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A NEOLITHIC SETTLEMENT ON THE DUTCH NORTH SEA COAST *c.* 3500 CAL BC

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AND PETER F.B. JONGSTE

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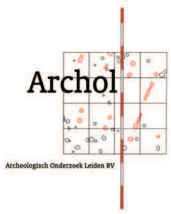

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17 Coprolites, macroscopic analysis

Mark van Waijjen
Caroline Vermeeren

Coprolites were collected from deposits from all the occupation phases. They were classified according to their shape, dimensions and inclusions. Two main categories (each including subtypes) were distinguished: a flat, round type, attributed to herbivores, probably cattle, and a cylindrical type, attributed to carnivores or omnivores, possibly dogs. The site's inhabitants may themselves have been responsible for the largest subtype of the latter category.

17.1 Introduction

Coprolites are fossilised droppings. They are usually preserved if they undergo desiccation before becoming incorporated in a deposit. During the excavation, 187 coprolites or coprolite-like remains were collected. From previous research it was known that pollen analysis can allow statements to be made about a site's former natural vegetation, the crops that were grown and the food that was consumed by the occupants (Vermeeren/Kuijper 1996). Herbivore coprolites provide information primarily on the (natural) vegetation in a site's surroundings while carnivore/omnivore coprolites can tell us more about consumption patterns and cultivated crops. For this reason the coprolites were macroscopically classified and a number of coprolites were selected for pollen analysis.

17.2 Methods

The macroscopic coprolite analysis comprised two parts. The first aimed to identify the 'producer' – herbivore, carnivore or omnivore – and where possible specify it more closely – cattle, dog, fox, man, *etc*. This is of vital importance with respect to the interpretation of the coprolites' pollen contents.

All the finds recorded as coprolites (N=194) were assessed. Seven finds were rejected. The remaining 187 specimens were coded by BIAX *Consult* on the basis of the following variables: fragmentation, dimensions, shape, large inclusions. The coprolites were not weighed, as the weight of such finds is greatly dependent on the state of preservation, and hence not very suitable as a criterion for identification

Figure 17.1 Examples of coprolites. No. 5856 type a, no. 2755 type c (scale 1:1).

(Van Waijjen/Vermeeren 2004). Although the coprolites were treated with special care, many disintegrated in the field or later during storage. Even so, the majority (N=167) could be attributed to one of the distinguished categories.

The second aim of the analysis was to select 16 suitable coprolites (plus 5 spare specimens) for pollen analysis. The coprolites in question were selected on the basis of quality, diversity of producers and spread across the distinguished occupation phases, to ensure optimum results. Two groups of eight coprolites each were thus selected. The results of the first group are reported in chapter 18.

17.3 Materials

The majority of the 187 collected coprolites came from the aquatic deposits on the dune slopes (89%). A much smaller number were recovered from the occupation layer on the dune itself and from pit fills. This difference is indisputably attributable to differences in preservation conditions. The largest number of coprolites was found on the long southeastern side (69%), in accordance with the general find distribution pattern. Coprolites were likewise found in find ratios comparable with those of the other finds at the northern end (13%) and on the northwestern flank (11%). In total, 167 coprolites could be dated to one of the occupation phases. More than half date from phase 2a. The find numbers decrease progressively via phase 2b to phase 3 (table 17.1). No coprolites had survived from phase 1. These proportions will be partly attributable to the employed collection method (phase 1) and partly to the preservation conditions. We again observe a correlation with the general find distribution. There is no particular area or period in which coprolites are disproportionately represented. They are a structural element of the find assemblage.

17.4 Classification and Producers

Three main types of coprolites were distinguished:
– type a is rounded and flat,
– type b has a comparable shape, but is less rounded and thinner.

phase / type	1-2a	2a	2b	3	1-3	totals
a	1	7	3	7	1	19
a/b	–	1	1	–	–	2
b	1	5	2	–	–	8
b/c	–	2	1	–	–	3
c	6	58	29	5	14	112
c large	–	11	4	2	2	19
?	–	7	10	4	3	24
Totals	*8*	*91*	*50*	*18*	*20*	*187*

Table 17.1 Coprolites, type versus phase.

These two types are both of the ‘cow pat’ variety and are assumed to derive from herbivores.
– type c is cylindrical; a number of subtypes were distinguished on the basis of diameter and inclusions. The coprolites of this type are assumed to derive from carnivores (dogs) and omnivores (humans). Below is a detailed description of the distinguished (sub)types.

Type a is characterised by dark brown, almost peaty matter and has a rounded, flat shape. It looks like an originally mushy substance that has hardened. The coprolites of this type include many – often fairly large – botanical remains. Remarkable are the many straight tunnels with a round cross-section lined with epidermis that were formed by plants growing vertically through the droppings. Evidently, (cyper)-grass, sedge and/or reed stems grew through the droppings while they were still soft. Some of the holes may however have been formed by roots penetrating the matter from overlying peat, as suggested by the presence in some of the coprolites of type a of (large) reed rhizomes, which certainly did not pass through the gastrointestinal tract. Coprolites of this type are most likely of herbivore origin. The flat shape and the (coarse) botanical component suggest they are (parts of) cow pats.

Subtype a2 is largely similar to type a, but less brown and less humic, and (virtually) not vertically penetrated by plant growth.

Type b has many features in common with type a, in particular the botanical component, but is less rounded and flatter (approx. 0.5 centimetre), contains a lot of inorganic matter (clay/sand), consists of harder and heavier matter and is less clearly vertically penetrated by plant growth than type a. It is quite possible that the only cause of the differences between types a and b is the substrate onto which the faeces were dropped. Type a will have been dropped onto a peaty or humic soil and type b onto a clayey or sandy substrate. So the coprolites of type b are most probably likewise of herbivore origin.

Subtype b2 is largely the same as type b, but (virtually) not vertically penetrated by plant growth. Only one coprolite of this type was distinguished.

Type c is characterised by a cylindrical shape and a clearly visible outside. The diameter of the cylinder is generally around 1.75 centimetres. In the case of unfragmented specimens the cylinder often has a pointed end, indicating a carnivore or omnivore origin.[1] The coprolites of type c are pale yellow; the matter is truly mineralised and contains gas cavities. In addition, sand, fine organic matter and often also small bone fragments were almost always observed in the macroscopic analysis. Their small size suggests they derive from foxes or dogs and makes it unlikely that they were produced by humans.

Subtype c* resembles type c, but is a little larger (ø = 2 cm) and clearly more porous. Only three coprolites of

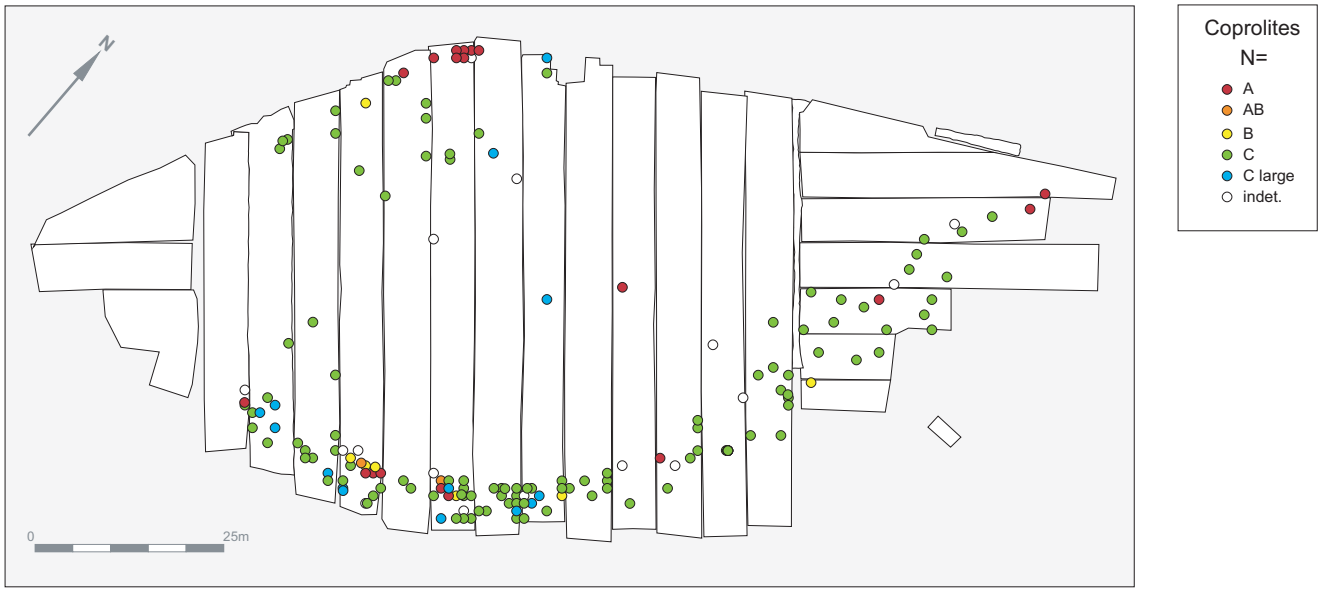

Figure 17.2 Distribution patterns of coprolites per square metre.

this type were distinguished. They probably also derive from carnivores or omnivores.

Subtype c-large likewise resembles type c, but is distinctly larger (ø = 2/2.5 cm). It is often not round, but oval or flattened in cross-section. These coprolites were produced by possibly carnivores, most probably omnivores such as large dogs or humans.

Subtype c2 is similar to subtype c-large, but clearly contains more botanical matter than type c, and little bone or sand. The matter is light and porous and contains more and larger gas cavities. These coprolites most likely derive from omnivores such as large dogs or humans.

Subtype c3 clearly contains more bone than type c, including fairly large fragments. The food was evidently less vigorously chewed. The coprolites of this type also contain larger quantities of coarse sand and sometimes also charcoal, implying feeding from the ground. They vary in size, but are on the whole larger than the coprolites of type c (approx. (ø = 2/2.5 cm). This type is probably attributable to a carnivore such as a large dog or possibly a wolf.

Table 17.2 shows the scores per type, table 17.1 the distribution of the (main) types according to the distinguished phases. The proportions of phases 2a and 2b are more or less the same. We note a relatively large number of coprolites of type a from phase 3, but this may very well be due to better preservation in the peat.

17.5 Conclusion

The great majority of the classified coprolites belong to type c and its subtypes (81%). Of these coprolites, 69% most probably derive from dogs and 20% (subtypes c-large and c2) possibly from humans, with dogs as alternatives. The other 11% could not be attributed to a specific producer. So most, if not all, of the cylindrical coprolites seem to have been produced by dogs, which evidently roamed freely around the settlement. Wolves and foxes are less likely producers, considering the context.

Some of the coprolites (18%) look like (parts of) cow pats. We assume that the proportions of the surviving coprolites do not correspond to the proportions of the original droppings. The difference will be largely attributable to the much smaller chances of fossilisation of the latter group of droppings. In the absence of alternatives, and considering their relative great importance for the community (chapter 22), cattle are the most likely producers of those droppings.

The coprolites comprise no droppings typical of pigs, sheep or goats. In the case of goats and sheep this is in accordance with the absence of remains of those animals in the bone assemblage. As for pigs, it could mean that pigs did not roam freely in the farmyards, that is, not in the peripheral zones to which the coprolite study relates.

type		N=	totals
a		10	
a?		1	
a2		8	
	subtotal		19
a/b		2	
b		7	
b2		1	
	subtotal		10
b/c		3	
c		78	
c large		19	
c*		3	
c/c2		4	
c/c3		8	
c?		2	
c2		8	
c3		9	
	subtotal		134
?		10	
–		14	
	subtotal		24
Totals			*187*

Table 17.2 Coprolites, numbers per type.

note

1 In – more or less – natural environments, the menu of carnivores such as dogs and foxes also includes a plant component, making it more difficult and less meaningful to distinguish between carnivores and omnivores.

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