

The Investigation of Fort Defiance: A Report on Preliminary Excavations

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Results of preliminary excavations at the 1791-92 winter quarters of Captain Robert Gray and the *Columbia* have been reported in part (Mitchell 1970). The earlier publication presented evidence that confirmed the location of Gray's Fort Defiance about three miles north of Tofino on the shore of a small cove in Lemmens Inlet, Meares Island. As the prospects for continued examination of the site have become uncertain, it now seems desirable to report results of the 1968 excavations without further delay. This paper describes surface aspects of the site, features disclosed by excavation, and the artifact assemblage recovered.

Gray and his crew spent the period from late September 1791, to late March 1792, at the place he called Adventure Cove. The *Columbia* lay at anchor with most of the crew aboard but a small party spent the winter months ashore where they built the *Adventure*, a 35 to 40 foot trading sloop. Under command of the First Mate, Robert Haswell, they were housed in a substantial square-timbered blockhouse whose main floor seems to have served as fort, dormitory, cookhouse, and blacksmith shop.

Our information about the structure and about activities that winter come from four main sources: diaries kept by Haswell, John Hoskins, and John Boit (Howay 1941), and a sketch produced by the ship's painter, George Davidson, who was temporarily idled while the *Adventure* was being launched.

Fort Defiance is situated on a low, narrow bench that fronts on a gently-sloping beach and sheltered cove. At the back of the site, the land rises steeply through a dense stand of hemlock and cedar to a ridge of about 1300 feet elevation. The large trees on the bench are also, for the most part, mature cedar and hemlock. None of the trees in the immediate vicinity of the winter quarters now exceeds two feet in diameter, although the journals refer to trees with diameters of nearly seven feet. Haswell records that the crew cut down big trees to establish the fort, and this would account for their absence from the area we investigated. As for the rest of the bench, the large timber was probably removed by loggers

within the last four or five decades. At the southern edge of the site lies a moss-covered, relatively sound log of some forty inches diameter. The stump from which it was sawn stands nearby.

The dense, characteristically west coast undergrowth covering the site consists mainly of salal, salmonberry, and ferns. Moss and a thick cushion of leaves, evergreen needles, and rotting twigs blanket the ground. At the front of the site grows a coarse variety of salt grass.

A small creek flows from the high ground behind the site, dividing, a short distance from the fort, into two and then three channels. The largest runs close to the north side of the blockhouse foundations, and in fact, the structure was erected on a slope of the stream's boulder and gravel fan. The other two channels make their way to the cove near the southern end of the beach.

Our preliminary investigation was one month long and involved the senior author and four assistants. Prior to excavation, the site was cleared, a 10 cm interval contour map drawn, and a systematic search made of the surface. We established a metric reference and excavation grid for the site. From west to east each two metre interval was identified alphabetically by a capital letter; from north to south, by a number. Each two metre square is thus specified by a letter and number, *e.g.*, H8, or I9. Of the squares, those shown in figures 2-4 were eventually explored.

STRATIGRAPHY

Stratification of the site is simple. At top is a 20 cm layer of humus; preceding this, the culture-bearing stratum, a mixture of sand, gravel, whole and broken brick rubble, large cobbles, clinkers, and charcoal; and beneath this, yellow-brown sandy beach gravels and cobbles containing no trace of cultural material.

The excavation was on the whole very shallow — in no case exceeding 42 cm, at which depth it was well into the culturally sterile beach gravels. The artifact-bearing stratum in most parts of the site was around 15 or 20 cm thick.

FEATURES

Bricks, clinkers, and cobbles were uncovered in almost all excavation units, but distinct patterns or concentrations were also discernible.

Brick features: At the northwest corner of square J8 was a small pad of

fourteen bricks and clay that had been earlier discovered by William Folan of the National Historic Sites Service (see Mitchell 1970:4, fig. 1). The main concentration of loose bricks extends as an irregular band from J9 in a southwesterly direction through I9, I10 and H10 into G10 (fig. 3). It is believed that these and the pad represent the remains of one of the two chimneys at the east end of the blockhouse, and that the band of bricks indicates the direction of fall when the chimney eventually came down. It is argued below that this is the southeastern rather than the northeastern chimney.

Clinker concentration: All but one of the clinkers uncovered (fig. 4) was located north of row 10 on the grid and the greatest concentrations were in I7, J6, and J7 to the northwest of the brick pad discussed above.

Cobble alignments: About 80 cm west of the brick pad, extending in a northerly direction for a distance of some five metres, is an irregular row of large cobbles. Parallel to this feature, and about 40 cm further west, is a second band of large rocks, approximately 80 cm wide. The southern end of what appears to be yet another row lies beyond this, 40 cm distant.

The length of these rows is very close to that recorded for the width of the blockhouse (18 feet, Howay 1941:247) and the area where they are located is an approximately level platform extending to the northwest of the brick feature. These data are consistent with an interpretation of the platform as the location of the blockhouse. The brick pad would then be the base of the southern of two chimneys on the east wall. The relatively uniformly spaced rows of stones may have resulted when the builders cleared spaces to place joists for the wooden floor. Alternatively, they may themselves have provided support for floor timbers.

Earth and cobble mounds: Approximately four metres south and parallel to the long axis of the platform is a row of five low mounds (four of them show up in figs. 2-4), each roughly 1.6 metres in diameter and three metres apart. Our interpretation is that these are part of the stocks on which the *Adventure* was built. In support of this view are the Davidson sketch, which shows the stocks close to the south wall of the house, and the distribution of artifacts, which indicates a concentration of such boat-building materials as nails, lead trimmings, and copper fragments in the area between the mounds and the platform.

Clay: Apart from the clay associated with the brick pad feature, there are small nodules of yellow clay scattered throughout the blockhouse area.

One large lens of the material (fig. 4) was uncovered between the block-house platform and the row of mounds that supposedly formed part of the *Adventure's* stocks, in square H9.

ARTIFACTS

In all, some 1590 artifacts were collected or recorded during the excavation of Fort Defiance. They consist mainly of building materials (including fasteners), waste material from construction of the *Adventure*, and remains of firearms. In describing the assemblage, functional categories have been used whenever these could be identified with reasonable certainty. Most dimensions have been reported in the metric system; however, for nails, gunflints, and shot the English system is adopted as it was in use in historical references to such artifacts.

Nails: Square-shanked, hand-wrought nails comprise one of the largest single categories in the collection, some 94 specimens, whole and fragmentary, being recovered. Without exception, they are thoroughly rusted, often to the point where few specific characteristics of the nail are recognizable. Most have particles of wood or charcoal as well as lumps of rusty concretion adhering to them. In some cases, fragments are entirely encased in concretion; in others, only the head or some portion of the shank is affected. In many cases, the nail has so deteriorated that only a fragile outer skin of iron is left as evidence of the original form although the larger specimens are still basically solid iron.

Specific categories of old nails are commonly separated according to method of manufacture *e.g.* (hand-wrought or cut) and by differences in head shape, point shape and length. So far as could be determined, all nails in the assemblage are hand-wrought. In other attributes, however, there is variation. In developing the following typology, we have adopted terms and measurements in common use by the nail industry at the end of the eighteenth century. Accordingly, cross-section dimensions of nails were measured at the junction of the head and shank, and shank length was measured from this junction to the point. Slight deviations from given standard dimensions occur within the categories, but these variations may be attributed to the effects of corrosion and encrustation and to the difficulties of producing standardized items by hand-forging techniques. Size equivalents are after Knight (1872:1505), and Blakelee (1889:26) and the terminology and comments on use follow Nelson (1968), Tarn (1880), and Knight (1872).

Spikes with a broad deck head and flat point:

Length: ca. $4\frac{1}{2}$ "
 Shank: ca. $\frac{1}{2}$ " x $\frac{1}{2}$ "
 Head: ca. $\frac{3}{4}$ " x $\frac{3}{4}$ "
 Number: 15 whole, 9 fragmentary (figs. 6, 7)

This type of nail was almost always made with a flat point (chisel-shaped but rounded at the end). It was generally used for rough framing. The term "broad deck" indicates that the corners of the nail-head were hammered down.

Six penny rose head with flat point:

Length: 2"
 Shank: $\frac{3}{16}$ " x $\frac{3}{16}$ "
 Head: $\frac{5}{8}$ " x $\frac{3}{8}$ "
 Number: 1 entire specimen (fig. 8a)

Eight penny rose head nail with flat point:

Length: ca. $2\frac{1}{2}$ "
 Shank: ca. $\frac{3}{16}$ " x $\frac{1}{4}$ "
 Head: ca. $\frac{1}{2}$ " x $\frac{3}{8}$ "
 Number: two complete specimens (fig. 8b, c)

This type of nail and the preceding were for general use rather than finish work. Tarn (1880:275) notes that they are useful for "driving into hard woods, brick or stone walls, and wherever there is great resistance to be encountered."

Two penny rose nail heads with sharp point:

Length: ca. 1"
 Shank: ca. $\frac{1}{8}$ " x $\frac{1}{8}$ "
 Head: ca. $\frac{3}{8}$ " x $\frac{5}{16}$ "
 Number: two complete specimens

Nails of this type were most often used for lathing in usual building construction.

Six penny rose head with sharp point:

Length: 2"
 Shank: $\frac{3}{16}$ " x $\frac{3}{16}$ "
 Head: $\frac{5}{8}$ " x $\frac{3}{8}$ "
 Number: 1 entire specimen (fig. 8d)

Eight penny rose head nails with sharp point:

Length: ca. 2½"
Shank: 3/16" x ¼"
Head: 5/8" x 3/8"
Number: six complete specimens (e.g. fig. 8e)

Ten penny rose head nails with sharp point:

Length: 3"
Shank: ca. 3/16" x 3/8"
Head: ca. 5/8" x 3/8"
Number: four complete specimens

Ten penny rose head hinge nails: Four artifacts represent a variation on the usual rose head design (e.g. fig. 8f). They have irregular, elongated, thin heads especially shaped to hold hinges where one leaf was to be mounted behind a wooden casing. Two of the specimens from Fort Defiance have been clinched — a common practice in the construction of batten doors or shutters (Isham 1968:3). Davidson's sketch shows batten closures for the windows and door.

Rose head nail fragments: The assemblage contains eleven additional rose head nail fragments for which neither the size nor point form can be determined.

Eight penny T-head brads:

Length: 2½"
Shank: 3/16" x 1/8"
Head: ½" x ¼"
Number: 1 whole, 1 incomplete specimen (fig. 8o)

Brads of 2 to 3 inches length were often used for fastening flooring (Tarn 1880:275). The complete specimen has a sharp point.

Ten penny T-head brads:

Length: 3"
Shank: ¼" x ¼"
Head: 5/8" x ¼"
Number: 1 whole, 1 incomplete specimen (fig. 8p)

These specimens have heavy shanks for their length and appear to be crudely made. The complete specimen has a sharp point.

Eight penny round head, round shank nail:

Length: 2½"
 Shank: ¼" in diameter
 Head: ¾" in diameter
 Number: 1 complete specimen (fig. 8q)

Although the first inch of the shank is round, the last 1½ inches has been squared. This nail is also called a dog nail (Knight 1872:II, 1505) or sometimes a jobent nail (Nicholson 1819:386). Made with flat or sharp points, they were intended to go through a round hole in any iron device to secure it to wood.

Nail fragments: Twenty-seven fragments of iron nails were in such a state of preservation that they could not be further classified. (e.g. fig. 8r). Most were either so encrusted in scale or concretions that diagnostic features were obscured, or they consisted of only the lower half inch or so of the shank and point. All points exposed are sharp. Shank dimensions of these fragments indicate they are the remains of small nails — probably all under 10 penny size.

Iron rod ends: The cut-off ends of four iron rods (fig. 8s, 9a, b) were recovered. One measures 1.6 cm long with a 1.9 cm diameter; another 2.4 cm long with about a 1.3 cm diameter. The third is roughly square, being 1.7 cm long and 1 cm by 1 cm in cross section. One thin iron rod (fig. 8s) is 8.2 cm long and 0.5 cm in diameter. These and many of the other iron objects may have comprised refuse from the blacksmith's shop in the blockhouse.

Iron tubes: Four short iron tubes (e.g. fig. 9f-h) were manufactured by folding a flat strip of iron until the outside edges met resulting in the formation of a tear-shaped passage. The length of the tube ranges from 1.2 cm to 1.8 cm. All are heavily corroded and encrusted with debris.

Miscellaneous iron fragments: Fifty-four miscellaneous pieces of iron were collected, none at this stage of analysis permitting any certainty of identity. The majority consist of small irregular flakes or lumps of rusted iron with maximum dimensions ranging from 1 to 6 cm. Most have particles of wood, gravel, or broken brick adhering to them. Several of the more distinctive specimens are described below.

Two are flat pieces of iron. One warped piece is about 0.3 cm thick, 8.7 cm long, and measures 1.1 and 2.7 cm at each end. The other is 7.5 cm long, 0.2 cm thick and measures 1.5 and 1.8 cm at either end.

A thin strip of iron (0.1 cm thick) is 1.7 cm long and measures 1.2 and 0.9 cm wide at opposite ends. Holes of about 0.3 cm diameter pierce the fragment at either end (fig. 9d).

An approximately cube-shaped specimen measures 2.9 x 2.6 x 1.7 cm.

One of the most distinctive fragments (fig. 9c) is a piece 2.9 cm long and 1.1 cm thick. It tapers from 2.2 to 1.5 cm in width and at the wide end is an open, semi-circular hollow. It appears to be part of a sturdy gouge blade but this cannot be considered a positive identification.

Sheet copper: Three fragments of crumpled and folded copper sheeting were recovered, probably discarded trimmings from material used in construction of the *Adventure*. The largest fragment (fig. 9e) measures 3.5 by 2.5 cm and is perforated at one edge by two small holes, the largest of which is no more than 0.5 cm in diameter. A second piece (fig. 9j) measures approximately 2 by 1.5 cm and it, too, is perforated by a number of small holes. There is no apparent pattern to the placement of these holes for either specimen and they seem to have been caused by corrosion.

The third piece of sheet copper is a roughly circular fragment approximately 1.5 cm in diameter (fig. 9i). It is perforated by a rectangular hole, 1/4" by 3/16" in size, corresponding roughly to any of the smaller sizes of rose head nails or brads described earlier.

Sheet lead trimmings: Four fragments (fig. 10h-k) appear to be cuttings from sheet lead as in all cases, one side has a smoothly cut or sheared edge. Each piece is about 25 mm in thickness, and the largest trimming is about 5 x 0.75 cm in size. One specimen shows signs of hammering on one surface.

Gunshot: Four musket balls were recovered, along with three very small shot still attached by a common sprue.

Sprue fragments: Five specimens (e.g. fig. 10a, b) are sprue or sullage-piece fragments from the filling channels and ports of shot moulds. Four have come from moulds for small shot — of about dust shot size — and one from a mould for musket balls apparently larger than the two lead balls described in Table 1.

Lead spill: The 80 items (e.g. fig. 10 l-s) recorded as lead spill range from droplets weighing only a fraction of a gram to irregular lumps of up to 126 grams. All were presumably spilled during some casting process. One of the 8 penny T-head brads is encased in a lead spill (fig. 10r) and

TABLE I
SHOT RECOVERED FROM FORT DEFIANCE

<i>Type</i>	<i>Diameter (.000")</i>	<i>Weight (grains)</i>	<i>Notes and Sources</i>
Dust shot	.028"	8.95	Three, attached by a common sprue, unfired (fig. 10c).
Buckshot	.314"	41.72	Cut sprue, cast in poorly fitting mould, slightly deformed but apparently unfired, surface pitted and corroded, buckshot (Russell, 1957:235) (fig. 10e).
Buckshot	.314"	39.66	Cut sprue, surface, badly pitted and corroded, apparently unfired, buckshot (Russell, 1957:235) (fig. 10d).
Ball	.346" (mean)	65.58	Flat cut sprue, cast in poorly fitting mould, slightly deformed but apparently unfired, small casting hole, surface pitted and corroded (fig. 10f).
Ball	.346" (mean)	66.35	Irregularly cut sprue, probably fired, one face slightly flattened by impact, surface pitted and corroded, knife marks on surface (fig. 10g).

the largest specimen collected has several small white feathers (fig. 10s) adhering to it.

Gunflints: The preliminary excavations recovered six whole or substantially whole specimens and five small flakes struck from the flint material (e.g. fig. 9m, n). All the gunflints conform to the French style of manufacture, exhibiting the rounded, retouched or "gnawed" heels typical of the French shape (Caldwell 1960:187; and see Sketcherly 1870:63, fig. 59).

One of the gunflints (No. 212) retains what is probably its original colour, an opaque light milky gray. The other five flints have all been subject to such intense heat that they are very brittle, their surfaces are crazed, and their colour altered (see Dolomieu 1960:54). Terms used in the following description are after Clarke (1935) and Sketcherly (1870). The identifying numbers refer to the artifact catalogue entry.

- No. 70: $1\frac{1}{16}'' \times 7/8''$; $1/8''$ thick at the heel; of an opaque milky white colour; the edge is chipped and the right corner of the heel has been broken away (fig. 9p).
- No. 113: $1\frac{5}{16}'' \times 1\frac{1}{16}''$; $1/8''$ thick at the heel of an opaque grey white colour; surface crackled; both sides of the flint, the edge and the heel are much broken (fig. 9l).
- No. 116: $3/4'' \times 1/2''$; $1/4''$ thick at the heel; of an opaque grey white colour; a pocket pistol flint showing signs of having been crudely resharpened, otherwise intact (fig. 9q).
- No. 122: $15/16'' \times (1'')$; narrows from $5/16''$ at the mid rib to about $1/8''$ thick at the heel; of an opaque grey white colour, surface crackled; the entire left side of the flint has been broken away (fig. 9k).
- No. 212: $3/4'' \times 1/2''$; $1/4''$ thick at the heel; of an opaque milky grey colour; no signs of its having been subject to heat; a pocket pistol flint showing signs of having been crudely resharpened, otherwise intact (fig. 9r).
- No. 252: $1\frac{1}{4}'' \times 1\frac{1}{8}''$; narrows from $3/16''$ at the mid rib to $1/16''$ at the heel; of an opaque grey colour; crudely manufactured chipped at the edge (fig. 9o).

Glass bottle fragment: An irregularly-shaped piece of thin yellow-green glass (fig. 9s) measures approximately 3×1.5 cm. As one edge of the piece curves to form a rounded right angle, the specimen is probably a body fragment from a thin-walled vessel of the "case" variety. The glass shows no sign of decay or deterioration.

Bricks: The 1968 investigation recovered 1009 whole or fragmentary brick specimens (e.g. fig. 11) embedded in the surface or from below the surface of the site. Prior to the systematic examination, an unknown number was collected from the surface of the site and from an excavation at the east end of the house platform (see fig. 3).

All are roughly manufactured and in size and shape resemble the type of brick being manufactured in New England during the late eighteenth and early nineteenth centuries (Hayes 1967: 108).

A typical entire specimen measures $14.5 \times 6.7 \times 3.5$ cm overall but is by no means uniform throughout. Several fragments have traces of clay and burned shell mortar adhering to them. At least one brick bears the finger marks of the brickmaker.

Clinker: Three hundred and sixteen lumps of rust-stained coal clinker (e.g. fig. 12a, b) were recorded, principally from the excavated portion of the blockhouse foundation and the area between the house and the ship's stocks (fig. 4).

Coal: A few small pieces of coal were noted during the excavations although only one specimen was actually collected and recorded (fig. 12c). This small chunk is anthracite. The *Columbia* carried "6 chaldrons of Sea Coal" (Howay 1941:453).

Siltstone rods: Two (fig. 9t, u); 3.2 cm long by 0.6 cm diameter; and 2.25 cm long by 0.6 cm diameter. The body of each is grey-brown in colour and relatively soft. Each has been shaped by a series of irregular, flat surfaces and the ends of one are rounded by crude facets as well. Use of the rods is not known.

Wood: Two cone-shaped knots of wood were collected from a depth of 20 cm below the surface in the culture-bearing stratum of the site. They are slightly charred and show signs of adze or axe cuts at the wide end. They may have come from barked and shaped timbers, such as were used to construct the walls of the blockhouse. A third, charred and very fragile rectangle of wood measures 9.5 x 4.5 x 1.2 cm. It is not certain that these fragments of wood date to the 1791-92 occupancy, however dense knots are very durable and charring of course helps to preserve wood from decay.

Bone: A few small fragments of bone were discovered, ranging in size from 0.2 x 0.2 cm to 5 x 3 cm. Included in the assemblage are one small section of bird bone (1 cm long) and two pieces of rib bone from a large animal, possibly a deer.

DISCUSSION

The preceding descriptions have made it reasonably clear that with the exception of the bricks, most artifacts at Fort Defiance are in a very poor state of preservation. Surfaces of all metal objects are covered with a heavy deposit of oxide and all but the heaviest items are in an advanced state of decay. Of the metals, iron has fared the worst in the 176 years that lapsed between abandonment of the site and the 1968 excavation. Lead and copper seem reasonably well preserved. Items of mineral manufacture such as gunflints, glass, and brick are in the best state of preservation although there has been considerable breakage.

An intriguing possibility disclosed by the investigation is that some normally very perishable remains have survived from the winter occupancy. A few pieces of charred or dense wood have resisted decay and apparently the lead spill has preserved such very fragile organic remains as feathers.

Even considering these occasional oddities of preservation, there is no doubt that varying rates of decay have left us with an artifact sample that is a distortion of the assemblage left when Gray abandoned his winter quarters. By and large we must conclude the remains have not survived well under the combined attack of exceedingly wet weather and encroaching forest. From the scattering of cobbles on the site it seems likely also that the stream lying so close to the northern edge of the site has from time to time flooded its banks and flowed over the house platform.

The results of our preliminary investigation suggest that only limited information about structures at the winter quarters can be recovered by excavation. The possibility that further archaeological work could contribute much to any projected reconstruction of the blockhouse, outbuildings, and ship's stocks is slight, beyond a fairly general indication of their locations. However, through careful recovery of a larger sample of artifacts we could add appreciably to our meagre knowledge of the materials brought to this coast by early participants in the maritime fur trade. It is to be hoped that a means will be found to continue the exploration of this important site.

ACKNOWLEDGEMENTS

Many persons and organizations have been involved at various stages in the investigations reported here. We wish to renew the statement of indebtedness that accompanied the earlier paper (particularly the debt owed the Vancouver Men's Canadian Club for its part in providing the means for undertaking exploratory excavations) and to acknowledge contributions directly concerned with analysis of the data recovered. We are indebted to Mr. Lee H. Nelson of the United States National Park Service and Mr. Abbott Cummings of the Boston Atheneum for information which helped immeasurably in the identification of artifacts. Figures 2, 3, and 4 were drawn by Ray Shergold. The photographs are by Les Laronde.

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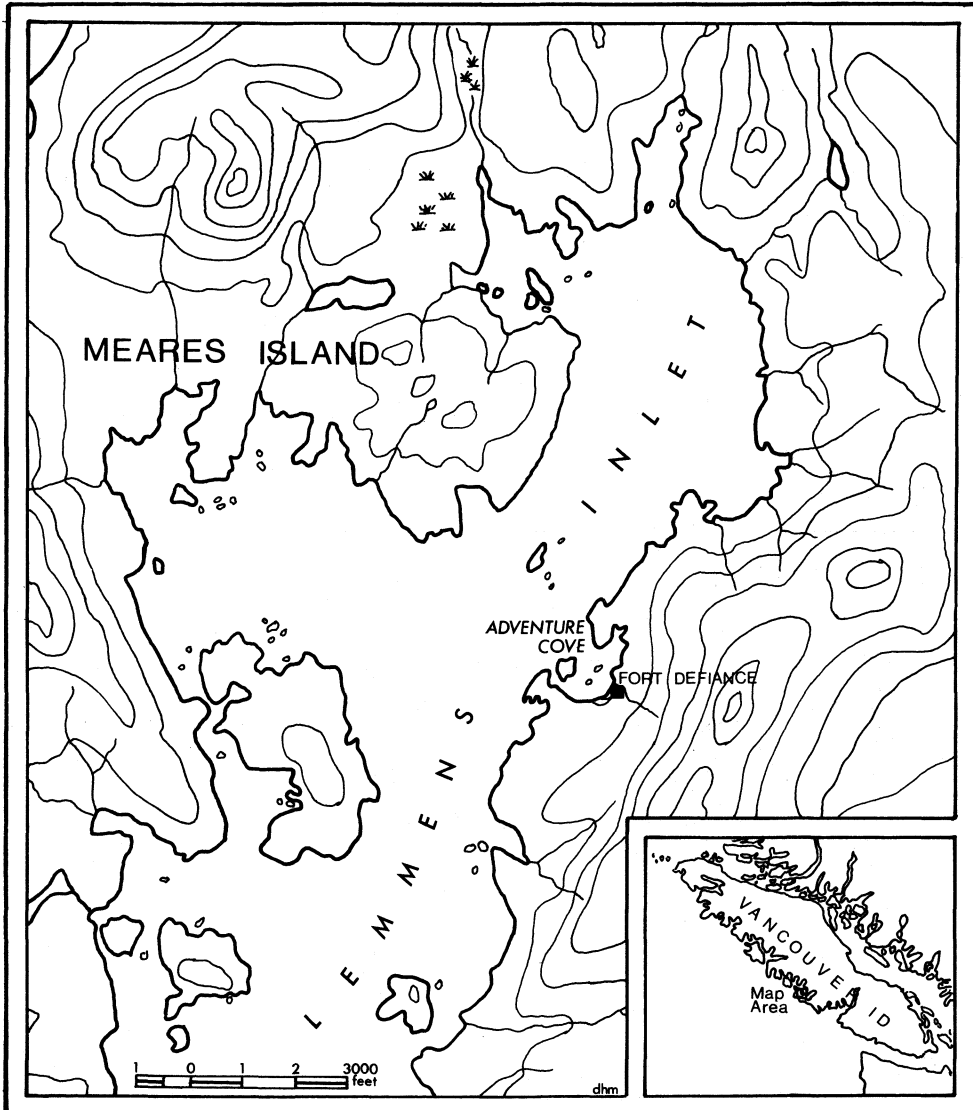


FIGURE 1. Map of Lemmens Inlet showing location of Fort Defiance.

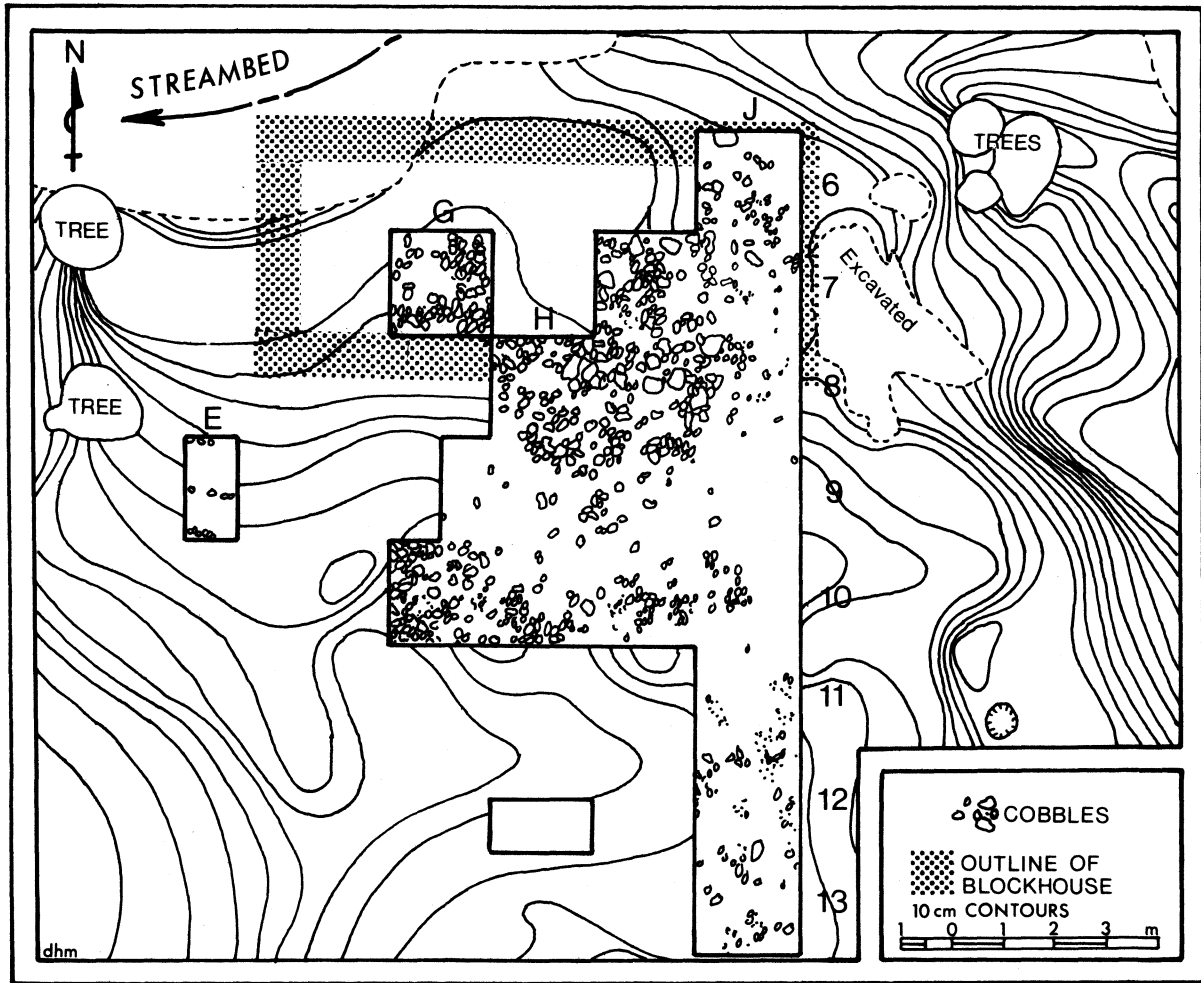


FIGURE 2. Site plan showing distribution of cobbles. Heavy lines define areas excavated in 1968.

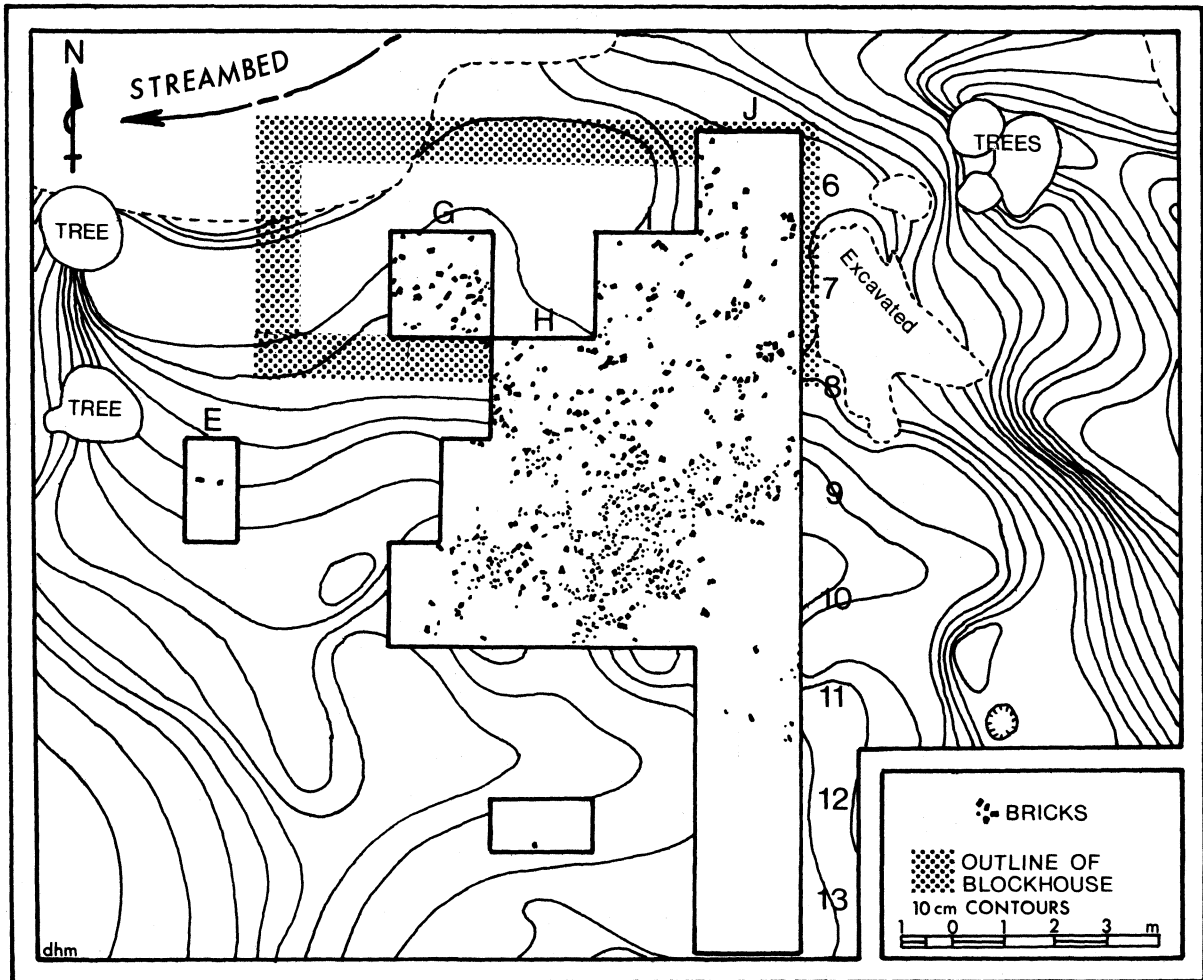


FIGURE 3. Distribution of bricks and brick fragments.

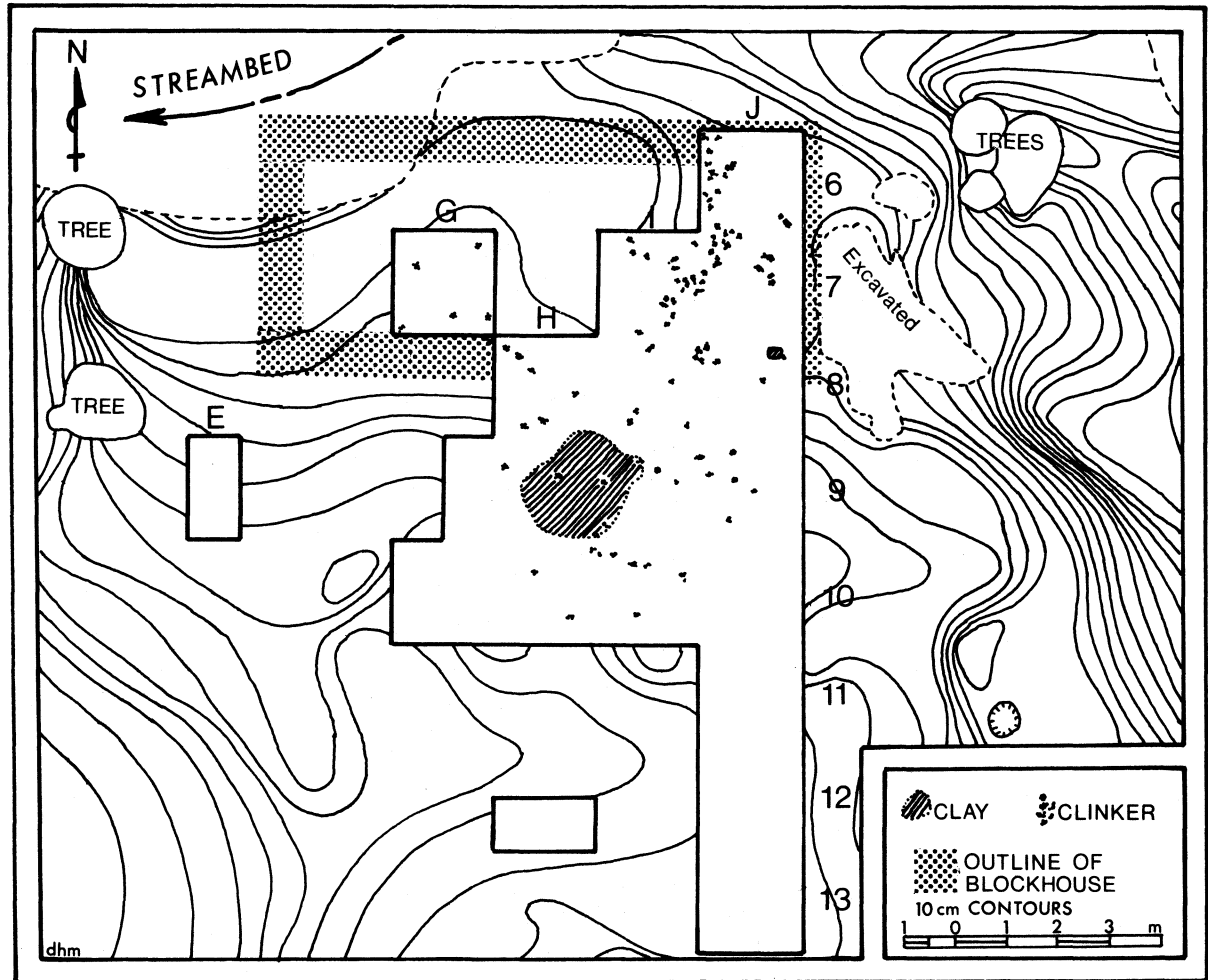


FIGURE 4. Distribution of clinker and location of clay feature.

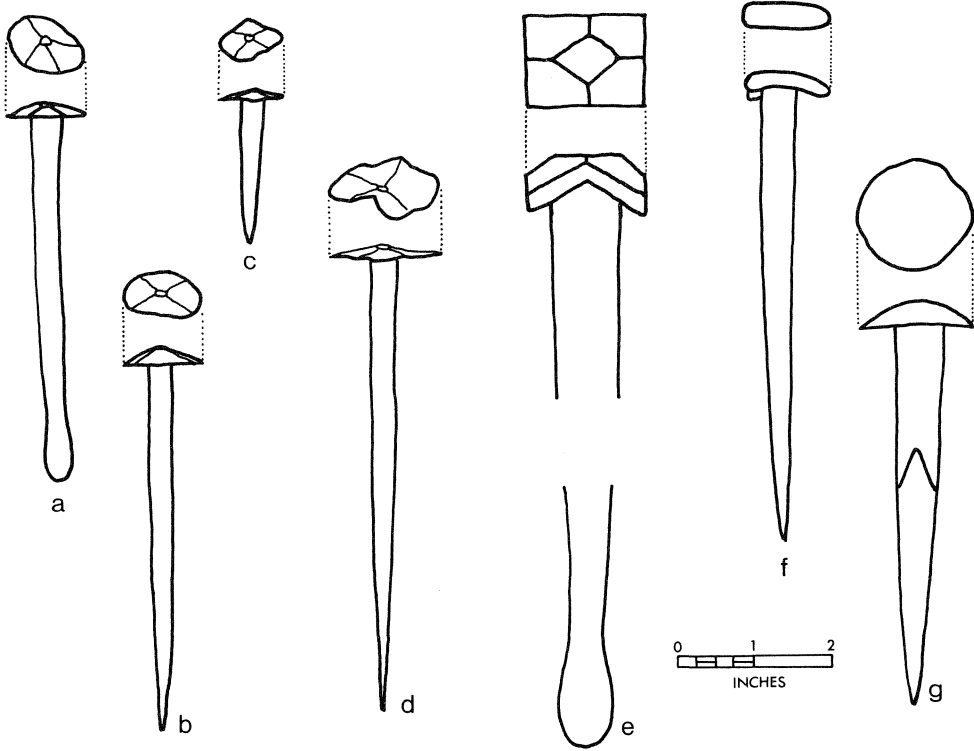


FIGURE 5. Type specimens of nails: *a*, eight penny rose head nail with flat point; *b*, eight penny rose head nails with flat points; *c*, six penny rose head nail with sharp point; *d*, ten penny rose head hinge nail; *e*, spike with broad deck head and flat point; *f*, ten penny T-head brad; *g*, eight penny round-head shank nail.



FIGURE 6. Spikes with broad deck head and flat point.



FIGURE 7. Spikes with broad deck head and flat point. *g* is a spike, toe-nailing the end of a wooden member to the side of another. Fragments of wood adhere to the spike.



FIGURE 8. Nails and nail fragments: *a*, six penny rose head nail with flat point; *b*, *c*, eight penny rose head nails with uat points; *d*, six penny rose head nail with sharp point; *e*, eight penny rose head nail with sharp point; *f*, ten penny rose head hinge nail; *g-n*, rose head nail fragments; *o*, eight penny T-head brad; *p*, ten penny T-head brad; *q*, eight penny round-head, round shank nail; *r*, nail fragment; *s*, iron rod end.

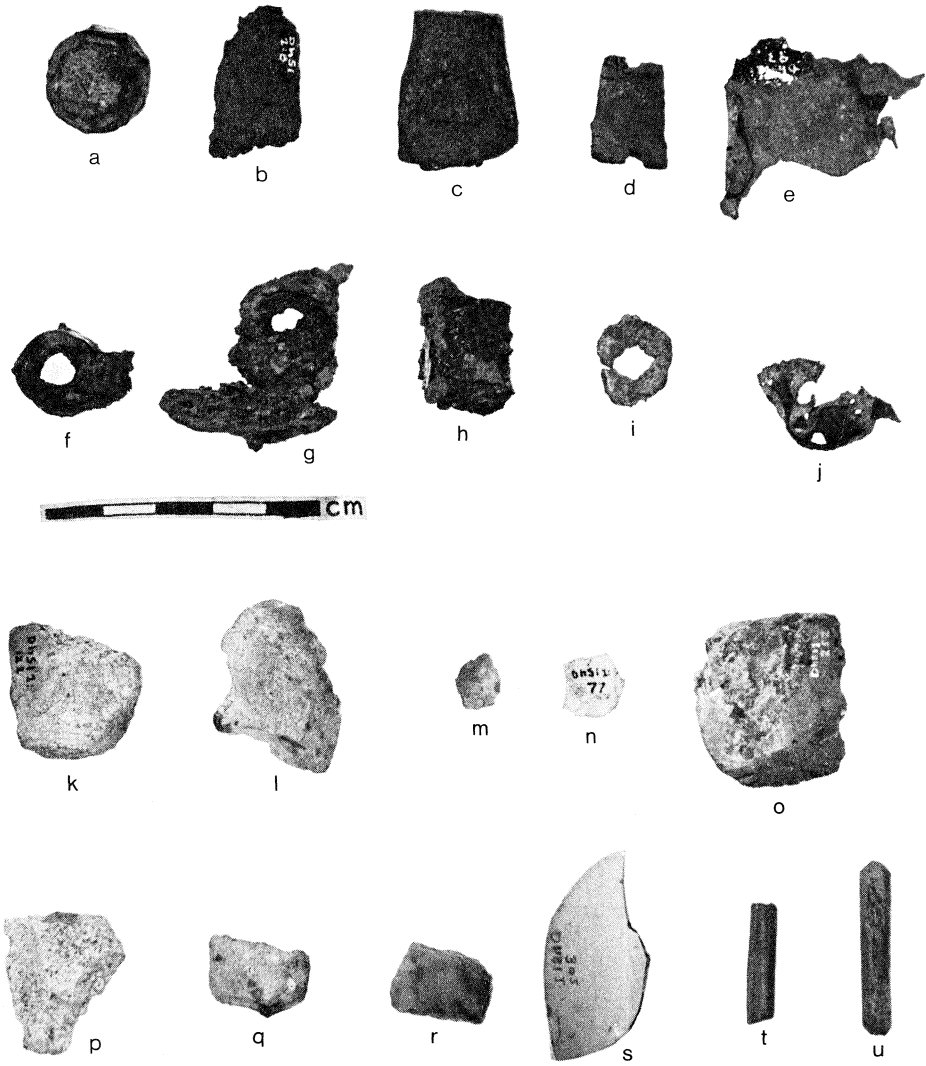


FIGURE 9. Miscellaneous artifacts: *a, b*, iron rod ends; *c*, iron "gouge"; *d*, thin iron strap; *e*, sheet copper; *f-h*, iron tubes; *i, j*, sheet copper; *k-r*, gun flints and flint flakes; *s*, glass bottle fragment; *t, u*, siltstone rods.

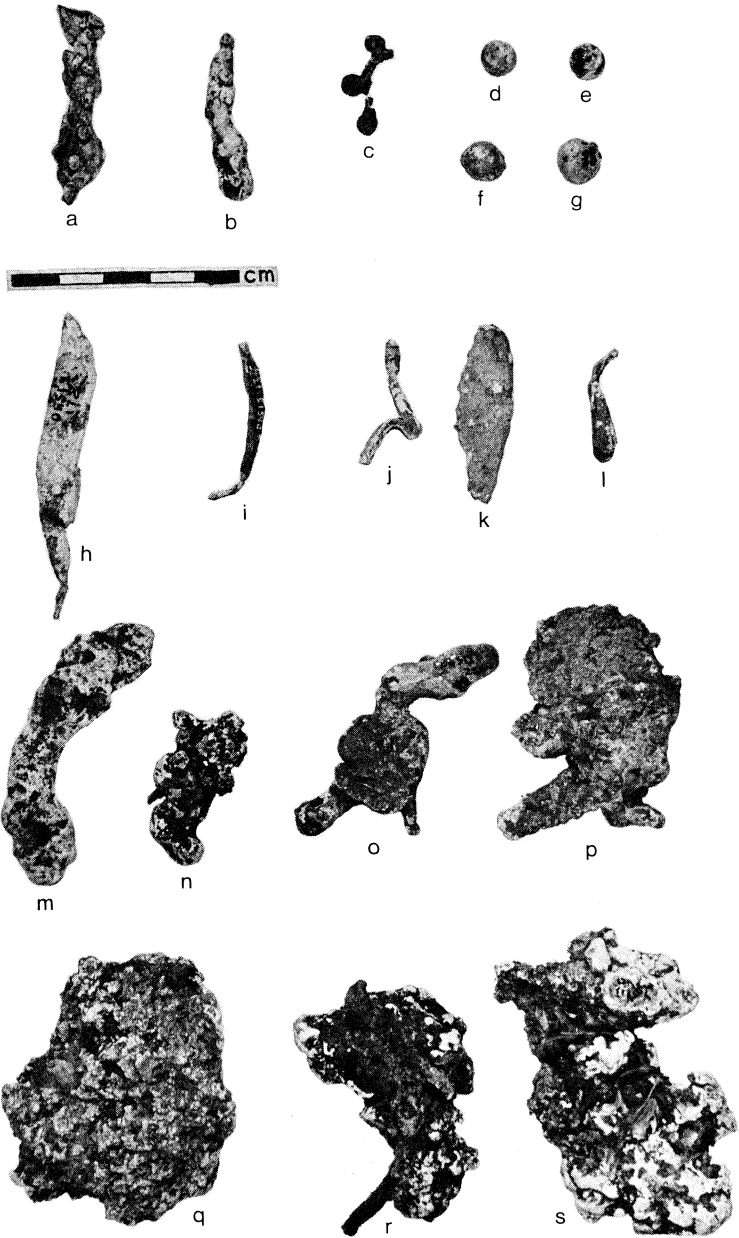


FIGURE 10. Lead artifacts: *a, b*, sprue fragments; *c*, sprue with three dustshot attached; *d, e*, buckshot; *f, g*, ball; *h-k*, sheet lead trimmings; *l-s*, lead spill; *l* has been pounded on two surfaces; an eight penny T-head brad is embedded in *r*, and feathers are partially incorporated in *s*.

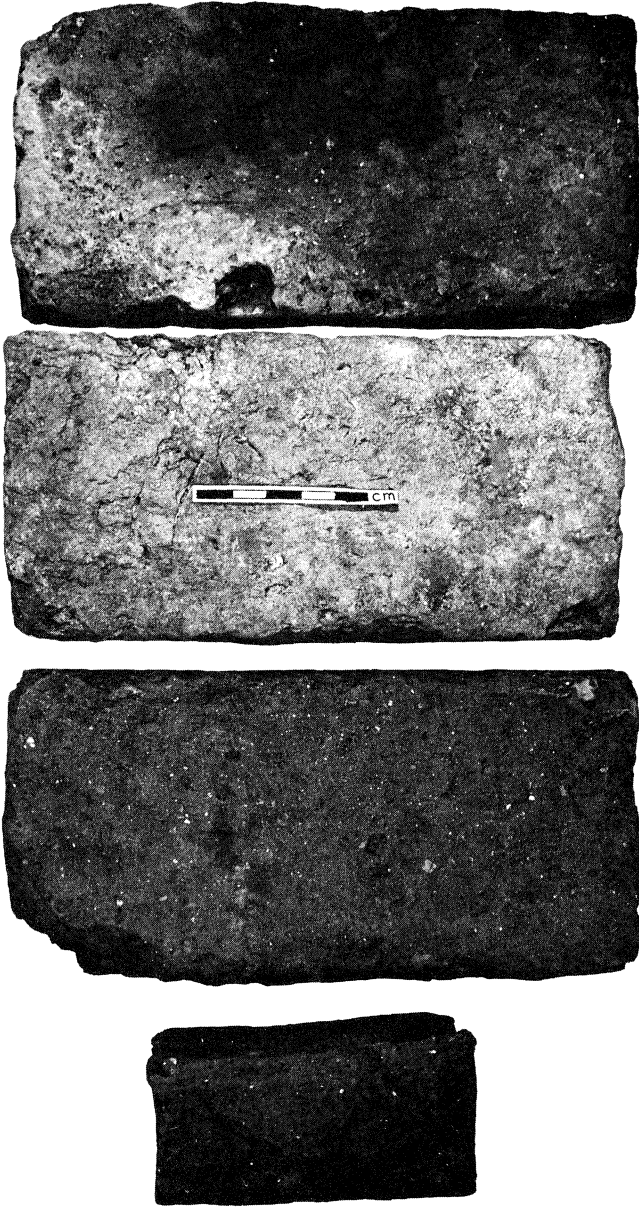


FIGURE 11. Bricks.

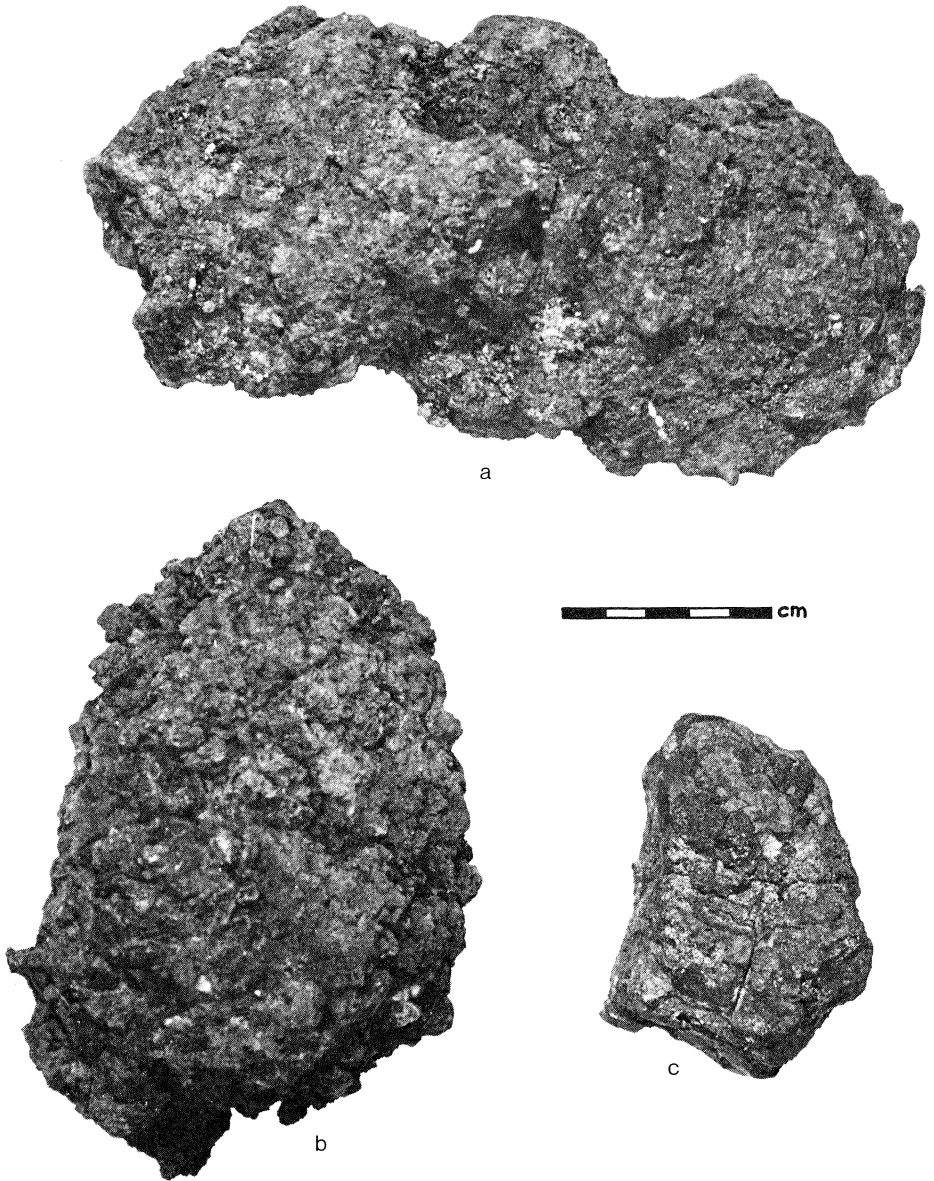


FIGURE 12. Clinker (*a, b*) and coal (*c*).