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CONTENTS

2. Reconstruction and Interpretation of the Pipes D. A. Higgins

More detailed post excavation work was carried out on the 'fabric A' pipes in layers 18-20 of the Rainford kiln site to try and reconstruct complete examples of these mid seventeenth century pipes. Since such work requires a somewhat different approach to reconstructing pottery, and is not yet widely attempted this paper is broken up into two sections. The first describes the considerations and methodology of reassembling pipes, using Rainford as an example, while the second discusses the results that were obtained from this material.

Methods for Reassembly and Analysis of Clay Tobacco Pipes

The problems posed by the reconstruction of clay tobaccopipes are somewhat different to those of pottery. Potsherds can usually be sorted by fabric and decorative motif to form easily managable groups. From these groups even a few sherds can give the complete profile of a pot. With pipes it is often not possible to divide them by fabric and the loss of just one small piece means that the stem length cannot be completed. These factors affect both the way in which the material should be excavated and the approach to post-excavation work.

Excavation

The importance of recovering a complete sample cannot be overstressed. If time and resources are to be allocated to a serious examination of the pipes the site time used, for example, in sifting a pit deposit becomes negligable. The technique of excavation and nature of the deposit will, of course, effect those factors. In a trowelled layer careful collection of all pipe fragments can yield worthwhile results. In areas of densly packed material or pit groups containing suitable deposits sieving is recommended since every piece missed means that the finds assistants are wasting their time working on the rest of that pipe. At Rainford half of the topsoil and all of layers 18-20 were sieved with a nest ranging from 1 mm to 50 mm all of which collected pipe fragments. Although such full recovery is desirable a 6 mm (1/4") sieve seems to give the most useful effort to recovery ratio. Sieving should be considered in deposits where there are obvious pot joins or very large quantities of pipes which are tedious to collect by hand.

Reassembly

The way that this is tackled will depend on the size of the deposit(s) being dealt with although the method remains the same. It relies on systematic and thorough sorting and checking of all the pieces with sufficient room to lay them all out. The fragments should be sorted into four groups: mouthpieces, stems, stems just opening to bowls and bowl/heel fragments. The most obvious joins are bowl to bowl and these should be examined first. After any bowl fragments have been reassembled the bowls should be laid out in order according to stem length, irrespective of type or colour. Short vertical rows are the most convenient to work on with the stems arranged as close together as possible. At one end of the progression will be bowls where the spur/heel is missing or broken into and at the other bowls with the longest length of stem surviving. An exact gradation is unnecessary provided each occupies its relative position within the sequence.

The mouthpieces should then be lined up in a similar order from the longest to the shortest in separate columns of their own. Although these two groups do not face each other they form the limit of the pipe range and all the remaining pieces must lie between them. The numbers in the two groups will give an indication of the 'validity' of the context, that is even in a mixed sample, if it is complete, the numbers should be roughly equal. If pieces survive to a considerable length there may be joins between these two groups. The longest mouthpiece should be taken and tried against the longest stem. If there is an 'overlap', that is the broken end of the mouthpiece is thicker than the broken piece on the bowl, it can be tested down the columns until the broken bowl ends become thicker than it is. At this point the mouthpiece end is thinner than the remaining bowl ends and there is no longer an overlap between the two sets. The next few should be tested in case the exact thickness does not correlate with length.

Few groups will start with complete pipes in two pieces, but it is important to establish that no joins exist within this body of material since attention can then be focused on any piece of stem introduced. By continually eliminating the possible joins for each piece and keeping the material in order it is checked in the most efficient and managable form. Since there is little point in completing a stem without a bowl it is now only necessary to work from the bowl ends and not to check stem to stem or stem to mouthpiece. Any pieces opening out into bowls should next be tested starting from the 'short' end of the bowl columns and after them the stem pieces, starting with the thickest and making sure that the thicker end is the one being tested against the bowl. It is important to try and select stem pieces in the correct order, that is. the thickest first irrespective of length. As with the previous testing there will be a point where the piece being tested becomes thicker than the bowl break and can be rejected without trying it against all the bowls. Any such 'rejected' stem pieces should be set up in ordered columns of their own and facing in the same direction. If the taper is not clear it can usually be determined by rolling the stem on a horizontal surface where it will describe an arc with the thicker end on the outside.

If a bowl/stem join is found the other end of the stem must be treated as a new bowl end and a number of checks made: it must be tested against all of the rejected stems, which is why they are kept in ordered sequence since if a piece has been tried out or order it may now fit, and it must be tested against the mouthpieces. If this system of cross checking is maintained it ensures that each piece is tested only against the relevant ends and that no two ends are checked against each other twice. In addition the system is simple and means anyone taking over knows at once that there are just two blocks of material: the bowls, mouthpieces and rejected stems between which there are no relevant joins, and the stems waiting to be tested within that framework.

Small groups can be tested as a matter of course but where there are more than about fifty bowls it is often useful to sample the group before it is all laid out. Pieces of stem opening out and bowls broken correspondingly short can easily be selected and tested for joins to see if the whole group is worth working on. Similar tests can be carried out between contexts to both test for mixing and to see if it is possible to complete pipes with pieces from other layers. Once the pipes are glued together they require careful handling since they are extremely fragile and if the stems are longer than about 10 cm they should be stored between layers of padding. Matchsticks can be inserted across the joins to reinforce them but care should be taken that the stick is loose and glued in rather than forced in which can both splinter the stem and impare close joins. On the whole this is time consuming and only worthwhile for complete pipes intended for display or frequent handling.

Mould Identification

Once the pipes have been reassembled as far as is possible they can be divided up into mould types. With decorated pipes or those with mould imparted marks this is compatatively easy, although care must be taken to distinguish between pipes from the same mould and pipes which have similar designs. At this site none of the Fabric A pipes have such markings and so identification had to rely on small but visible defects in the mould.

Initially the pipes should be sorted into groups that look similar; often there will be a distinctive type which will provide a convenient starting point. Two bowls thought to be from the same mould should be rotated together under a strong light which strikes the pipes at a low angle. The interface between light and shadow should be closely examined for any mould imparted nicks or defects visible on both examples. Since pipes are usually trimmed along the mould lines and early ones have trimmed heels and bottered tops the most useful areas to observe are around the heel or on the bowl sides. Even if one distinguishing mark is found two or three should be looked for to act as checks. Once a mould tvpe has been established it is fairly easy to look for the distinguishing marks on other bowls. Care should be taken not to attribute bowls to a specific mould type unless they can be shown to be the same, and there will inevitably be pipes which are either unidentifiable or damaged in the relevant areas. Stamp types and milling can, of course, be applied independently of mould type and should be ignored at this stage. Later stamp markings should be divided up into die types, in a similar way, and compared with mould types. Where large numbers of the same stamp type are found it can be useful to record consistent idyosyncrasies of stamping orientation or pressure.

The Rainford Pipes

Although all the contexts on the site contained 'fabric A' pipes from the kiln, the majority came from the undisturbed layers 18-20 and it is on these that most of the work has been done. Material from the other layers is only included when it sheds additional light on these groups. Due to the lack of time and resources it has not been possible to deal exhaustively with all the material and there are, undoubtedly, many more complete pipes within this group.

Since layer 19 seemed to contain the remains of about 300 pipes both by bowl count (min. no. 303) and mouthpieces (312) it was assumed to contain a relatively undisturbed tip and so was dealt with first. In fact, although many joins were found and five pipes completed (Fig. 1) itbecame clear that many pieces were missing. By testing bowl to stem joins with the other layers it was found that pieces fitted with layers ranging from 1 to 20, thus demonstrating that even within the 'undisturbed' layers the pipes were mixed. The majority of joins were found within each layer but the act of tipping them will have accounted for many of these breaks.

Having discovered the nature of the material and the length of some of the pipes, the mould types were identified. As there are so many examples only almost complete bowls were dealt with, thus avoiding the lengthy problem of enumerating broken examples. Some 587 out of 621 complete bowls could be identified by mould (Table 1). By far the most common type (Mould A) accounted for 68% of the identified bowls, and, with the possible exception of 1.1, all the complete pipes are of this type. It is easily identified by a pronounced, slightly cresent shaped flaw, about $1^1/2$ mm long, which occurs on the right hand side of the bowl (as smoked) in the top right quarter of its profile.

The identification of this mould type at once raised two important points which demonstrated the value of such work. The stem length for this pipe in the four definite examples ranges from 174-194 mm, and if 1.1 is included (which is probably from the same mould but smoothed in the distinctive area) to 202 mm. This shows that the maker producing these pipes had no consistent length, but trimmed the stem off at various points over a range of at least 20-30 mm. The extremely thin stem walls are a possible explanation of this since, being only c. 1 mm thick at the mouthpiece they could easily be broken through by the wire and the maker may simply have trimmed off at the greatest complete length.

The other important point is that although this is the most common bowl type with 397 examples, only one of them is stamped and that is not with the most common type 1 stamp, but with a type 3 stamp. This example (2.3) is most unusual in that it has three stamp impressions, one on the base and one on each side of the bowl. Far from supporting the suggestion that the 'HB' maker was responsible for the majority of the pipes, this suggests, if any thing, that it was the 'IB' maker. This undermines the simplistic approach to examining pipes by stamp only, and the problems were made even more apparent when the marked bowls were examined.

The type 1 (2.2) 'HB' stamp only occurs on mould type B (2.2) which is characterised by a series of low scratches and undulations running round the base of the heel. Since there are 94 examples (16%) the fact that he only used one mould type can be seen as representative of his stamping rather than the result of insufficient data, although the 1:397 ratio of the 'IB' stamp must be bourne in mind. Also there were an additional four examples this 'IB' stamp which also seemed to be on mould type B. Because the fabric 'A' has such a coarse texture, and consequently poor surface, it is impossible to be absolutely sure but comparisons of an additional 17 examples from the upper layers seems to confirm that the 'IB' stamp occurs on this mould type.

If these two makers were using the same mould type it raises questions about their relationship and pipe production. Since the kilns seem to have been family affairs at this period it seems more likely that they are related rather than being from different families and the mould having changed hands.

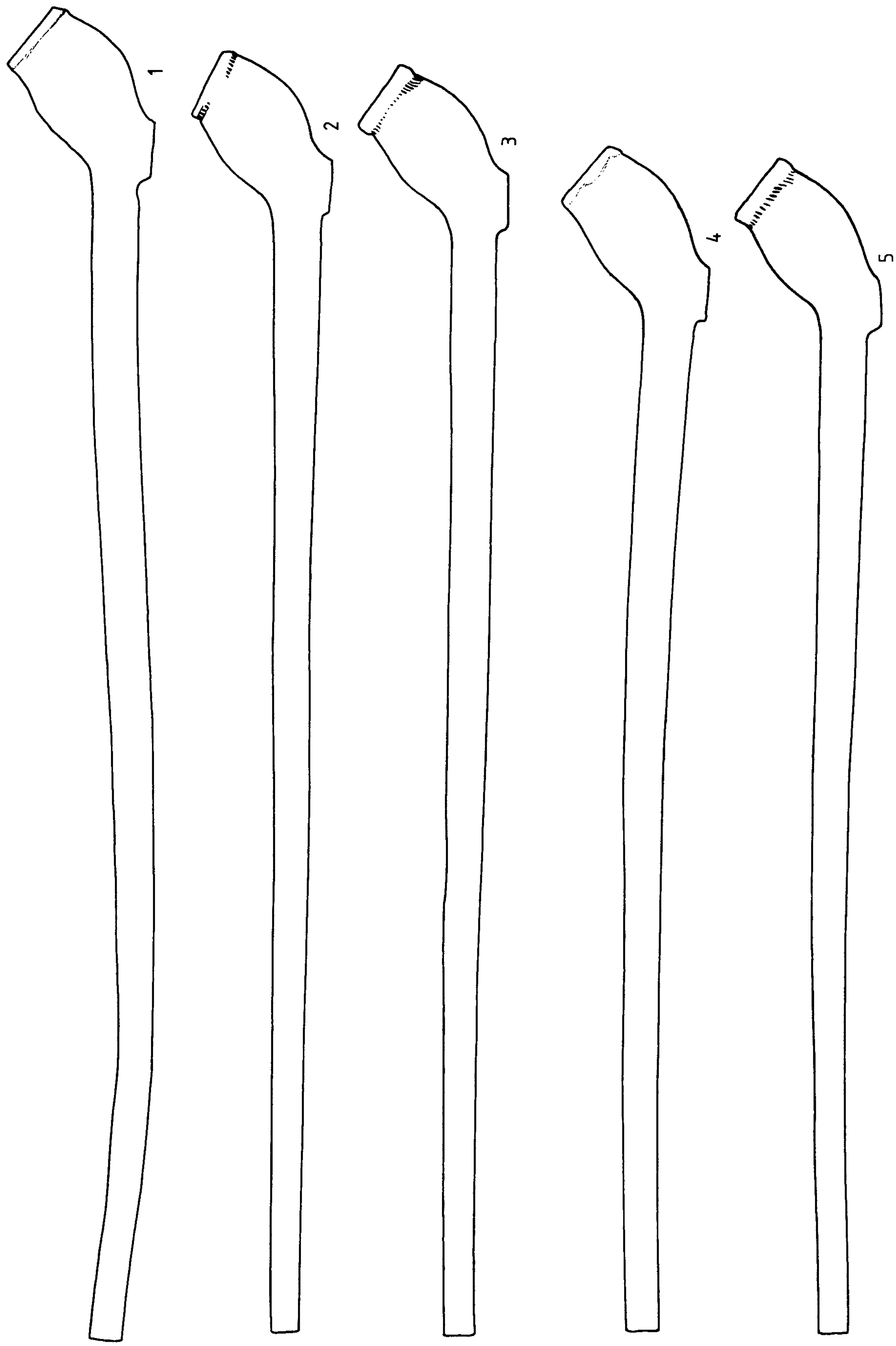

Fig. 21. Rainford, Site 9. Complete pipes. 1:1

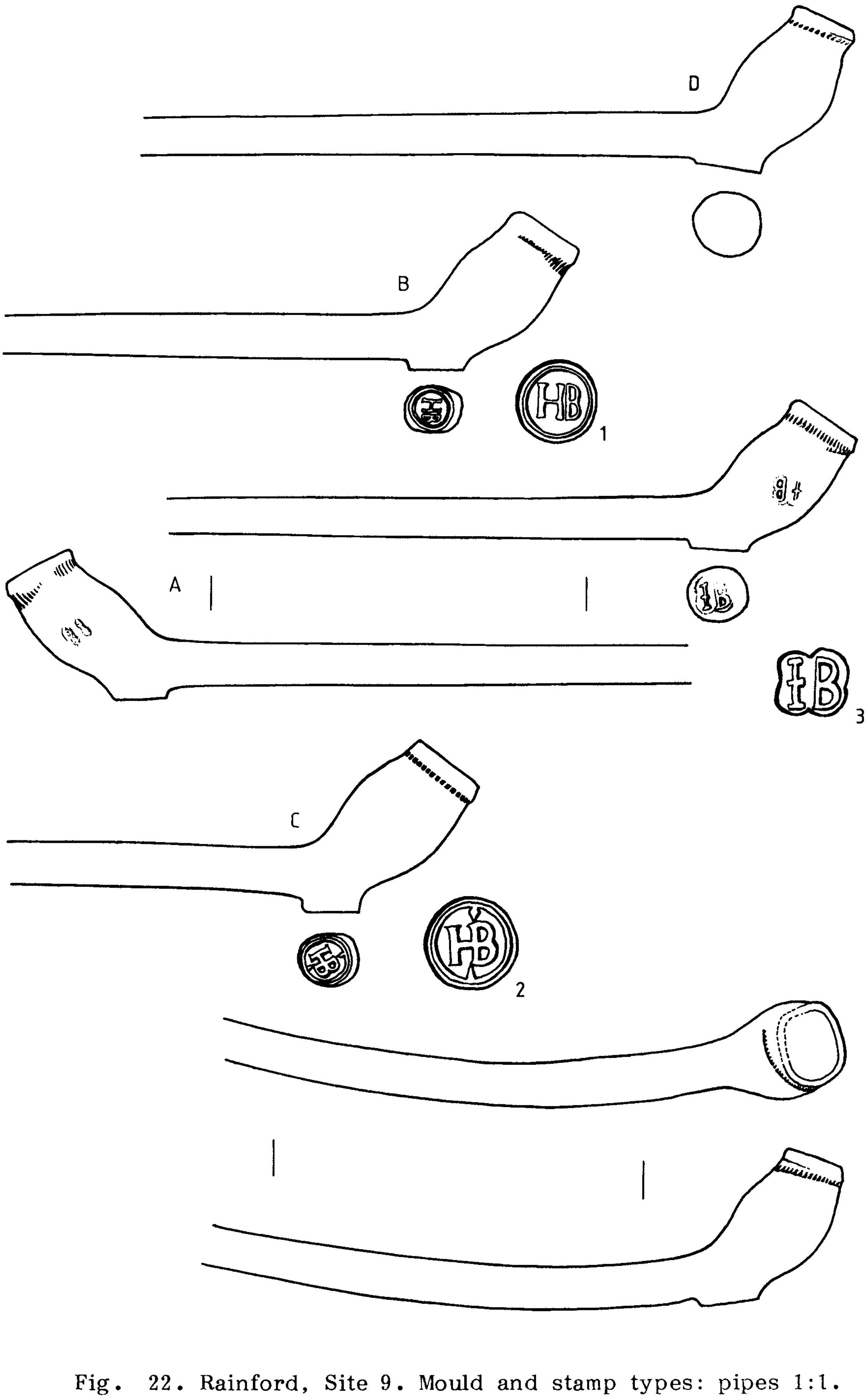

Fig. 22. Rainford, Site 9. Mould and stamp types: pipes 1:1.

There are also 46 type B bowls which are unstamped. Since there are twenty-four times as many 'HB' marks than those of 'IB' it could be assumed that most of the unstamped examples belong to the 'HB' maker and that he was, therefore, only stamping two thirds of his pipes. On the other hand since the 'IB' maker marked so few type A pipes it is possible that he may have been responsible for most of the unmarked type B pipes as well.

There is also a third stamp type (stamp 2) with the initials 'HB' ligatured. These, however, occur on a quite distinctive bowl form (C, restored drawing 2.4) which has a slightly different fabric. It is consistently fired to a rather glass-like texture and has a blotchy cream/grey-green surface with a burnished bowl. Since two fitting pieces were found in context 20 it must be contemporary with the other pipes (unless the tipping of the kiln waste was later than its production) and the low number, presence of burnishing and different fabric and mould type suggests perhaps a different maker.

This suggestion is reinforced by the stamp orientation which is markedly different between types 1 and 2. Of the type 1 stamps examined about 89% of type 1 were at about 45° to the right of the usual vertical axis, while all the stamp 2 types were 10° to 20° to the left of it. While this in itself cannot be conclusive, being possibly due to the orientation of the stamp on the block rather than the manner in which it was used, it at least adds weight to the different character of these pipes. Almost all of the type 3 stamps are applied vertically and, like the type 2 stamps, are usually clearly impressed. The type 1 stamps are very poor and unevenly applied, often almost illegible.

The last bowl type (D), associated with the kiln waste, is not marked at all, although the 44 examples (7.5%) occur regularly in the layers 18-20. It is distinguished by the narrow top and bulbous body, with a large rather upright heel, often trimmed rather short (2.1). The fabric is rather pale orange in colour and highly fired with a generally smoother better finish than types A and B, although some of them are comparable with it.

Stem Length

Although five pipes have been completed they only represent one of the three common mould types in use at this site. Some long, fine mouthpieces which were reassembled seem to be more slender than the completed examples and suggest that the other mould types may have been longer. Calculations have been carried out under the guidance of P. J. Davey to determine the theoretical length through linear measurement and stem taper projection and additional calculations were done by weight to compare the results with the known lengths.

The linear work was done on context 19. All the extant stem fragments, whether mouthpieces, broken sections or attached to bowls were measured and the total length divided by the minimum number of pipes in the context. This was based on the mouthpiece count of 312 which compared favourably with the estimated minimum number of bowls (303). The total length of stem was 80,336 mm which gave an estimated average length of 257.5 mm.

The second method involved the selection of the ten longest mouthpieces with the ten longest bowls. These were moved around on graph paper until their extrapolated tapers coincided, which suggests a length of 204 mm. Although this result is close to that obtained by the linear method it is probably less reliable since the finishing techniques tended to distort the pipe stems and without an overlap it is impossible to be sure of the consistency of the taper.

For the weight calculations all the material in 18-20 was used because it has been so intermixed through joining that it was no longer possible to weigh it alone. Also a different method of calculating the number was employed. Since mouthpieces are the most easily crushed to an unrecoverable/unrecognisable state it is better to count the number of pipes in more than one way and produce an average.

There are three easily recognised parts unique to each pipe: the mouthpiece, heel/spur and bowl rim. Each of these was counted and if, for example, a heel was broken the base area surviving was estimated as was the percentage of the rim. By adding these totals and dividing by three the average number of pipes represented was calculated. The figures obtained were 521 mouthpieces, 648.9 heels and 608.1 bowl rims giving an average of 592.6 pipes (Table Two). The low number of mouthpieces shows how vunerable they are to loss, and so although they are most easily counted they are the least reliable indication of numbers.

All the fragments of pipe from the three layers were then weighed (totalling 12365.5 g) and the result divided by the calculated number of pipes. This gave an average weight of 20.9 g for each pipe. By weighing the five complete pipes (84.5g) and dividing by five the weight for a complete pipe of their average length (187.2 mm) was calculated to be 16.9 g. Compared with the other methods of calculation the theoretical value is always higher than the known values from the reconstructed examples. This tends to support the suggestion that longer (and thus more difficult to reassemble) pipes exist within the sample, and that the pipes reconstructed should be seen as the shorter varieties in circulation at this period. Even if the highest number value (heels) is taken the weight does not drop as low as 16.9 g.

These pipes are fairly close to London types in style, and date from a period when pipemaking was only newly established outside the larger cities. Regional designs are only just emerging and previously forms were fairly standard being based on examples from early centres, usually London. This suggests the design would be fairly standard, being based on what amounts to a single model and thus, that these stem lengths are representative of the types in general circulation at this period.

Milling

In layers 18-20 were twenty-five examples of stems decorated with bands of milling (Fig. 3). Although this only represents a small number (4%) of the estimated total, it is enough to show that it was a consistent feature of production on the site. The milling is often carelessly applied with the usual single band either failing to go right round the stem (3.1) or failing to meet when it does (3.4/5). None of the pipes show any signs of having had more than one band and it often occurs on a distorted or bulging area, as has been noted at Staines in Surrey.

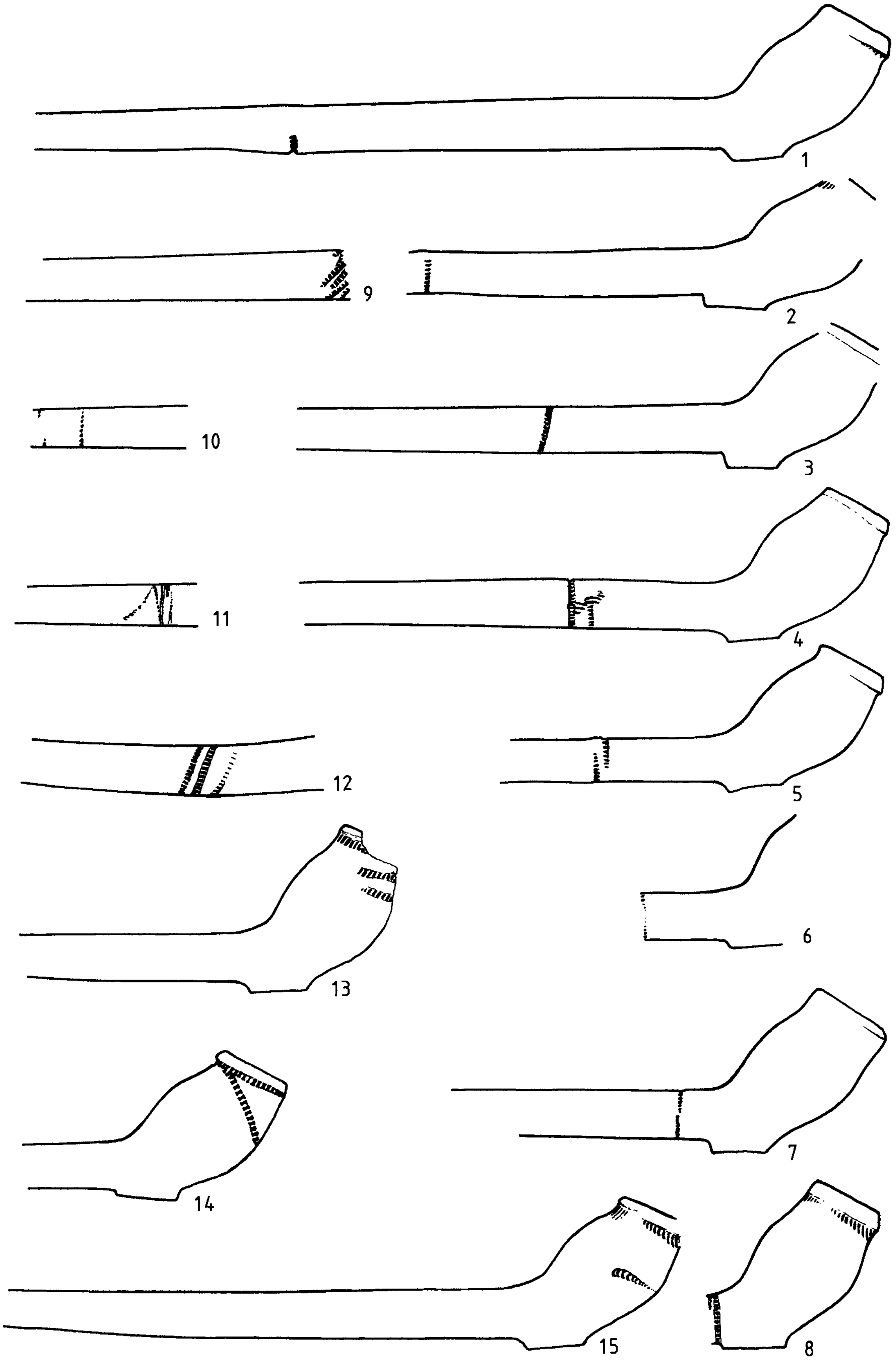

Fig. 23. Rainford, Site 9. Milling. 1:1

The milling seems to be purely decorative and not to indicate any sort of balance point since it occurs at various places along the stem (3.1-8) and, judging from the thickness of 3.11, it was placed up to 80-90 mm from the bowl. Two of the bowls (3.6/8) have type 1 stamps on them, while the remainder are all type A bowls. This ratio is roughly the same as type 1 stamped bowls to type A pipes ratio (Table 1) and suggests that the ratio of milled stems is constant irrespective of bowl or stamp on these two types.

The milling varies in depth and design but invariably occupies only a short space. In some cases (3.9/12) more than one band had been applied to form a spiral design but the single band is usual. Figure 3.10 has two half completed bands on opposing sides of the stem which are separated by a short space. The milling on 3.11, although multiple, does not seem to aim at any design with the bands just crossing or lying on top of each other at various angles.

Bowl milling, on the basis of documentary references, has been taken as an indication of the status of the pipe since to apply it fully and carefully is more time consuming. Whether any status is attached to this stem milling is unclear. If it denoted a better pipe it would be expected that it was more carefully applied and also that the bowl would be milled, yet in some examples (e.g. 3.4) bowl milling is missing altogether. The complete pipes also show some variation since, although they are all from the same mould, two of them have no milling.

Even when bowl milling does occur it seems to be equally poor and erratic in nature. Some bowls (3.13-15) exhibit obvious milling errors yet were not considered to be wasters since they were fired. One example (3.14) was even considered good enough to place a type 3 stamp on. Pipes with milling flaws such as this do occur on domestic sites and care must be taken not to call them wasters, which they clearly were not, although they may be indicative of the general quality or particular status of a period or site.

The actual milling often consists of very fine slits rather than the more usual rectangular impression. On mould A and B pipes there seems to be a concentration of milling at either end of the scale, that is they are either milled almost completely or not at all. Table 3 shows the milling on each mould type in context 19 estimated by quarters: if a bowl has milling all, or almost all the way around the rim it is entered under the column 4, for four quarters, and under column 0 if none is present. The numbers in columns 1 and 2 are particularly low showing that if milling was applied it was intended to go all the way around, irrespective of whether the bowl was stamped or not. The stamped pipes however seem to be milled more frequently than the type A pipes as are the type B pipes in general.

The type D pipes show a different pattern with a more regular, but partial, milling. Here the peak is at three-quarters milled rather than fully milled and suggests, perhaps, a different makers hand. The 'IB' bowls from layer 1 were examined to compare the milling and here it was found that all of the complete examples were fully milled. They also all show traces of a light burnishing on the bowl suggesting that although the overall finish was rough compared to that of the pipes from established centres they were intended here to form a superior product.

The fact that these 'IB' pipes seem to be the only examples of types A, B or D which are burnished and the fuller milling on both the 'IB' and 'HB' stamped pipes reinforces the suggestion that stamping and full milling denotes a better class of pipe.

Wasters

Pipe wasters are extremely difficult to recognise and even with 8,901 pieces of 'Fabric A' pipe very few could be recognised as such. Since pipes exhibit little colour change and have no glaze to reveal firing breaks, it is distortion that is most easily recognised but due to the high melting point of pipe clay this rarely occurs. The best example (2.5) was only revealed after reassembly and shows that even with pronounced distortion a reasonable amount is needed to make it noticeable. It is interesting to note that the distortion of the bowl may be evidence for stacking the pipes radially from a central column where the weight would cause this defect. It is the most common defect noted on the site and is always sideways across the bowl—the way upright stacking would deform it. Most of the pipes, however, appear perfect and, no doubt, simply broke during the firing or handling processes. It is important to note that even in a known kiln dump the main evidence comes from kiln fabric rather than waster pipes and so extreme caution should be used before identifying kiln deposits from wasters alone.

Summary

This paper outlines the methods of reassembling and identifying pipes using the Rainford kiln site as an example. This site represents one of the earliest set up outside the larger towns and is probably the earliest excavated example in Britain. It operated during a brief period when local clay sources were utilised at a minimum of three sites in the area. It provides important details about the early manufacture, stamp use and milling at one site and shows the importance of mould identification in interpreting pipe groups.

On this site four main mould types (A-D) and three stamp types (1-3) were identified. One bowl type (C) with its exclusively associated mark (2) seems to be intrusive, while one of the kiln types (D) was not marked at all. The remaining two stamps with different initials both occurred on mould type B, although the type 1 stamp is the more common of the two. Of the most common mould type (A) only one was marked (stamp 3). Milling, burnishing and stamping seemed to mark slightly better quality pipes, although individual idyosyncracies occur. Stem milling formed a small but constant feature of the mould A and stamp 1 pipes. All the moulds and stamps were probably being used at the same time. Five pipes were reassembled showing a range of stem lengths from one mould, which probably reflect the national trend at this period.

Table One: Pipe Numbers by Mould/Stamp Type

Context	Mould A	Mould A Stamp 3	Mould B	Mould B Stamp 1	Mould B Stamp 3	Mould C Stamp 2	Mould D	Total
18	170	0	32	52	4	0	24	282
19	195	1	9	24	0	0	13	242
20	32	0	5	18	0	1	7	63
Total	397	1	46	94	4	1	44	587

Table Two: Estimated Pipe Numbers and Average Weight

	Mouthpieces	Heels	Bowl Rims	Total ÷ 3
18	171	291.8	282.7	248.5
19 19	312	277.2	262.0	283.7
20	38	79.9	63.4	60.4
Total	521	648.9	608.1	592.6
Average Weight (g)	23.7	19.0	20.3	20.9

Table Three: Bowl Milling

Mould type	0	1	2	3	4
Type A	68	1	4	49	72
Type B	1	0	0	0	8
Type B stamped	1	0	0	6	17
Type D	0	0	3	8	2
Total	70	1	7	63	99