

# RITUALS, SKINS AND HOMER: THE DANUBIAN 'TAN - PITS'

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*A number of recent publications has reported the existence of a class of archaeological objects, labeled either 'traps', 'tan-pits' or 'sacrificial pits'. Besides presenting data on 22 of these slits, excavated at Hienheim, Bavaria, and summarizing data on similar pits from other sites, it is the purpose of this paper to arrive at a testable hypothesis regarding the function(s) of these slits.*

## 1. Introduction, definition

Since 1965 the Institute of Prehistory of Leiden University has been conducting excavations at Hienheim, Bavaria (Modderman 1966; 1971), a site occupied almost continuously from the Middle Neolithic<sup>1</sup> to this day. I was a member of the excavation team during the 1970 and 1971 seasons. Among other features, some long, narrow and deep slit-like pits were noted (until 1972, 22 in number) which defied interpretation; with a length of generally between 2 and 3 Metres, the ratio Length : Width : Depth = (2-10) : 1 : (1-4) encompasses all of them. These artefacts will be labeled 'slits' in the present paper.

The following is an attempt to arrive at a testable hypothesis regarding their function(s). First I will briefly describe in the next section the slits at Hienheim as regards form and contents; then a summary of supposed analogues at other sites will be given. In the fourth section I will consider two related problems regarding these slits: whether or not they constitute a separate archaeological category; and if so, how to formulate a hypothesis about their function(s) and deduce from this a number of empirically testable statements. Evidence regarding these problems makes up the 5th and 6th sections, and the 7th section brings together the data on dating the phenomenon. In the 8th section the contents of the previous sections will be used to formulate some conclu-

sions. Suggestions for further research and a summary will end the article.

## 2. Hienheim, the data

Up to 1972, 22 slit-like features have been found at Hienheim. The description of these pits and of their contents, as summarized in table 1, has been extracted from a full corpus of the data, which will be made available on request.

As to the forms of the slits, these are presented in the figures 1 to 3 incl.; selected contents are shown in fig. 4 (rim sherds and decorated ware), and in table 2 (flint tools). Special attention is drawn to:

- the cup fragment (fig. 4 nr. 19). Rim diameter 14 cm, bottom diameter 13 cm. Smoothed surface. Tempered with sand. Colour 10 YR 3/1 (Munsell scale). No known parallels.
- The bone fragment (fig. 4, nr. 248). With traces of sharpening and burning.

From table 1 it appears that 10 slits out of 22 show layered fillings; however, in none of the pits paired stratification was observed (as at Branč, cf. the next section). Rather, as demonstrated in figs 5 and 6, in at least two of the slits the pattern of stratification is suggestive of a filling in at once (and not every year a thin layer, as at Branč; see below). Such a complete filling up can be conjectured for the other slits (at Hienheim) as well: every slit marked 'stratified' in the table, shows a dark top-layer. This layer will be due to filling in with regular (dirty) settlement debris, following the setting of the original stuffing. As the present observation le-

<sup>1</sup> Throughout this paper I will use the Central European chronology, as defined in Neustupný 1969.

Table 1. Hienheim. Summary description of the slits found before 1972.

Find nr.	(corpus nr.)	Size L × W × D			Position			Ori-entation	Stratif-ication	Dating (evidence)
19	(1)	220	120	138	N 59.7	E 36.6	160	+	Stroke Ware Cult. (youngest sherd)	
150	(2)	c. 220	c. 120	110	N 53.8	E 33.5	145	+	Stroke Ware Cult. (youngest sherd)	
224	(3)	194	44	≥ 84	N 50.9	E 52.8	170	—	Uncertain	
248	(4)	160	44	≥ 80	N 47.7	E 51.4	155	—	Lin. Pottery Cult. (youngest sherd)	
249	(5)	216	50	56	N 47.4	E 58.2	175	—	Stroke Ware Cult. (youngest sherd)	
276	(6)	c. 185	c. 60	90	N 42.1	E 62.3	050	—	≤ Altheim Cult. (stratigraphy)	
278	(7)	c. 175	44	76	N 44.5	E 32.3	145	—	Uncertain	
—	(8)	200	70	92	N 56.2	E 50.5	015	+	Uncertain	
382	(9)	c. 190	c. 55	c. 124	N 64.6	E 29.4	185	—	≤ Lin. Pott. Cult. (stratigraphy)	
392	(10)	c. 200	c. 25	c. 90	c.N 68	c.E. 53	190	—	≤ Lin. Pott. Cult. (stratigraphy)	
399	(11)	≥ 140	c. 65	≥ 94	N 79.6	E 41.0	190	+	Stroke Ware Cult. (youngest sherd)	
412	(12)	195	50	104	N 73.0	E 46.6	020	+	Rössener Cult. (youngest sherd)	
436	(13)	≥ 190	40	≥ 54	N 69.8	E 83.6	160	—	Band Ceramical (youngest sherd)	
442	(14)	176	c. 40	86	N 28.0	E 15.0	175	—	Uncertain	
—	(15)	236	c. 25	82	N 62.2	E 92.4	025	+	Uncertain	
—	(16)	≥ 140	50	65	N 79.4	E 47.5	150	—	Uncertain	
557	(17)	220	26	78	N 82.0	E 27.3	065	+	Lin. Pott. Cult. (youngest sherd)	
566	(18)	282	54	70	N 79.2	W 0.9	180	—	Lin. Pott. Cult. (youngest sherd)	
—	(19)	≥ 186	≥ 26	85	N 93.8	W 4.1	180	+	≤ Lin. Pott. Cult (stratigraphy)	
571	(20)	212	39	76	N 87.6	W 6.1	115	+	Lin. Pott. Cult. (youngest sherd)	
—	(21)	200	54	84	N 6.5	E 130.1	105	—	Uncertain	
—	(22)	160	44	64	N 29.4	E 127.7	160	+	Uncertain	

Corpus nr: the number which has been arbitrarily assigned to the various slits, which also appears in figs. 1-3.  
 Size: maximum size on relevant coup-drawings in cm; 'Depth' referring to level of observation (c. 25 cm below recent surface).  
 Position: position of the slit's centre on the excavation's reference grid, in Metres.  
 Orientation: the direction of the Eastern end of the long axis of the slit (400°).  
 Stratification: + : stratified, — : no layers observed.

Table 2. Hienheim. Flint tools recovered from the slits.

Find nr.	(corpus nr.)	'Scrapers'	'Borers'	'Knives'	Comments
19	(1)	1	.	4	unusually formed slit (cf. fig. 1-1)
150	(2)	.	.	1	unusually formed slit (cf. fig. 1-2)
224	(3)	.	.	1	—
248	(4)	.	2	.	—
249	(5)	.	.	1	—
399	(11)	.	.	1	—
412	(12)	.	1	3	possibly contaminated by fillings of (earlier?) pit nr. 414
436	(13)	1	.	1	possibly contaminated by adjacent pit nr. 418
566	(18)	5	.	.	—
571	(20)	1	.	1	—
		+ 8	+ 3	+ 13	

'Scraper': all flint blade tools with one-sided retouch on (one of the) short edge(s).  
 'Borer': all triangular flint tools with retouched points/corners.  
 'Knife': all flint blade tools with one-sided retouch on (one of the) long edge(s).

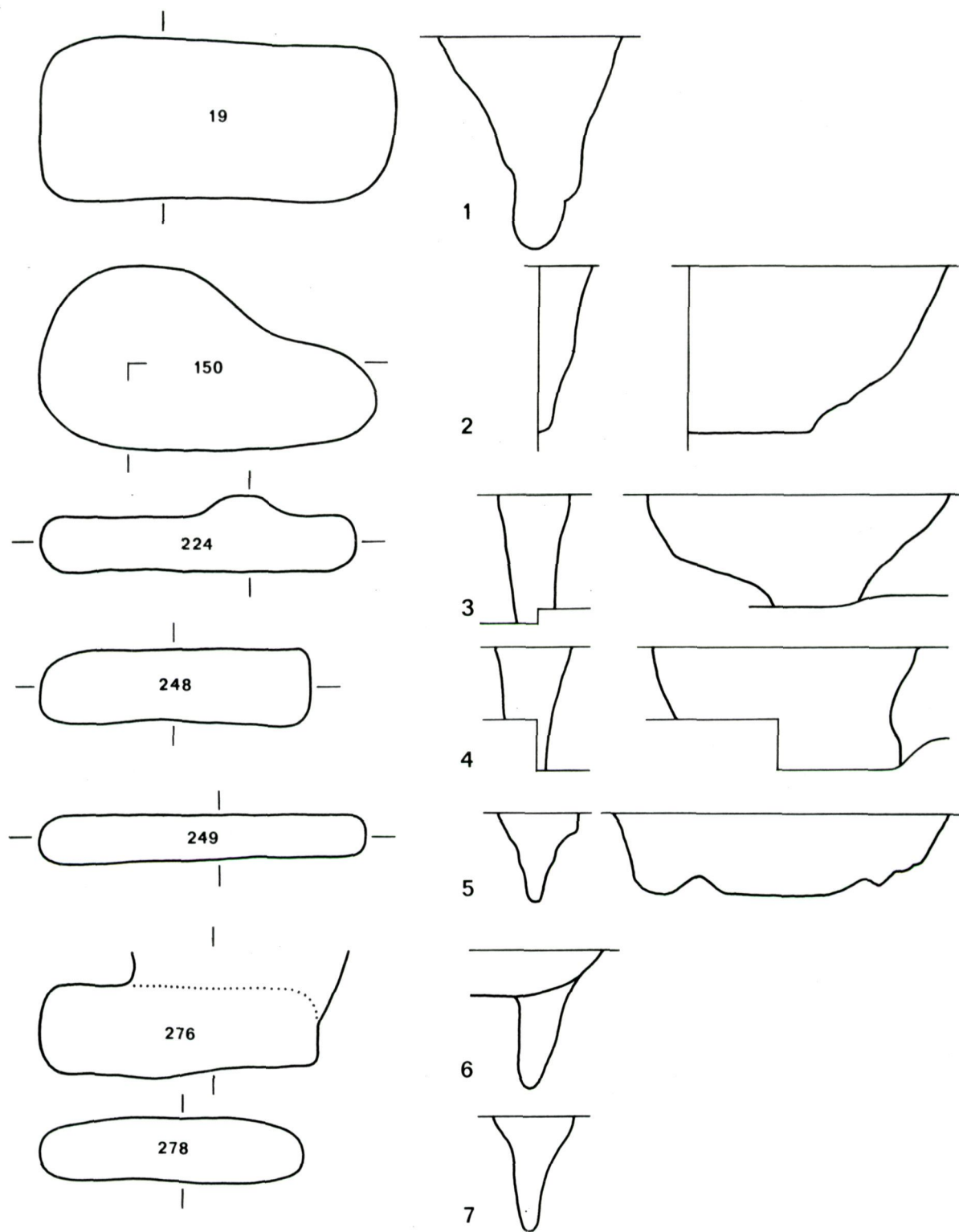


Fig. 1. Hienheim, slits with corpus nr. and corresponding find nr. 1:40.

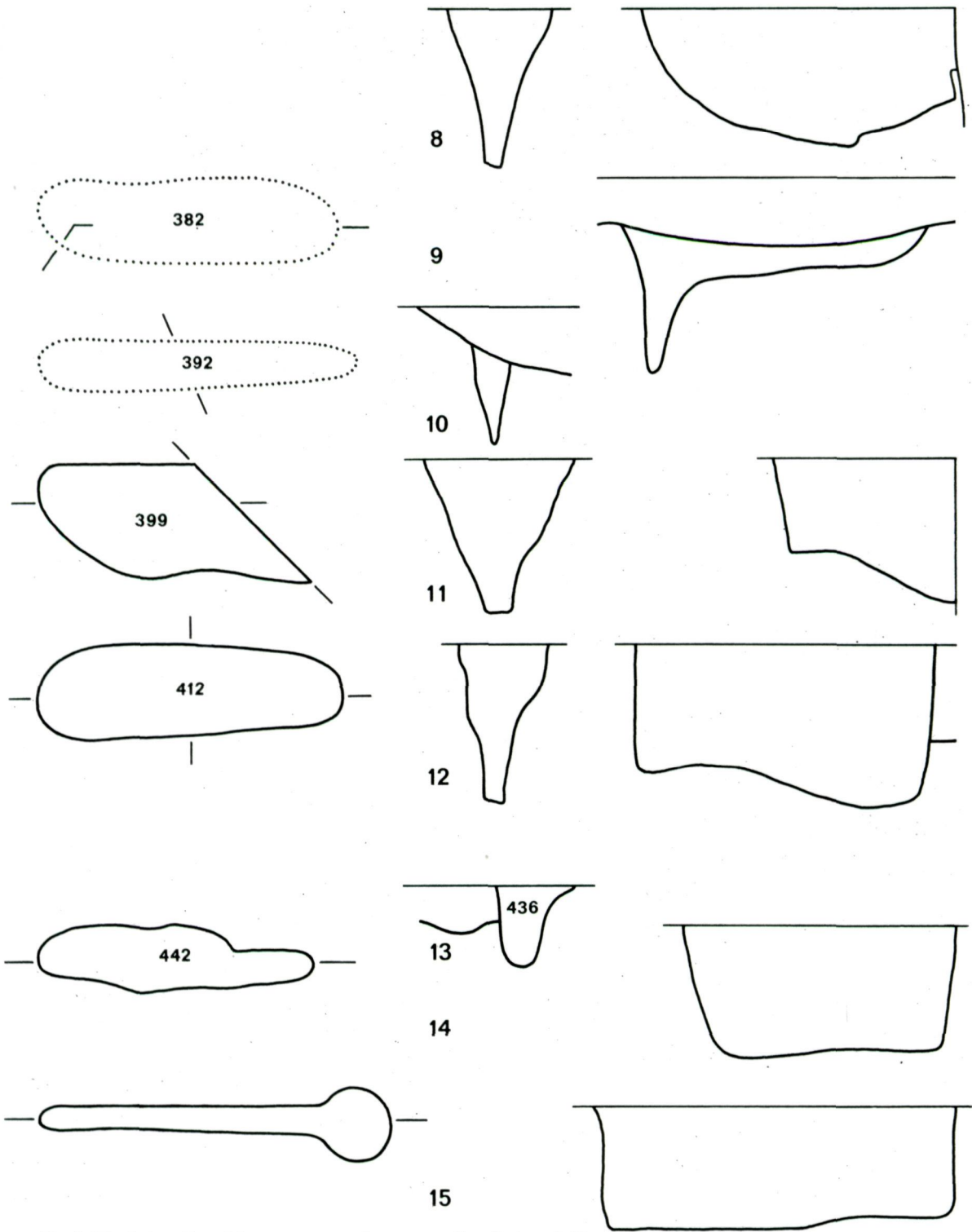


Fig. 2 Hienheim, slits with corpus nr. and corresponding find nr. 1:40.

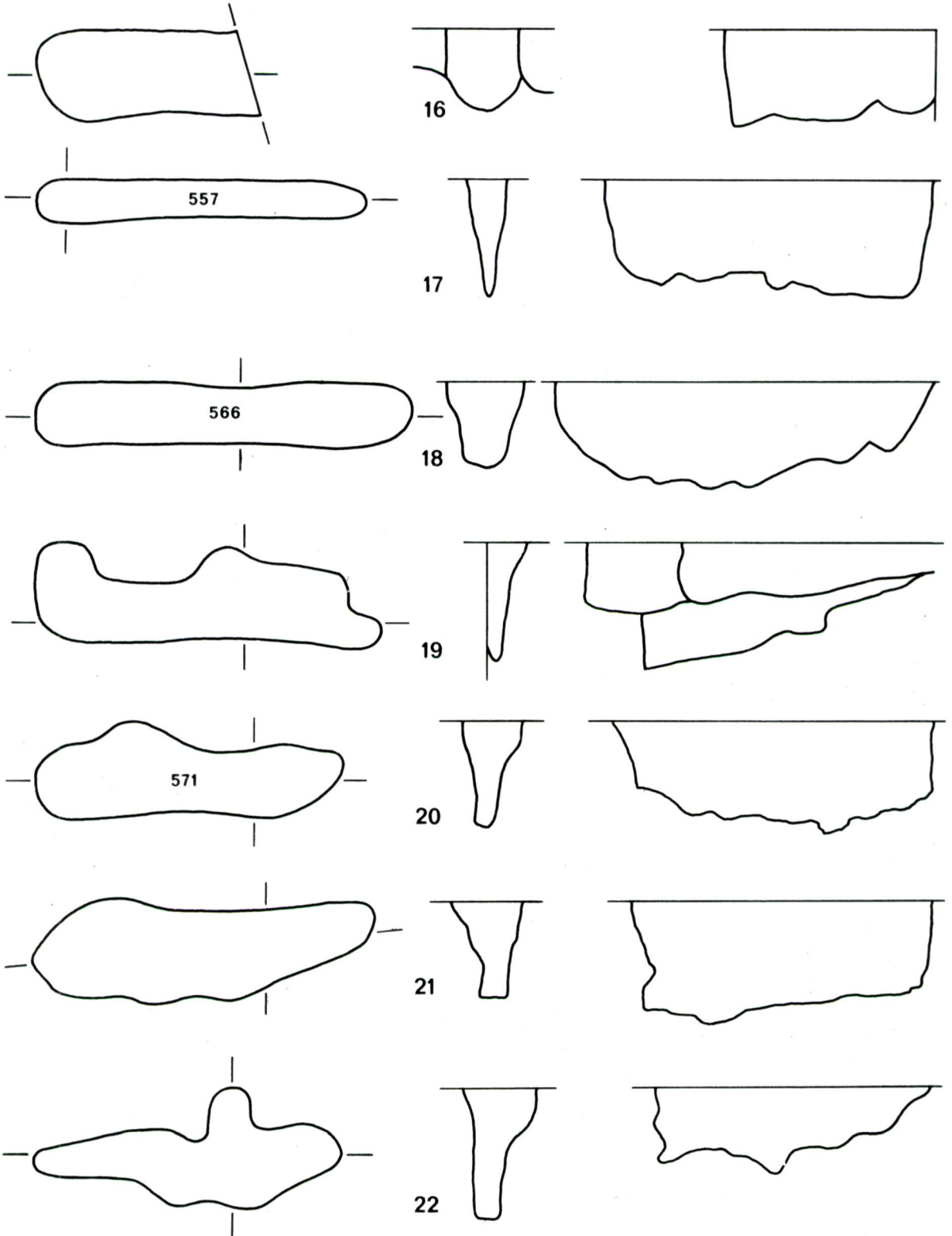


Fig. 3. Hrenheim, slits with corpus nr. and corresponding find nr. 1:40.

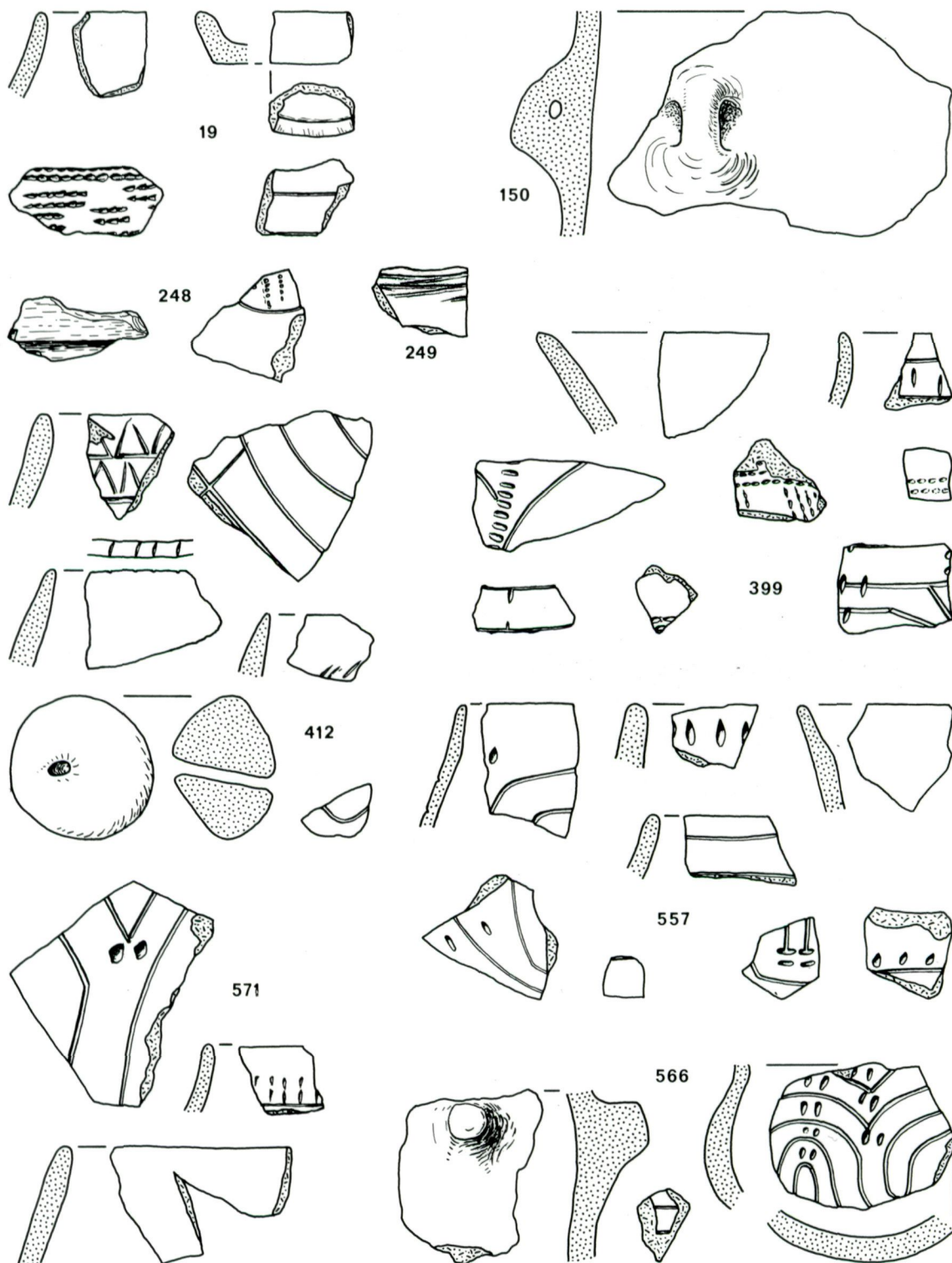


Fig. 4. Hienheim, selected finds from the slits. Nrs. in the drawing correspond to find nrs. 1:2.

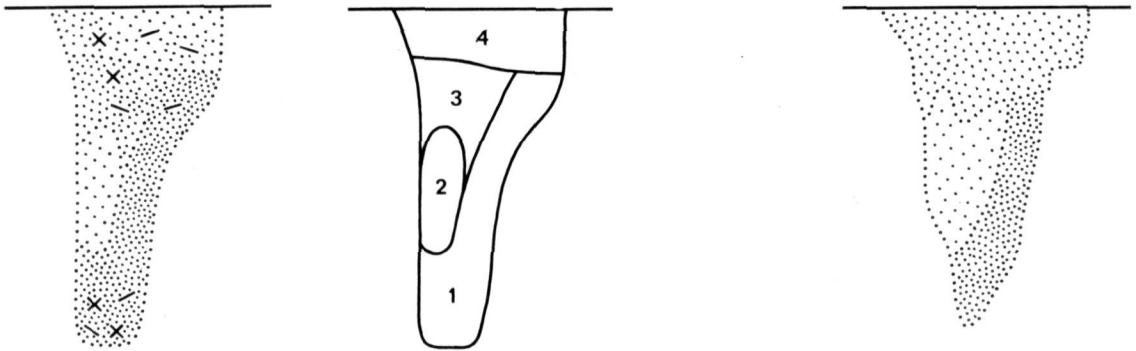


Fig. 5. Hienheim, cross section through slit.

To the left, the original field-drawing re-drawn for print; to the right, interpretative sketch from the author's diary, with nrs. 1, 2, and 3 showing different patches of filling, and nr. 4 the top layer, deposited after setting of the original fillings. This slit is shown as nr. 22 in fig. 3.1:20.

Fig. 6. Hienheim, cross section through slit. This slit is shown as nr. 21 in fig. 3.1:20.

vel is c. 25 cm below the ancient floor, this setting must have been considerable, as if the slits had been filled in their entirety with loose soil, without much further ado.

### 3. Analogues at other sites

Pending the discussion in the sections 4, 6 and 7 below, a non-exhaustive<sup>2</sup> survey of the literature on Western and Central European Prehistory, reveals the following possible parallels for the Hienheim slits:

**Monrepos (W. Germany).** Tangential to a circular 'dwelling pit', a slit was found. It could have as a place to store the dweller's bows and arrows (Paret 1010, p. 7).

**Windecken (W. Germany).** The bones of a young doe on the bottom of the slit found here, argue for an interpretation as a game trap (Wolff 1911, p. 21).

**Plaidt (W. Germany).** Two slits were found, one of which was radially aligned on the causeway through two ring-ditches; the other one was situated outside the ditches; their average orientation was 030°. From the position of the former slit, it was concluded that they must have been used as wolves' traps (Lehner 1912, p. 281, 295-296).

<sup>2</sup> cf. The appendix to the list of literature.

**Eberstadt (W. Germany).** Here, slits were found within the settlement area; they contained no exceptional finds nor specialized tools; some slits incorporated post holes or were adjacent to them; their average direction was 050°. The explanation offered by the excavator is: founding slits for windscreens. This is based on ethnographic parallels (and the location within the settlement): stone-masons use transportable windscreens (Bremer 1913, p. 389-390).

**Worms (W. Germany).** Casually, two 'game traps' are mentioned in a treatise on Band Ceramic Pottery. No reason is offered for this interpretation (Köhl 1914, p. 83).

**Sarmsheim (W. Germany).** Within a rather restricted area, nineteen slits were found; their average direction is 183°.6 (the two houses shown: 160°); some incorporate post holes, some are adjacent to them. Since the narrow mouth of the slits will cause a relatively cool atmosphere within them, they may have served to store meat, according to the excavator (Lehner 1917, p. 116-118).

**Lindenthal (W. Germany).** Within this Danubian settlement eighteen slits were found. Two mutually independent and non-exclusive functions were proposed:

a. Loam-pits. Some slits were found to have

underdug ends; so relatively much unfouled loam, more attractive to potters than humus, was taken from the pits.

b. Tan-pits. Since some of the slits have the length of a cow-hide: *‘Ich kann mir recht gut denken, dasz man Felle nebeneinander in die Schlitze gehängt hat, die Grube mit Eichenrinde gefüllt hat, und dann die Gerbsäure wirken liesz’* (Buttler and Haberey 1936, p. 65). Although the authors were unable to offer conclusive evidence regarding their proposals, they rejected earlier hypotheses (as given above) as being less plausible (p. 30, 65). They also reported that some of the slits showed stratification; all of them were found within the settlement area; no notable finds from the fillings are mentioned; some are adjacent to post holes or have them incorporated.

Duderstadt (W. Germany). Two slits, similar to those above, and two ‘pseudo-graves’ (perhaps akin to the Hienheim slits, corpus nrs. 1 and 2, fig. 1) were found. The former were, following Buttler and Haberey, interpreted as ‘tan-pits’; their average orientation is 180° (Ankel and Tackenberg 1961, p. 23–24). Branč (Czechoslovakia). Attention is drawn to fourteen long, narrow, deep pits at the Lengyel IV site excavated there. It is concluded that the pits must have served magico-religious purposes (more specific: sacrificial) because of the following observations:

- a. A skull of horned cattle was found in one of them.
- b. Fillings show paired layering, which is suggestive of cyclical filling.
- c. Near each hut, one pair of slits was found.
- d. Archaeological and ethnographical parallels (Vladár and Lichardus 1968, p. 318–320). Except in the publication by Vladár and Lichardus all interpretations incorporate earlier attempts at explanation.

#### 4. *The problem, formally and materially*

Logically speaking, any object has two aspects: a formal one (such as shape and definition) and a material side (substance, function, meaning).

These two ways of looking at things may also be used when discussing slits, thereby raising the following questions:

Formally: Are slits sufficiently distinctive within the class of hole-like artefacts to warrant a separate classificatory label?

Materially: Which functions can be attributed reasonably (i.e., testably) to the slits on the basis of either (observed) contents or lack of contents, or (hypothesized) meaning?

To answer the first question, ideally every group of slits should be compared with all other pits at the site concerned. Unfortunately sufficient documentation is available for Branč only, not even for Hienheim as yet, and the issue could be settled solely for that site. The fourteen ‘sacrificial pits’ were statistically compared with a sample<sup>3</sup> from the other pits to determine whether or not a dividing line may be drawn. Then, by probabilistic reasoning (cf. Dixon and Massey 1957, p. 35, 127–129; Popper 1968, p. 268, 312–313) this division is extended: the ‘sacrificial pits’ at Branč are statistically compared with the slits at Hienheim. If it is found that both groups correlate appreciably – say, at least 90% – this will be taken to prove that they are drawn from the same universe, i.e., from the same side of the boundary between slits and other pits.

The paucity of the data from other sites already alluded to, prevents a similar testing of the hypothesis that the slits reported there belong to the same category as those at Branč and Hienheim except, partially, those at Sarmshiem. I will have to assume, then, that the equation of the slits at Branč and at Hienheim holds good for the other slits presented in the third section too; also that an eventual dividing line between slits and other pits at Branč is applicable at the other sites as well.

<sup>3</sup> From the pertinent publication (Vladár and Lichardus 1968) all pits were listed that were contemporaneous with the ‘sacrificial pits’ (and that were not huts, loam-pits, post holes or palissades). From this list, after renumbering the objects, a random selection of 14 pits was drawn.



Now the first question can be rewritten: are slits at Branč akin to slits at the sites mentioned in the previous section, and do all these slits together constitute a distinct artefact type?

To answer the second question (about the possible functions) an axiom is needed to link material and formal attributes, simply to avoid any possibility of ascribing several functions such as trapping, tanning and sacrificing to every single slit, since this would practically amount to an evasion of testing and of criticism. The axiom will read: like functions cause like forms; or, alternatively, equivalent material attributes correlate high with equivalent formal attributes. Clarke (1968, p. 20, 59–62) states this very axiom as part of the Black Box Theory.

Apart from this axiom, a methodological remark may be to the point. The various authors writing on slits (cf. the 3rd section above), time and again were consciously incorporating the hypotheses of their predecessors, sometimes improving upon, sometimes rejecting earlier notions, but steadily becoming more specific. The Buttler and Haberey proposal regarding tan-pits (still approvingly mentioned by Ankel and Tackenberg 1961), however, was not contested by Vladár and Lichardus when they offered their 'sacrificial pit' hypothesis; they were apparently unaware of it, since none of the publications listed in the 3rd section are to be found in their references. Still, the function of tanning seems to be more specific than that of sacrificing, a 'tannery' being more tangible than an 'offering place' and consequently easier to be tested and falsified. On methodological grounds the tanning hypothesis should be preferred, therefore (Popper 1968, p. 53–54, 267). On the basis of ethnographical reports and historical recipes of pre-industrial tanning, this hypothesis can be further elaborated, and testable statements derived (cf. Bravo and Trupke 1970, p. 20; Gansser 1949, p. 3156–3157). Generally speaking, tanning serves two purposes: the suppling and preservation of animal skins. Out of many known, three ways

to achieve this are relevant here: 1. rubbing, 2. smoking and 3. vegetal tanning. Any of these 'tanning' processes passes through three stages: A. cleaning, B. 'tanning' (in its broad meaning) and C. finishing. For present purposes, a very summary description of these three tanning processes will suffice:

1. Rubbing. Stage A: repeated application of urine looses the hair from the skin in 3 to 40 days, after which it should be removed by scraping. Stage B: animal fat is pounded and kneaded into the skin, working the hide over and over again. After this, the skin is ready for further processing.

2. Smoking. Stage A: as 1A. Stage B: the skins are hung over straw fires for several days. Stage C: to finish the process, the hides are stored away, well wrapped in straw, for a day or so. Then the skins are ready for further processing.

3. Vegetal tanning. Stage A: as 1A. Stage B: the hides are sandwiched between oak or chestnut leaves/bark/wood and left to the elements; within one winter, rain and snow leach sufficient tanning agents from the material to tan the skins. Stage C: to finish the hides, they should be dried and lightly kneaded. After this, they are ready for further processing.

Besides suppling the skins the processes 2 and 3 also act to preserve the skins.

Pits may be used in process and stage: 1A; 2A, C; 3A, B.

A number of testable statements can be derived from the above, in view of the problem at hand. If the slits were used in the tanning process, it necessarily follows that:

- a. Slits should be large enough to accommodate skins. If the slits were used in stage A of either of the three processes above, then:
- b. Phosphates (from the urine) and/or sulphur compounds (from the hair) should be present in the vicinity of the bottom of the slits.

##### *5. The formal aspects of the data*

The data on the excavations at Branč have

been excellently published by Vladár and Lichardus (1968). No difficulty is met with when re-analysing their findings. As outlined in the fourth section, the fourteen 'sacrificial pits' should be compared with the other pits at Branč. In table 3 the fourteen slits are compared statistically with a random sample of fourteen other pits, to test the hypothesis: 'sacrificial pits' and other pits are drawn from the same population. From this table, it appears that there is a marked difference between 'sacrificial pits' and other pits on the attributes of shape and stratification (the last column reads: reject the hypothesis); as for contents, both groups show similar fillings (the hypothesis is accepted).

The second comparison called for in the previous section is summarized in table 4. Slits at Hienheim are compared with the 'sacrificial

pits' at Branč, by means of a statistical test of the hypothesis that both groups of objects are part of one class of objects. From this table (and from table 3) it follows that:

a. t-values, which are difference indicators, (in both tables below 'compared, t') are a good deal smaller in table 4 than in table 3 on attributes of shape; differences between the slits at both sites are less than those between 'sacrificial pits' and other pits at Branč.

b. The apparently significant differences in contents of the slits at both sites are easily explained by a glance at the plans of the settlements (Modderman 1971, p. 8-9; Vladár and Lichardus 1968, fig. 8); due to the much denser occupation at Hienheim there should be more 'background noise' per square metre and thus per slit-fillings than at Branč.

c. More variables are compared in the tables

Table 3. Branč. A comparison of 'sacrificial pits' with other pits, by means of a statistical test of the hypothesis: 'sacrificial pits' and other pits are drawn from one population.

Variables	'Sacrificial pits'			Other pits			Compared		Table t	Conclusion
	$\alpha$	$s^2$	N	$\alpha$	$s^2$	N	df.	t		
Orientation	062°8	2425	14	081°2	3072	4	7.3	.60	1.88	accept
L/W-index	2.71	1.17	12	1.42	.76	12	$\infty$	3.22	1.64	reject
D/W-index	2.05	.34	14	.46	.09	12	1	9.35	6.31	reject
L/D-index	1.40	.15	12	3.17	9.10	13	12.5	-2.11	-1.78	reject
Size	2.25	1.91	12	6.31	132.4	14	15.4	-1.30	-1.75	undecided
Stratification	0.79	1.28	13	.43	3.57	14	29	7.55	1.69	reject
Bones	0.86	1.82	14	.14	.29	14	20	1.59	1.72	undecided
Pottery	4.00	12.0	14	3.00	10.6	14	29	.79	1.70	accept
Flint	0.71	2.20	14	.00	.00	14	15	1.77	1.75	undecided

(t-values according to Dixon & Massey 1957: 384 at the 5-95 % level of significance).

$\alpha$ : average value.

$s^2$ : standard deviation.

N: number of objects entered into calculation.

Orientation: direction of (Eastern end of) long axis of object.

L/W-index: maximum length of object divided by maximum width of object.

D/W-index: maximum depth of object divided by maximum width of object.

L/D-index: maximum length of object divided by maximum depth of object.

Size: volume of object in cubic Metres, approximate.

Stratification: ratio of objects with stratification to N.

Bones

Pottery } : number of such artefacts found in the objects, averaged.

Flint

Table 4. Slits. A comparison of 'sacrificial pits' at Branč with slits at Hienheim by means of a statistical test of the hypothesis: 'sacrificial pits' and slits belong to one single class of artefacts.

Variables	Hienheim			Branč			Compared		Table	Conclusion
	$\alpha$	$s^2$	N	$\alpha$	$s^2$	N	df	t		
Orientation	+ 12°	1477	22	+ 43°	2425	14	26.2	2.00	3.00	accept
L/W-index	4.39	3.85	18	2.71	1.17	12	$\infty$	2.84	2.93	undecided
D/W-index	2.27	1.38	19	2.05	.34	14	$\infty$	.74	2.93	accept
L/D-index	1.80	.11	16	1.40	.15	12	$\infty$	2.85	2.93	undecided
Size	.57	.16	16	2.25	1.91	12	$\infty$	4.10	2.93	reject
Stratification	.46	.01	22	.79	1.28	13	$\infty$	3.31	2.93	undecided
Bones	.27	.77	22	.86	1.82	14	$\infty$	1.24	2.93	accept
Pottery	8.82	13.02	22	4.00	12.00	14	12.3	4.02	3.11	reject
Flint	4.73	8.26	22	.71	2.20	14	26	5.85	3.00	reject

(t-values according to Dixon & Massey 1957: 424. Assumptions:  $(1 - \beta) = 90\%$ , level of significance 5% two-sided).

For a description of the labels used cf. Table 3, except orientation, which in this table 4 lists the difference in degrees between the (averaged) directions of the huts and of the slits at the site concerned.

than required by the formal side of the problem; contents refer to the material aspect, i.e., the tanning hypothesis, and thus properly belong to the next section.

The only site from which some more details are known, is Sarmsheim (Lehner 1917); the sizes of the tan-pits are listed, and the orientation may be read from the site-plan. Mean indices:  $L/W = 9.24$ ,  $D/W = 3.21$ ,  $L/D = 2.88$ . However, since the position of the excavation level with respect to the ancient floor level is not given, not too much weight should be given to these indices. Although perhaps linked to function, orientation of the slits may be considered a formal attribute also.

In table 5, the orientations of the slits, relative to the average direction of the huts at the site concerned, are listed for Branč, Hienheim and Sarmsheim. It appears that a tendency of equal alignment of huts and slits exists, coupled to the number of slits excavated.

#### 6. The material aspects of the data

Searching the excavation-reports to gather data regarding contents, one fact stands out above all others: the scantiness of objects found in the fillings of the slits. Adequate descriptions of the contents are available for

Branč (Vladár and Lichardus 1968) and Hienheim (unpublished) only; these are summarized in table 6. From this table, for both sites strong correlations emerge between the different types of waste, as well as a nearly absent tie between size of the pits and number and category of the refuse in it.

The various correlations at Hienheim are tending slightly more to the extremes of the scale than are those at Branč, which show more regular values. In view of a possible sacrificial function the high correlations between bones and other contents (especially, and noteworthy, wall plaster) are remarkable, since mutual statistical dependency is the only possible conclusion. The differences in absolute numbers of pieces per category at Hienheim and at

Table 5. A comparison of the average orientations of the slits at Hienheim, Branč and Sarmsheim, relative to the average directions of the huts at these sites.

	Hienheim	Branč	Sarmsheim
Orientation	+ 12°	+ 43°	+ 24°
Stand. devn.	38°.4	49°.3	38°.1
Kurtosis	.25	- 1.01	- 1.18
Skewness	.48	.30	-.02
Abs. numbers	22	14	19

Table 6. Hienheim, Branč. Correlation coefficients between the various categories of mobilia from the slits. Above the diagonal: Hienheim; below the diagonal: Branč.

Rim sherds	.85	-.02	.71	-.08	.03	.82	.01	16
.53	Wall sherds	.01	.79	.07	.16	.79	.19	178
.68	.88	Lugs	-.00	-.09	-.14	.19	.27	3
—	—	—	Smooth ware	.43	.53	.69	.36	37
.53	.36	.26	—	Wall plaster	.83	-.05	.07	133
.59	.65	.75	—	.32	Bones	.04	.72	6
.57	.47	.55	—	.35	.86	Flint totals	.28	105
.75	.65	.82	—	.29	.88	.72	Size	16
14	42	28	—	6	12	10	12	Absolute numbers

Branč will be mainly due to the much denser occupation of the former site: more waste must have been around when the slits were filled in (compare Modderman 1971, p. 8-9 with Vladár and Lichardus 1968, fig. 8).

From tables 3 and 6, an impossibility to separate slits from other pits on basis of their generalized contents is apparent. Even the absence of specialized tools, uniting the slits at Hienheim and at Branč, does not serve to disentangle 'sacrificial pits' and other pits at Branč.

Finally, a little should be said on the alleged archaeological and ethnographical parallels (Vladár and Lichardus 1968, p. 320). Tracing their references (of which only Banner 1956, Makkay 1963 and 1964, and Novotný and Jarmárik 1961 have been incorporated in my list of references) which sometimes speak of 'sacri-

ficial pits', and sometimes of 'bothroi' (often rendered in Greek letters!) the original and oldest source seems to be Homer's *Odyssey*: 'There [at 'the frontiers of the world, where the fog-bound Cimmerians live in the City of Perpetual Mist'] . . . I [Odysseus] drew my sharp sword from my side and dug a trench about a cubit long and a cubit wide. Around this trench I poured libations to all the dead . . .' (Homer: *Od.* XI: 23-26; transl. 1946, p. 171).

Given that material equivalence should be demonstrated by formal equivalence (section 4), it follows that Homer's description ('a cubit long and a cubit wide') precludes equation of the material attributes of Odysseus' 'sacrificial pit' with the slits at Branč and at Hienheim. This even more so, since it has been demonstrated above that shape is the only waterproof criterion for identifying slits.

As to the ethnographic parallels, Vladár and Lichardus (1968) do not present evidence, nor parallels. So I asked cultural anthropologists in Leiden University, dr. H. J. M. Claessen, prof. dr. A. A. Gerbrands and prof. dr. P. E. de Josselin de Jong, if they ever had come across pits, analogous to those defined above. Their answer: 'definitely no'. The ethnographic accounts on which the description of the various processes of tanning are based (see section 4) do speak of tan-pits; however, no reference to slits, or even slit-like pits, as understood in this article, appears.

Dr. H. J. M. Claessen kindly drew my attention to a tradition, apparently existing in learned circles in Europe during the last century regarding sacrificial pits, large enough to hold a canoe; these pits would be dug on the occasion of the interment of the king of Abomey (Dahomey, W. Africa), to be filled with the blood of human sacrifices. This story was exploded by a letter of the Rev. Peter W. Bernasko, missionary, dated February 1861, who had been there:

*'The pit at Abomey, which was reported to have been dug deep enough to contain human blood sufficient to float a canoe, was false. There were two small pits, of two feet deep and four feet in diameter each, to contain poor human blood, but not to float a canoe.'* (Quoted in Richard F. Burton: 'A Mission to Gelele, King of Dahome', London 1864; Vol. II, Appendix III.)

#### 7. Dating of the slits

The dating of the slits at Hienheim has been given separately for each of them in table 1. To sum up: seven slits dated to the Linear Pottery Culture, four to the Stroke Ware Culture, and one to either of these; one to the Rössener Culture, and one to not later than the Altheimer Group; leaving eight undetermined. Most certainly, there were no finds in the slits that were to be attributed to the Chamer Group or the Altheimer Group, or any later culture, even not in the top layers filled in after the setting of the original fillings. Conse-

quently, the slits at Hienheim must have been dug between 6200 and 5000 B.P. (cf. Neustupný 1969).

At Branč the 'sacrificial pits' were dug by people of the Brodzany-Nitra Group, the local manifestation of phase IV of the Lengyel Culture (Vladár and Lichardus 1968, p. 320); nothing preceding that phase was found, while in the Lengyel V phase, represented by the Ludanice Group, apparently no slits were made. According to the authors, the Lengyel IV phase is contemporaneous with the Tiszapolgár Culture (Vladár and Lichardus 1968, p. 334; cf. also Šiška 1968, p. 163, and E. Neustupný in Točík 1969, p. 284), which co-incides with the first half of the Central European Proto-Proto-Chalcolithic or 5550 – 5300 B.P., (Neustupný 1968, p. 48–49; 1969, p. 793; 1970, p. 106).

As regards the other sites, a short indication of the relevant culture phase will suffice.

Duderstadt: Linear Pottery and Stroke Ware Cultures (Ankel and Tackenberg 1961).

Lindenthal: the tan-pits themselves are not datable (Buttler and Haberey 1936, p. 31, 65), yet at the settlement Linear Pottery and Stroke Ware Cultures are abundantly represented.

Sarmsheim: where cross-cuttings did occur, the slits were invariably the older features (Lehner 1917, p. 118). The pottery, shown in the figures of the report, is of Linear Pottery and Stroke Ware Cultural ancestry, while the two houses on the plan probably date from the former culture.

Worms: the slits are dated to the Linear Pottery Culture (Köhl 1914, p. 83).

Eberstadt: if I interpret drawings and text correctly, the slit there is at least as old as the Rössener Culture (Bremer 1913, p. 389–390). Plaidt: the excavated site is part of a Linear Pottery Culture settlement (Lehner 1912, p. 294).

Windecken: the finds from the several pits are not differentiated; however, both Linear Pottery and Stroke Ware Cultures are present (Wolff 1911, p. 21).

Monrepos: finds are not differentiated per pit;

the figures show, among other things, Linear Pottery (Paret 1910, p. 8).

Taken together, at several sites of the Danubian I and II Culture Groups people have dug slits between 6200 and 5000 B.P.; total numbers, however, are as yet too small to allow any further differentiation as to time and space distributions.

#### 8. *Conclusions, interpretations*

The first question raised in the 4th section was whether slits constitute a separate class of artefacts. As far as the evidence goes, the answer is yes. In Branč a difference in form between 'sacrificial pits' and other pits was clearly demonstrable (table 3), whereas a statistical comparison of the slits at Branč with those at Hienheim (table 4) corroborates the hypothesis that both groups are elements of one single set, or artefact category. Lacking sufficient quantitative data from other sites, the there described slits are also entered into that class<sup>4</sup>.

Looking for other distinctive formal characteristics, the orientation of the slits was considered in relation to that of the huts<sup>5</sup>. However, the small and possibly negligible difference in orientation (table 5) does not point to any such distinction. In the 7th section, the class of artefacts referred to, was found to be restricted to a limited number of sites of the Danubian I and II Culture Groups as provisionally defined by Clarke (1968, p. 290).

Together this amounts to the conclusion that within the Danubian I and II Culture Groups,

between 6200 and 5000 B.P., a class of artefacts, here labeled 'slits' or 'tan-pits', can be recognized that is differing in shape from all other pit-like artefacts.

The second question raised in the 4th section asked for a hypothesis regarding the function of the slits. Very few objects are found in them, and those that are recovered are not indicative of any special function. Moreover, the high correlations between the various categories of objects, as shown in table 6, suggest a filling in of the slits with the regular settlement rubbish. This is also to be concluded from table 3, where it is shown that the slits at Branč contain similar objects as the other pits at that site. The scantiness of the objects in the fillings, added to a few field-observations (cf. fig. 5 and 6) on the stratification and the relatively unfouled earth in the slits, argue for an intended filling in of the slits at once, after possibly having been used for a short period. Therefore, any hypothesis as to the function of the slits, has to be based on their form only.

As Homeric parallels had to be turned down, and ethnographic analogues were not found, the Vladár and Lichardus hypothesis of a sacrificial function has to be rejected, which leaves standing the proposal of Buttler and Haberey (1936, p. 65): tan-pits. From descriptions of the various techniques of tanning, it was concluded that – provided skins can be fitted into the tan-pits – the pits may have served at several stages of different processes of tanning. On the assumption that the animals of a species show a more or less constant length-height ratio, the more or less constant length-depth ratio of the slits is suggestive. Therefore, it is unfortunate that only one stage of the tanning process is potentially testable. Urine-induced unhairing may perhaps be 'proven' by chemical analysis of the soil (phosphates from the urine, sulphur compounds from the hair). As a negative indicator for a tanning function may be taken the absence in the fillings of the slits of tools used when cleaning hides and/or the sewing of skins (which cannot have been done at exactly the

<sup>4</sup> Not given here is an analysis regarding eventual compositeness of this category as should be demonstrable by a differential clustering of the various measures and indices of the shape of the slits. Within this class, no subdivision has been found. Rather, length and depth appeared to vary jointly, Length (L) regressing on Depth (D) according to the formula  $L = 0.43 D + 1.68$  (approximately).

<sup>5</sup> Formally, dispersion of the slits over the settlement area should be considered also. However, since possibly no Danubian site has been excavated completely, and since statistics on dispersal depend on area excavated, this matter could not be investigated (cf. Clarke 1968, p. 507-509; Haggert 1965, p. 91, 231-233).

same place). For Hienheim, table 2 slightly points into this direction; in Branč, however, neither in the slits nor in the other pits, flint tools were found. Of course, together these points are suggestive; yet they are not conclusive vis-à-vis a postulated function of the slits during the tanning process. Thus, the conclusion arrived at can be no more than a proposal to maintain Buttler and Haberey's label for slits: tan-pits.

#### 9. *Suggestions for further research*

The data presented here neither reject nor affirm fully the hypothesis that the slits may have been used in the tanning process. Therefore:

– a zoologist should look into the matter of the distribution of length and height within an animal species, to see whether the assumption that there is a constant ratio between the two measures proves tenable.

– then the soil in the vicinity of the bottom of the slits (not the contents of the bottom parts) should be analyzed chemically, especially on the (significant) presence/absence of phosphates and sulphur compounds.

– a detailed comparison of the contents of the slits with that of the other pits within several settlements, especially with regards to the absence/presence of specialized tools is, archaeologically speaking, the easiest continuation of the testing of this hypothesis.

– the rather small number of slits reported relative to the time-span involved, may have its cause in the almost unfouled fillings of the tan-pits, which diminishes their observability. It is recommendable to keep the existence of this class of artefacts in mind when excavating a Danubian settlement.

#### 10. *Acknowledgements*

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#### 11. *Summary*

At Hienheim, Bavaria, twenty-two rather distinct long, narrow, deep pits have been excavated. They are presented in some detail, together with reported analogues from other sites. Then this group of artefacts, here called slits, is formally defined. They have been dug by people of the Danubian I and II Culture Groups between 6200 and 5000 B.P. Their length of generally between 2 and 3 m appears to co-vary with their depth at a ratio of c. 2.1 : 1. Their fillings, which are relatively unfouled, contain finds indistinguishable from those in other pits within the same settlement.

From the definition, it follows that a hypothesis regarding their function should be linked with their special form rather than with their contents. The present data, although only weakly corroborative, certainly do not falsify the proposal originally formulated by Buttler and Haberey (1936, p. 65) that the slits may have served in a tanning process; this hypothesis is further elaborated.

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## Appendix

When the above had been finished, I was kindly informed by Dr. O. Höckmann, Mainz that the following papers which I did not consider, also contain references to slits:

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