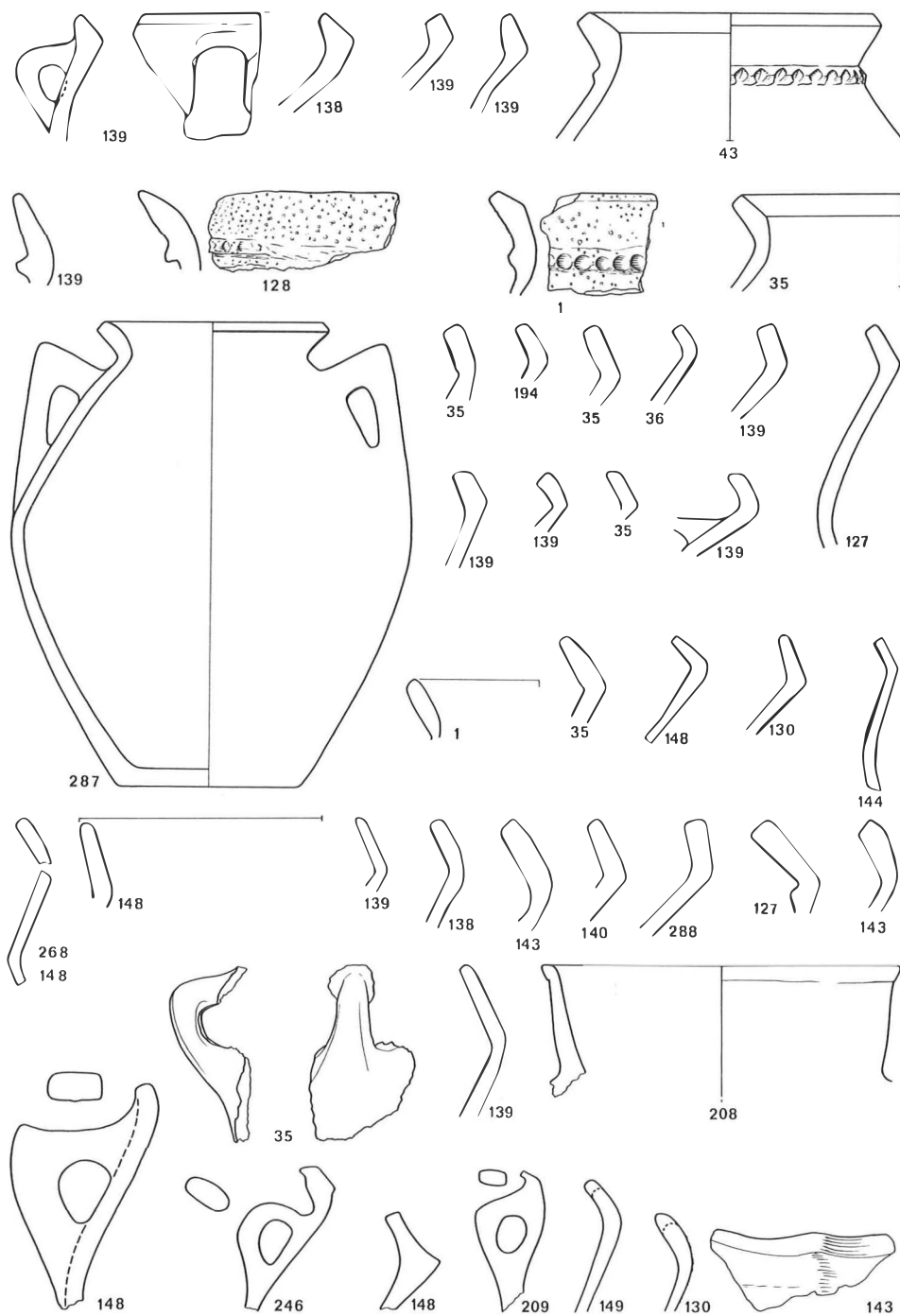


Fig. 40. Hand-made pottery: type IIIA. Paddepoel I–III. Scale 1:4.

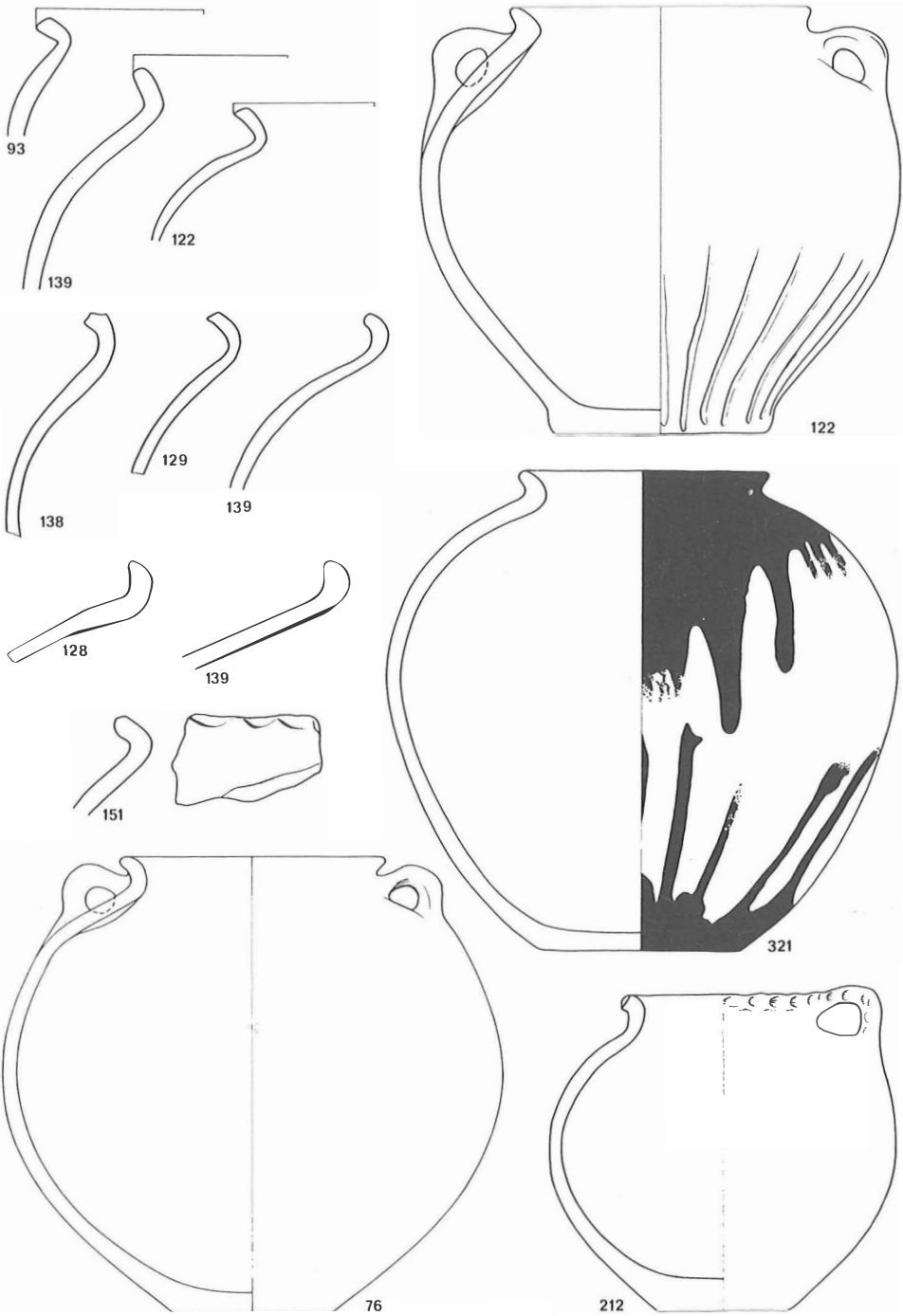


Fig.42. Hand-made pottery: type IIIC. Paddepoel I-III. Scale 1:4.

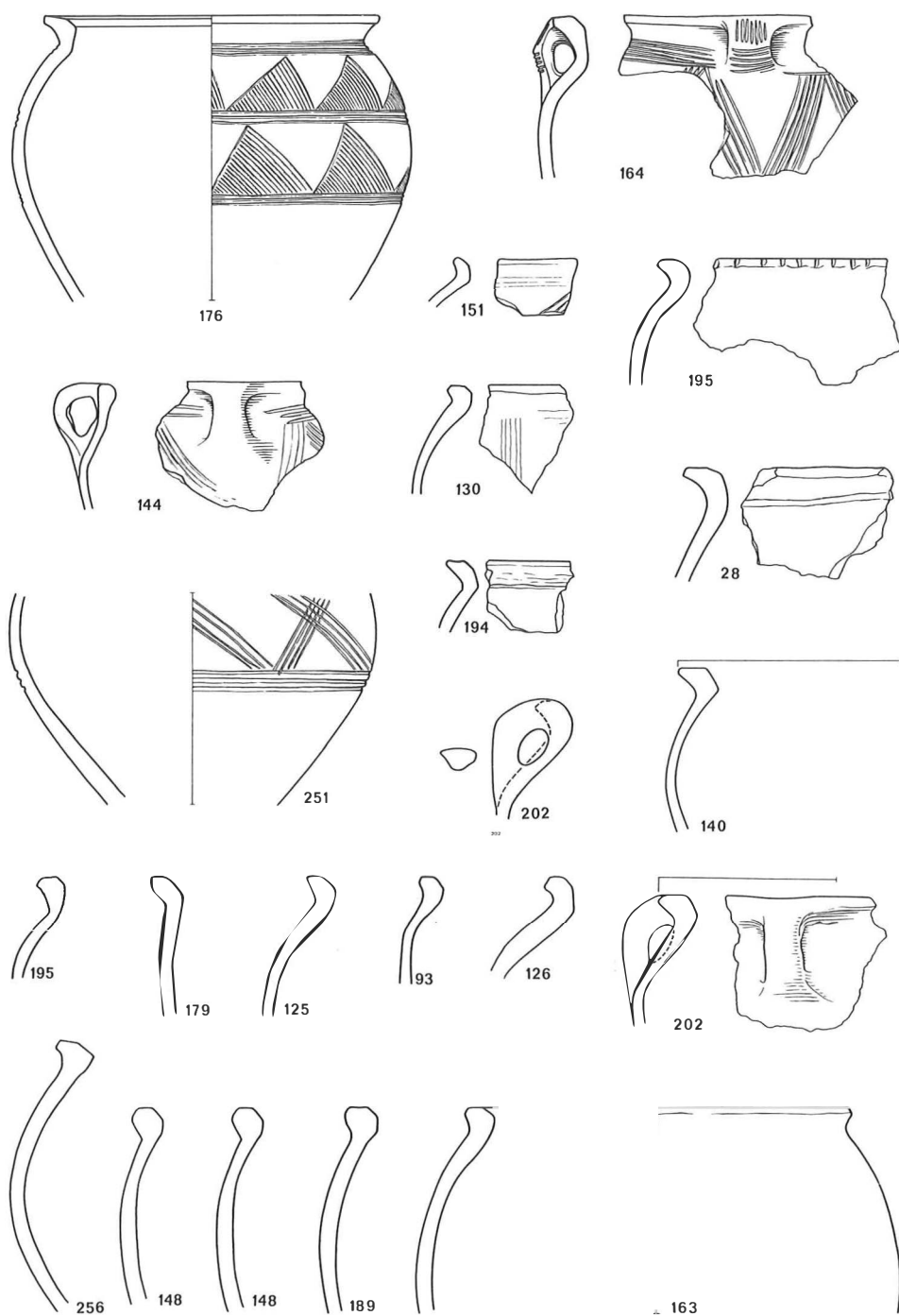


Fig. 43. Hand-made pottery: type IVA. Paddepoel I-III. Scale 1:4.

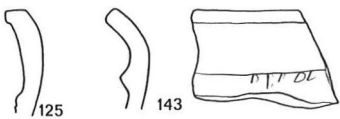


Fig.41. Hand-made pottery: type IIIB. Paddepoel I-III. Scale 1:4.

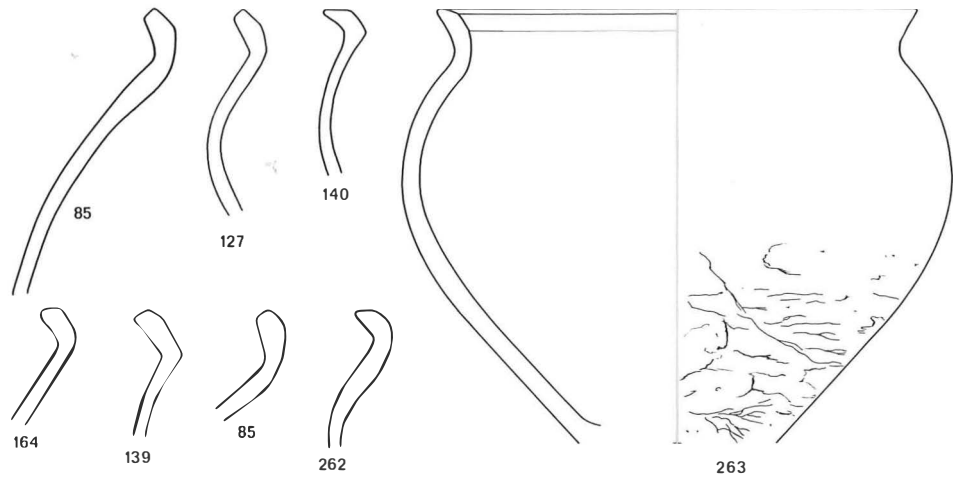


Fig. 44. Hand-made pottery: type IVA. Paddepoel I-III. Scale 1:4.

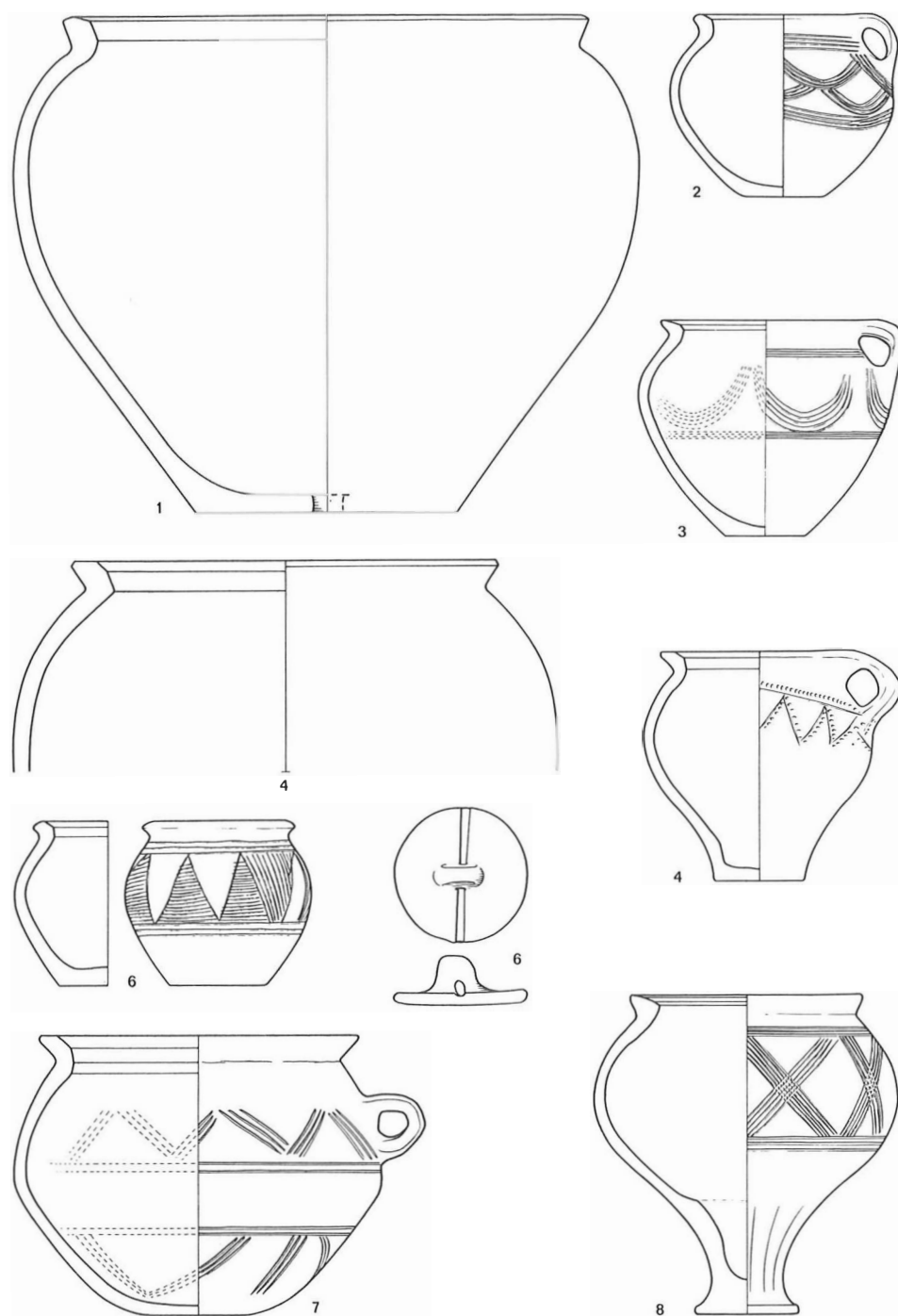


Fig. 45. Hand-made pottery: type IVA. 1: Ezinge (GM 1930/IV 412), 2: Hoogebeintum (Fries Museum, Leeuwarden), 3: Antum (GM 1908/VI 112), 4: Ezinge (GM 1930/IV 416), 5: Ezinge (GM 1932/IV-XI 1176), 6: Valkum near Winsum (Gr.) (GM 1889/VI, 2, 2^A), 7: Ezinge (GM 1932/IV-XI 1168), 8: Wierhuizen near Appingedam (BAI 1918/I 1).

Scale 1:4.

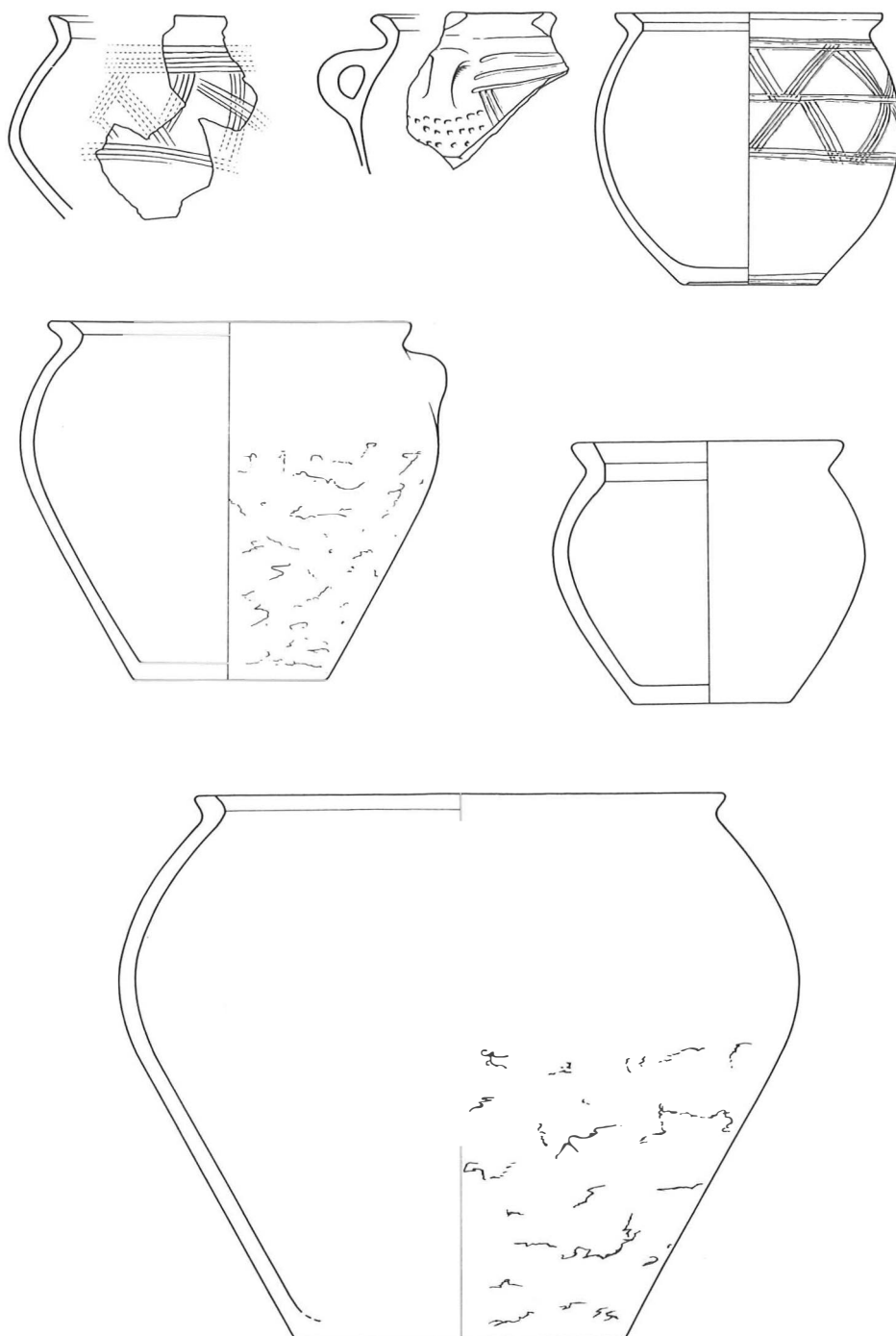


Fig. 46. Hand-made pottery: type IVA. Zeijen (Provinciaal Museum Drente, Assen, 1934/VII 6, 6^{a-c}). Scale 1:4.

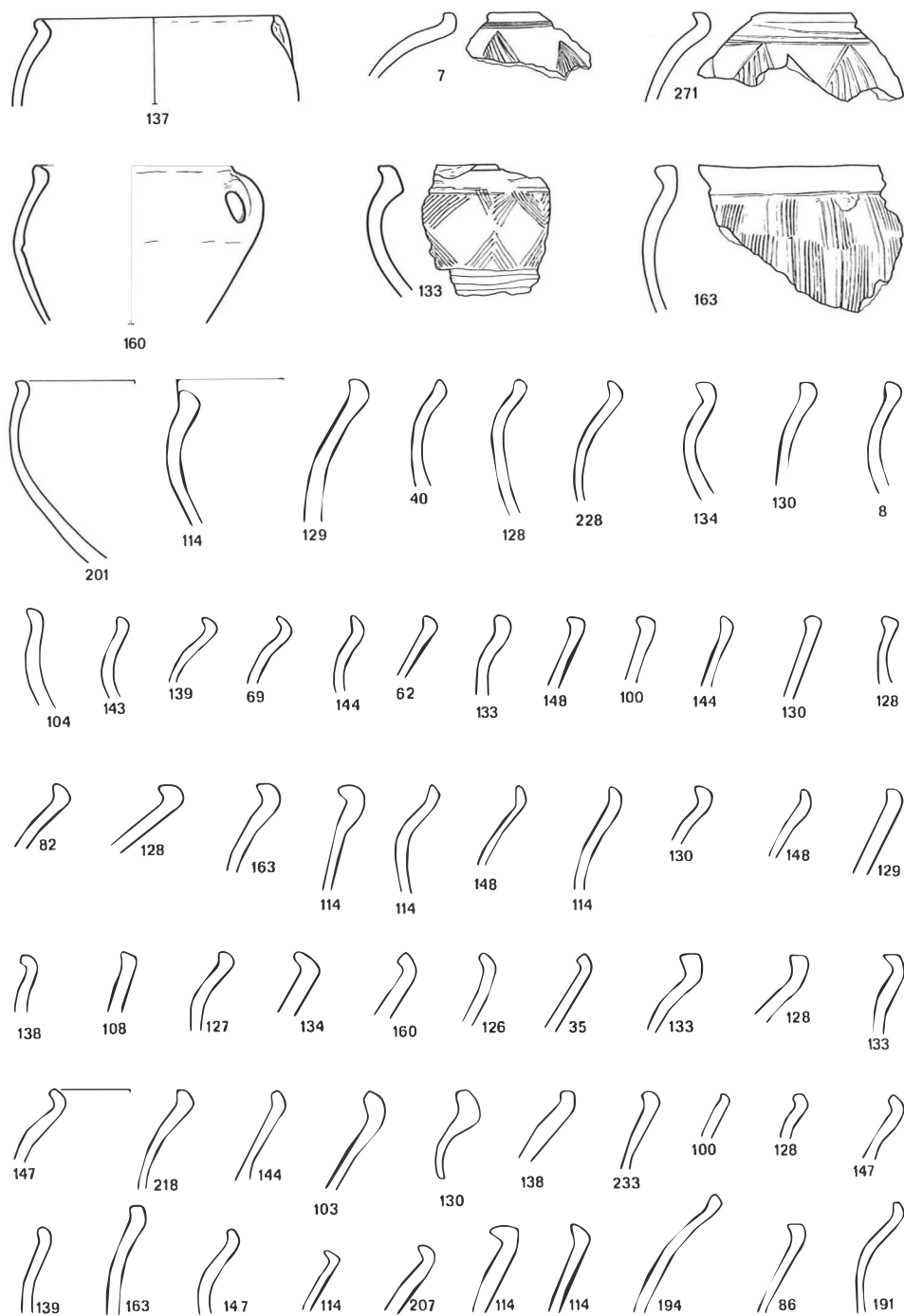


Fig. 47. Hand-made pottery: type IVB. Paddepoel I–III. Scale 1:4.

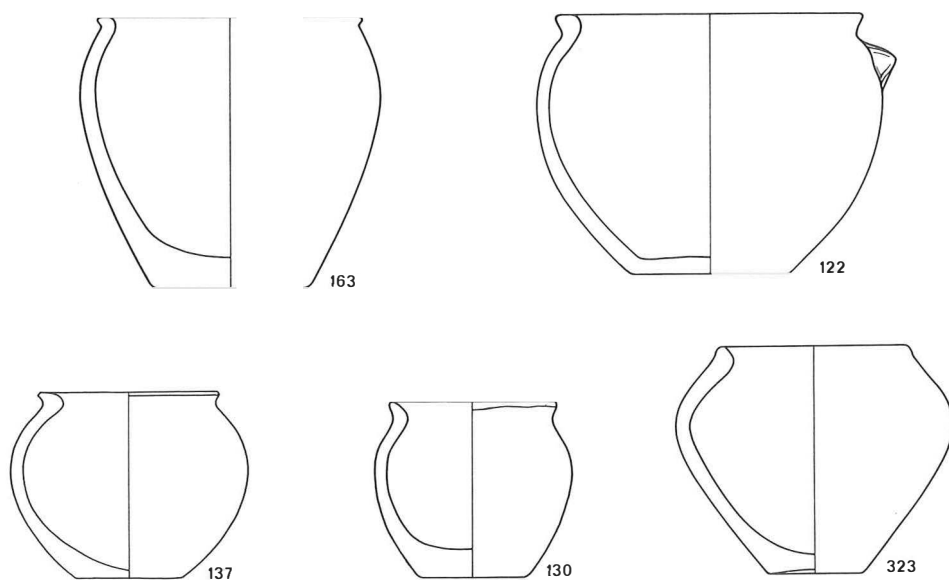


Fig.48. Hand-made pottery: type IVB. Paddepoel I-III. Scale 1:4.

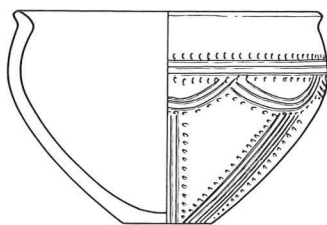


Fig.49. Hand-made pottery: type IVB. Ezinga (GM 1932/IV-XI 1090). Scale 1:4.

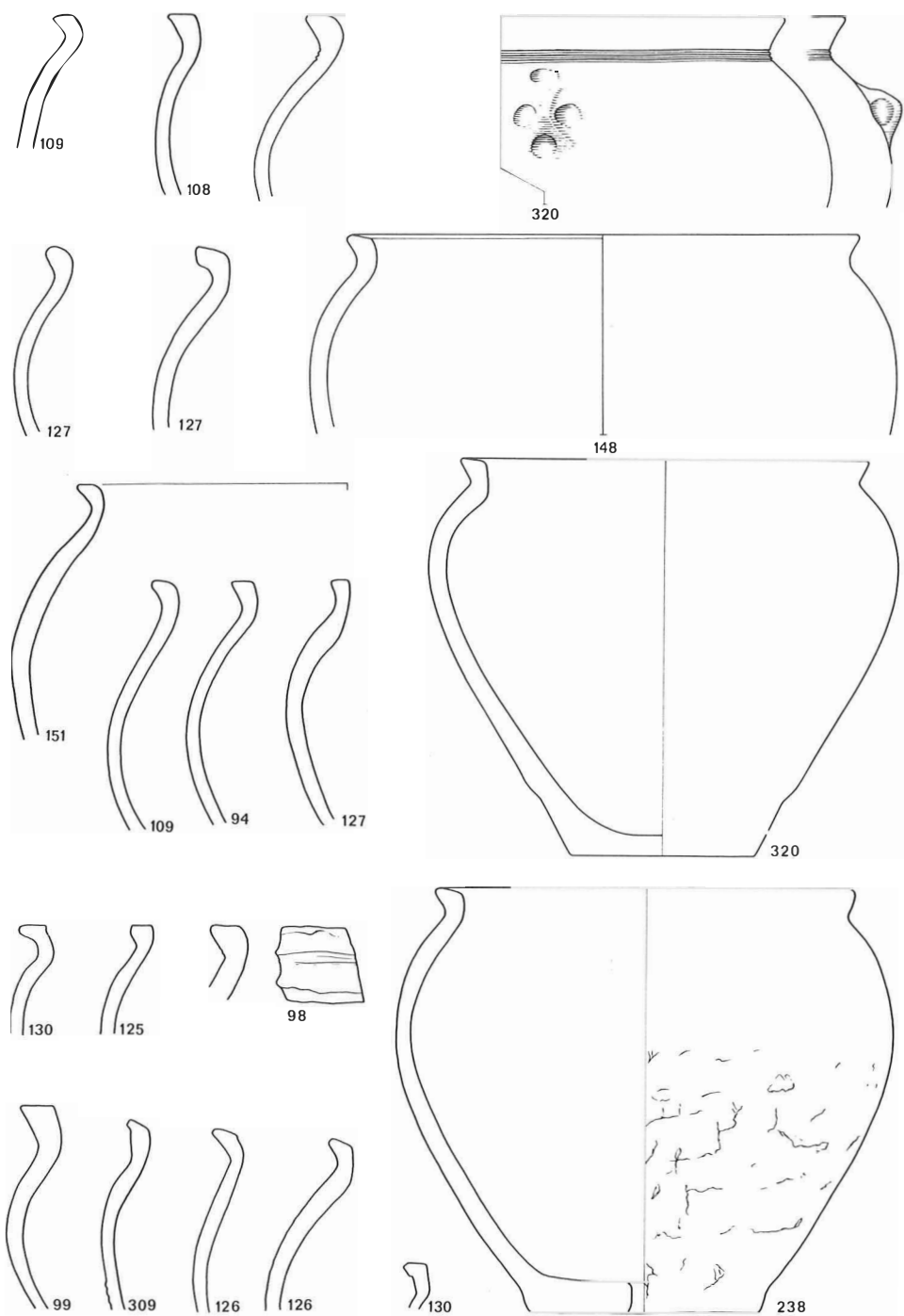


Fig. 50. Hand-made pottery: type IVC. Paddepoel I-III. Scale 1:4.

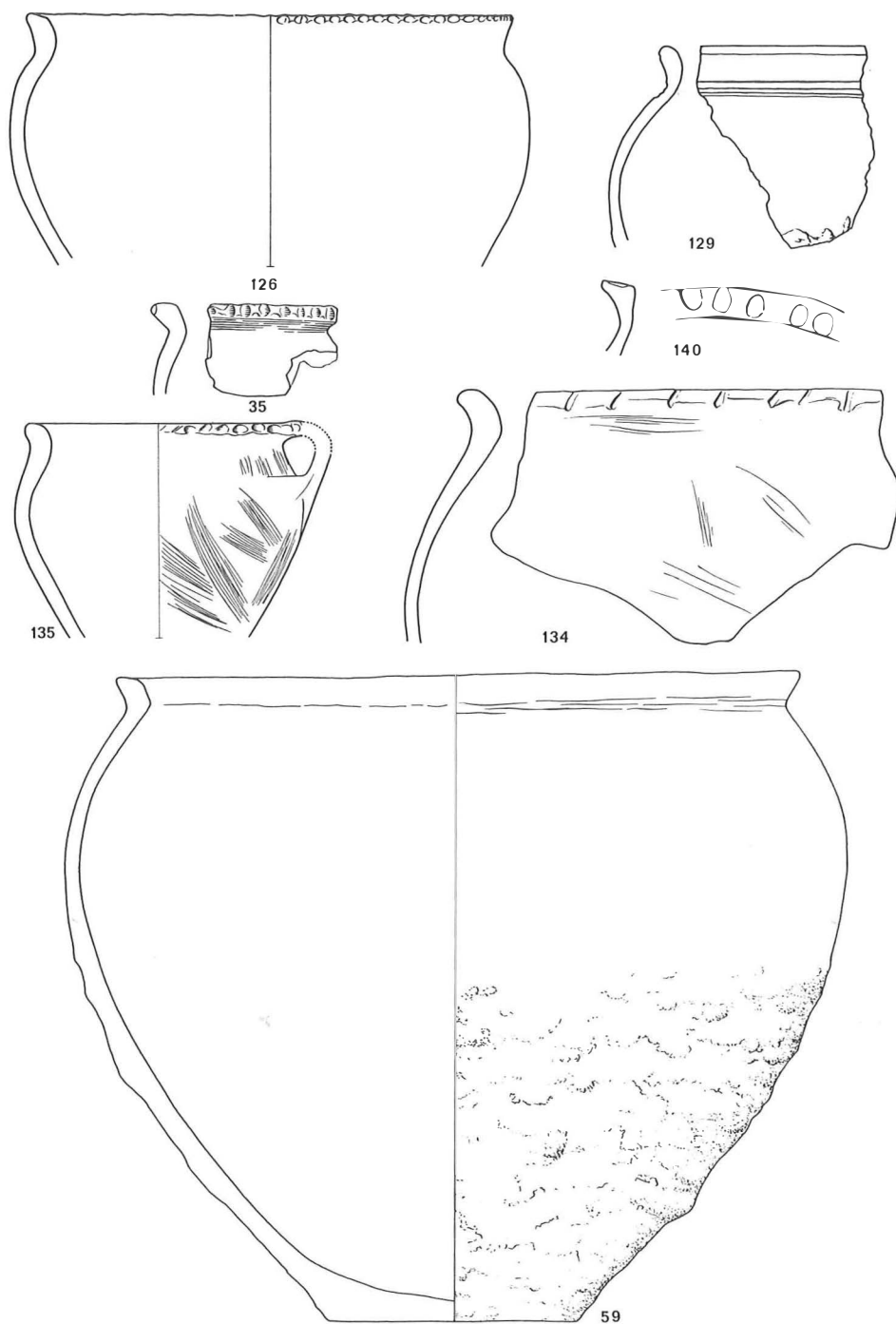


Fig. 51. Hand-made pottery: type IVC. Paddepoel I-III. Scale 1:4.

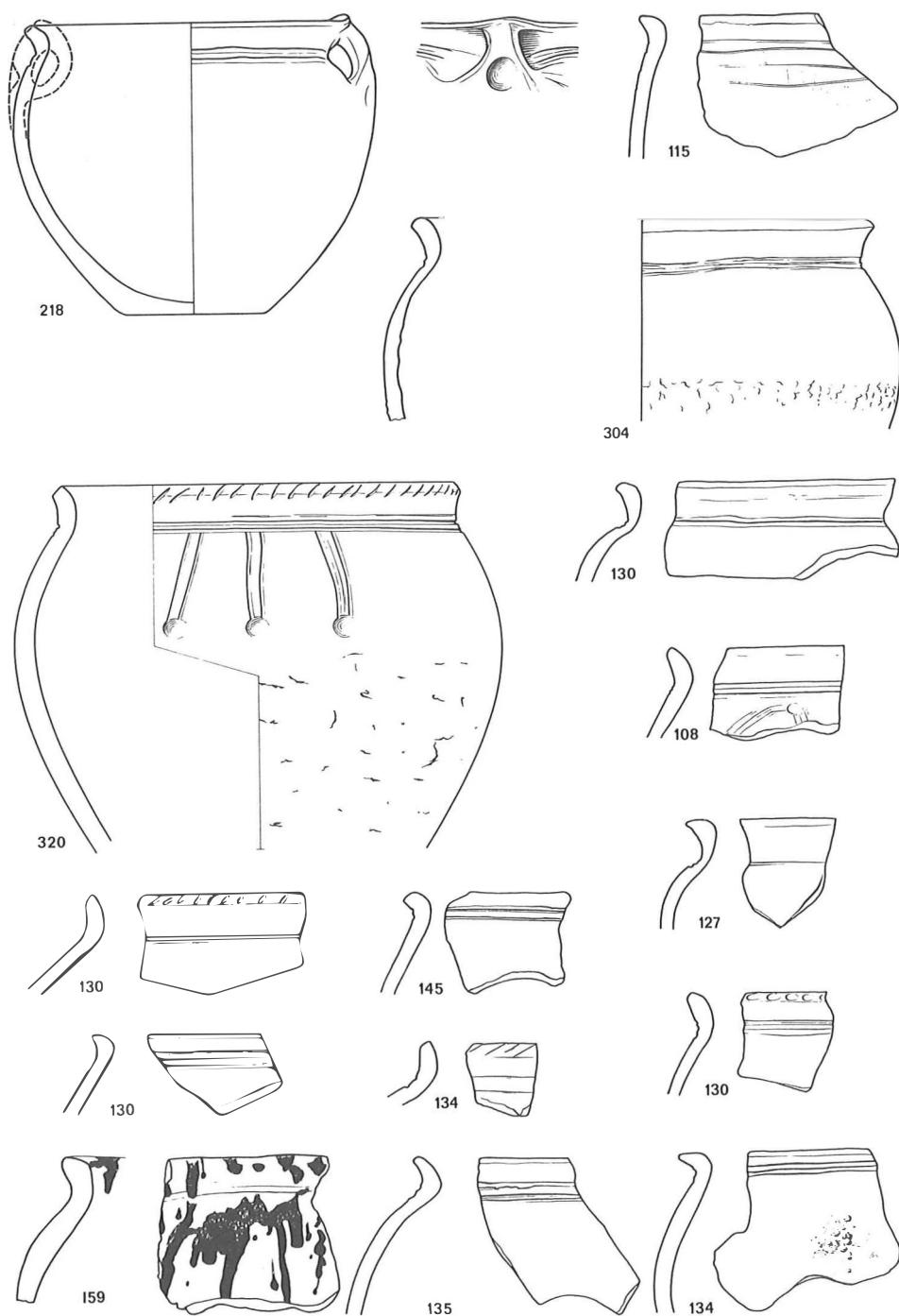


Fig.52. Hand-made pottery: type IVC. Paddepoel I–III. Scale 1:4.

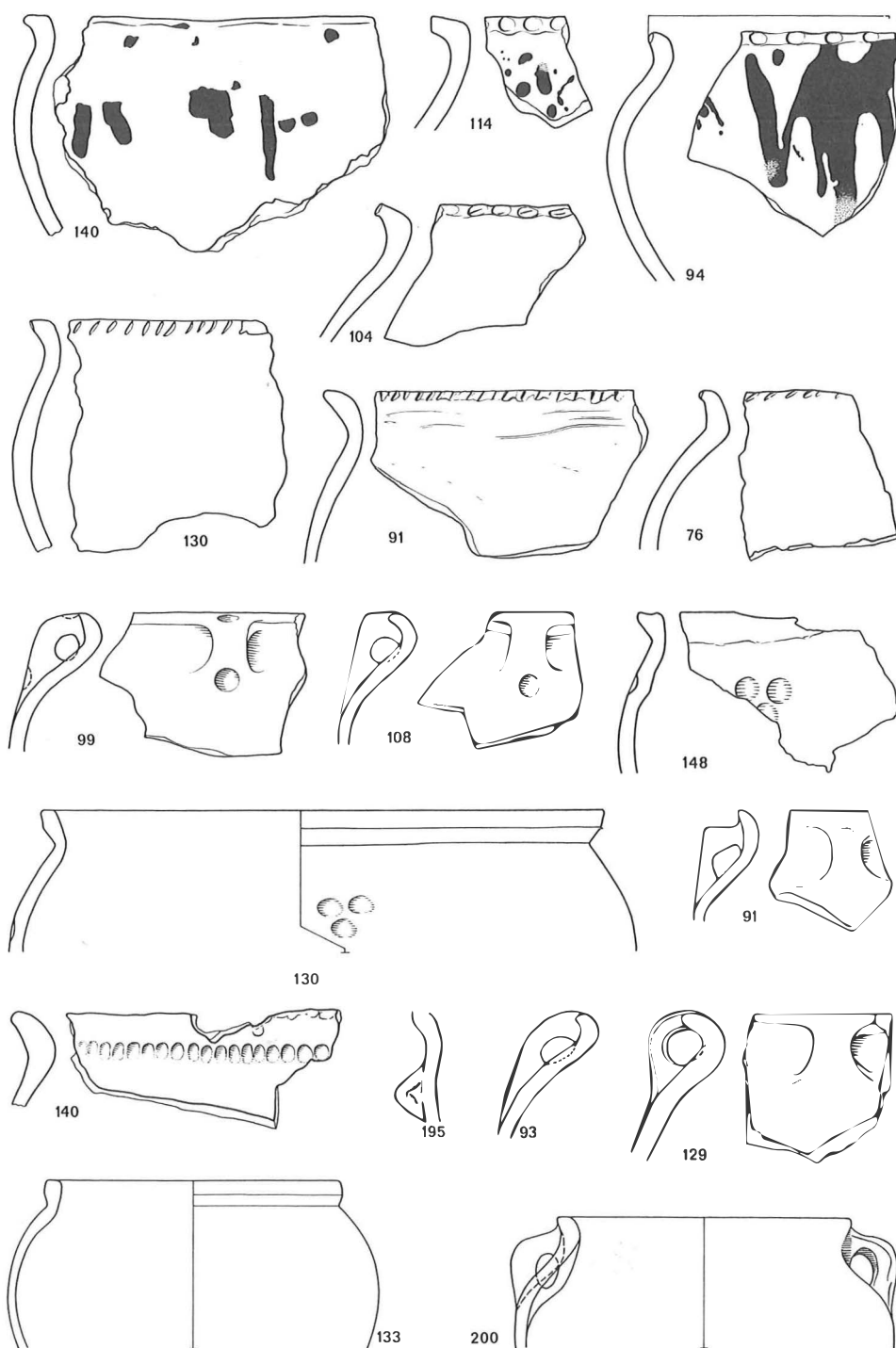


Fig. 53. Hand-made pottery: type IVC. Paddepoel I-III. Scale 1:4.

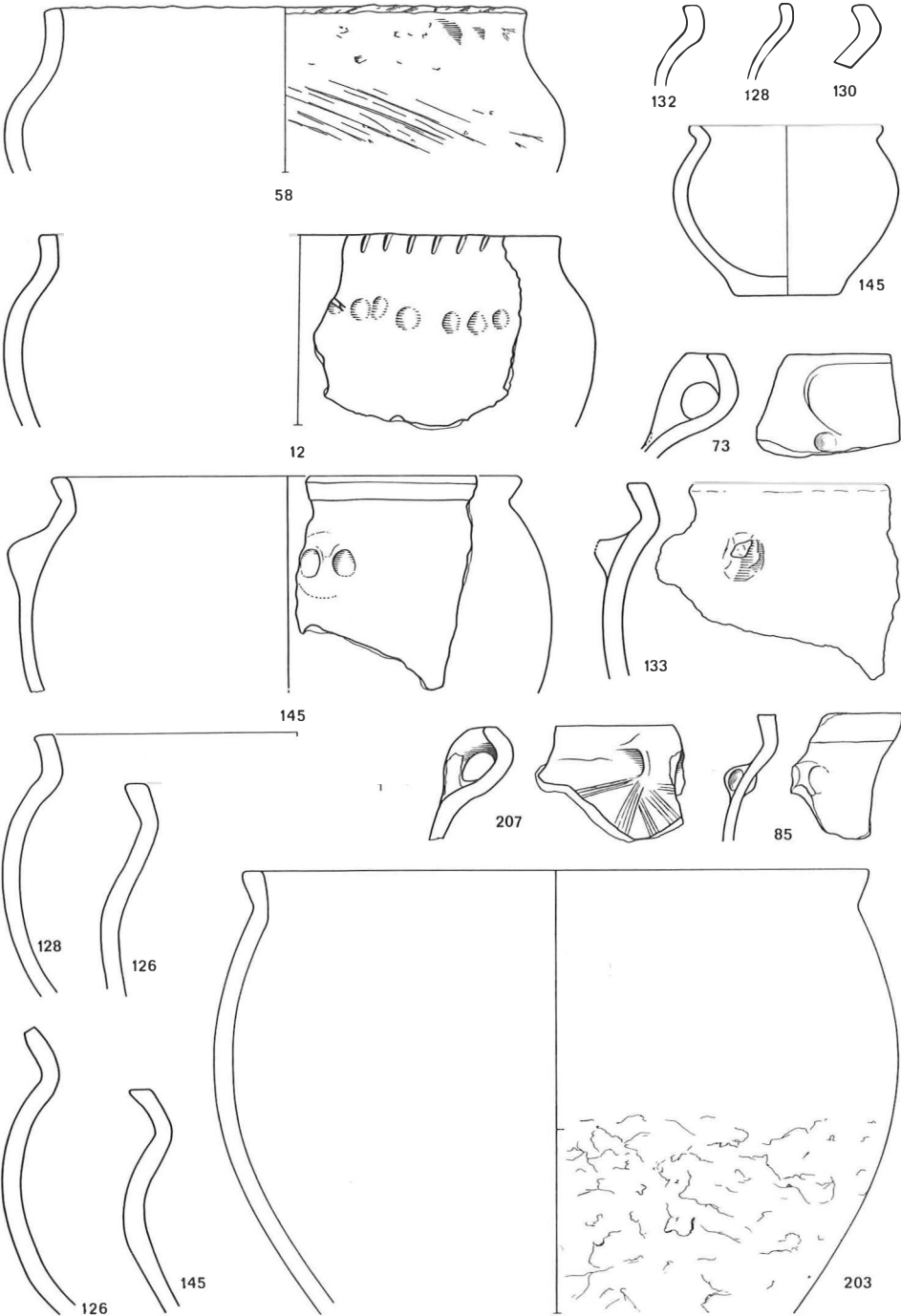


Fig. 54. Hand-made pottery: type IVD. Paddepoel I-III. Scale 1:4.

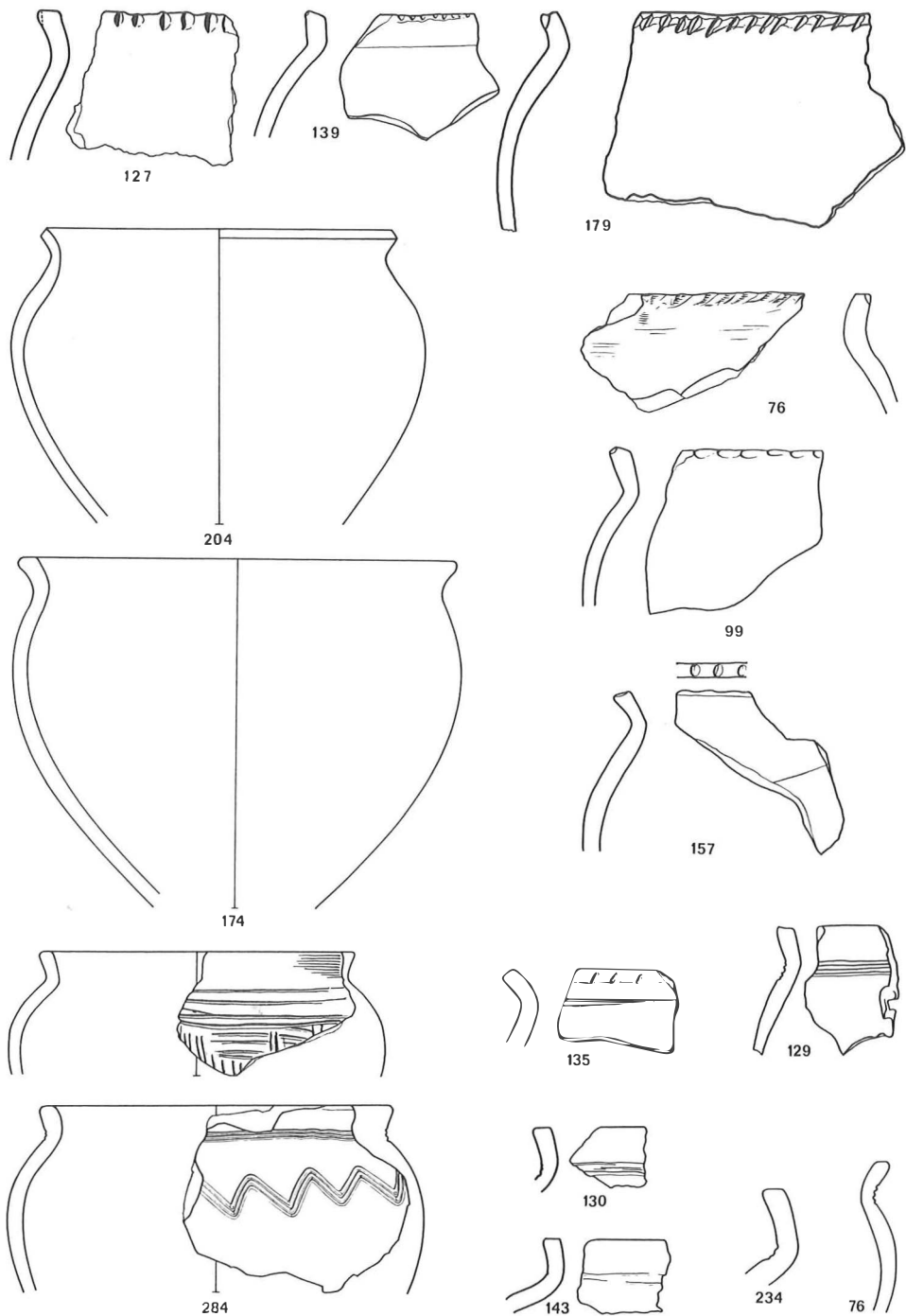


Fig. 55. Hand-made pottery: type IVD. Paddepoel I-III. Scale 1:4.

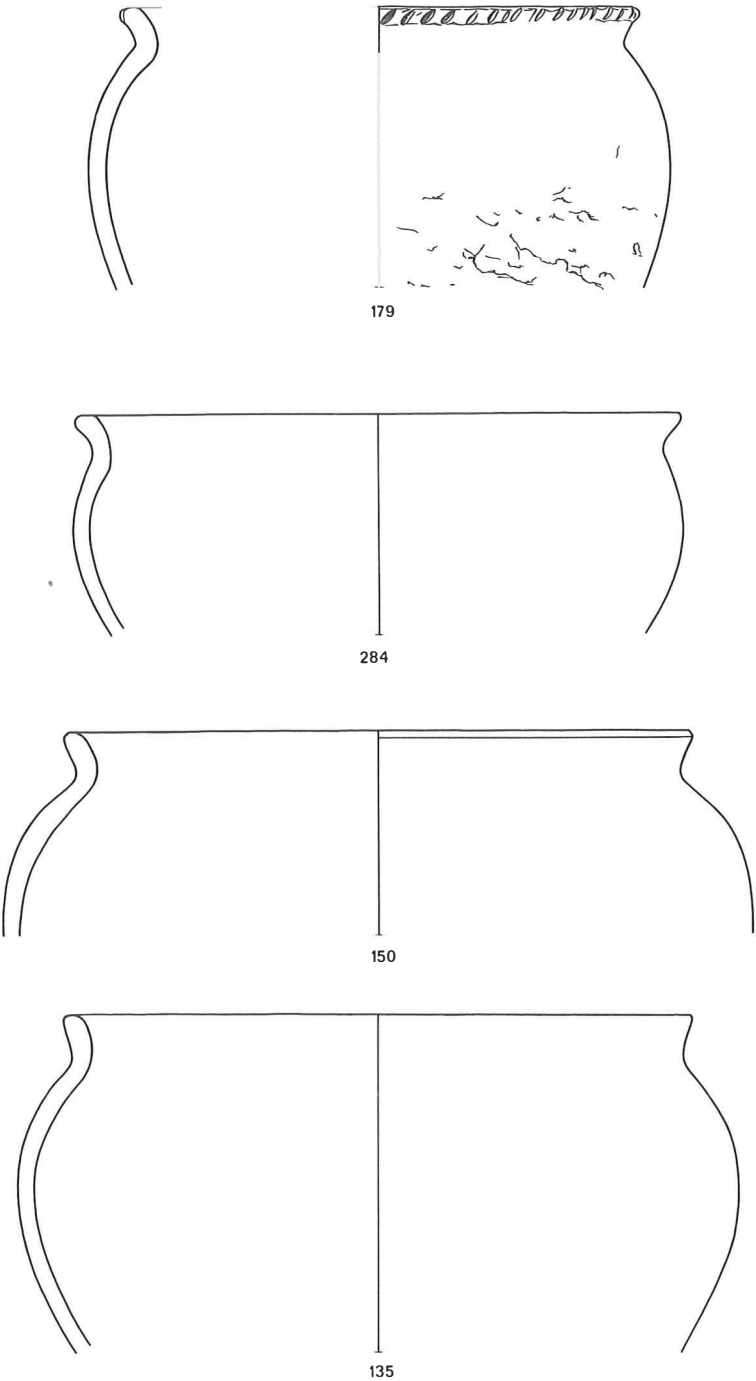


Fig.56. Hand-made pottery: type IVD. Paddepoel I–III. Scale 1:4.

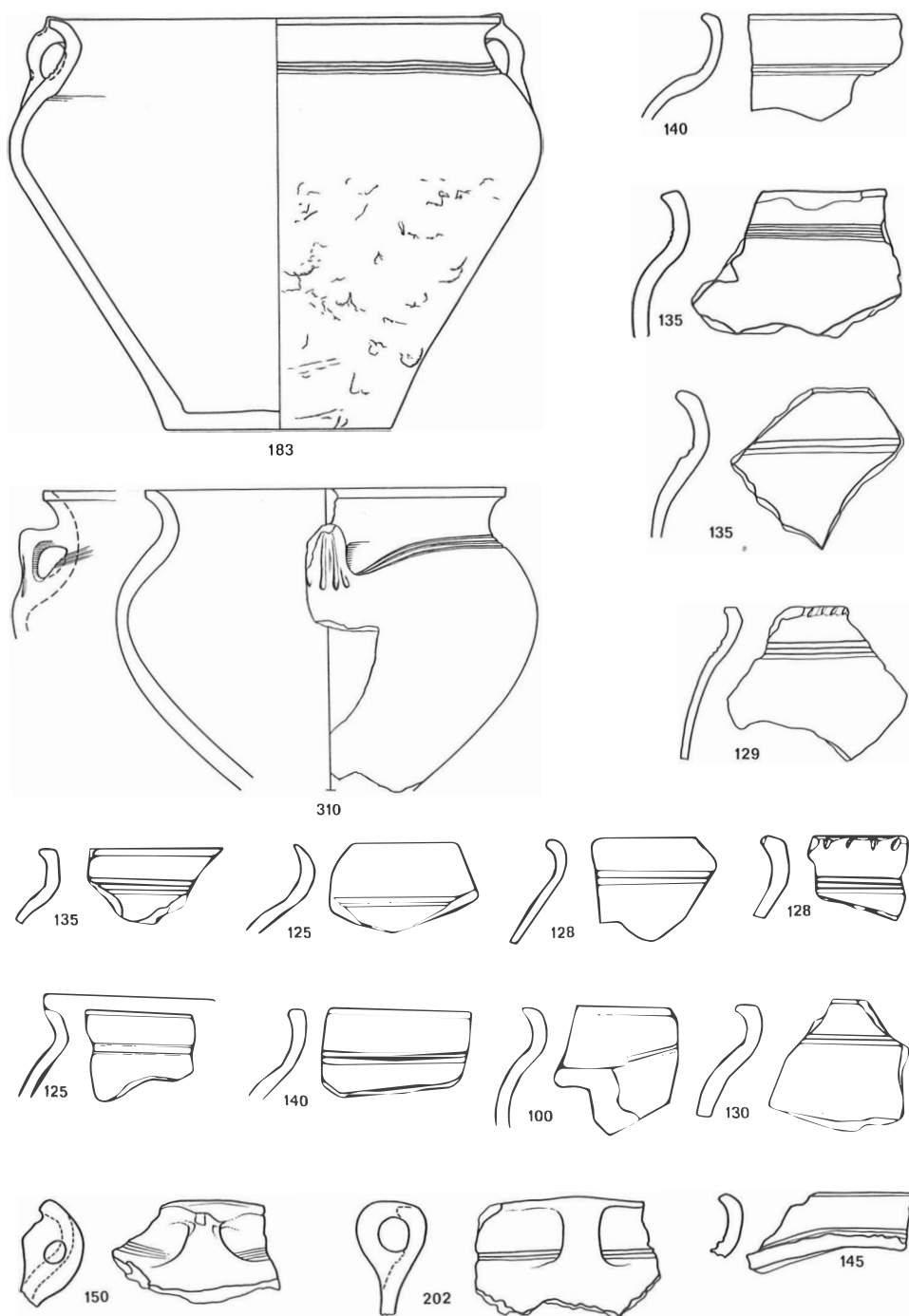


Fig. 57. Hand-made pottery: type IVE. Paddepoel I-III. Scale 1:4.

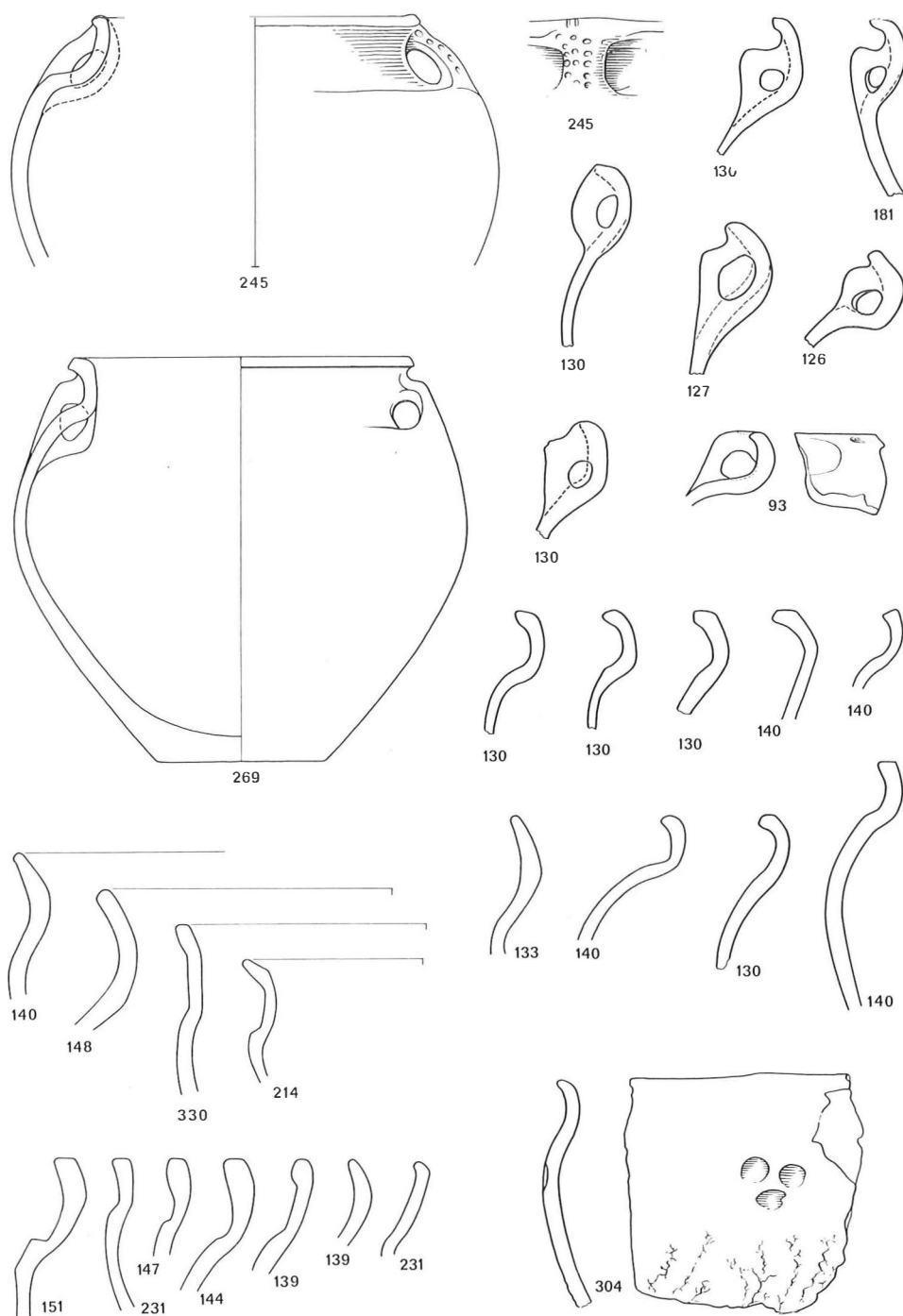


Fig. 58. Hand-made pottery: type IVE. Paddepoel I-III. Scale 1:4.

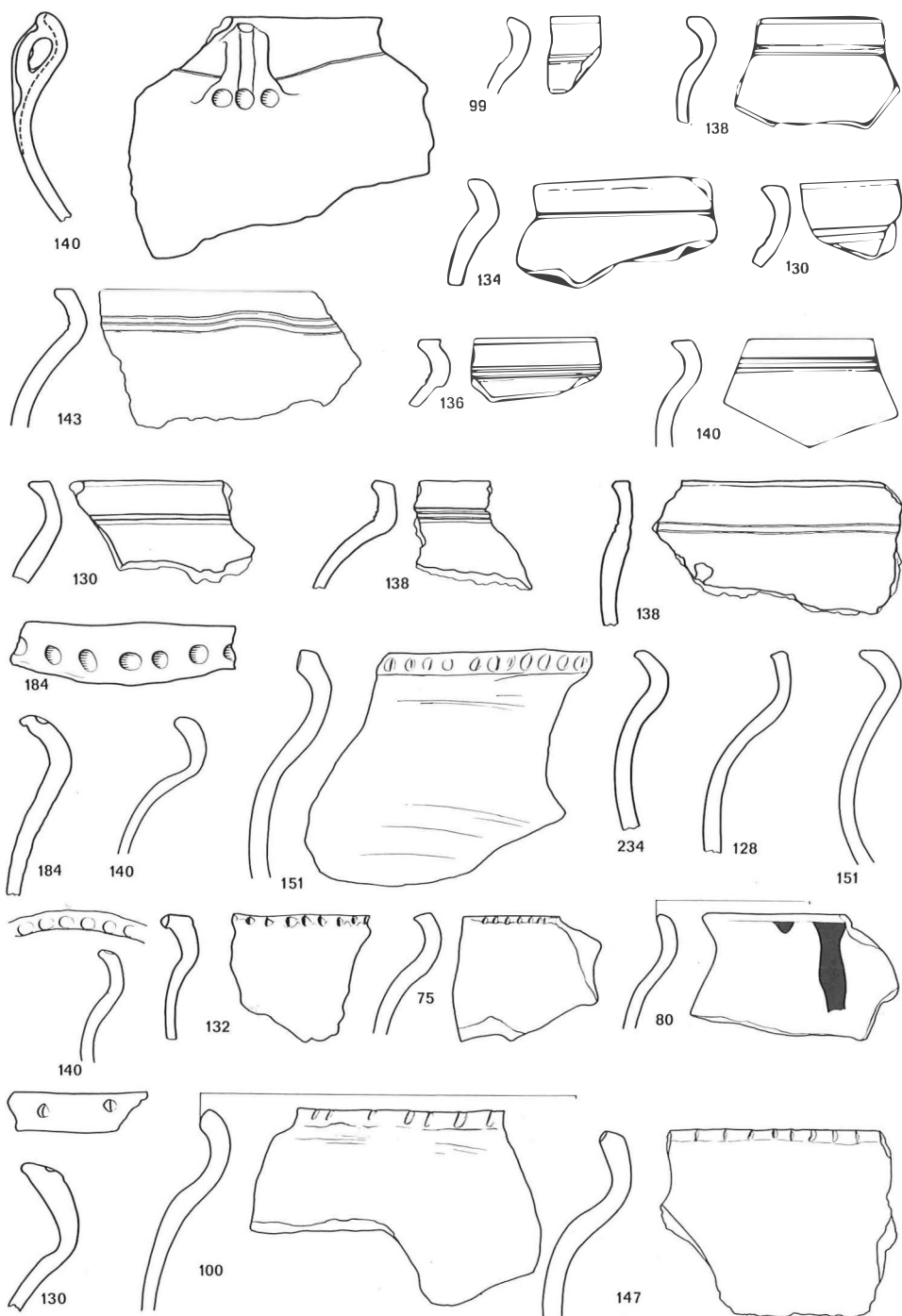


Fig. 59. Hand-made pottery: type IVE. Paddepoel I-III. Scale 1:4.

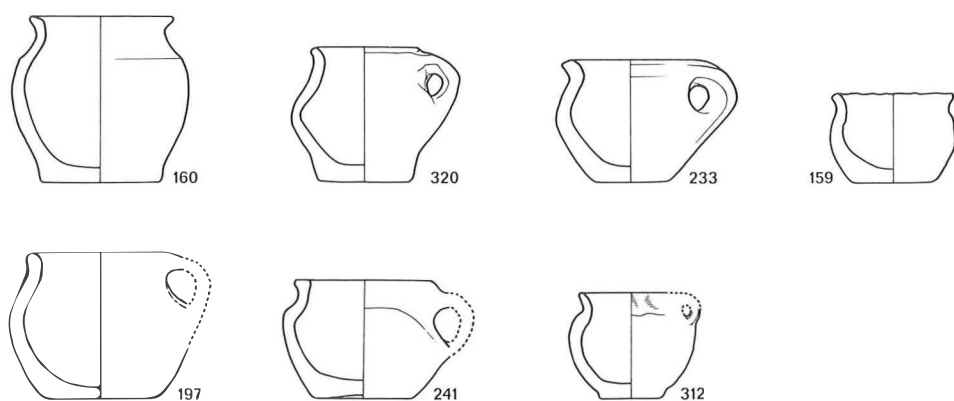


Fig. 6o. Hand-made pottery: Miniature copies. Paddepoel I–III. Scale 1:4.

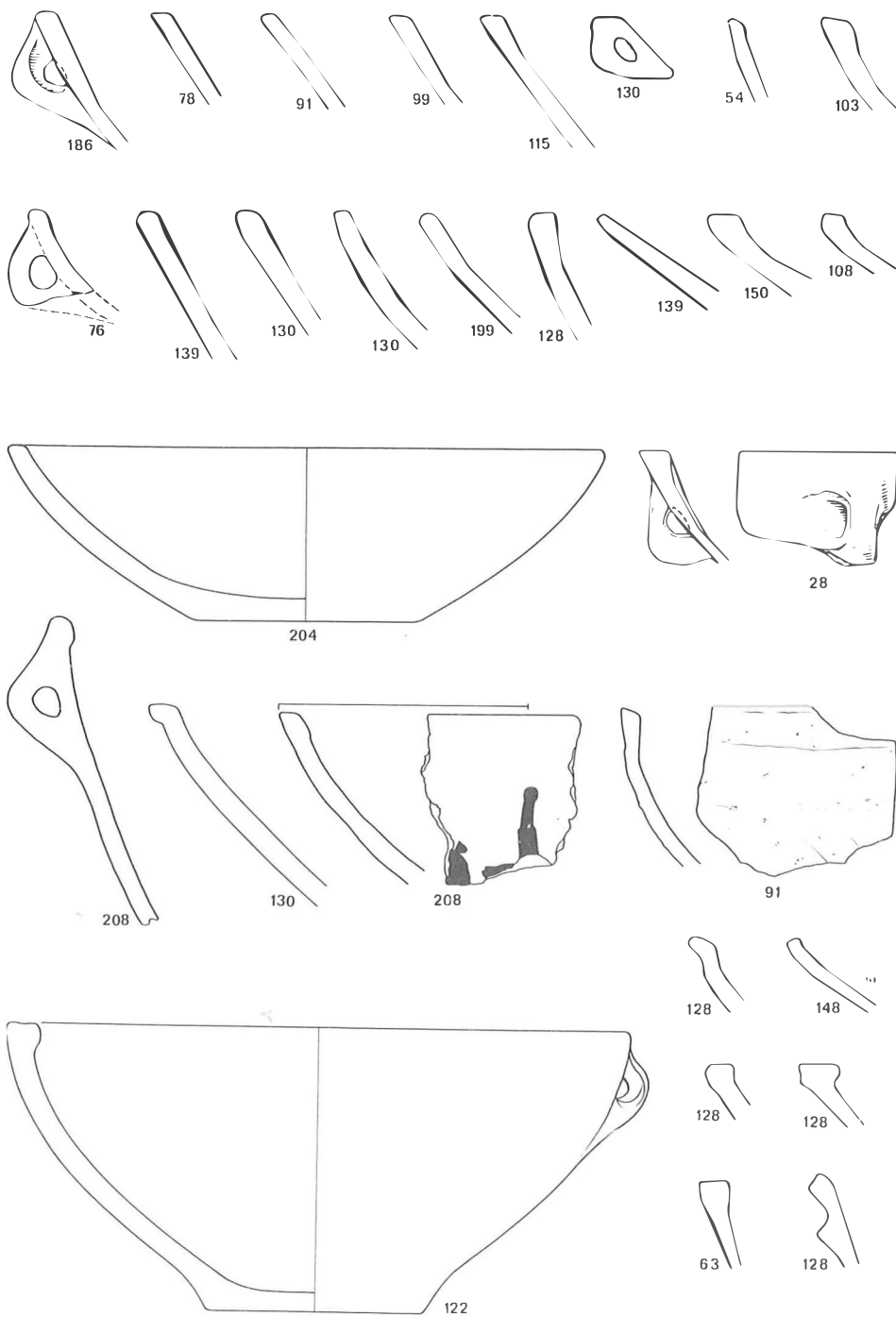


Fig. 61. Hand-made pottery: type VA. Paddepoel I-III. Scale 1:4.

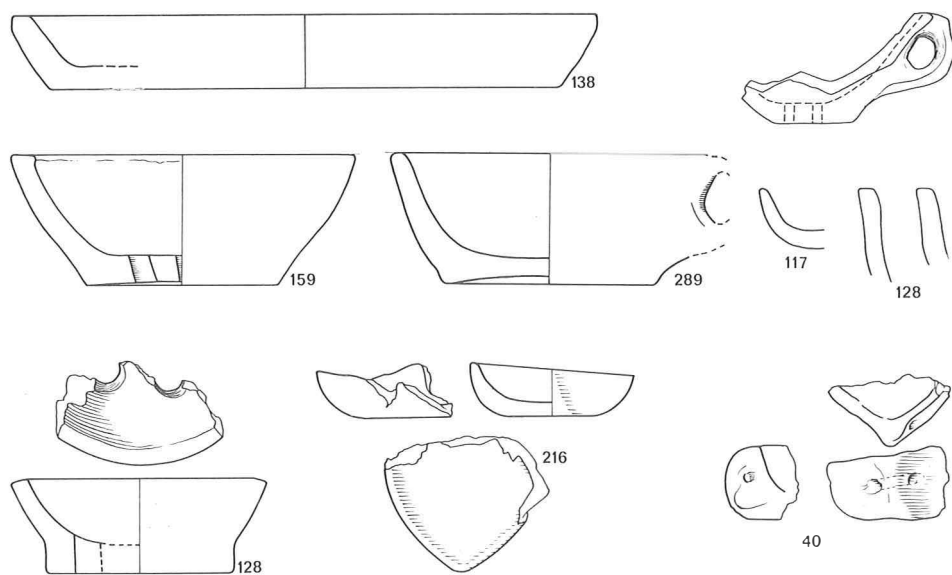


Fig. 62. Hand-made pottery: type VB. Paddepoel I–III. Scale 1:4.

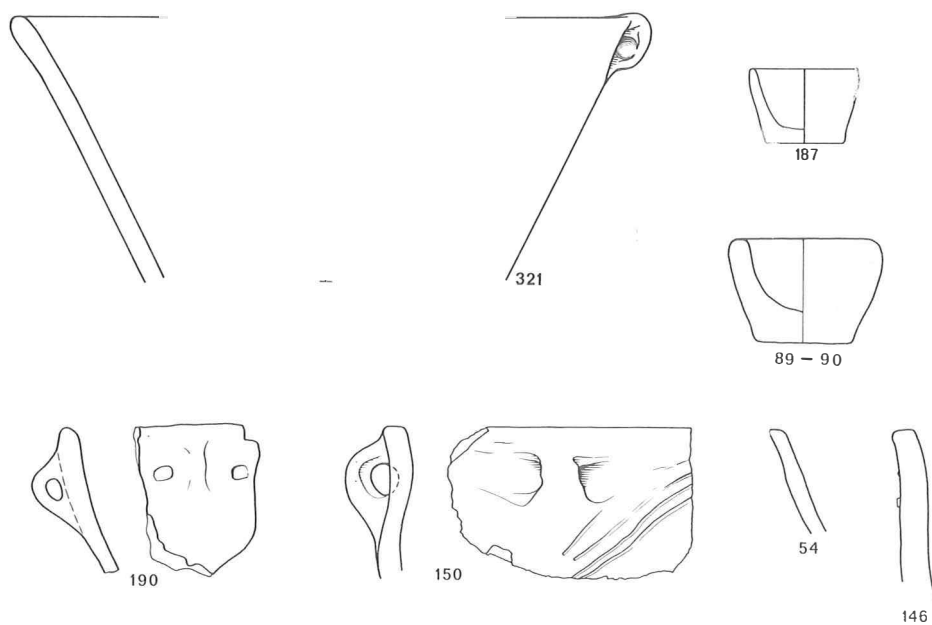


Fig. 63. Hand-made pottery: type VI. Paddepoel I–III. Scale 1:4.

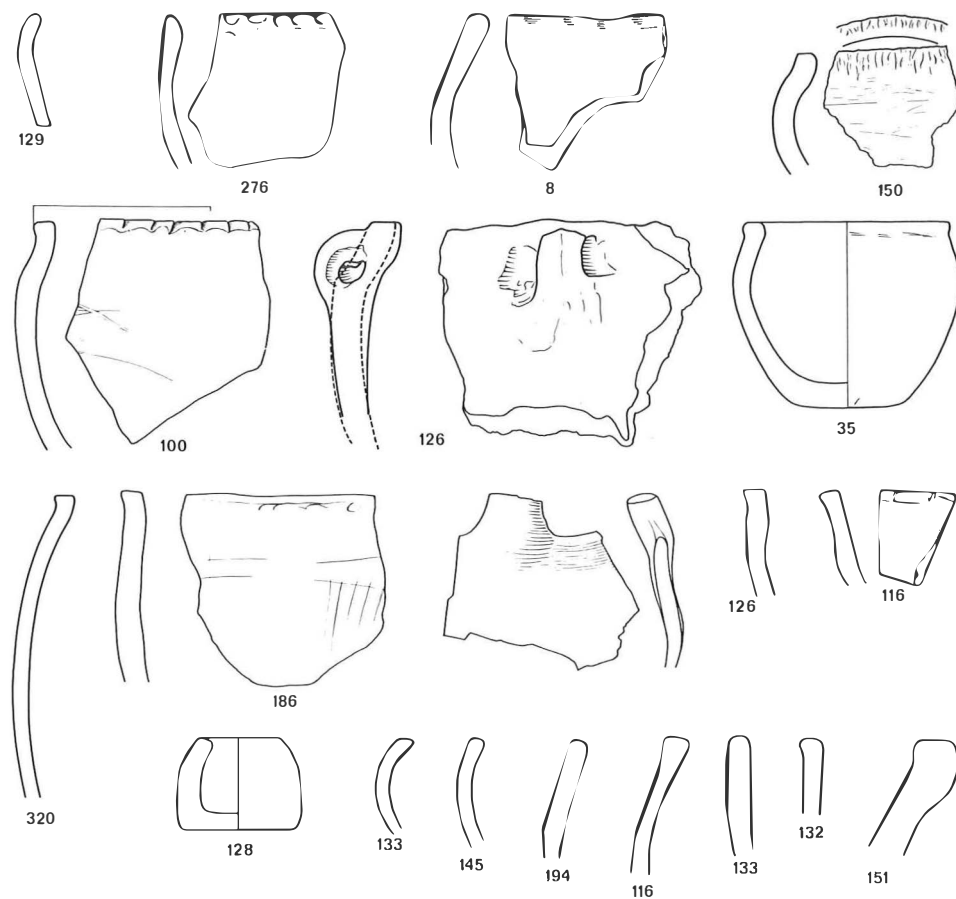


Fig. 64. Hand-made pottery: type VII. Paddepoel I-III. Scale 1:4.

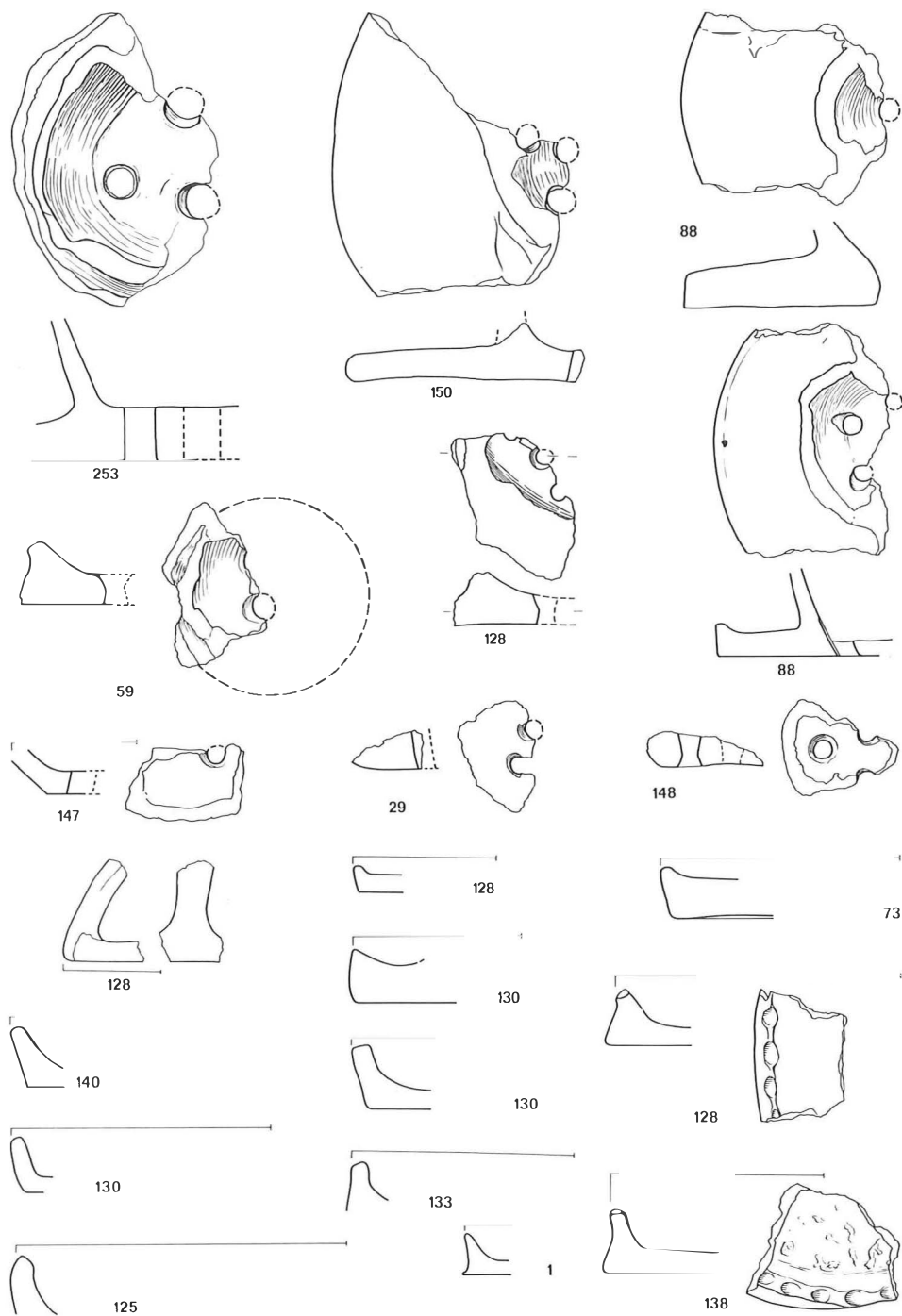


Fig. 65. Hand-made pottery: type VIII, "Cheese-mould". Paddepoel I–III. Scale 1:4.

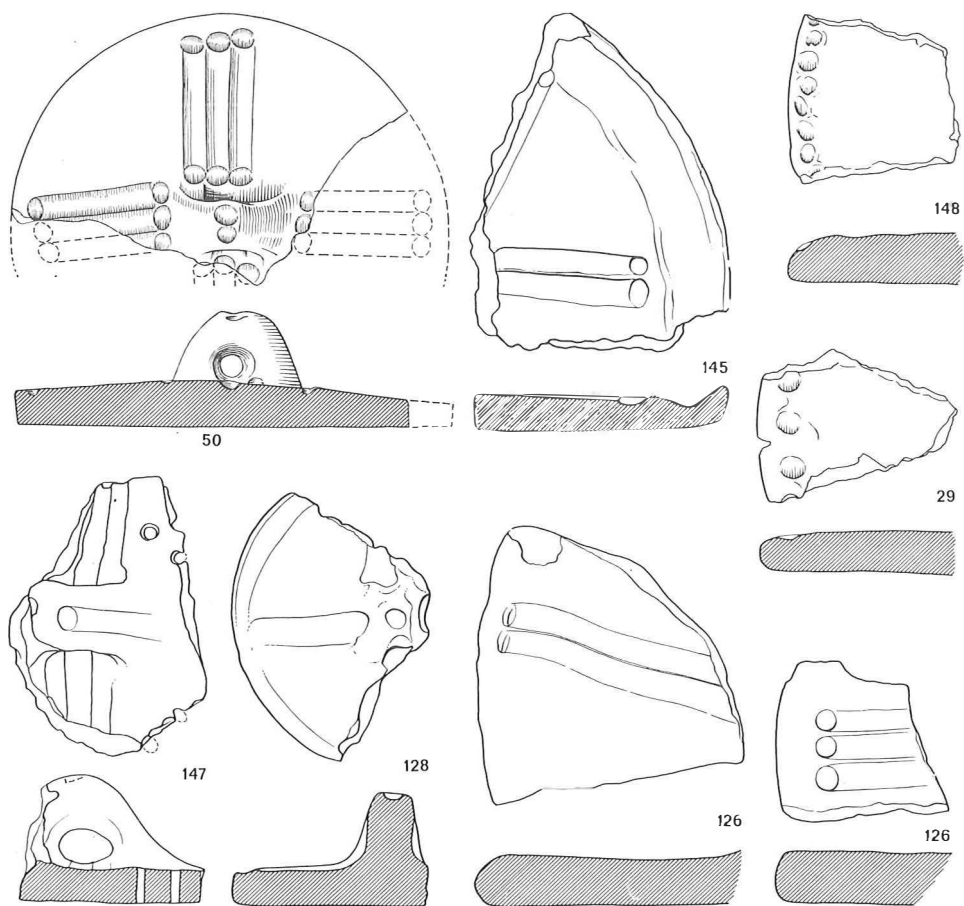


Fig. 66. Hand-made pottery: type IX, Lids. Paddepoel I–III. Scale 1:4.

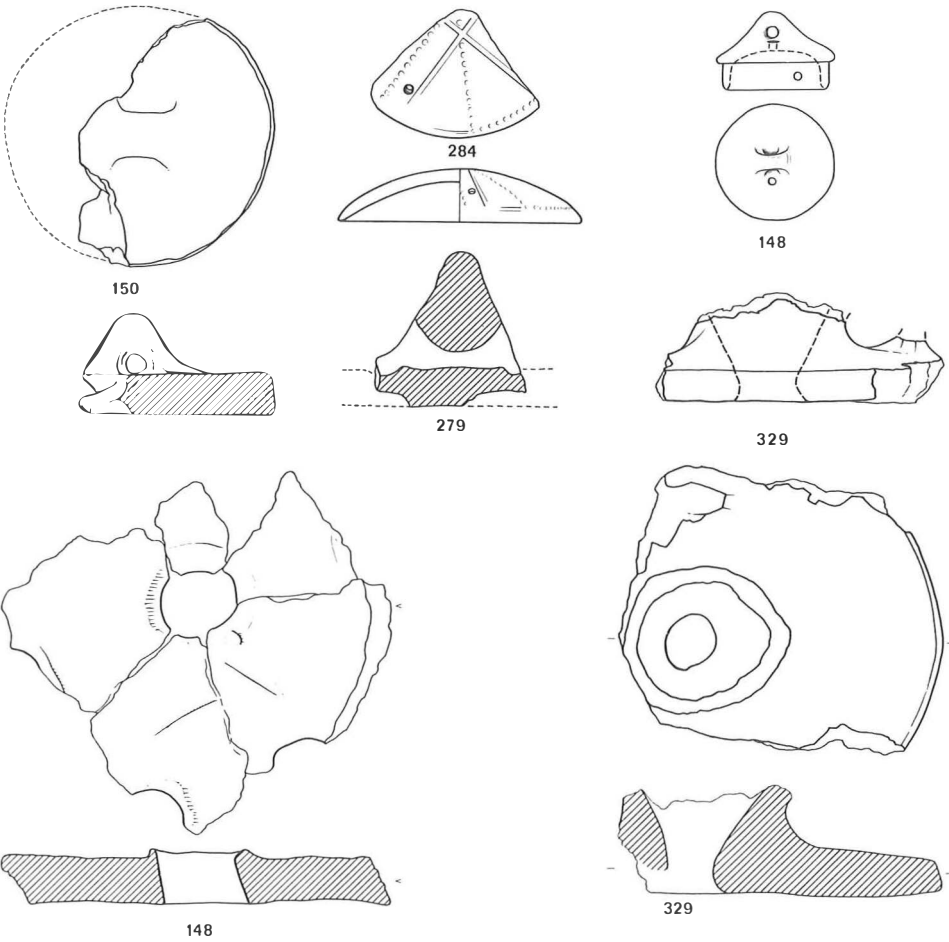


Fig. 67. Hand-made pottery: type IX, Lids. Paddepoel I-III. Scale 1:4.

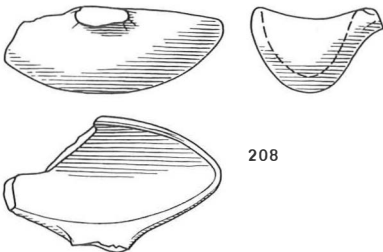


Fig. 68. Hand-made pottery: type X, Ladle. Paddepoel I-III. Scale 1:4.

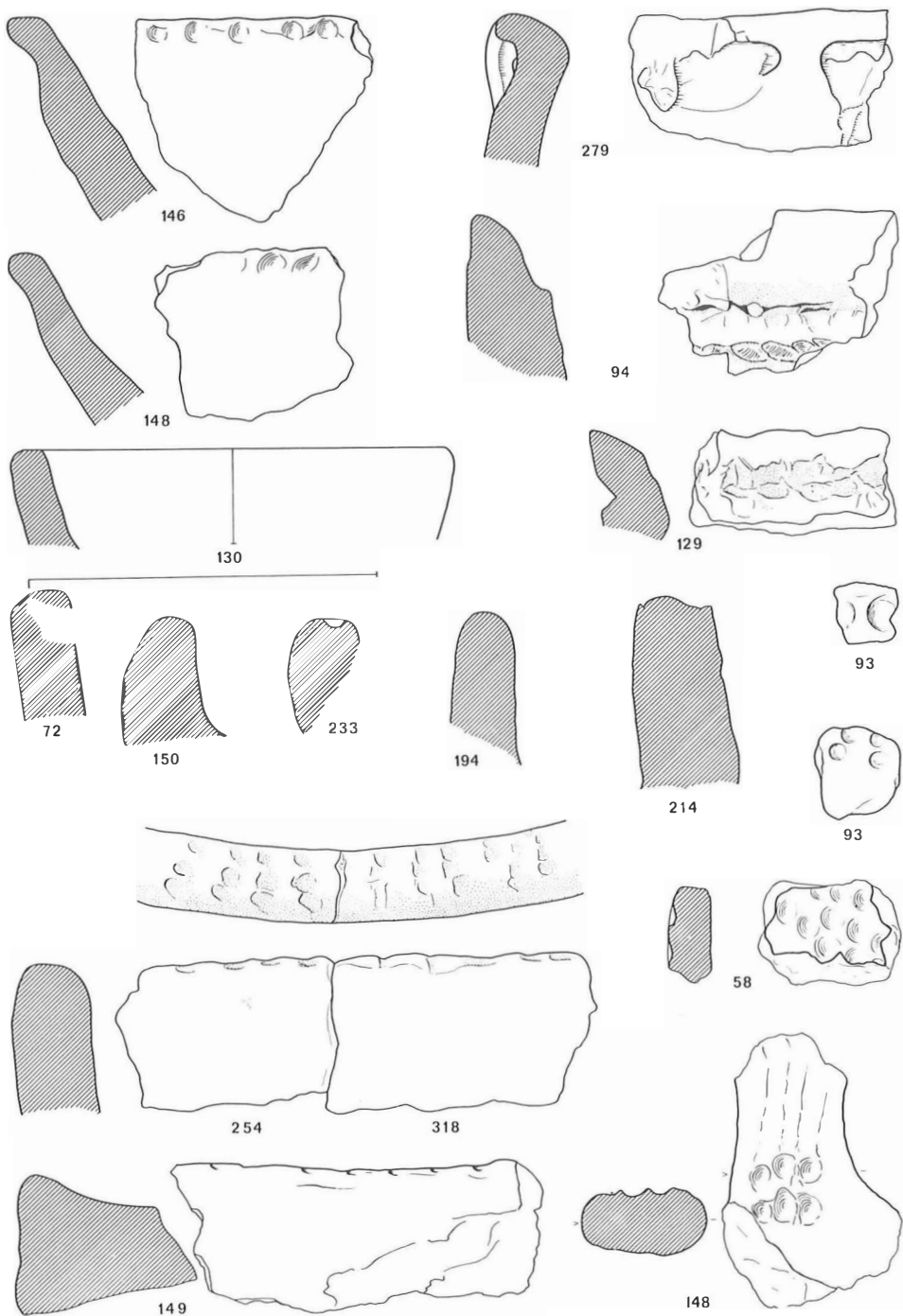


Fig. 69. Hand-made pottery: types XIB, XID, XIF. Paddepoel I-III. Scale 1:4.

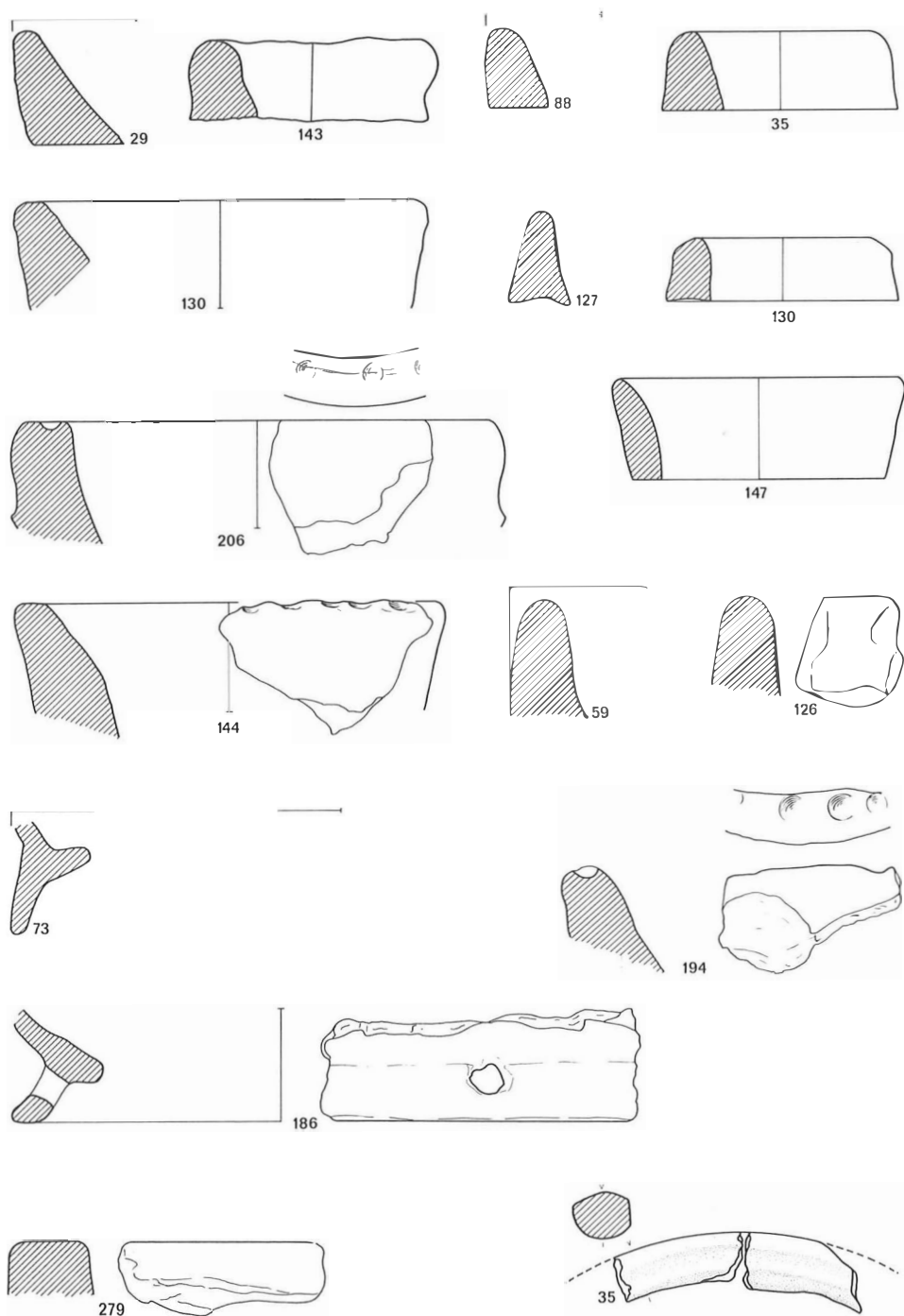


Fig. 70. Hand-made pottery: types XIC, XIE. Paddepoel I-III. Scale 1:4.

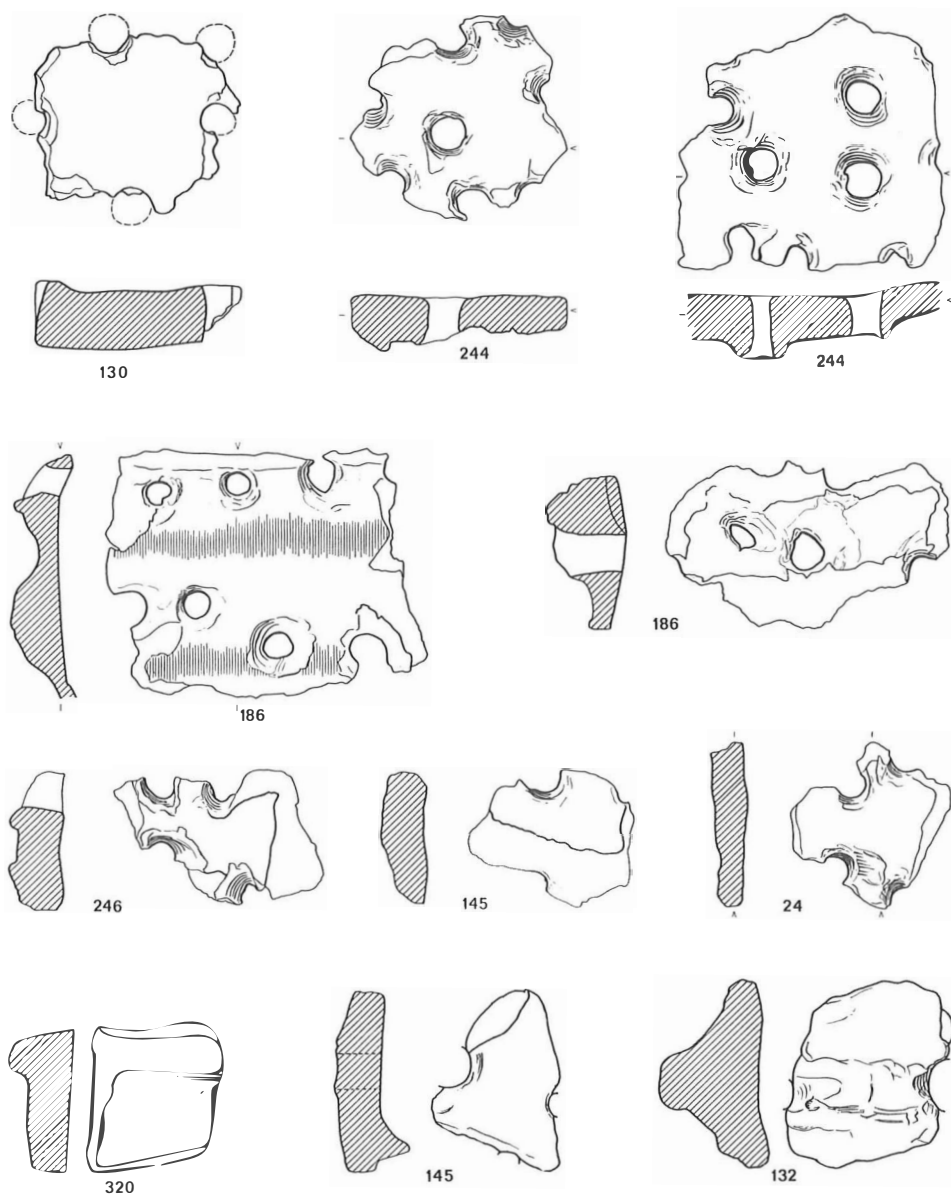


Fig. 71. Hand-made pottery: types XIX. Paddepoel I-III. Scale 1:4.

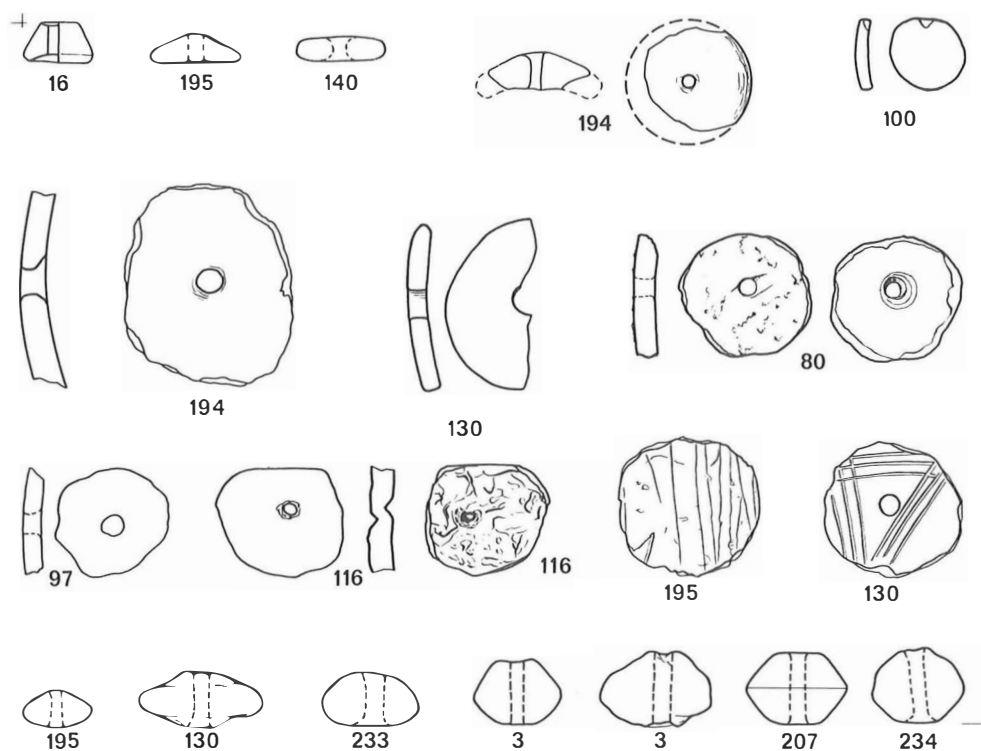


Fig.72. Hand-made pottery: type XII, Spindle-whorls. Paddepoel I–III. Scale 1:3.

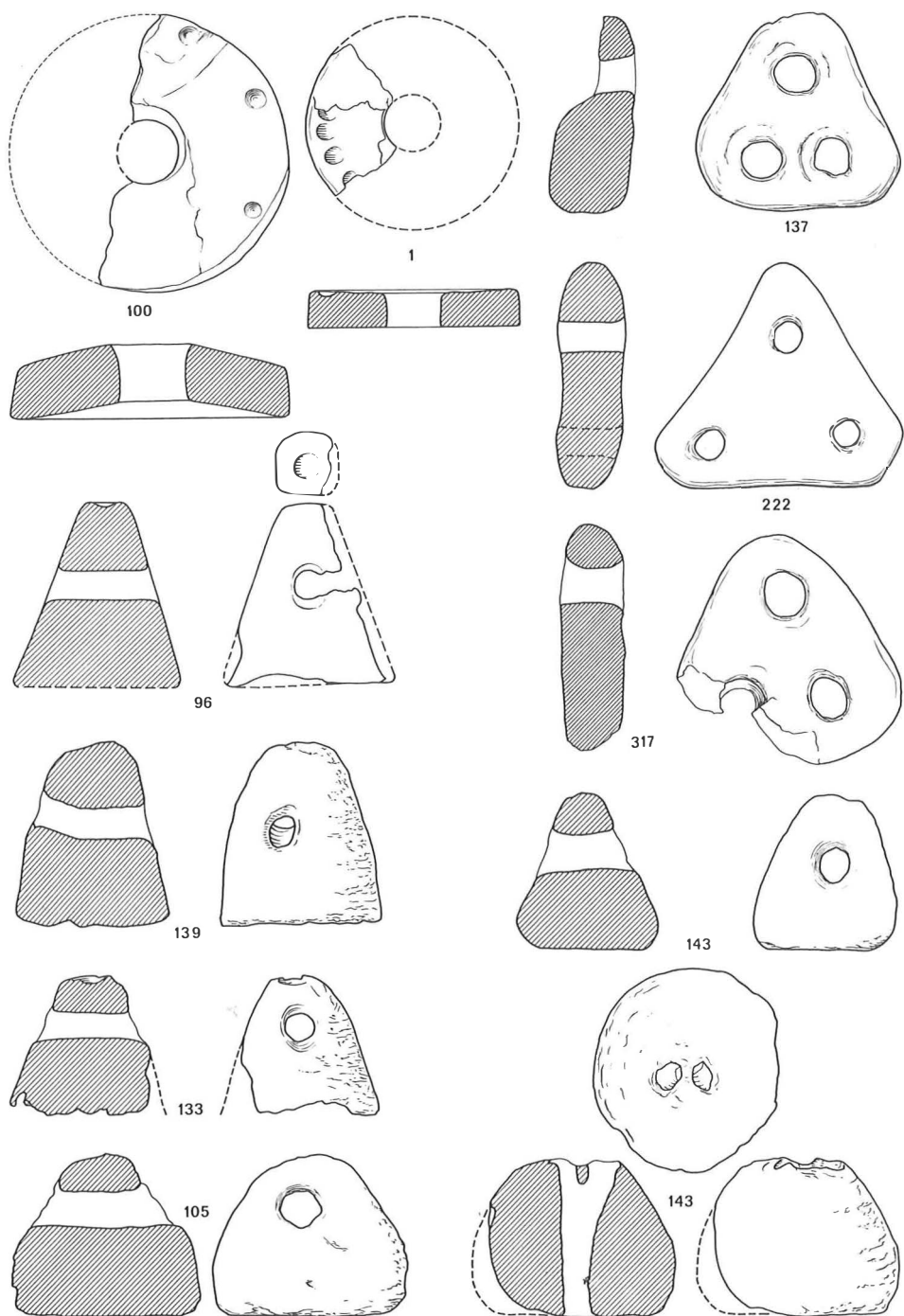


Fig. 73. Hand-made pottery: type XIII, Loom-weights. Paddepoel I-III. Scale 1:4.

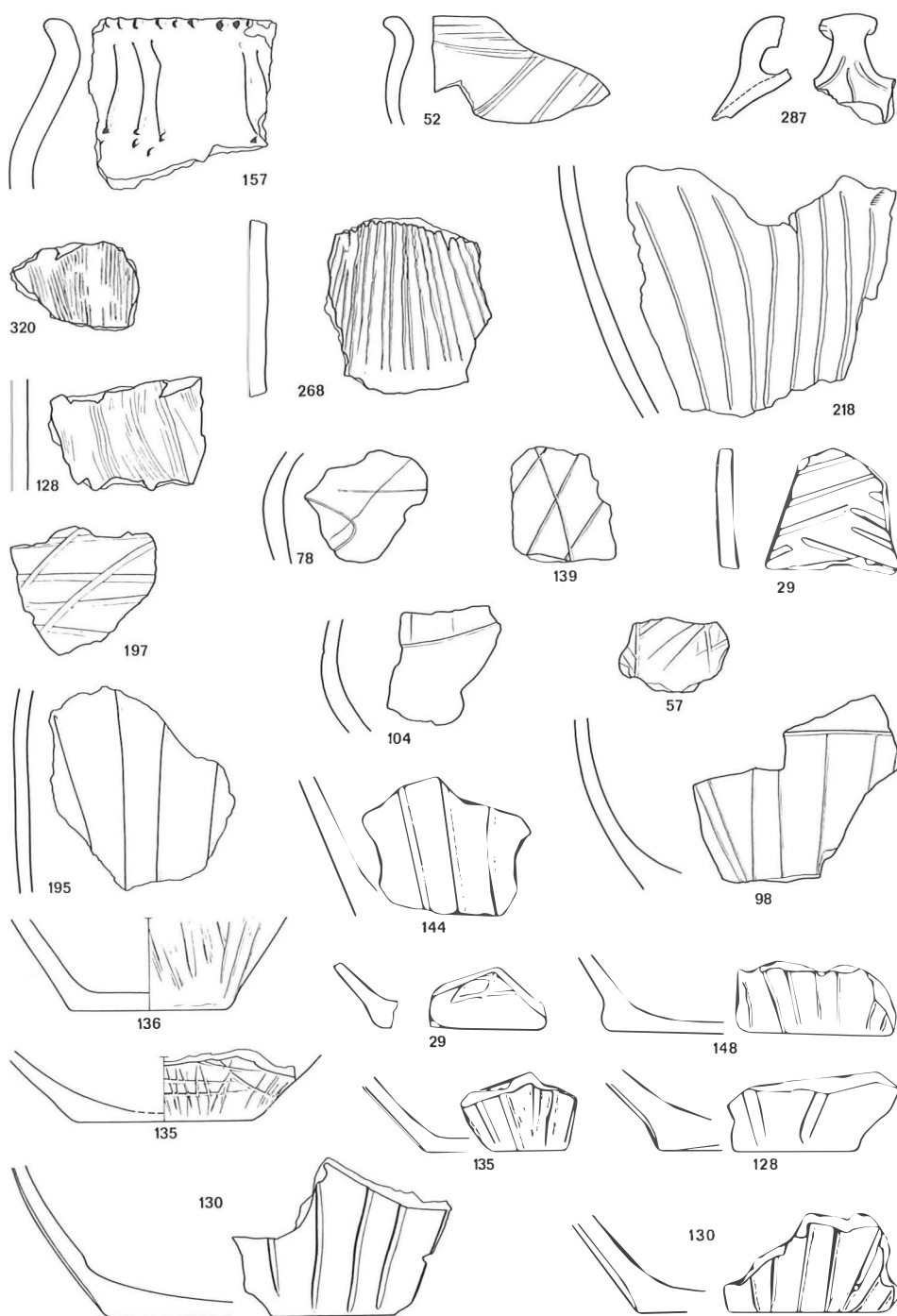


Fig. 74. Hand-made pottery: type XIV, ornamental pattern A 2. Paddepoel I–III.
Scale 1:4.

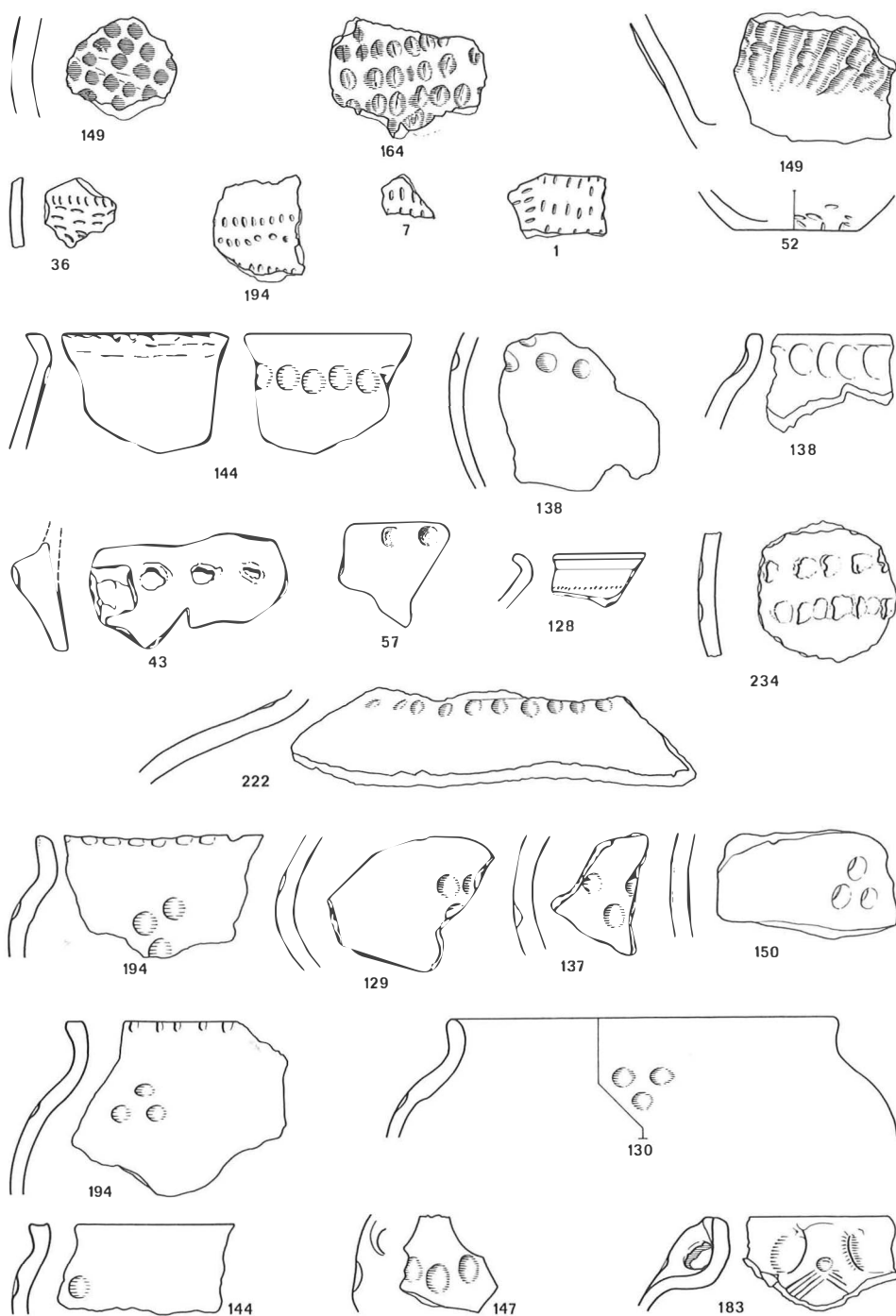


Fig.75. Hand-made pottery: type XIV, ornamental patterns A3, B2, B3, B4. Paddepoel I-III. Scale 1:4.

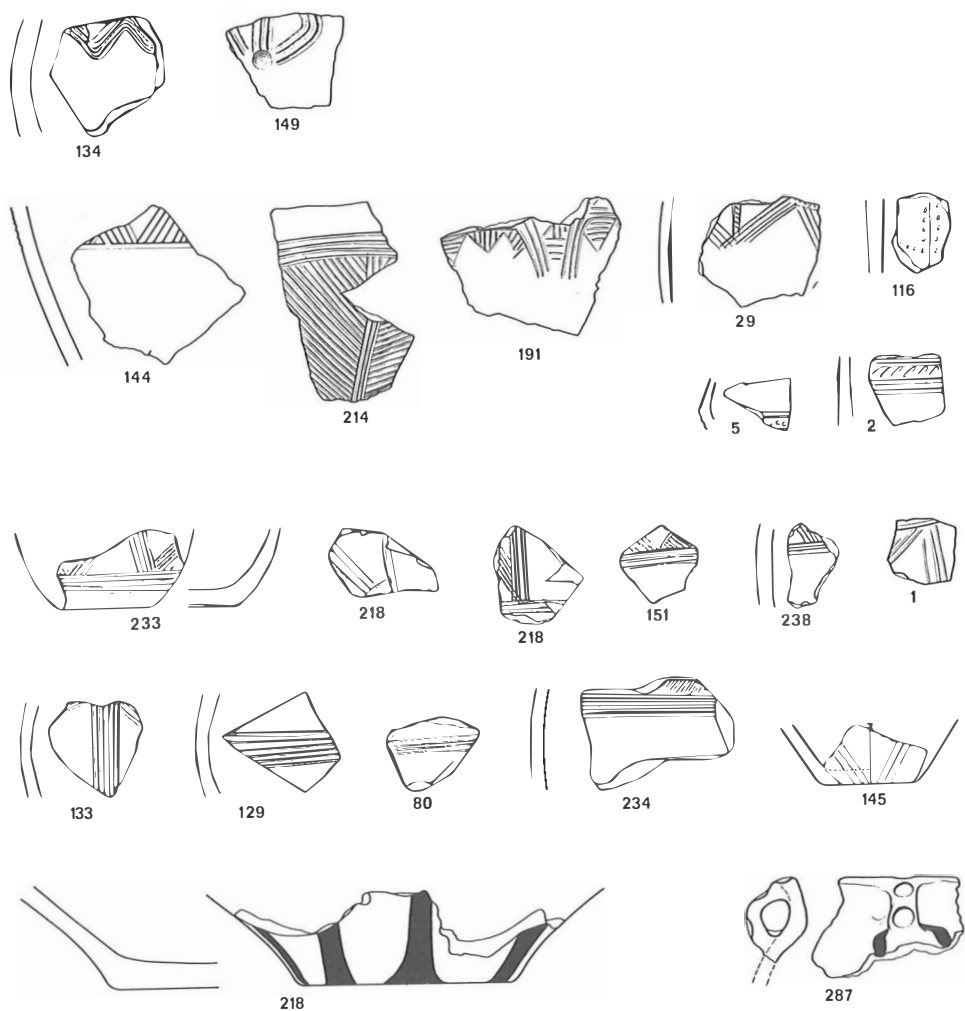
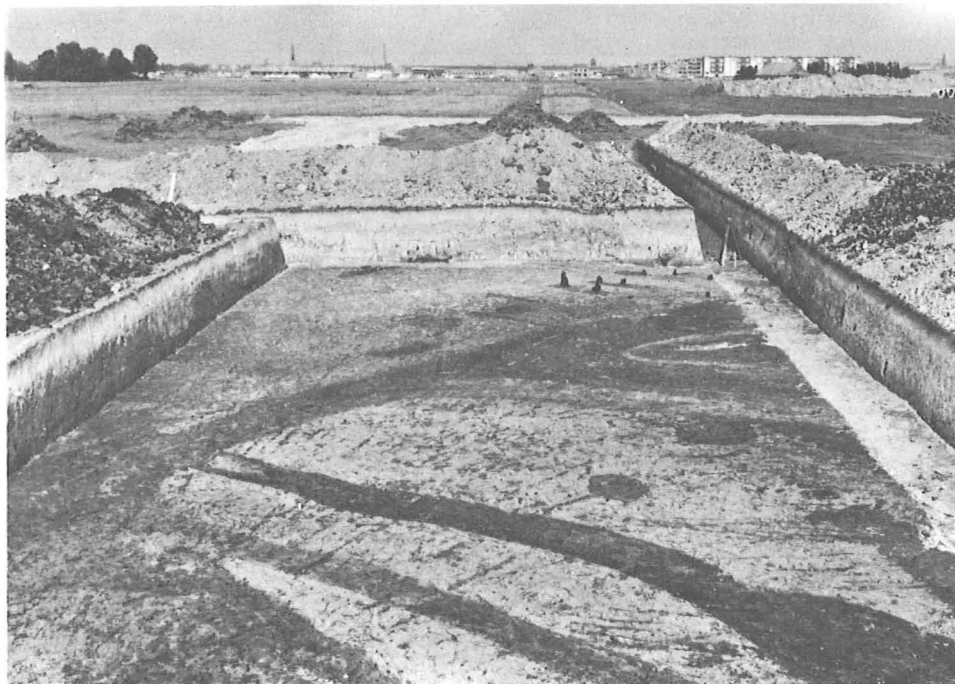


Fig.76. Hand-made pottery: type XIV, ornamental patterns C1, C2, C3, E. Paddepoel I–III. Scale 1:4.

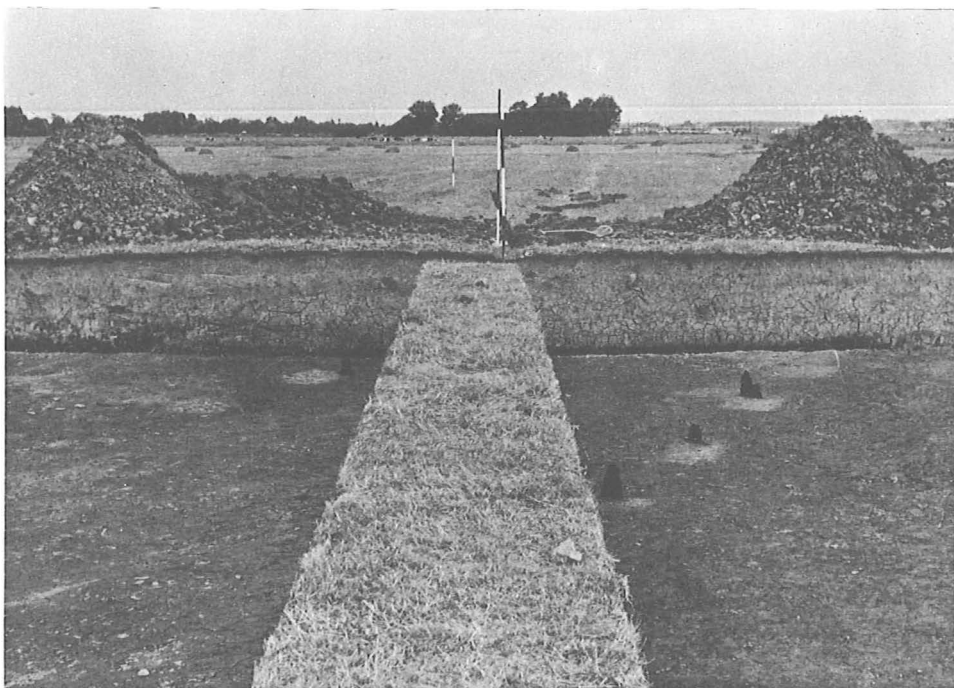
(Fig. 77, see p. 268).



Pl. I Paddepoel II: excavation trench 3 with ditch and granaries seen from south.



Pl. II Paddepoel II: excavation trench 3 with ditches and granaries seen from west.



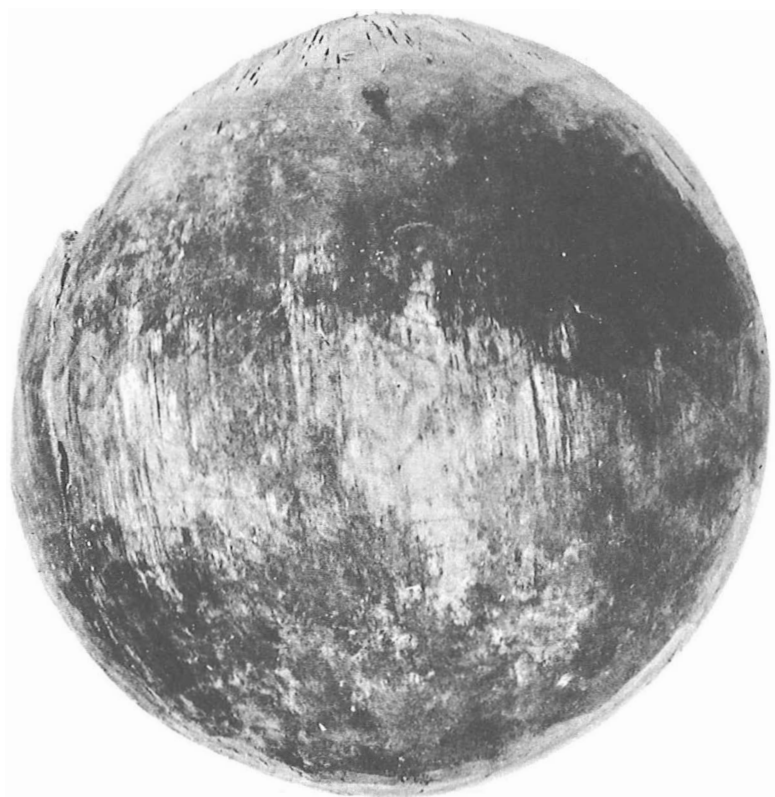
Pl. III

Paddepoel III: posts and post-holes of farm building in squares
Z/A^e-21/24 seen from west.



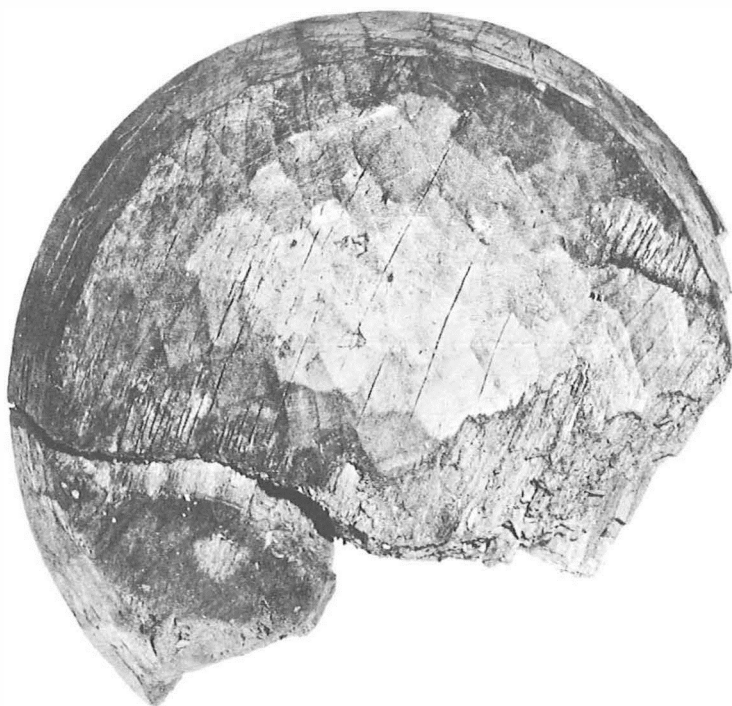
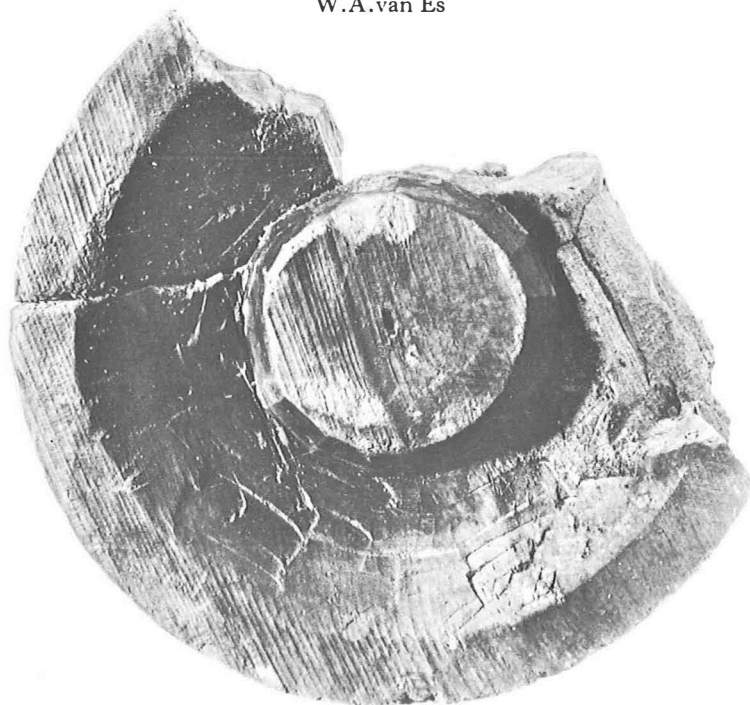
Pl. IV

Paddepoel III: section E¹, eastern part, showing two vegetation horizons.



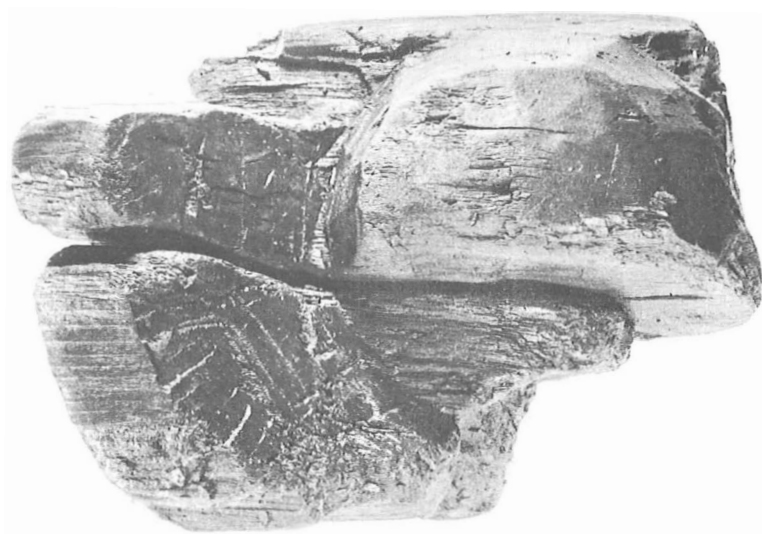
Pl. V

Paddepoel III: rough-out of bowl of maple-wood (find no. GM 1969/IV/2)



Pl. VI

Paddepoel III: rough-out of bowl of maple-wood (find no. GM 1969/IV/2)



Pl. VII Paddepoel III: rough-out of bowl of maple-wood (find no. GM 1969/IV/2)



Pl. VIII Paddepoel III: rough-out of bowl of maple-wood (find no. GM 1969/IV/2)