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ANALYSIS OF INTRASITE ARTIFACT SPATIAL DISTRIBUTIONS:
THE DRAPER SITE SMOKING PIPES

by

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Once upon a time there was a man who had plenty of tobacco, and God spoke to the man and asked him where his pipe was. The man took it and gave it to God, who smoked for some time, and after having had a good smoke broke the pipe into fragments. The man asked him, "Why have you broken my pipe? Surely you see that I have no other." So God took one that he had and gave it to him saying, "Here is one which I give you; take it to your grand Sagamore, let him keep it, and if he keeps it safe he will not be in want of anything whatever, nor any of his companions." The man took the pipe and gave it to his grand Sagamore, and as long as he had it the savages lacked nothing in the world; but afterwards the Sagamore lost the pipe, and this was the cause of the severe famine they sometimes experience.

—— Micmac tale related by Sagard
(Wrong 1939:168-69)

ABSTRACT

An analysis of the intrasite spatial distribution of over 4,000 smoking pipe fragments excavated at a late prehistoric Huron settlement has raised a number of important questions concerning the interpretation of an artifact's provenience within an archaeological site. A model which illustrates the processes contributing to the formation of archaeological sites is presented and the analysis of pipe fragments is accomplished in light of this conceptual framework.

The study includes a computerized analysis of adult smoking pipes in addition to an independent treatment of juvenile pipes, effigy pipes, clay preforms, recycled fragments, and other special samples.

Archaeological evidence is supplemented with extensive ethnohistorical documentation as these smoking devices are used to derive information about prehistoric Iroquoian behaviour.

It is concluded that researchers must continue to develop models that systematically isolate all stages of an artifact's pre- and post-depositional life and archaeologists are encouraged to investigate the intellectual processes that enable them to link artifacts recovered in the present with socio-cultural patterns that existed in the past.

RESUME

Une analyse de la distribution spatiale de plus de 4000 morceaux de pipes récupérés d'un village Huron préhistorique a soulevé plusieurs questions importantes concernant l'interprétation de la provenance d'artéfacts à l'interieur d'un même site archéologique. Un modèle illustrant les procédés qui contribuent à la formation de sites archéologiques est présenté et l'analyse des morceaux de pipes entrepris à la lumière de ce modèle.

L'étude comprend aussi une analyse informatique des fragments de pipes pour adults. Les pipes pour enfants, celles à effigie ainsi que les forms en argile, les morceaux réutilisés et plusieurs autres échantillons spéciaux ont été pour leur part traités de façon indépendent.

Etant donné que tous ces fragments sont utilisés pour mieux comprendre le comportement Iroquois préhistorique, la discussion archéologique est supplementeé de documentation ethnique et historique.

Il est conclu que les chercheurs devraient continuer de développer des modèles qui isolent systématiquement tous les stades précédant et suivant la déposition d'un objet trouvé. Les archéologues sont de plus encouragés à bien examiner les processus intellectuels par lesquels on relie les objets trouvés maintenant avec les profils socioculturels d'autrefois.

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CHAPTER ONE

1A) *INTRODUCTION*

The tale which introduces this thesis suggests that breakage and loss of smoking pipes among native North Americans was such a regular occurrence that it became part of their folklore. The tremendous popularity of smoking devices, coupled with a constant need for replacements, has resulted in the deposition of large quantities of pipes and pipe fragments on Huron habitation sites.

Few archaeologists who have dealt with Iroquoian sites have failed to encounter at least a handful of pipe fragments in the course of their excavations. Consequently, the smoking pipe has become one item of Iroquoian material culture that has been the subject of a considerable amount of scrutiny. In this study we will be examining approximately 4,000 pipes and pipe fragments recovered at a single Huron site. Before we discuss our own problem orientation and the methods we will use to study such a vast sample, we will briefly survey the history of Iroquoian pipe analysis.

An historical survey should provide a general synopsis of existing knowledge on a specific topic, familiarize the reader with the goals and accomplishments of past and current research on that topic, and generate a fruitful commentary which endeavors to guide work in fresh directions. The latter function makes such a survey inherently critical, for research cannot proceed by taking for granted prescribed orientations, but only through re-evaluating all work done to date. What follows is a brief summary of a much more comprehensive review of the literature and historical survey which is currently in preparation (von Gernet 1982).

1B) HISTORICAL SURVEY

Description and interpretation of pipes

At the time of their contact with Iroquoian-speaking peoples, Europeans had already expressed a great deal of interest in aboriginal smoking devices. In fact, more early ethnohistorical information has survived on pipes than about any other single item of Amerindian material culture. Explorers and travelers were particularily impressed by those pipes which were "three quarters of a yard long, prettily carved with a bird, a deare or with some such device at the great end sufficient to beat out the braynes of a horse" (Strachey 1612:40).

Later descriptions were equally colourful. A work written in 1775 (which was primarily concerned with arguments to prove that American Indians were descended from the Jews) included a section dealing with general observations on aborigines based on the author's actual experience with them:

> They make beautiful stone pipes...they easily form them with their tomohawks, and afterward finish them in any desired form with their knives...on both sides of the bowl lengthwise they cut several pictures... a rabbit and a fox; and, very often, a man and a woman *puris naturalibus*. Their sculpture cannot much be commended for its modesty. The savages work so slow, that one of their artists is two months at a pipe with his knife, before he finishes it (Adair 1775:423).

Between 1885 and 1925, the *Annual Archaeological Report for Ontario* published 285 pages devoted to the description of pipes, including 523 illustrations. These pipes, unlike those described in later site reports, were primarily museum acquisitions with vague proveniences rather than archaeologically recovered specimens.

By the 1960's, archaeologists had been doing a great deal of site excavation and they described their recovered samples in a spirit of objectivity:

> The largest and most complete is an elongated conical pipe rising 50 mm above the top of the stem, having an outside diameter of 35 mm at the top and 25 mm at the narrowest point above the stem (Plate 18 fig 7). The lip is 10 mm thick and has four broad equal scallops which are in no way squared and therefore are not reminiscent of the Huron coronet trumpet pipe as defined by Emerson. The scalloped elevations rise 6 mm above the depressions, which slope outwards. The bowl is decorated with a band of twelve horizontal lines 1 mm wide, extending from the top of the scallops to a point 15 mm above the top of the stem. The front half of the bowl is also decorated with vertical lines superimposed on the band of horizontal lines at angles of approximately 90,135,180,225 and 270 degrees from the axis of the stem (Pendergast 1966:56).

Although such exhaustive treatments of single specimens were intended to facilitate inter-site comparison, a lack of consistency in artifact description among various researchers decreased their usefulness.

Attempts at the interpretation of pipe effigies had already been made between 1880 and 1925, when McGuire, Boyle, Laidlaw, Hunter, Orr, and others published extensive articles describing museum acquisitions. Yet no significant new efforts appeared until Noble (1968, 1979) and Mathews (1976, 1978, 1979, 1981) initiated serious research in recent decades.

Pipes as culture-chronological diagnostics

The publication of accession descriptions by museums in the United States and Canada in the late 1800s and early twentieth century, created a vast corpus of readily accessible comparative data. McGuire recognized the value of museum collections for diachronic and spatially extensive studies of artifact distributions and decided to begin classifying pipes from all over North America into general categories. He felt that "practically all pipes may be classified as belonging to one or other of about a dozen forms recognizable by the interior dimensions of the bowls and stems and their proportions one to the other" (1899:626). The different 'forms' of this primarily morphological typology were plotted to ascertain patterns in their continental distributions. In a later article, McGuire summed up the results of his analysis with the rather vague statement:

> All pipes were found to be distributed over certain geographic areas...and with one exception, these areas were small when compared with the whole area of the continent (1904:43).

The one exception was, by no coincidence, the type which McGuire argued was the only pipe form not influenced by Europeans.

Wintemberg had read McGuire's 1899 report, regarded his classifications as 'types', and used them in his description of pipes excavated at the Uren, Roebuck, and Lawson sites. For comparative data, he also depended on Boyle's and Orr's meticulous descriptions of museum accessions from the late nineteenth century through to the 1920s.

In addition to describing pipes, both in terms of their individual morphological characteristics and by reference to similar artifacts illustrated in previous publications, Wintemberg began isolating pipe attributes particular to certain Indian groups:

> Short stems seem to be characteristic of Algonkian pipes (1928:40)

or restricted to general temporal spans:

> pipes of stone are scarce at most pre-European Iroquoian sites (1937:77).

Wintemberg never attempted a quantitave assessment to substantiate such statements, but rather based them on the general impressions he had of material recovered throughout Ontario.

The combination of description based on morphological characteristics and the attempts at isolating culture-chronological attributes did, however, lead to the development of a typology which Wintemberg used in his analysis of pipes recovered at the Roebuck site:

> There are five main types of earthenware pipe bowls, all of them being susceptible of division into sub-types, making about seventeen kinds. Several of these sub-types grade into other sub-types even of other main types. The four *(sic)* main types are: I, nearly tubular; II, cylindrical; III, trumpet; IV, ovoid; and V, conoid (1937:79).

Wintemberg added several others and used this nomenclature in subsequent work. The development of such classificatory schemes greatly facilitated standardized description, inter-site comparison, and the isolation of distinguishing characteristics of different aboriginal groups, such as the Algonkians and Iroquoians.

Unlike pottery, a relatively small pipe fragment may represent a considerable percentage of the complete specimen. This made the recognition of general morphological features much simpler and led to the establishment of typologies based on form rather than decorative technique or motif.

By 1954, Norman Emerson had examined over 1200 Iroquoian pipes. As part of his doctoral dissertation, he classified these into basic types that were a combination of general morphology and decorative elements, and attempted to ascertain their chronological sequence. By investigating pipe frequencies at various temporally disparate sites, Emerson deduced that Ontario Iroquoian pipes "are not the clear-cut time markers that one might wish for, since some forms maintain popularity over a long period of time" (1954:64). As encouragement to further study he added:

> It does appear, however, that percentage occurrences indicating degree of popularity at a given period will add some refinement to these as period diagnostics" (1954:64).

This shift from previous analyses, which stressed "presence" or "absence" of pipe types, to quantitative assessments involving percentage occurrences and "popularity" caused a proliferation of statistical seriation attempts by Ontario archaeologists in the 1960s.

A much more explicit attempt to define different pipe types was made by Emerson in 1967 and, although the comparison of specimens with his rather crude sketches involved significant ambiguities, the work was used by subsequent researchers as a rough guideline. Only two modifications of Emerson's typology were offered (Wright: 1966; Noble: 1968) and archaeologists continued to use it through the 1970s.

One of the most extensive uses of Emerson's typology was made by David Bush in his report on the CRS site in 1976. Thirty-two types were employed to determine the percentage distributions of ceramic pipes at eight different sites. Coefficients of similarity based on these pipe types were calculated to determine the chronological position of CRS. The study, in some cases, contradicted the outcome of the pottery vessel analysis and Bush felt:

> The fact that pipe studies have produced such vague definitions of pipe types may be affecting what the analysis is trying to test. Consistent and exact definitions of pipe types must be formulated in order for the coefficients of similarity tests to be valid (1976:28).

Yet Pendergast believed that pipes "serve as an excellent indication of influence from areas where certain pipe types have been proven to have temporal, spatial and tribal affiliation" (1967:9). This view encouraged researchers to draw inferences involving widespread geographical distributions which had surprising resemblances to those initiated by McGuire at the turn of the century.

In 1973, Edward Rutsch published an extensive 250page descriptive work on the pipes and smoking technology of the New York and Ontario Iroquoians. His analysis involved 661 specimens, of which 231 were from Ontario. This pool was derived from various museums and many artifacts lacked specific provenience.

Rutsch's analytical method was the comparison of 10 stone and 14 ceramic pipe types with eight arbitrary "subcultural areas" in Ontario and New York. The typology was designed by the researcher based on what he felt was a representative sample, yet it has serious shortcomings. Of his 14 ceramic pipe types, four are probably not Iroquoian, five are effigy forms, and one is "miscellaneous", leaving four severely lumped types.

Rutsch believed that the typology, in the general order in which he presented it, may reflect a chronological progression in time (1973:232). The fact that the majority of pipes in his typology could be found on Iroquoian sites of any age seemed of no concern.

Rutsch further claimed that his sample was fairly diagnostic of the range of pipe styles prevalent among the tribes under investigation (1973:232). His 'representative' Ontario Huron subcultural area sample involved nine ceramic pipes and his readers were erroneously led to believe that 33% of Huron ceramic pipes are effigies. He summarized his findings as follows:

> My most important conclusion from these data is that correlations seem to exist between the construction and style of artifacts and the sites in which they were found — that is, artifacts of a given type tend to cluster in a given geographical area and occur in sites attributed to a certain archaeological culture (1973:231).

Despite Rutsch's efforts, it had become apparent that research into museum pipe collections should not involve questions dealing with "representative types" or spatial distributions, because of problems of sample size and the type bias (*i.e.,* complete and spectacular specimens) in the holdings. Rutsch's claim that "private and museum collections, although poorly documented, can be useful as analytical tools in formulating typologies" (1973:233) had already been dismissed on the grounds that valid type constructions could only be derived from archaeological excavations involving large representative samples. His study was completely ignored and has remained in relative obscurity.

Meanwhile Emerson's types were generating a great deal of confusion. This was probably a result of the inconsistency in the nomenclature he had assigned. For the novice archaeologist who lacked visual aids, the types "Iroquois Trumpet" or "Iroquois Ring" had little meaning, since they inadequately described their constituent features. Various bulbous and constricted forms became the objects of organic analogies including "apple" and "acorn" types. Inconsistency in name order caused additional confusion: "Collared Ring" and "Ring Trumpet" seemed like the equivalent of mixing species and genera. It was becoming obvious that the inadequate delineation of parameters which defined types gave pipes little value as culture-chronological diagnostics.

Yet instead of revamping the entire typological framework, researchers began investigating the potential of attribute analysis. Several factors seem to have contributed to this shift from morphological typology to attributes as the analytical basis of pipe studies. James Ford's notion that the complexity of formal variation in material culture reduced all attempts at morphological typology to mere organizational devices or constructs of the researcher (1954) probably influenced many researchers to pursue other methods of study. Spaulding's widely published studies on statistical techniques involving attribute associations and combinations (1953) did, however, validate type classifications, if the combinations of attributes favoured by the manufacturers were discovered. Wright's introduction of attribute analysis into Iroquoian archaeology (1967), coupled with Emerson's recognition of pipes as a potentially valuable artifact class (1954), led to studies questioning the relative merits of types and attributes in culture-chronological research orientations.

At the forefront of this questioning was Cynthia Weber's massive work on *Types and Attributes in the Study of Iroquois Pipes* (1970).

Unfortunately, it has had poor circulation, being an unpublished Harvard Ph.D. dissertation with restricted accessibility. To determine whether type or attribute analysis had greater validity Weber selected 3,763 specimens from 312 Iroquoian locations. The results indicated that a significant number of "established types" (including the popular Plain Trumpet and Ring Trumpet) which were used to seriate pipes in Iroquoian archaeology have no spatial or temporal significance.

Weber then selected 962 "possible cultural modifications" that a pipe maker might have used and analyzed the distribution of these attributes. 34 had spatial significance (traditional), 64 had temporal significance (horizontal) and 192 attributes exhibited significant distributions in both time and space (modal). The researcher went on to reconstruct Iroquois prehistory and concluded:

> The attribute-based reconstruction was compared to the reconstruction based on established types. The greater sensitivity of the former in enabling the inference of the interactions of Iroquoian prehistory is obvious (1970:144).

The study was discouraging: if the cultural-historical information is inherent in the attributes then seriations based on established types are merely abstractions. Weber's findings, although useful in reminding archaeologists of the dangers of general typologies, did, however, have a number of drawbacks. First, "possible cultural modifications", although perhaps more sensitive than types, are still a classificatory scheme like any other and can be altered to attain specified objectives. Second, the use of attribute analysis for seriation is practically impossible, since no Iroquoian site reports have described specimens in this fashion and therefore no comparative data are available. Third, it must be remembered that some types in Weber's study *did* demonstrate limited occurrences in both spatial and temporal dimensions, thus rendering them of continuing importance as an analytical tool.

Although researchers like Rutsch, working in 1973, ignored (or were unaware of?) Weber's findings, Wagner and Mecredy applied them at the Moyer site in southwestern Ontario in the same year. Since the Moyer study involved inter-site comparison, attribute analysis was not utilized; rather Weber's findings concerning the temporal and spatial significance of types were used to determine whether Moyer pipes had any comparative validity. Wagner and Mecredy concluded that the pipe types were of little assistance in dating the site, since they belonged to Weber's temporally insignificant variety:

> The absence of any type known to be a reliable time marker with known temporal significance makes it virtually impossible to accurately estimate the date of the Moyer site using solely ceramic pipe formation (1973:66).

The attempt to shift from types to attributes led to an increasing hesitancy on the part of archaeologists to use pipes as culture-chronological diagnostics. Rather than begin to build attribute-based classifications, researchers saw Weber's work as a cautionary tale.

Intrasite distributions of pipes

As early as 1937, Wintemberg had already produced a few vague speculations on refuse disposal behaviour:

> The whole pipes were probably lost, all others being kept or taken away by the inhabitants when they left the site, only broken ones being discarded. Even some of the bowls that were intact may have had a hole bored in one side for the reception of a wooden stem and were carried away when the place was abandoned.
> The pipes and fragments were found on the surface, in the muck surrounding the spring, and in all the refuse deposits excavated. In general they were most numerous in the deepest and richest deposits, the largest number of them usually being in the deposits that yielded the largest numbers of specialized types of pipes (1937:77-78).

Yet no attempts to elaborate and test some of these impressions were made, since Wintemberg was primarily interested in the artifacts *per se* rather than the potential information gained through analyzing their distributions within a site.

In the 1960s, some North American archaeologists began moving away from a preoccupation with culture-chronological goals and attempted to infer socio-cultural behaviour from archaeological materials. The specific intrasite location of an artifact rapidly became as important as the artifact itself and an analysis of the spatial distributions of pottery design motifs led to bold reconstructions of past behavioural systems (*i.e.*: Longacre 1964; Deetz 1965; Hill 1966; and others).

In the spirit of Longacre, Deetz, and Hill, Noble suggested that "if future excavators were to plot effigy pipes in relation to house structures and over entire villages, the pipes might reveal the locations of lineages represented within these settlement units" (1968:297). In addition to the probability that "designs, as such, may have had no social connotations" (Trigger 1976:143), no archaeological sites produced a sufficient sample of effigy forms to test this claim; in the 13 years since Noble's dissertation all such attempts have proven unsuccessful.

Although most archaeologists recognized the limitations that small pipe sample sizes imposed on generating inferences about prehistoric social behaviour, others did not view it as a serious impediment. In the 1970s an attempt was made to infer past social composition and activity areas using material from portions of one early sixteenth century longhouse excavated at the Draper site by Brian Hayden in 1973. The ceramic analyst David Arthurs surmised that the study was justified, since the longhouse living floor was ostensibly undisturbed and the excavations sufficiently meticulous to assure adequate spatial control during artifact recovery.

A mere 55 pipe fragments were recovered and of these only 19 could be typed, yet the sample was seen as adequate to allow comparison with two small previous excavations in other areas of the site. Arthurs concluded that "real differences exist in the pipe assemblages of different houses, which may well relate to their social composition" (Arthurs 1979:89).

Arthurs also plotted pipe fragments within the house to determine if any social generalizations could be made from the ensuing distributions. He noted that the majority of pipes were found on the south side of the hearth line — an observation of dubious validity considering that vast sections of the north side were unexcavated. He also observed that the distribution of pottery pipes appeared to reflect patterns of male related activities such as bone, wood, and lithic manufacture (1979:84). Yet the fact that the pipes were found in the same areas, and the same proportions as pottery distributions, did not seem to bother him. Moreover, the excavations missed an intersecting palisade wall which had been removed prior to the house construction, so that Arthurs was unaware of the resulting sample contamination.

The most startling deductions arose from Arthurs' attempts to infer social behaviour from distributions of *single* artifacts:

> A well-modelled ceramic bird's beak which, while rather large to have been part of a pipe, may have been part of a dance mask, was discovered lying along the wall on the edge of this space. This evidence would tend to support the interpretation that the cleared space was a recreation area (Arthurs 1979:84).

Anyone familiar with Huron artifacts would question the existence of ceramic bird-beak masks and identify the specimen as one of the numerous (and notably large) bird-beak effigy pipes. It requires a capacious imagination to fancy Huron pipe smoking as recreation in a restricted area of the longhouse. Such initial efforts to infer intrasite social behaviour by plotting spatial distributions of samples generally failed because they did not distinguish contexts of manufacture, use, and deposition.

1C) STATEMENT OF OBJECTIVES

This study has three primary goals: (A) to derive information about prehistoric Iroquois behaviour from the intrasite spatial distribution of smoking pipe fragments; (B) to analyse processes contributing to the formation of archaeological sites; and (C) to investigate the intellectual processes that enable archaeologists to link artifacts recovered in the present with socio-cultural patterns that existed in the past.

At first glance, this may seem an overly ambitious task for an M.A. thesis. Yet my preliminary studies have indicated that the achievement of the first goal (A) cannot be properly realized without a comprehensive scrutiny of the last two (B and C).

We have seen that, although aboriginal pipes have been researched at length, there have been few efforts to study their distribution systematically within a single site. This is a result both of a paucity of significantly large samples and of a tendency among archaeologists to use pipes primarily as data contributing to the achievement of rather limited culture-chronological goals. Those studies which did attempt to infer socio-cultural behaviour from archaeological materials stopped at a level equivalent to our first goal. More recently, such studies have been seriously questioned by researchers who recognize the importance of analyzing the actual formation processes that structure archaeological materials (Schiffer 1972, 1976; Plog 1980; and others). Yet our objectives must carry us even beyond this level, since a systematic analysis of site formation processes inevitably requires building conceptual models relating the present to the past.

Once we have built adequate conceptual models allowing us to achieve our first goal (chapter two) we will describe our data base (chapter three). The archaeological material used in this study are smoking pipe fragments which were excavated at the Draper site, a late prehistoric Huron settlement near Pickering, Ontario. Draper is ideal for intrasite studies, since the site combines the largest sample size of any Iroquoian excavation with a significant spatial distribution. Over 4,000 pipe fragments were recovered from 44 houses and 25 middens over an area totalling more than 4 hectares.

In addition to providing the data base for our analysis of intrasite spatial distributions (chapter four), the descriptive section will allow comparison of artifact attributes between sites in any future culture-chronological studies.

The enormous sample of pipe fragments recovered at the Draper site will enable us to ask and perhaps answer a myriad of different questions. In this thesis, we will address only those pertaining to intrasite distributions.

CHAPTER TWO

Before we examine the Draper pipes and discuss the analytical methods we will use to study them, we must construct a terminological framework and use it to investigate "one aspect of archaeological science that logically precedes the study of specific methods and techniques, namely an analysis of the mental operations carried out in archaeological constructions" (Gardin 1980:xi). We commonly forget that reconstructions are initiated by the mental operations of the researcher and this omission often leads to the separation of the archaeologist from the information he has generated about the past. What follows is both a delineation of the conceptual foundations of the proposed thesis and an attempt to bring the archaeologist back into archaeology.

2A) THE DYADIC STRUCTURE OF ARCHAEOLOGICAL CONCEPTS

An item of material culture found on an archaeological site may assume one of two states depending on how we conceptualize and order archaeological information. Resting upon the laboratory table in front of the researcher, it plays the role of an *artifact*. Yet the artifact was not always resting; at one time it was part of a dynamic behavioural system. When we conceptualize the item in this latter state it becomes an *element*.

Every artifact has one important attribute that distinguishes it from other artifacts and yields further vital information about its role as an element. This is the specific location of its archaeological retrieval, or *provenience*. The systemic manifestation of provenience can be the area in which an element was produced, used, and/or disposed. Following Binford (1964), we call all such areas *loci*.

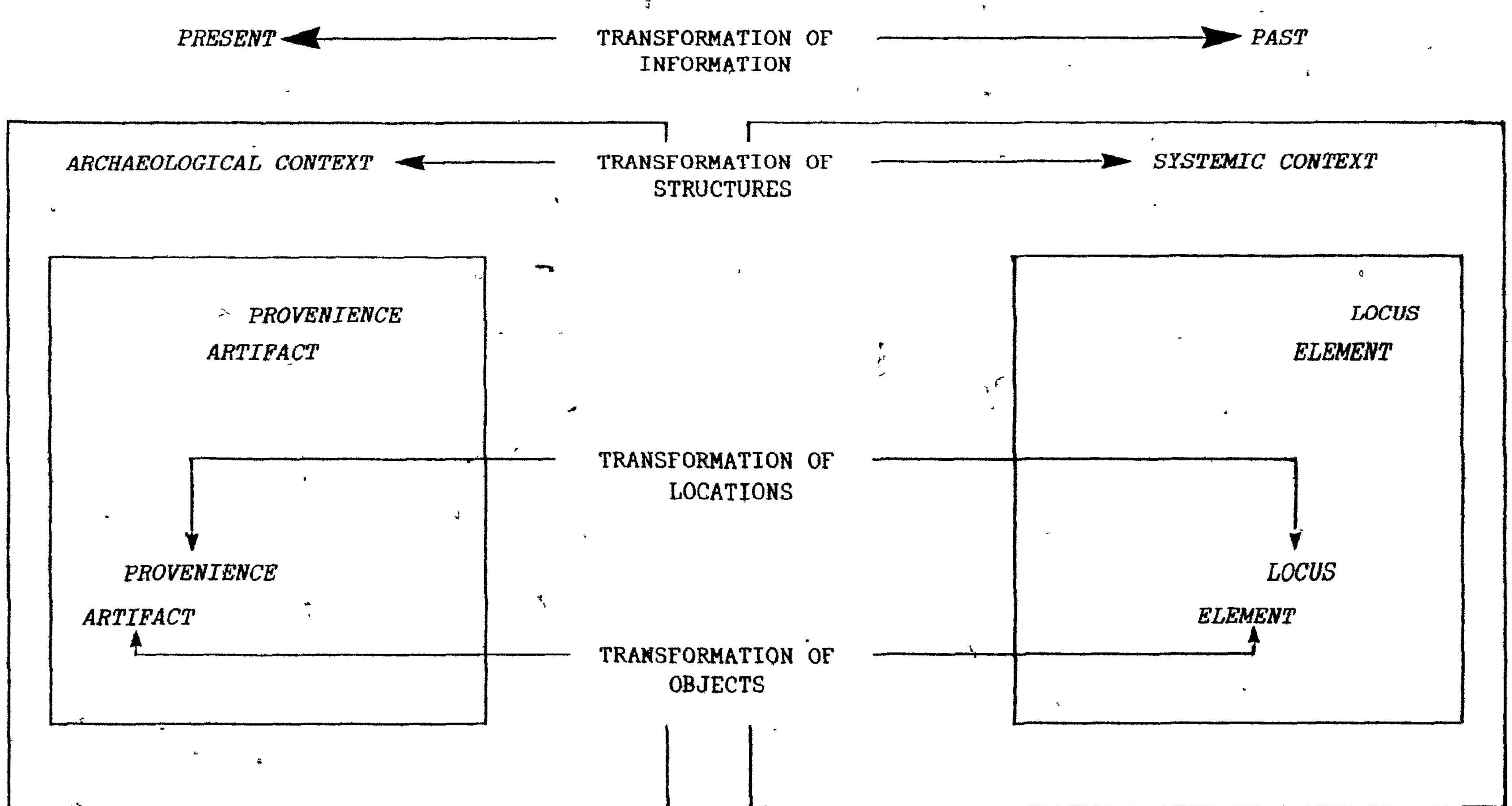
An element and an associated locus were once joined with other elements and loci in a *systemic context*. The set of material culture (artifacts) and their respective proveniences recovered by prehistoric archaeologists constitutes an *archaeological context* (Schiffer 1972, 1976).

The systemic context may be conceptually subsumed under the domain of social reality which no one has the potential to experience directly: the *past*. The archaeological context, being a stucture of vestiges from the past, is part of our current experiential surroundings: the *present*.

The two components of each dyadic set are linked by relationships that we will call *transformations* (Schiffer 1976). The transformation of an object occurs as its status is changed from element to artifact, between the time when it ceases to play an active role in a behavioural system and the point when it becomes an object of scientific scrutiny. When this is combined with locus/provenience, we have a transformation of structures between the systemic and archaeological contexts. On a conceptually higher level, there occurs a transformation of information between the past and the present domains (figure 2.1).

A basic form of transformation has been identified by Schiffer (1973:73; 1976:44) as an *equivalence transformation*. This conception of the relationship between past and present is the archaeological version

Figure 2.1 The Dyadic Structure of Archaeological Concepts



of the uniformitarian principle first enunciated in the geological sciences: the variables of the past and present domains are seen as identical. Equivalence is dependent on the degree of specificity we assign our variables. The relationship between artifact and element, for example, may be seen as an equivalence transformation if our variables are defined on a relatively general scale (*e.g.*, artifact = smoking device). A more detailed degree of specification in our interpretations or description often increases the tenuousness of an equivalence transformation (*e.g.*, artifact = shaman's pipe used in iconoclastic ritual).

When we deal with provenience/locus relationships our interpretations gain the additional complexity of a spatial dimension and an equivalence transformation can only rarely be demonstrated. For example, a number of pipes found in a longhouse by an excavator may lead to the conclusion that smoking was prevalent in this habitation. Yet unless the myriad of other processes that may have resulted in the patterning of these artifacts can be ruled out, the activity of "smoking" cannot be deduced from the pipe fragment proveniences. This however, has not restrained some researchers from entertaining the assumption that particular proveniences 'reflect' specific loci. James Hill, for example, believes that "the spatial distributions of cultural materials are patterned or structured (non-random), and will be so within an archaeological site. These patterns reflect the loci of patterned behaviour that existed in prehistoric times" (1966:10).

It is obvious that the equivalence transformation is a normative relation linking the systemic with the archaeological context. The role of archaeology is to try to establish this normative relation by reducing non-equivalence. Before we discuss how this may be done, we must first examine the nature of transformations themselves.

2B) THE NATURE OF TRANSFORMATIONS

Transformations which link systemic and archaeolgical contexts have a bi-directional nature. If we begin with an artifact and its provenience, we start within an archaeological context and initiate a transformation that seeks to end by establishing a systemic structure composed of elements and their respective loci. Such an operation, involving the construction of the past from the material remains recovered in the present, will be referred to as a *constitution* process.

Alternatively, we may commence with a systemic context (usually a hypothetical behavioural system, stochastic simulation model, or an ethnographic analogy) and initiate a reverse transformation, thereby engaging in a *reduction* process. This ends with an archaeological structure containing bits of material culture and information as to where one might expect these vestiges to be found (the sub-discipline of ethnoarchaeology is devoted to this type of transformation).

Thus, a transformation involving a reduction process generally has a significant amount of external input, making it inherently nomothetic in nature. Because constitution processes emphasize working towards the explanation of specific archaeological patterning and variability (*i.e.*, artifacts and provenience), these types of transformations have a tendency to be more idiographic.

Although these two processes constitute independent transformations that cannot occur simultaneously, they are often found together, oscillating back and forth between what is known in the present and what is unfamiliar in the past (figure 2.2). As Trigger points out:

> The aim of any idiographic discipline is to explain specific events or situations. The ideal in each case is to account for a particular development or event by isolating the determining conditions and showing how these were sufficient to cause it to take place... Almost invariably, the explanation of such an event involves setting forth a number of testable generalizations about human behaviour (1978:39-40).

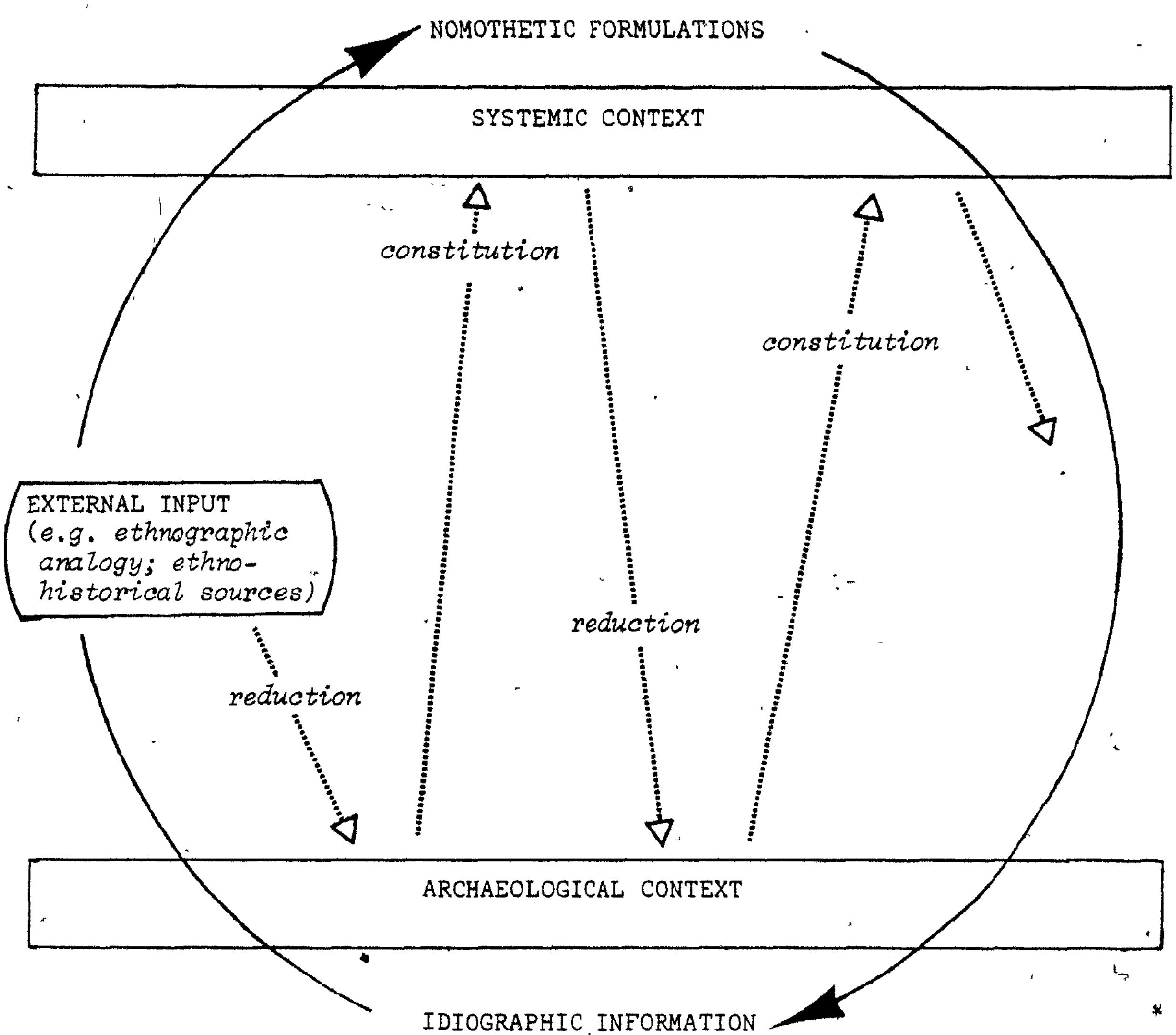
We must now turn to the isolation of demonstrable equivalence transformations, a task that is perhaps easiest to comprehend by employing the terminological framework of information theory:

> The role of material culture as an information communication system is particularly relevant to the task of the archaeologist. For, although the ancient societies are long since dead, the continuing existence of their material culture still conveys the weak coded messages which were intended for the culture's generators but which may yet be interpreted by us. The archaeologist must try to separate the message from the noise... (Clarke 1978:410-411).

Message

The primary consideration of message as a communicator within a transformation is that it has a *transmitter* but no *act of transmitting*. Although the systemic context is a type of transmitter with messages for us to receive, no one in the past acted consciously to relay messages into the future (in the way in which we sometimes create

Figure 2.2 The Nature of Transformations



time capsules). This is of immense importance for understanding the communication system of archaeology: the message is exclusively an act of reception; the proverbial mute stones do *not* speak.

This being the case, an artifact and provenience have no inherent message until we engage in the act of transforming them to a possible element and locus in the systemic context. We make the equivalence transformation artifact = smoking device not because of some information emanating from the artifact, but rather because the received message has a similarity to something with which we are already familiar. A set of evenly spaced, patterned post moulds only conveys the message *HOUSE* if we already possess the knowledge that human beings construct dwellings for shelter. When undergoing a transformation from the archaeological to the systemic context, a particular patterning of spatial distributions of artifacts will only convey a meaningful message if the receiver has some knowledge of how behaviour in social complexes affects the arrangement of material culture. There is nothing inherent in the nature of the archaeological record that suggests matrilocal post-marital residence patterns; only through some external input is the message received in this fashion. It is then that the oscillation of transformations between archaeological and systemic contexts is set in motion.

Noise

Every equivalence transformation requires the isolation of message through the reduction of noise. Although Clarke believes that the message differs from noise in having been structured (1978:411), this is obviously not always the case. Both the functional and stylistic variability of a set of artifacts may be highly structured; yet the former is often the noise which partially conceals the latter.

This is also true in the case of spatial distribution analysis. Two independent clusters of specific artifact attributes within a site may suggest that a particular person or social group was depositing elements in two different loci. The clustering may, however, be related to post-marital residence re-location; an activity equally structured, but possibly involving the movement of mental templates in the minds of the artisans instead of physical objects. Such a juxtaposition of structures often creates sufficient noise to distort message management during a transformation.

From this discussion, it becomes clear that equivalence transformations are: (A) dependent on initial knowledge on the part of the receiver which is derived from an external model or analogy; and (B) demonstrated not merely through the identification of structure, but rather, through isolating those patterns which provide a meaningful message in light of the initial model or analogy. The isolation of relevant patterns can only occur through a continuous reduction/constitution oscillation between the archaeologist's model of the past and the archaeological data of the present.

2C) *MODEL OF ELEMENT/ARTIFACT FLOW*

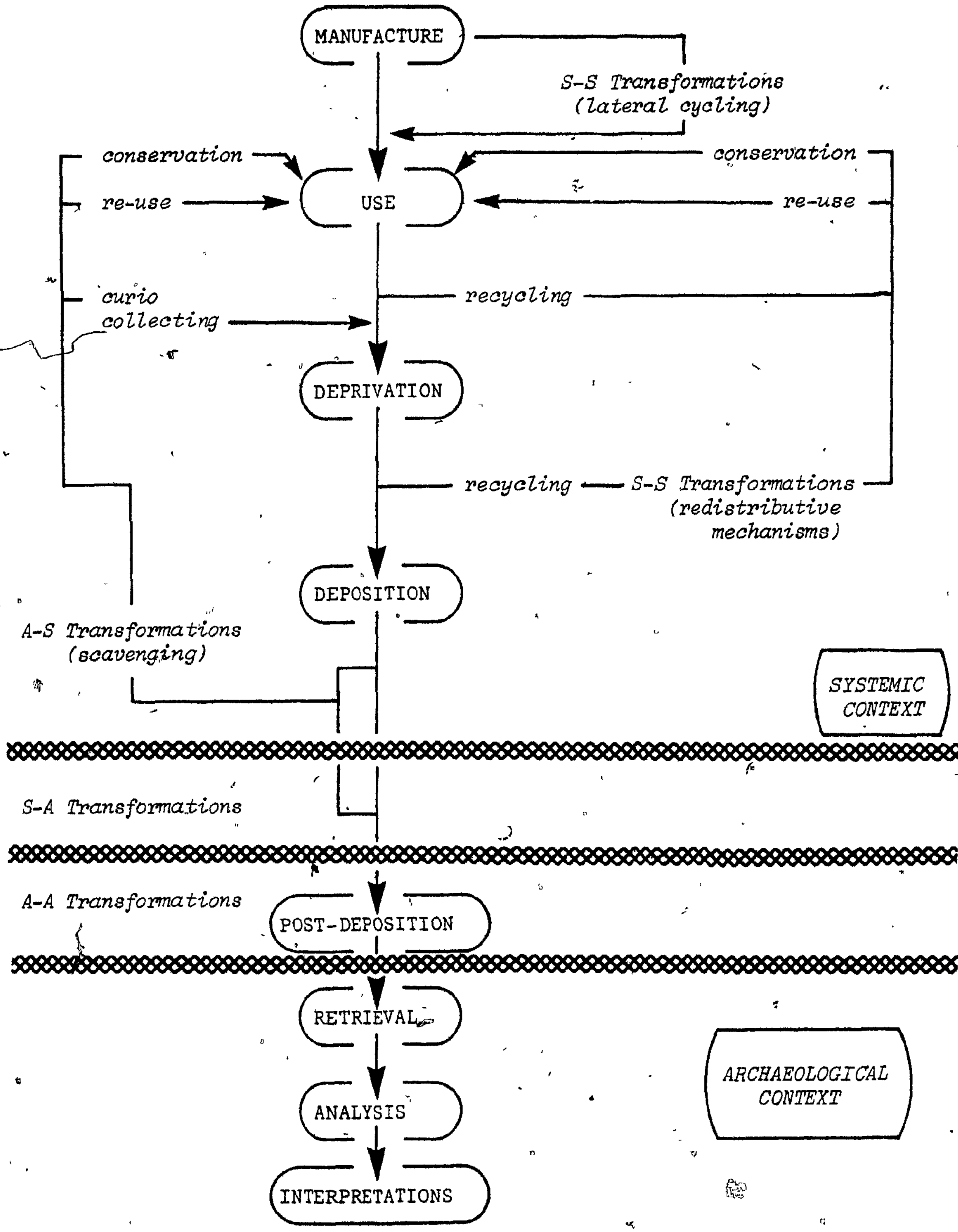
Our goal will be to transform information in the present into information about the past through a series of reduction/constitution oscillations. More precisely, we are interested in transforming artifact spatial distributions (*i.e.*, collections of proveniences) within an archaeological site into possible behaviour patterns in the systemic context.

We must start with a reduction process, since, as our discussion of *message* has shown, a particular pattern of artifact spatial distributions will only convey a meaningful message if the receiver has some knowledge of how behaviour affects the arrangement of material culture. This knowledge will, in our case, be organized into a model (figure 2.3); each contributing component representing a piece of information gained from ethnohistorical records and other behavioural sources. The question then asked, is: "Given one particular route in our flow chart model, how might the archaeological structure appear?"

Secondly, we will engage in a constitution process, transforming the archaeological context into information about the past: "This artifact spatial distribution seems to suggest specialist production." If the received message is even remotely distorted, further constitution oscillations must follow, using a different route on our flow chart model. The oscillations at some point abate with a final constitution process; one which can never be 'proved' as an ideal, noiseless equivalence transformation, but rather, one which suggests a much clearer message than the initial reception.

In our discussion of *noise* we found that it may be just as structured as *message*; the decision as to which it may be is dependent on how patterns provide meaningful messages in relationship to our initial model.

Figure 2.3 Model of Element/Artifact Flow



Although we may never fully sort out the entire communication system in the transformation of archaeological and systemic contexts, we must think of all potential communication produced in both contexts. The following are messages and noise we may expect to find in the archaeological material used in this study:

<u>*NOISE AND MESSAGE PRODUCED IN THE SYSTEMIC CONTEXT*</u>

A) Pre-manufacture - Cognitive variables

1) Spatially restricted spheres of influence directly affecting attribute application

- -natal learning sphere (*e.g.*, longhouse of mother's matriclan)
- -post-marital learning sphere (*e.g.*, longhouse of wife's matriclan)
- -peripheral learning sphere (*e.g.*, other longhouses in village)
- -regional learning sphere (*e.g.*, other villages in area)

2) Mimicry of attributes found on:

- -scavenged elements
- -gifts
- -bartered elements
- -exchanged elements
- -gambled elements
- -recovered elements
- -stolen elements

- Physical variables

1) Material

- -proximity to raw materials
- -seasonal availability of resources

2) Manipulation of material

- -artisan skill
- -tool effectiveness
- -time restrictions, patience, *etc.*
- -interruptions

B) Manufacture

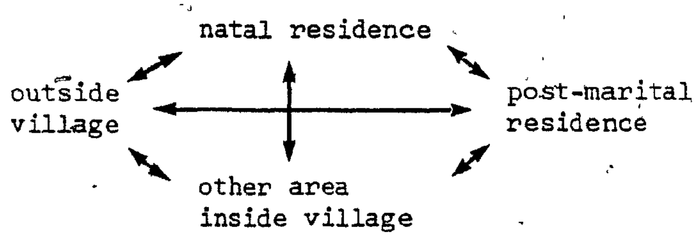
1) Who
- -male/female
- -specialist/non-specialist
- -all/some

2) Loci
- -natal residence
- -post-marital residence
- -other area inside village
- -outside village

C) S-S transformations: lateral cycling (post-manufacture/pre-use)

1) Type
- -gift
- -exchanged
- -bartered
- -gambled
- -found
- -stolen

2) Loci changes



D) Use

1) Who
- -male/female
- -child/adult
- -all/some

2) Loci
- -natal residence
- -post-marital residence
- -other area within village
- -outside village

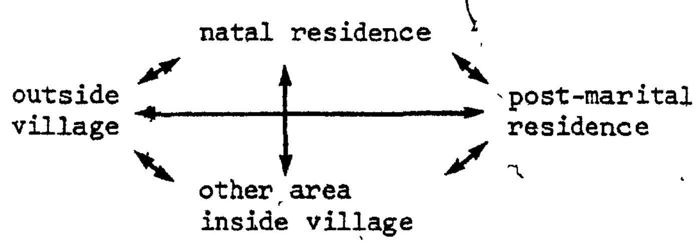
3) Function
- -relaxation
- -deadening of hunger
- -hunting, traveling
- -religious/shamanistic
- -social/etiquette
- -political

2) Time
- -between meals
- -rest stops during travel
- -during hunting
- -curing ceremonies
- -invocations
- -entertaining
- -village councils
- -regional councils

E) S-S transformations: redistributive mechanisms (post-use/pre-deposition)

1) Type
- -gift
- -exchanged
- -bartered
- -gambled
- -stolen

2) Loci changes



3) Reason
- -re-use
- -conservation

F) Deposition

1) Reason
- -loss
- -non-functional/fractured
- -functional/damaged
- -possession of superior replacement
- -discontinued habit
- -aborted attempt at manufacture
- -disposal of deceased individual's property
- -*de facto* refuse (upon village abandonment)
- -ritual disposal

2) Refuse type
- -primary (in house, midden, or other area)
- -secondary (in house, midden, or other area)

3) Loci
   -natal residence
   -post-marital residence
   -other area within village
   -outside village

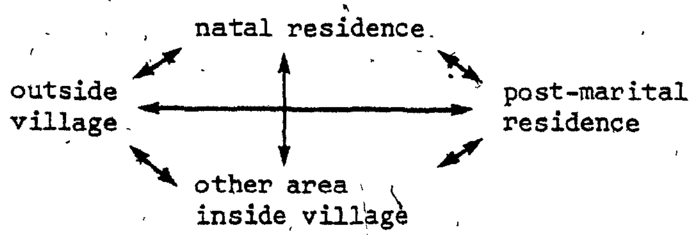
4) External variables
   -changes in intrasite settlement patterns (*i.e.*, house expansions, contractions, super-positions, relocations)

G) A-S transformations: scavenging (post-deposition)

1) Reason
   -curio collecting
   -re-use
   -conservation
   -toys

2) Who
   -children
   -adults

3) Loci changes



NOISE AND MESSAGE PRODUCED BETWEEN THE SYSTEMIC AND ARCHAEOLOGICAL CONTEXTS

A) A-A transformations: post-deposition

1) Soil mixing
   -vertical pedoturbation
   -horizontal pedoturbation

2) Recent agricultural activity
   -deforestation disturbance processes
   -plough disturbance processes

NOISE AND MESSAGE PRODUCED IN THE ARCHAEOLOGICAL CONTEXT

A) Retrieval: A-A transformations of artifact proveniences

1) Excavation technique

2) Provenience record organization

B) Retrieval: non-transformational biases

1) Excavation loci selection bias

2) Sampling design

3) Provenience control

4) Artifact selection bias

C) Analysis: selection of analytical units

1) Recognition of significant specific attributes

2) Recognition of significant contextual attributes

3) Ascertaining adequate levels of specificity in attributes (*i.e.*, 'lumping' *vs* 'splitting')

D) Analysis: statistical

1) Use of proper methods

2) Sampling error

3) Mathematical error

E) Interpretations: present/past transformations of information

1) Use of only those portions of analyses relevant to initial hypotheses

2) Deductive leaps from general to particular

3) Inductive leaps from particular to general

To many researchers such a systematized delineation of the noise and message produced during the flow of elements and artifacts through systemic and archaeological contexts may seem rather superfluous. Such conceptualizations are justified, however, since they function to decrease the tenuous nature of transformations between information collected in the present and behaviour in the past. The absence of these models in previous research has resulted in the failure to distinguish between the contexts of manufacture, use, and deposition, in addition to the acceptance of extremely weak equivalence transformations:

> Although pipes appear to have been commonly used throughout the house (as were post holes and pits), these concentrations all suggest a relatively important resident at this location with feasting responsibilities. We can probably equate these data with someone acting as a representative of the group, and as a managerial person of relatively high social power and authority (Hayden 1979:182).

CHAPTER THREE

3A) SAMPLE BREAKDOWN

The 1975 and 1978 field seasons at the Draper site, and several sporadic test excavations in previous years led to the recovery of 4,203 pipes and pipe fragments. After all possible reconstruction, these fragments seem to represent a maximum of 4,128 pipes. A general breakdown of this sample is provided in table 3.1. The material recovered in the pre-1975 test excavations has been dealt with elsewhere, was unavailable for analysis, has virtually no provenience,and represents less than 5% of the sample; hence this study will be concerned exclusively with the 3,997 pipe fragments recovered in 1975 and 1978.

The Draper site yielded more pipe fragments than any other excavation in North America. Because of this, traditional methods of describing aboriginal smoking devices have had to be modified substantially. The problem orientation in this study also has little to do with culture-chronological goals or inter-site comparison,but deals rather with processes contributing to the formation of spatial distribution of artifacts within a site. As a result of this,the analysis of artifacts also deviates radically from traditional methods.

Despite the astonishing number of archaeological specimens, the Draper excavations produced excellent control of provenience data, so that the exact location where an artifact was recovered may be plotted. Pipe fragments were widely distributed throughout the settlement and were

Table 3.1 Draper Pipes and Pipe Fragments: Sample Breakdown

			After reconstruction *f*	Before reconstruction *f*
1975, 1978 excavations	General sample	computer coded	3274	3340
		unanalyzable	196	196
	Special samples	effigy pipes	59	68
		special non-effigy pipes	26	26
		juvenile pipes	235	235
		recycled pipes	104	104
		pre-forms and wastage	28	28
Pre-1975 test excavations			206	206
Totals			4128	4203

found in nearly all of the 44 longhouses and 25 refuse deposits.

The immense size, the complexity of modifications to traditional methods of artifact description and analysis, and the high number of independent provenience units has made it necessary to elicit the services of a computer. 3,340 pipe fragments (representing 3,274 pipes) have been described and analyzed with the help of a computer code. Effigy, special non-effigy, juvenile, and recycled pipes, as well as pipe pre-forms and wastage were not coded but were analyzed as independent samples (see chapter five below).

3B) REMARKS ON THE DESCRIPTIVE CODE

The descriptive code employed in the analysis of the Draper sample of 3,274 pipes and fragments was designed for use with the *Statistical Package for Social Sciences (SPSS)* program. The original version of the code was designed by Laura Finsten who adapted it from a code used in the analysis of Moyer site pipes (Wagner *et. al.* 1973) and from a code developed for the study of Middle Woodland ceramics by W.D. Finlayson (1977). Further modifications were made by the author; a complete copy of the code is provided in appendix I.

The ultimate objective of such a code is the organization and standardization of attribute description. Computer analysis creates a need for objectivity since observations must be reduced to numeric equivalents for statistical manipulation. Although the bulk of our general sample lends itself to such standardized description, the attributes and attribute combinations in our special sample are too complex and are therefore analyzed manually.

The observations made during the description of each artifact include both quantitative multistate attributes (such as bowl orifice widths) and qualitative multistate attributes (such as decorative motifs). Since both kinds of attributes must be converted to numeric codes for computer analysis, a considerable amount of diagrammatic clarification is necessary to ensure consistency and to avoid ambiguity.

Since not all observations in the descriptive code are attributes (*e.g.:* provenience, type), we will use the term *variable* to describe independent pieces of information about a certain artifact. Each variable will, of course, have several different possibilities or categories, which in an *SPSS* programare called *values*.

The descriptive code used in this study has 69 variables. 19 of these involve provenience and cataloguing information; 30 involve qualitative multistate attributes; 19 involve quantitative multistate attributes;and the remaining variable is used to designate the specimen type. Not all variables will be used in our analysis. The number of values for each variable ranges from 2 to 181. Generally, the higher the number of values, the greater the tendency towards 'splitting' observations into smaller and more precise categories. A high degree of specificity is justified in a computerized analysis since the recombining or 'lumping' of values during later stages can be achieved with great ease. In any case, it was felt that these values adequately reflected the significant variability in the artifact sample.

3C) FREQUENCY BREAKDOWN OF VALUES

Table 3.2 *Variable 7* House/midden number

Value label	*value code*	*f*	*% of determinate cases*
House	1	8	.3
	3	15	.5
	4	10	.3
	5	74	2.5
	6	55	1.9
	7	3	.1
	8	9	.3
	9	34	1.1
	10	55	1.9
	11	66	2.2
	12	103	3.5
	13	5	.2
	14	3	.1
	15	15	.5
	16	8	.3
	18	4	.1
	19	24	.8
	20	15	.5
	21	6	.2
	22	2	.1
	25	3	.1
	26	6	.2
	27	4	.1
	28	3	.1
	29	7	.2
	30	2	.1
	33	1	.0
	35	4	.1
	36	1	.0
	37	3	.1
	38	14	.5
	40	4	.1
	41	6	.2
	42	17	.6
	45	1	.0

cont.

Table 3.2 cont.

Value label	Value code	f	% of determinate cases
Midden	51	97	3.3
	52	674	22.7
	53	126	4.3
	54	244	8.2
	55	160	5.4
	56	279	9.2
	57	42	1.4
	58	2	.1
	59	37	1.2
	60	16	.5
	62	59	2.0
	64	112	3.8
	65	62	2.1
	66	138	4.7
	67	122	4.1
	68	5	.2
	69	35	1.2
	70	21	.7
	71	2	.1
	72	6	.2
	75	14	.5
	76	9	.3
	77	25	.8
	78	43	1.5
	79	6	.2
	80	9	.3
	81	12	.4
	82	14	.5
	83	1	.0
	85	1	.0
Total determinate		2963	100
Total indeterminate		311	
Total number of pipes		3274	
Total number of pipes recovered in houses		590	18.0
Total number of pipes recovered in middens		2373	72.5
Total number of pipes recovered in other areas		311	9.5
Total number of pipes		3274	100

Table 3.3 *Variable 15* Nature of Specimen

Value label	*Value code*	*f*	*% of determinate cases*
Whole pipe	1	28	.9
Bowl	2	1152	38.2
Bowl with elbow	3	14	.5
Bowl with elbow and stem	4	280	9.3
Elbow	5	36	1.2
Elbow and stem	6	15	.5
Elbow with stem and mouthpiece	7	14	.5
Stem	8	1006	33.4
Stem with mouthpiece	9	469	15.6
Total determinate		3014	100
Total indeterminate		260	
Total number of pipes		3274	

Table 3.4 *Variable 16* Mouthpiece shape

Value label	*Value code*	*f*	*% of determinate cases*
Tapered - flat	1	240	50.0
Tapered - flared	2	16	3.3
Pointed - round	3	74	15.3
Tapered - angular	4	45	9.3
Straight - flat	5	55	11.4
Pointed - flat	6	27	5.6
Straight - flared	7	5	1.1
Straight - Irregular	8	16	3.3
Grooved	9	5	1.1
Total determinate		483	100
Total indeterminate		0	
Total number of mouthpieces		483	

Table 3.5 *Variable 17* Method of stemhole manufacture

Value label	*Value code*	*f*	*% of determinate cases*
Reed - 1 hole	1	1207	86.1
Reed - 2 holes	2	161	11.5
Reed - 3 holes	3	19	1.4
Reed - 4 holes	4	5	.4
Untwisted fibre - 1 hole	8	9	.6
Twisted cord - 1 hole	9	1	.1
Total determinate		1402	100
Total indeterminate		410	
Total number of stem portions		1812	

Table 3.6 *Variable 18* Stem cross-section shape

Value label	*Value code*	*f*	*% of determinate cases*
Round	1	425	52.7
Ovoid	2	328	40.6
Keeled	3	12	1.5
Rectanguloid	4	12	1.5
Triangular	5	1	.1
D-shaped	6	9	1.1
Irregular	7	20	2.5
Total determinate		807	100
Total indeterminate		1005	
Total number of stem portions		1812	

Table 3.7 *Variable 19* Stem decorative motif

Value label	*Value code*	*f*	*% of determinate cases*
Motif	1	4	13.8
	2	1	3.5
(see appendix II)	3	1	3.5
	4	1	3.5
	5	1	3.5
	6	1	3.5
	7	1	3.5
	8	1	3.5
	9	2	6.9
	10	4	13.8
	11	1	3.5
	12	1	3.5
	13	1	3.5
	14	1	3.5
	15	1	3.5
	16	1	3.5
	17	2	6.9
	18	1	3.5
	19	2	6.9
	20	1	3.5
Total determinate		29	100
Total indeterminate		0	
Total number of decorated stems		29	

Table 3.8 *Variable 20* Stem decorative technique

Value label	*Value code*	*f*	*% of determinate cases*
Pigmentation	1	38	56.7
Incising	2	9	13.4
Punctates - round/blunt	3	2	3.0
Punctates - round/pointed	4	7	10.5
Punctates - irregular	5	4	6.0
Incising - punctates	6	3	4.5
Other	7	4	6.0
Total determinate		67	100
Total indeterminate		0	
Total number of decorated stems (including pigmentation)		67	

Table 3.9 *Variable 21* Stem surface texture

Value label	*value code*	*f*	*% of determinate cases*
Smooth	1	867	47.9
Polished	2	596	32.9
Grainy	3	349	19.3
Total determinate		1812	100
Total indeterminate		0	
Total number of stem portions		1812	

Table 3.10 *Variable 22* Material

Value label	*value code*	*f*	*% of determinate cases*
Clay - untempered	1	1660	50.7
Clay - grit tempered (?)	2	1612	49.2
Clay - shell tempered	3	2	.1
Total determinate		3274	100
Total indeterminate		0	
Total number of pipes		3274	

Table 3.11 *Variable 23* Average temper size

Value label	*value code*	*f*	*% of determinate cases*
Less than 1 mm	0	3214	98.2
1 mm	1	51	1.6
2 mm	2	9	.3
Total determinate		3274	100
Total indeterminate		0	
Total number of pipes		3274	

Table 3.12 *Variable 24* Bowl surface texture

Value label	*Value code*	*f*	*% of determinate cases*
Smooth	1	736	49.9
Polished	2	579	39.3
Grainy	3	159	10.8
Total determinate		1474	100
Total indeterminate		0	
Total number of bowl portions		1474	

Table 3.13 *Variable 25* Bowl surface evenness

Value label	*Value code*	*f*	*% of determinate cases*
Even - unstriated	1	499	33.9
Even - striated	2	617	41.9
Uneven - unstriated	3	251	17.0
Uneven - striated	4	107	7.3
Total determinate		1474	100
Total indeterminate		0	
Total number of bowl portions		1474	

Table 3.14 *Variable 27* Pipe height

Value label	*Value code*	*f*	*% of determinate cases*
15-20 mm *	1	2	3.2
21-25 mm	2	3	4.8
26-30 mm	3	0	.0
31-35 mm	4	3	4.8
36-40 mm	5	7	11.3
41-45 mm	6	4	6.5
46-50 mm	7	11	17.7
51-55 mm	8	7	11.3
56-60 mm	9	11	17.7
66-70 mm	11	3	4.8
71-75 mm	12	2	3.2
76-80 mm	13	3	4.8
81-85 mm	14	0	.0
86-90 mm	15	0	.0
91-95 mm	16	1	1.6
Total determinate		62	100
Total indeterminate		3212	
Total number of pipes		3274	

Average pipe height: 51 mm

*note: These value ranges are the result of recombining original measurements

Table 3.15 *Variable 28* Pipe length

Value label	*Value code*	*f*	*% of determinate cases*
20-25 mm *	1	1	3.5
26-30 mm	2	0	.0
31-35 mm	3	1	3.5
36-40 mm	4	4	13.8
41-45 mm	5	2	6.9
46-50 mm	6	6	20.7
51-55 mm	7	3	10.4
56-60 mm	8	2	6.9
61-65 mm	9	1	3.5
66-70 mm	10	2	6.9
71-75 mm	11	0	.0
76-80 mm	12	3	10.4
81-85 mm	13	2	6.9
86-90 mm	14	1	3.5
91-95 mm	15	1	3.5
Total whole pipes (plus one with determinate length)		29	100
Total indeterminate		3245	
Total pipes		3274	

Average pipe length: 56 mm

*note: These value ranges are the result of recombining original measurements

Table 3.16 *Variable 29* Bowl orifice shape

Value label	*Value code*	*f*	*% of determinate cases*
Round	1	821	93.0
Ovoid	2	57	6.5
Rectanguloid	3	1	.1
D-shaped	4	3	.3
Triangular	5	1	.1
Total determinate		883	100
Total indeterminate		591	
Total number of bowl portions		1474	

Table 3.17 *Variable 30* Bowl length

Value label	*Value code*	*f*	*% of determinate cases*
10-15 mm *	1	2	3.0
16-20 mm	2	9	13.4
21-25 mm	3	19	28.4
26-30 mm	4	16	23.9
31-35 mm	5	9	13.4
36-40 mm	6	7	10.5
41-45 mm	7	1	1.5
46-50 mm	8	2	3.0
51-55 mm	9	2	3.0
Total determinate		67	100
Total indeterminate		1407	
Total number of bowls		1474	

Average bowl length: 27 mm

*note: These value ranges are the result of recombining original measurements

Table 3.18 *Variable 31* Bowl width

Value label	*Value code*	*f*	*% of determinate cases*
5-10 mm *	1	1	.6
11-15 mm	2	10	6.0
16-20 mm	3	20	12.1
21-25 mm	4	49	29.5
26-30 mm	5	34	20.5
31-35 mm	6	25	15.1
36-40 mm	7	14	8.4
41-45 mm	8	4	2.4
46-50 mm	9	3	1.8
51-55 mm	10	4	2.4
56-60 mm	11	1	.6
61-65 mm	12	1	.6
Total determinate		166	100
Total indeterminate		1308	
Total number of bowl portions		1474	

Average bowl width: 28 mm

*note: These value ranges are the result of recombining original measurements

Table 3.19 *Variable 32* Angle of bowl axis to stem axis

Value label	*Value code*	*f*	*% of determinate cases*
90 deg.	1	7	7.1
95 deg.	2	6	6.1
100 deg.	3	10	10.2
105 deg.	4	14	14.3
110 deg.	5	21	21.4
115 deg.	6	14	14.3
120 deg.	7	15	15.3
125 deg.	8	5	5.1
130 deg.	9	6	6.1
Total determinate		98	100
Total indeterminate		3176	
Total number of pipes		3274	

Average angle of bowl axis to stem axis: 110 deg.

Table 3.20 *Variable 33* Lip shape

Value label	*Value label*	*f*	*% of determinate cases*
Flat - level	1	330	34.2
Flat - insloping	2	42	4.4
Flat - outsloping	3	28	2.9
Round - symmetric	4	313	32.4
Round - insloping	5	135	14.0
Round - outsloping	6	40	4.2
Pointed	7	40	4.2
Round - flared	8	21	2.2
Pointed - insloping	9	16	1.7
Total determinate		965	100
Total indeterminate		509	
Total number of bowl portions		1474	

Table 3.21 *Variable 34* Exterior bowl shape

Value label	*Value code*	*f*	*% of determinate cases*
Constricted	1	148	19.2
Vertical	2	33	4.3
Outflaring	3	589	76.5
Total determinate		770	100
Total indeterminate		704	
Total number of bowl portions		1474	

Table 3.22 *Variable 35* Exterior surface curvature

Value label	*Value label*	*f*	*% of determinate cases*
As per diagram (see appendix I)	1	166	32.2
	2	17	3.3
	3	80	15.5
	4	64	12.4
	5	9	1.8
	6	8	1.6
	7	4	.8
	8	4	.8
	9	29	5.6
	10	9	1.8
	11	8	1.6
	12	17	3.3
	13	1	.2
	14	1	.2
	15	47	9.1
	16	22	4.3
	17	8	1.6
	18	3	.6
	19	3	.6
	20	10	1.9
	21	5	1.0
Total determinate		515	100
Total indeterminate		959	
Total number of bowl portions		1474	

Table 3.23 *Variable 36* Bowl shape at lip

Value label	*Value code*	*f*	*% of determinate cases*
Round	1	920	93.4
Ovoid	2	47	4.8
Rectangular	3	14	1.4
D-shaped	4	1	.1
Triangular	5	3	.3
Total determinate		985	100
Total indeterminate		489	
Total number of bowl portions		1474	

Table 3.24 *Variable 37* Location of bowl decoration

Value label	*Value code*	*f*	*% of determinate cases*
Entire bowl	1	27	4.4
Upper bowl	2	575	94.0
Middle bowl	3	8	1.3
Lower bowl	4	2	.3
Total determinate		612	100
Total indeterminate		862	
Total number of bowl portions		1474	

Table 3.25 *Variable 38* Extent of bowl decoration

Value label	*Value code*	*f*	*% of determinate cases*
Entire circumference (0-360 deg.)	1	101	97.1
At 0 degrees only	2	1	1.0
At 180 degrees only	3	1	1.0
At 0 and 180 degrees	4	1	1.0
Total determinate		104	100
Total indeterminate		1370	
Total number of bowl portions		1474	

Table 3.26 *Variable 44* Bowl decorative motif

Value code	*f*	*Value code*	*f*	*Value code*	*f*	*Value code*	*f*
1	204	61	3	148	1	212	1
2	13	64*	39	149	2	213	1
3	12	65	1	150	1	214	1
4	11	66	1	156	1	221	1
5	11	68	1	157	1	226	1
6	13	69	1	158	1	227	1
7	11	71	1	159	1	228	1
8	10	72	1	160	1	229	1
9	12	73	2	161	1	236	1
10	6	74	2	162	1	237	1
11	2	75	1	163	1	238	1
12	3	81	1	164	1	239	1
13	5	82	2	165	1	240	1
14	1	83	1	166	1	241	1
16	1	84	1	167	1	246	1
19	1	85	1	168	1	247	1
23*	45	91	1	169	2	248	1
24*	47	96	1	170	3	249	1
25*	122	97	1	171	1	250	1
26	7	98	1	172	2	251	1
27	3	99	1	173	1	256	1
28	1	100	8	174	1	257	1
29	2	101	4	181	2	258	1
30*	29	102	8	182	1	259	1
31	1	103	10	183	1	260	1
36	1	104	3	184	1	266	1
40	1	105	6	185	1	267	1
41	1	106	5	191	3	268	1
42	1	107	10	192	1	269	1
43	1	108	4	193	1	270	1
44*	1	109	1	194	2	271	1
45	1	111	1	195	2	276	1
46	2	116	1	196	1	277	1
47	3	117	1	197	1	278	1
48	3	118	1	198	1	279	1
50	1	122	1	199	1	280	1
51	5	123	1	200	1	281	1
52	7	126	1	201	1	282	1
53	21	127	1	202	2	283	1
54	37	128	1	203	1	284	1
55	36	134*	4	204	1	285	1
56	26	136	1	205	1	286	1
57	15	137	1	206	1	287	1
58	10	138	1	207	1	288	1
59	7	146	1	208	1	289	1
60	2	147	1	211	1		

Total decorated cases 795 (not including 13 cases of pigmentation)
Total undecorated cases 204
Total determinate 999

*incomplete yet recognizable motifs

Table 3.27 *Variable 45* Bowl decorative technique

Value label	*Value code*	*f*	*% of determinate cases*
Pigmentation	1	13	1.3
Incising	2	393	38.8
Incising-punctates	3	323	31.9
Incising-punctates-pigmentation	4	9	.9
Incising-pigmentation	5	3	.3
Punctates	6	59	5.8
Mortice	7	2	.2
Incising-moulding	8	1	.1
Fingernail incising	9	5	.5
Undecorated	10	204	20.5
Total determinate		1012	100
Total indeterminate		462	
Total bowl portions		1417	
Total number of decorated bowls		808	

Table 3.28 *Variable 50* *Pipe Type* *

Value label	*Value code*	*f*	*% of determinate cases*
Iroquois Ring	2	108	18.4
Elongated Ring	4	39	6.6
Conical Plain	5	17	2.9
Plain Trumpet	6	189	32.2
Decorated Trumpet	9	9	1.5
Ring Trumpet	10	3	.5
Collared Ring	11	99	16.9
Vasiform	13	8	1.4
Bulbous Ring	18	8	1.4
Decorated Bulbous	19	1	.2
Apple Bowl Ring	23	31	5.3
Conical Ring	24	62	10.6
Plain Apple	25	4	.7
Cylindrical Plain	27	7	1.2
Cylindrical Decorated	29	2	.3
Total typed determinate		587	100
Total other and indeterminate		887	
Total bowl portions		1474	

* Includes only those fragments which could be accurately typed
* Very general categorization based on Emerson (1967)
* Not for use in intersite studies
* Does not include effigies, juvenile pipes, complex forms, etc.

CHAPTER FOUR

4A) INTRODUCTION

The analysis of the spatial distributions of material culture found by archaeologists requires both artifacts and artifact proveniences. At the most general level, we may say that 4,203 pipe fragments were recovered at the Draper site. This would already be a statement associating artifacts with a unit of space in the archaeological context. As we have seen in the last chapter, our descriptive code included one variable dealing specifically with space (*VAR 7*). Through it we learned, for example, that 674 pipe fragments were found in one particular refuse deposit at the Draper site. Although this represents a significant increase in the specificity of the spatial units of analysis, the fact that we are using the general category 'pipe fragment' greatly restricts the kind of information we may derive from a spatial analysis.

Before we begin to define those units of analysis which, for our purposes, appear to represent an adequate level of specificity, we must examine the statistical methods which aid in the organization and interpretation of distribution data.

One useful method, *Chi-square*, involves the initial postulation of a random distribution of attributes within two variables presented in a contingency table format. In a contingency format, attributes within the two variables being compared are listed on each axis of a two-dimensional table. Each cell in the table is the intersection of one attribute from each variable and the values in each cell are the number of times that a particular combination occurs. Computation of *Chi-square* requires calculation of expected frequencies for each cell under the assumption of random attribute combinations. This is accomplished by multiplying the corresponding row and column totals for each cell and dividing each result by the total number of cases in the table. To test the degree of deviation from a random distribution, a *Chi-square* calculation is performed using the following formula in which *fo* is the observed and *fe* the expected frequency:

$$x^2 = \sum \frac{(fo-fe)^2}{fe}$$

The *degrees of freedom* for any given table are determined by subtracting 1 from the total number of rows and multiplying by the total number of columns minus 1. The *critical value* may then be derived from tables found in the back of most statistics manuals. If the *Chi-square* is less than the *critical value*, we accept the null hypothesis and the chances are that we are dealing with a random distribution.

Although *Chi-square* calculations are useful in studying the degree to which distributions are random in any given table, differences in sample sizes between tables make it impossible to ascertain general trends. If we wish to compare all tables with each other we must use a different measure of association. In this study, we will use Goodman and Kruskal's *Tau*, which is a measure involving probabilistic interpretations. A complete explanation of the rather complex formula may be found in Blalock (1972:300-2).

4B) RECODING OF ANALYTICAL UNITS

The selection of variables and values during the development of the computer code was primarily oriented towards the maximization of sample description. The use of such a descriptive code for analytical purposes requires some modification of the degree of specificity in certain variables and values.

Just as an artifact may be conceptualized as the synthesis of several constituent attributes, so too is it possible to sub-divide an archaeological site into smaller units for analytical purposes. If our problem were solely to position a site within a temporal framework, the horizontal distribution of artifacts within the site would be of little significance; the smallest relevant spatial unit of analysis would be the site itself. An intrasite study, however, by definition, requires dividing an archaeological context into smaller and spatially distinct archaeological contexts.

Since Draper appears to be a continuously occupied site and its relatively short occupation history (*i.e.*, one or two generations) has minimized the chances for stratigraphy, our study is exclusively concerned with the horizontal rather than vertical dimensions of space.

In chapter two, we defined an artifact's contextual attribute as the provenience of an item of material culture recovered in an archaeological context. Barring any post-depositional disturbance, it is an archaeological transformation of an element's loci of manufacture, use, or deposition in the systemic context. It is important to realize however, that although a (non-reconstructed) artifact has only one contextual attribute, it may be assigned several different levels in a hierarchy of proveniences. For example, a fragment may have been recovered in a particular sub-square, which at the same time was within a specific square located in a certain site. In the systemic context, an element may have been simultaneously deposited in a storage pit, a house, a village expansion, and a settlement. It is therefore clear, that contextual attributes may be analyzed at various levels of specificity.

It is likely that space will be categorized differently by people living in the systemic context and researchers working in the archaeological context. Since it is impossible to predict the structure of archaeological contexts before excavation, the removal of material culture from the ground has in recent decades usually been controlled and organized through a network of square or rectangular provenience units. These units are always arbitrary and have no correlate in the systemic context. Yet they are often valuable in maintaining an artifact's contextual attribution.

Fortunately, during and after excavation it often becomes possible to recognize features, such as houses and middens, which enable us to make direct transformations between the spatial units of the archaeological context and those of the systemic context. If we are to illuminate the past by studying the material vestiges in the present, it is obvious that our analytical units should be (as much as possible) common to both.

At Draper it has been possible to identify the remains of 45 house structures, 25 refuse deposits, and a complexity of palisade walls. The number of pipes found in each of these houses and middens is shown in chapter three (table 3.2). Our aim in this chapter is to analyze all non-contextual attributes in light of these non-arbitrary provenience units.

Since we are primarily concerned with spatial distributions, it is to our advantage to retain as many provenience units as possible. At the same time, large numbers of analytical units often reduce statistical significance. It was therefore decided to compare all specific attributes with the 70 provenience units to maximize retrieval of distributional data (see appendix III). Four other 'lumped' groups of provenience units have also been created to minimize statistical insignificance.

The first lumped category groups all houses and the 12 middens that can be definitely assigned to a particular segment of the Draper site. Finlayson's (1979) preliminary analysis of settlement pattern data at Draper suggested that the initial village underwent a series of at least five expansions. All provenience units within four major expansions have been recoded in table 4.1 and illustrated in figure 4.1.

Our second recode (table 4.2) groups all houses into three general categories based on three discrete statistical clusters of house lengths identified by Finlayson (1978:24-25).

Recode 3 (table 4.3) has been created to allow analysis of the content of all houses as contrasted with the content of all middens.

Finally, since the first two recodes deal primarily with houses and these are restricted to only 18% of the total pipe sample, recode 4 has been designed to enable most of the rest of the sample to be analyzed. Only those middens with a significant sample size were selected for independent statistical analysis (table 4.4). The distribution of these middens is illustrated in figure 4.2.

In our discussion of contextual attributes we have noted that 'split' values, although useful for descriptive purposes, must be lumped into statistically significant categories during analysis. This also holds true for contextual attributes and we are forced to modify our descriptive categorizations for these as well.

By far the most complex of all Draper pipe variables is bowl decorative motif (*VAR 44*). 183 values were isolated: 175 values representing complete motifs, 7 representing incomplete yet partially recognizable motifs, and one used to identify undecorated determinate cases. Of the 1474 bowls, only 999 were complete enough to be assigned to one of these values. Categorizing 999 cases into 183 values and studying their spatial distributions over a large area would result in meaningless variability, since many values represent merely one case. It is obvious that these highly specific categories must be lumped into much more generalized analytical units.

Since the selection of different levels of specificity or value lumping may radically alter the degree of variability in the analysis of intrasite spatial distributions, a firm understanding of the significance of our values is necessary. Unlike the case with Huron pottery, specific design motifs on pipes have almost always been excluded in the definition of culturally and chronologically sensitive types. We are unsure, therefore, whether the arrangement of different design elements or the actual number of incisions is important in the construction of a motif. It is essential that we experiment with a number of different criteria when lumping our categories during analysis.

Our first lumped categorization has already been accomplished through observations recorded for a different variable: bowl decorative technique (*VAR 45*). The values for this variable have been further recombined in table 4.5.

A second classification of motifs includes both decorative technique and arrangement of design elements. Not all motifs are reorganized in such a fashion; the majority however, have become part of the four recodes shown in table 4.6. This recode forms the new data base for a further lumped classification used in the *Chi-square* and *Tau* calculations (table 4.7).

Another classification of motifs is designed to group values according to the number of horizontal elements in each design, regardless of decorative technique (table 4.8). The 15 new values form the data base for variable 44 recode 4 (table 4.9), which was created to minimize statistical insignificance.

In addition to the variables relating to bowl decoration, several other attributes required value lumping during statistical analysis. These are shown in tables 4.10 - 4.14.

Crosstabulations with expected frequency, *Chi-square*, and *Tau* calculations were produced between all specific attributes with significant sample sizes and the four provenience recodes. The results are shown in section *4C*.

Table 4.1 *Variable 7 - Recode 1* Village expansions

Value label	*Original value codes*	*Value recode*
Core	4,6,9,10,11,12,24,27,29,59,64,65	90
Expansion 1	16,18,19,20,21,1,15,3	91
Expansion 2	2,5,13,14,17,22,26,28,31,51,56,62,67,79	92
Expansion 3	7,8,25,38,41,76	93
Expansion 4	33,36,37,39,40,42,44,75,80,81	94

Table 4.2 *Variable 7 - Recode 2* House lengths

Value label	*Original value codes*	*Value recode*
15-27 m	15,18,20,23,24,27,30,31,32,34,37,39,42	95
32-51 m	3,6,7,9,11,12,13,14,16,19,21,26,29,33, 36,39,40,41,44	96
64-76	4,5,8,10,17,25,45	97

Table 4.3 *Variable 7 - Recode 3* Middens/houses

Value label	*Original value codes*	*Value recode*
Houses	1-45	98
Middens	51-85	99

Table 4.4 *Variable 7 - Recode 4* Middens with significant sample sizes

Value label	*Original value codes*	*Value recode*
Midden	51	51
"	52	52
"	53	53
"	54	54
"	55	55
"	56	56
"	64	64
"	66	66
"	67	67

Table 4.5 *Variable 45 - Recode 1* Bowl decorative technique

Value label	*Original value codes*	*Value recode*
Incising	2,5	11
Incising/punctates	3,4	12
Undecorated	10	14
Other	1,6,7,8,9	16

Table 4.6 *Variable 44 - Recode 1* Bowl decorative motif

Value label	*Original value codes*	*Value recode*
Horizontal incising	2,3,4,5,6,7,8,9,10,11,12,13,14,16,19,23,24,25	300
Punctates	26,27,28,29,30,31,36,40,41,42,43,44,45,46,47, 48,50	301
Incising over one punctate row	51,52,53,54,55,56,57,58,59,60,61,64	302
Incising & multiple punctate rows	49,96,97,98,99,100,101,102,103,105,107,108,109 111,266	303

Table 4.7 *Variable 44 - Recode 2* Bowl decorative motif

Value label	*Original value codes*	*Value recode*
Horizontal incising	2,3,4,5,6,7,8,9,10,11,12,13,14,16,19,23,24,25	304
Combination incising/punctates	49,51,52,53,54,55,56,57,58,59,60,61,64,96,97 98,99,100,101,102,102,105,107,108,109,111,266	305

Table 4.8 *Variable 44 - Recode 3* Bowl decorative motif

Value label	*Original value codes*	*Value recode*
1 line motif	2,26,31,36,41,46,116,191,201,205,206,208,211,286	310
2 line motif	3,27,42,47,51,71,204,250	311
3 line motif	4,28,52,72,81,126,136,192,193,203,212,213	312
4 line motif	5,53,68,73,82,101,117,137,195,202,207,259	313
5 line motif	6,54,65,74,83,91,102,103,106,111,118,138, 214,240,256,267,278	314
6 line motif	7,55,69,75,84,99,119,229,266,270	315
7 line motif	8,56,85,98,108,120,122,279	316
8 line motif	9,57,96,100,104,123,128,194,269,271	317
9 line motif	10,58,121,127	318
10 line motif	11,59,97,105	319
11 line motif	12,60	320
12 line motif	13,61	321
13 line motif	14,66,109	322
14 line motif	107	323
15 line motif	16	324

Table 4.9 *Variable 44 - Recode 4* Bowl decorative motif

Value label	*Original value codes*	*Value recode*
1-4 line motif	310,311,312,313 (see *44 Re 3 above*)	330
5-6 line motif	314,315	331
7-15 line motif	316,317,318,319,320,321,322,323,324	332

Table 4.10 *Variable 15 - Recode 1* Nature of specimen

Value label	*Original value code*	*Value recode*
Bowl	2	10
Elbow	3,4,5,6,7	11
Stem	8,9	12

Note: original value code 1 (whole pipes) has been excluded from this recode

Table 4.11 *Variable 16 - Recode 1* Mouthpiece shape

Value label	*Original value code*	*Value recode*
Tapered	1,2,4	10
Pointed	3,6	11
Straight	5,7,8	12

Note: original value code 9 (grooved) has been excluded from this recode

Table 4.12 *Variable 18 - Recode 1* Stem cross-section shape

Value label	*Original value code*	*Value recode*
Round	1	10
Ovoid	2	11

Note: original value codes 3-7 have been excluded from this recode

Table 4.13 *Variable 33 - Recode 1* Lip shape

Value label	*Original value code*	*Value recode*
Flat	1,2,3	10
Round	4,5,6,8	11

Note: original value codes 7 & 9 have been excluded from this recode

Table 4.14 *Variable 50 - Recode 1* *Pipe Type*

Value label	*Original value code*	*Value recode*
Cylindrical	2,4,27,29	30
Trumpet	6,9,10	31
Collared	11	32
Conical	5,24	33

Note: original value codes 13,18,19,23,25 have been excluded from this recode

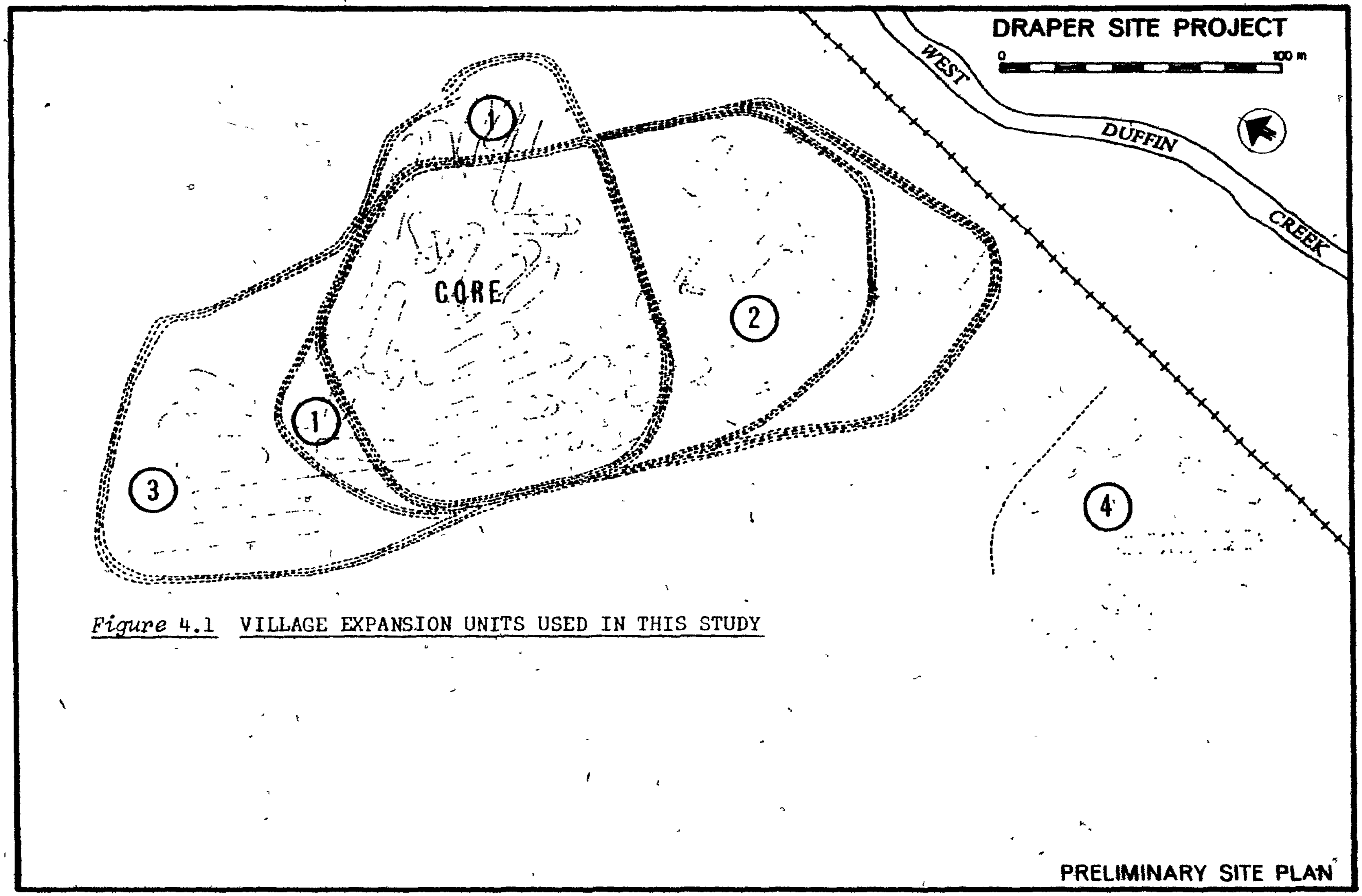


Figure 4.1 VILLAGE EXPANSION UNITS USED IN THIS STUDY

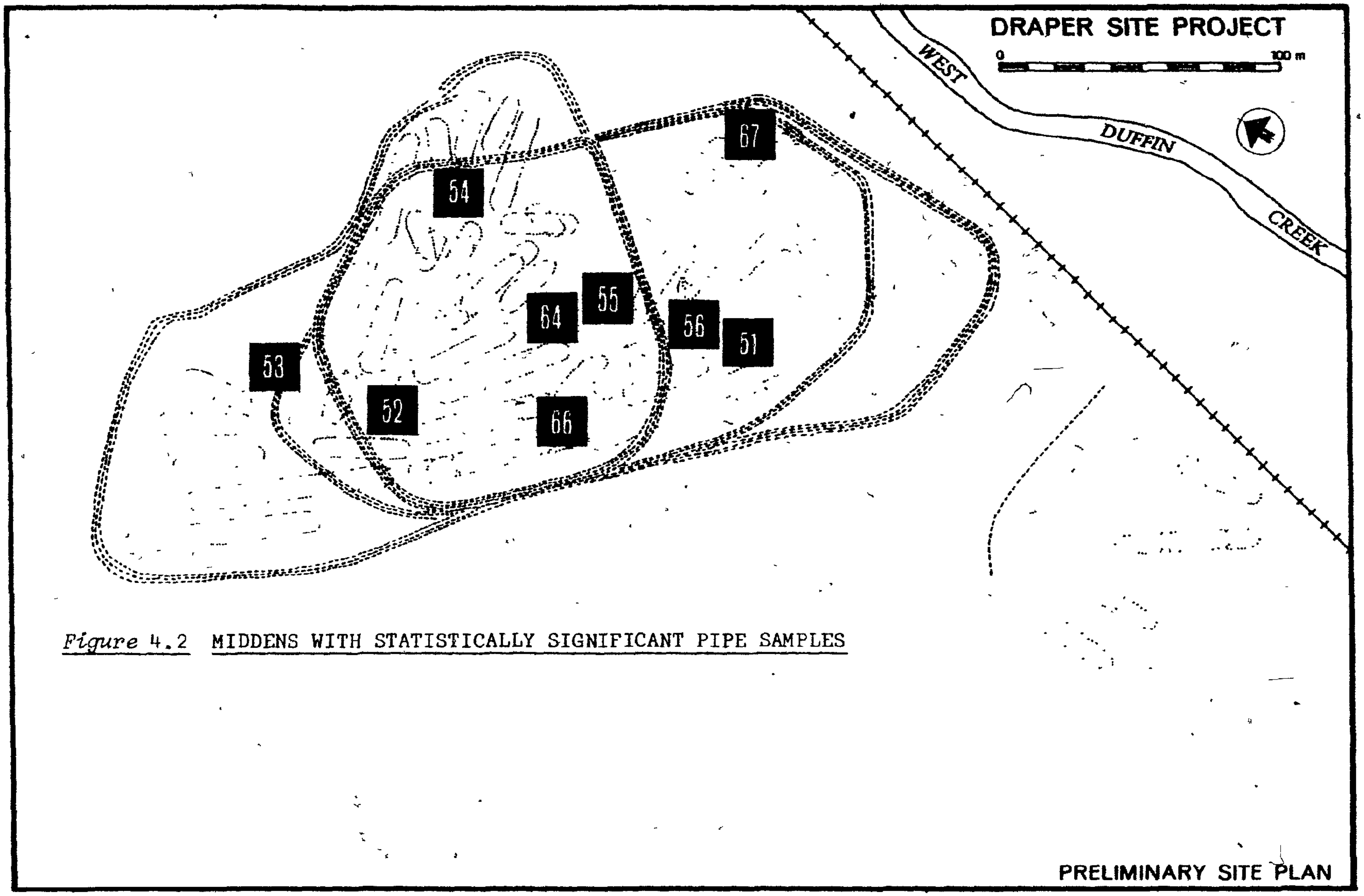


Figure 4.2 MIDDENS WITH STATISTICALLY SIGNIFICANT PIPE SAMPLES

4C) CROSSTABULATION OF SPECIFIC ATTRIBUTES BY PROVENIENCE

Table 4.15 Key to variable and value codes

Variable code	*Recode*	*Variable label*	*Value code*	*Value label*
7	1	Village expansions	90	Core
			91	Expansion 1
			92	Expansion 2
			93	Expansion 3
			94	Expansion 4
7	2	House sizes	95	15-27 m
			96	32-51 m
			97	64-76 m
7	3	Houses *vs.* middens	98	Houses
			99	Middens
7	4	Significant sample sizes	51-56,	Middens
			64,66,67	Middens
15	1	Nature of specimen	10	Bowl
			11	Elbow
			12	Stem
16	1	Mouthpiece shape	10	Tapered
			11	Pointed
			12	Straight
18	1	Stem cross-section shape	10	Round
			11	Ovoid
21	-	Stem surface texture	1	Smooth
			2	Polished
			3	Grainy
22	-	Material	1	Clay - untempered
			2	Clay - tempered
24	-	Bowl surface texture	1	Smooth
			2	Polished
			3	Grainy
25	-	Bowl surface evenness	1	Even - unstriated
			2	Even - striated
			3	Uneven - unstri.
			4	Uneven - striated
33	1	Lip shape	10	Flat
			11	Round

cont.

Table 4.15 cont.

Variable code	*Recode*	*Variable label*	*Value code*	*Value label*
44	1	Bowl decorative motif	300	Horizontal incising
			301	Punctates
			302	Incising over one punctate row
			303	Incising and multiple punc. rows
44	2	Bowl decorative motif	304	Horizontal incising
			305	Combination incising/punctates
44	3	Bowl decorative motif	310	1 line motif
			311	2 line motif
			312	3 line motif
			313	4 line motif
			314	5 line motif
			315	6 line motif
			316	7 line motif
			317	8 line motif
			318	9 line motif
			319	10 line motif
			320	11 line motif
			321	12 line motif
			322	13 line motif
			323	14 line motif
			324	15 line motif
44	4	Bowl decorative motif	330	1-4 line motif
			331	5-6 line motif
			332	7-15 line motif
45	1	Bowl decorative technique	11	Incising
			12	Incising/punctates
			14	Undecorated
			16	Other
50	1	Pipe type	30	Cylindrical
			31	Trumpet
			32	Collared
			33	Conical

Table 4.16 Crosstabulation - VAR 15 RECODE 1 X VAR 7 RECODE 1

VAR 7 Values	VAR 15 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
90	192	239.7	60	69.1	240	183.2	492	492
91	41	42.8	9	12.4	38	32.8	88	88
92	237	189.6	72	54.6	80	144.8	389	389
93	21	20.0	5	5.8	15	15.2	41	41
94	26	24.9	3	7.1	22	19.0	51	51
Total	517	517.0	149	149.0	395	395.0	1061	1061

Chi-square	79.7
Degree of freedom	8
Critical value at 5% level of significance	15.5
Tau	4.49%

Table 4.17 Crosstabulation - VAR 16 RECODE 1 X VAR 7 RECODE 1

VAR 7 Values	VAR 16 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
90	56	53.0	13	16.9	15	14.1	84	84
91	7	6.9	3	2.2	1	1.9	11	11
92	64	67.6	25	21.5	18	17.9	107	107
93	2	1.3	0	.4	0	.3	2	2
94	3	3.2	1	1.0	1	.8	5	5
Total	132	132.0	42	42.0	35	35.0	209	209

Chi-square	3.7
Degree of freedom	8
Critical value at 5% level of significance	15.5
Tau	.74%

Table 4.18. Crosstabulation - VAR 18 RECODE 1 X VAR 7 RECODE 1

VAR 7 Values	VAR 18 Values 10 fo	10 fe	11 fo	11 fe	Total fo	Total fe
90	63	72.5	71	61.5	134	134
91	14	10.8	6	9.2	20	20
92	84	84.5	72	71.5	156	156
93	6	3.8	1	3.2	7	7
94	10	5.4	0	4.6	10	10
Total	177	177.0	150	150.0	327	327

Chi-square 16.1
Degree of freedom 4
Critical value at 5% level of significance 9.5
Tau .8%

Table 4.19 Crosstabulation - VAR 21 RECODE - X VAR 7 RECODE 1

VAR 7 Values	VAR 21 Values 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
90	142	150.6	81	80.2	72	64.2	295	295
91	35	25.0	7	13.3	7	10.7	49	49
92	167	184.7	115	98.4	80	78.7	362	362
93	18	9.7	0	5.2	1	4.1	19	19
94	23	14.8	2	7.9	4	6.3	29	29
Total	385	385.0	205	205.0	164	164.0	754	754

Chi-square 38.7
Degree of freedom 8
Critical value at 5% level of significance 15.5
Tau .88%

Table 4.20 Crosstabulation - VAR 22 RECODE - X VAR 7 RECODE 1

VAR 7 Values	VAR 22 Values 1 fo	1 fe	2 fo	2 fe	Total fo	Total fe
90	265	239.3	256	281.7	521	521
91	21	43.6	74	51.4	95	95
92	313	285.2	308	335.8	621	621
93	7	19.8	36	23.2	43	43
94	9	27.1	50	31.9	59	59
Total	615	615.0	724	724.0	1339	1339

Chi-square 69.5
Degree of freedom 4
Critical value at 5% level of significance 9.5
Tau .87%

Table 4.21 Crosstabulation - VAR 24 RECODE - X VAR 7 RECODE 1

VAR 7 Values	VAR 24 Values 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
90	134	134.0	81	87.0	43	37.0	258	258
91	42	26.5	8	17.2	1	7.3	51	51
92	148	168.3	129	109.3	47	46.4	324	324
93	15	13.0	6	8.4	4	3.6	25	25
94	20	17.1	9	11.1	4	4.7	33	33
Total	359	359.0	233	233.0	99	99.0	691	691

Chi-square 28.8
Degree of freedom 8
Critical value at 5% level of significance 15.5
Tau 1.12%

Table 4.22 Crosstabulation - VAR 25 RECODE - X VAR 7 RECODE 1

VAR 7 Values	VAR 25 Values 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	4 fo	4 fe	Total fo	Total fe
90	95	97.9	100	98.9	32	38.7	19	10.7	246	246
91	31	20.6	12	20.9	6	8.2	3	2.2	52	52
92	84	105.6	127	106.9	52	41.9	3	11.5	226	226
93	11	9.5	9	9.6	3	3.8	1	1.0	24	24
94	26	13.5	2	13.7	5	5.3	1	1.5	34	34
Total	247	247.0	250	250.0	98	98.0	27	27.0	622	622

Chi-square 56.7
Degree of freedom 12
Critical value at 5% level of significance 21.0
Tau 3.06%

Table 4.23 Crosstabulation - VAR 33 RECODE 1 X VAR 7 RECODE 1

VAR 7 Values	VAR 33 Values 10 fo	10 fe	11 fo	11 fe	Total fo	Total fe
90	68	70.7	93	90.3	161	161
91	14	11.8	13	15.0	27	27
92	86	87.4	113	111.6	199	199
93	9	6.6	6	8.4	15	15
94	7	7.5	10	9.5	17	17
Total	184	184.0	235	235.0	419	419

Chi-square 2.5
Degree of freedom 4
Critical value at 5% level of significance 9.5
Tau .07%

Table 4.25 Crosstabulation - VAR 45 RECODE 1 X VAR 7 RECODE 1

VAR 7 Values	VAR 45 Values: 11 fo	11 fe	12 fo	12 fe	14 fo	14 fe	16 fo	16 fe	Total fo	Total fe
90	78	83.9	80	72.5	27	25.7	11	13.9	196	196
91	18	15.8	13	13.7	6	4.9	0	2.6	37	37
92	89	83.0	68	71.7	17	25.5	20	13.8	194	194
93	5	7.3	9	6.3	3	2.2	0	1.2	17	17
94	9	9.0	2	7.8	8	2.7	2	1.5	21	21
Total	199	199.0	172	172.0	61	61.0	33	33.0	465	465

Chi-square	28.8
Degree of freedom	12
Critical value at 5% level of significance	21.0
Tau	1.49%

Table 4.26 Crosstabulation - VAR 50 RECODE 1 X VAR 7 RECODE 1

VAR 7 Values	VAR 50 Values: 30 fo	30 fe	31 fo	31 fe	32 fo	32 fe	33 fo	33 fe	Total fo	Total fe
90	34	32.7	27	28.3	19	16.6	8	10.4	88	88
91	5	5.2	4	4.5	1	2.6	4	1.7	14	14
92	32	31.6	26	27.4	17	16.0	10	10.0	85	85
93	3	2.2	2	1.9	1	1.1	0	.8	6	6
94	1	3.3	6	2.9	0	1.7	2	1.1	9	9
Total	75	75.0	65	65.0	38	38.0	24	24.0	202	202

Chi-square	12.8
Degree of freedom	12
Critical value at 5% level of significance	21.0
Tau	.94%

Table 4.27 Crosstabulation - VAR 15 RECODE 1 X VAR 7 RECODE 2

VAR 7 Values	VAR 15 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
95	28	22.4	2	7.0	23	23.6	53	53
96	145	136.8	42	42.5	136	143.7	323	323
97	46	59.8	24	18.5	71	62.7	141	141
Total	219	219.0	68	68.0	230	230.0	517	517

Chi-square	11.7
Degree of freedom	4
Critical value at 5% level of significance	9.5
Tau	.91%

Table 4.28 Crosstabulation - VAR 16 RECODE 1 X VAR 7 RECODE 2

VAR 7 Values	VAR 16 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
95	1	3.2	2	1.0	2	.8	5	5
96	28	27.7	7	8.2	8	7.1	43	43
97	18	16.1	5	4.8	2	4.1	25	25
Total	47	47.0	14	14.0	12	12.0	73	73

Chi-square	5.9
Degree of freedom	4
Critical value at 5% level of significance	9.5
Tau	2.41%

Table 4.29 *Crosstabulation - VAR 18 RECODE 1 X VAR 7 RECODE 2*

VAR 7 Values	*VAR 18 Values* 10 *fo*	10 *fe*	11 *fo*	11 *fe*	Total *fo*	Total *fe*
95	10	7.1	2	4.9	12	12
96	50	44.7	25	30.3	75	75
97	18	26.2	26	17.8	44	44
Total	78	78.0	53	53.0	131	131

Chi-square	10.8
Degree of freedom	2
Critical value at 5% level of significance	6.0
Tau	4.56%

Table 4.30 *Crosstabulation - VAR 21 RECODE - X VAR 7 RECODE 2*

VAR 7 Values	*VAR 18 Values* 1 *fo*	1 *fe*	2 *fo*	2 *fe*	3 *fo*	3 *fe*	Total *fo*	Total *fe*
95	22	16.1	4	6.0	3	6.9	29	29
96	101	97.8	33	36.0	42	42.2	176	176
97	37	46.1	22	17.0	24	19.9	83	83
Total	160	160.0	59	59.0	69	69.0	288	288

Chi-square	9.5
Degree of freedom	4
Critical value at 5% level of significance	9.5
Tau	1.24%

Table 4.31 Crosstabulation - VAR 22 RECODE - X VAR 7 RECODE 2

VAR 7 Values	VAR 22 Values 1 fo	1 fe	2 fo	2 fe	Total fo	Total fe
95	12	25.4	46	32.6	58	58
96	144	146.2	190	187.8	334	334
97	79	63.4	66	81.6	145	145
Total	235	235.0	302	302.0	537	537

Chi-square	19.5
Degree of freedom	2
Critical value at 5% level of significance	6.0
Tau	1.13%

Table 4.32 Crosstabulation - VAR 24 Recode - X VAR 7 RECODE 2

VAR 7 Values	VAR 24 Values 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
95	26	17.3	3	8.3	2	5.3	31	31
96	96	101.2	53	48.7	32	31.0	181	181
97	38	41.4	21	19.9	15	12.7	74	74
Total	160	160.0	77	77.0	49	49.0	286	286

Chi-square	11.2
Degree of freedom	4
Critical value at 5% level of significance	9.5
Tau	1.09%

Table 4.33 Crosstabulation - VAR 25 RECODE - X VAR 7 RECODE 2

VAR 7 Values	VAR 25 Values 1		2		3		4		Total	
	fo	fe	fo	fe	fo	fe	fo	fe	fo	fe
95	24	15.7	5	13.0	4	2.5	1	2.8	34	34
96	77	76.9	68	63.9	11	12.4	11	13.7	167	167
97	23	13.3	30	26.0	5	5.1	10	5.6	68	68
Total	124	124.0	103	103.0	20	20.0	22	22.0	269	269

Chi-square 18.6
Degree of freedom 6
Critical value at 5% level of significance 12.6
Tau 2.52 %

Table 4.34 Crosstabulation - VAR 33 RECODE 1 - X VAR 7 RECODE 2

VAR 7 Values	VAR 33 Values 10		11		Total	
	fo	fe	fo	fe	fo	fe
95	4	5.4	8	6.6	12	12
96	51	53.0	66	64.0	117	117
97	22	18.6	19	22.4	41	41
Total	77	77.0	93	93.0	170	170

Chi-square 1.9
Degree of freedom 2
Critical value at 5% level of significance 6.0
Tau .54%

Table 4.35 Crosstabulation - VAR 45 RECODE 1 X VAR 7 RECODE 2

VAR 7 Values	VAR 45 Values: 11 fo	11 fe	12 fo	12 fe	14 fo	14 fe	16 fo	16 fe	Total fo	Total fe
95	12	9.5	7	11.5	5	3.3	2	1.7	26	26
96	51	52.6	66	63.8	20	18.4	7	9.2	144	144
97	17	17.9	24	21.7	3	6.3	5	3.1	49	49
Total	80	80.0	97	97.0	28	28.0	14	14.0	219	219

Chi-square	7.3
Degree of freedom	6
Critical value at 5% level of significance	12.6
Tau	1.46%

Table 4.36 Crosstabulation - VAR 50 RECODE 1 X VAR 7 RECODE 2

VAR 7 Values	VAR 50 Values: 30 fo	30 fe	32 fo	32 fe	33 fo	33 fe	34 fo	34 fe	Total fo	Total fe
95	1	3.9	5	2.7	3	1.7	0	.7	9	9
96	24	23.5	17	15.8	9	10.2	4	4.5	54	54
97	12	9.6	3	6.5	4	4.1	3	1.8	22	22
Total	37	37.0	25	25.0	16	16.0	7	7.0	85	85

Chi-square	9.4
Degree of freedom	6
Critical value at 5% level of significance	12.6
Tau	3.75%

Table 4.37 Crosstabulation - VAR 15 RECODE 1 X VAR 7 RECODE 3

VAR 7 Values	VAR 15 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
98	224	207.2	73	66.0	243	266.6	540	540
99	814	830.6	257	264.0	1091	1067.4	2162	2162
Total	1038	1038.0	330	330.0	1334	1334.0	2702	2702

Chi-square,	5.2
Degree of freedom	2
Critical value at 5% level of significance	6.0
Tau	.19%

Table 4.38 Crosstabulation - VAR 16 RECODE 1 X VAR 7 RECODE 3

VAR 7 Values	VAR 16 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
98	50	50.4	15	16.1	14	12.5	79	79
99	240	239.6	78	76.9	58	59.5	376	376
Total	290	290.0	93	93.0	72	72.0	455	455

Chi-square	.31
Degree of freedom	2
Critical value at 5% level of significance	6.0
Tau	3.97 %

Table 4.39 Crosstabulation - VAR 18 RECODE 1 X VAR 7 RECODE 3

VAR 7 Values	VAR 18 Values: 10 fo	10 fe	11 fo	11 fe	Total fo	Total fe
98	84	75.5	57	65.5	141	141
99	287	295.5	265	256.5	552	552
Total	371	371.0	322	322.0	693	693

Chi-square 2.6
Degree of freedom 1
Critical value at 5% level of significance 3.8
Tau .38%

Table 4.40 Crosstabulation - VAR 21 RECODE - X VAR 7 RECODE 3

VAR 7 Values	VAR 21 Values: 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
98	172	147.0	62	99.6	71	58.4	305	305
99	613	638.0	470	432.4	241	253.6	1324	1324
Total	785	785.0	532	532.0	312	312.0	1629	1629

Chi-square 26.0
Degree of freedom 2
Critical value at 5% level of significance 6.0
Tau 1.6%

Table 4.41 Crosstabulation - VAR 22 RECODE - X VAR 7 RECODE 3

VAR 7 Values	VAR 22 Values: 1 fo	1 fe	2 fo	2 fe	Total fo	Total fe
98	245	278.8	326	292.2	571	571
99	1122	1088.2	1107	1140.8	2229	2229
Total	1367	1367.0	1433	1433.0	2800	2800

Chi-square	10.1
Degree of freedom	1
Critical value at 5% level of significance	3.8
Tau	.36%

Table 4.42 Crosstabulation - VAR 24 RECODE - X VAR 7 RECODE 3

VAR 7 Values	VAR 24 Values: 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
98	167	144.4	83	120.9	49	33.7	299	299
99	498	520.6	474	436.1	106	121.3	1078	1078
Total	665	665.0	557	557.0	155	155.0	1377	1377

Chi-square	28.6
Degree of freedom	2
Critical value at 5% level of significance	6.0
Tau	2.08%

Table 4.43 Crosstabulation - VAR 25 RECODE - X VAR 7 RECODE 3

VAR 7 Values	VAR 25 Values: 1		2		3		4		Total	
	fo	fe	fo	fe	fo	fe	fo	fe	fo	fe
98	132	97.1	106	118.3	21	47.7	25	20.9	284	284
99	318	352.9	442	429.7	200	173.3	72	76.1	1032	1032
Total	450	450.0	548	548.0	221	221.0	97	97.0	1316	1316

Chi-square	37.7
Degree of freedom	3
Critical value at 5% level of significance	7.8
Tau	2.86

Table 4.44 Crosstabulation - VAR 33 RECODE 1 X VAR 7 RECODE 3

VAR 7 Values	VAR 33 Values: 10		11		Total	
	fo	fe	fo	fe	fo	fe
98	84	80.1	95	98.9	179	179
99	285	288.9	361	357.1	646	646
Total	369	369.0	456	456.0	825	825

Chi-square	.4
Degree of freedom	1
Critical value at 5% level of significance	3.8
Tau	.05%

Table 4.45 Crosstabulation - VAR 44 RECODE 1 X VAR 7 RECODE 3

VAR 7 Values	VAR 44 Values: 300		301		302		303		Total	
	fo	*fe*	*fo*	*fe*	*fo*	*fe*	*fo*	*fe*	*fo*	*fe*
98	66	69.5	12	14.2	52	45.8	13	13.5	143	143
99	213	209.5	45	42.8	132	138.2	41	40.5	431	431
Total	279	279.0	57	57.0	184	184.0	54	54.0	574	574

Chi-square	1.8
Degree of freedom	3
Critical value at 5% level of significance	7.8
Tau	.32%

Table 4.46 Crosstabulation - VAR 44 RECODE 4 X VAR 7 RECODE 3

VAR 7 Values	VAR 44 Values: 330		331		332		Total	
	fo	*fe*	*fo*	*fe*	*fo*	*fe*	*fo*	*fe*
98	25	32.1	37	30.6	34	33.3	96	96
99	104	96.9	86	92.4	100	100.7	290	290
Total	129	129.0	123	123.0	134	134.0	386	386

Chi-square	3.9
Degree of freedom	2
Critical value at 5% level of significance	6.0
Tau	1.0%

Table 4.47 Crosstabulation - VAR 45 RECODE 1 X VAR 7 RECODE 3

VAR 7 Values	VAR 45 Values: 11		12		14		16		Total	
	fo	fe	fo	fe	fo	fe	fo	fe	fo	fe
98	87	93.1	101	78.2	28	43.4	14	15.3	230	230
99	308	301.9	231	253.8	156	140.6	51	49.7	746	746
Total	395	395.0	332	332.0	184	184.0	65	65.0	976	976

Chi-square 16.5
Degree of freedom 3
Critical value at 5% level of significance 7.8
Tau 1.7%

Table 4.48 Crosstabulation - VAR 50 RECODE 1 X RECODE 3

VAR 7 Values	VAR 50 Values: 30		31		32		33		Total	
	fo	fe	fo	fe	fo	fe	fo	fe	fo	fe
98	39	26.1	26	34.4	15	15.4	8	12.1	88	88
99	90	102.9	144	135.6	61	60.6	52	47.9	347	347
Total	129	129.0	170	170.0	76	76.0	60	60.0	435	435

Chi-square 12.3
Degree of freedom 3
Critical value at 5% level of significance 7.8
Tau 1.7%

Table 4.49 Crosstabulation - VAR 15 RECODE 1 X VAR 7 RECODE 4

VAR 7 Values	VAR 15 Values 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
51	38	33.9	10	10.8	45	48.3	93	93
52	232	229.5	61	73.0	336	326.5	629	629
53	34	43.4	19	13.8	66	61.8	119	119
54	81	81.0	23	25.7	118	115.3	222	222
55	57	54.7	25	17.4	68	77.9	150	150
56	101	95.2	28	30.3	132	135.5	261	261
64	36	35.8	11	11.4	51	50.8	98	98
66	40	43.0	19	13.7	59	61.3	118	118
67	38	40.5	13	12.9	60	57.6	111	111
Total	657	657.0	209	209.0	935	935.0	1801	1801

Chi-square	15.6
Degree of freedom	16
Critical value at 5% level of significance	26.3
Tau	.11%

Table 4.50 Crosstabulation - VAR 16 RECODE 1 X VAR 7 RECODE 4

VAR 7 Values	VAR 16 Values: 10 fo	10 fe	11 fo	11 fe	12 fo	12 fe	Total fo	Total fe
51	6	8.2	4	2.9	3	1.9	13	13
52	59	61.7	26	22.0	13	14.3	98	98
53	19	15.1	4	5.4	1	3.5	24	24
54	27	26.4	7	9.5	8	6.1	42	42
55	12	14.4	6	5.2	5	3.2	23	23
56	35	30.8	10	11.1	4	7.1	49	49
64	11	11.3	4	4.1	3	2.6	18	18
66	12	10.1	3	3.6	1	2.3	16	16
67	9	12.0	4	4.2	6	2.8	19	19
Total	190	190.0	68	68.0	44	44.0	302	302

Chi-square	16
Degree of freedom	16
Critical value at 5% level of significance	26.3
Tau	.63%

Table 4.51 Crosstabulation - VAR 18 RECODE 1 X VAR 7 RECODE 4

VAR 7 Values	VAR 18 Values: 10 fo	10 fe	11 fo	11 fe	Total fo	Total fe
51	13	12.5	11	11.5	24	24
52	87	81.6	70	75.4	157	157
53	20	18.2	15	16.8	35	35
54	34	30.7	25	28.3	59	59
55	16	19.2	21	17.8	37	37
56	31	32.7	32	30.3	63	63
64	11	13.5	15	12.5	26	26
66	11	14.0	16	13.0	27	27
67	15	15.6	15	14.4	30	30
Total	238	238.0	220	220.0	458	458

Chi-square	5.5
Degree of freedom	8
Critical value at 5% level of significance	15.5
Tau	.17%

Table 4.52 Crosstabulation - VAR 21 RECODE - X VAR 7 RECODE 4

VAR 7 Values	VAR 21 Values: 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
51	22	24.6	16	20.1	17	10.3	55	55
52	162	173.3	148	141.3	77	72.4	387	387
53	49	35.9	25	29.2	6	14.9	80	80
54	69	63.6	54	51.8	19	26.6	142	142
55	26	38.5	41	31.4	19	16.1	86	86
56	67	69.9	54	56.9	35	29.2	156	156
64	23	27.3	24	22.3	14	11.4	61	61
66	39	31.8	19	25.9	13	13.3	71	71
67	41	33.1	25	27.1	8	13.8	74	74
Total	498	498.0	406	406.0	208	208.0	1112	1112

Chi-square	38.5
Degree of freedom	16
Critical value at 5% level of significance	26.3
Tau	.36%

Table 4.53 Crosstabulation - VAR 22 RECODE - X VAR 7 RECODE 4

VAR 7 Values	VAR 22 Values 1 fo	1 fe	2 fo	2 fe	Total fo	Total fe
51	49	48.4	41	41.6	90	90
52	336	336.2	289	288.8	625	625
53	71	63.0	46	54.0	117	117
54	125	123.7	105	106.3	230	230
55	81	82.8	73	71.2	154	154
56	130	140.4	131	120.6	261	261
64	60	57.0	46	49.0	106	106
66	65	69.9	65	60.1	130	130
67	69	64.6	51	55.4	120	120
Total	986	986.0	847	847.0	1833	1833

Chi-square 5.7

Degree of freedom 8

Critical value at 5% level of significance 15.5

Tau .03%

Table 4.54 Crosstabulation - VAR 24 RECODE - X VAR 7 RECODE 4

VAR 7 Values	VAR 24 Values 1 fo	1 fe	2 fo	2 fe	3 fo	3 fe	Total fo	Total fe
51	18	19.4	15	19.1	9	3.5	42	42
52	124	126.2	133	124.9	17	22.9	274	274
53	17	24.0	28	23.7	7	4.3	52	52
54	55	50.2	50	49.7	4	9.1	109	109
55	31	36.8	40	36.5	9	6.7	80	80
56	62	58.9	55	58.4	11	10.7	128	128
64	27	24.4	21	24.2	5	4.4	53	53
66	27	25.8	21	25.5	8	4.7	56	56
67	31	26.3	25	26.0	1	4.7	57	57
Total	392	392.0	388	388.0	71	71.0	851	851

Chi-square	29.7
Degree of freedom	16
Critical value at 5% level of significance	26.3
Tau	.37%

Table 4.55 Crosstabulation - VAR 25 RECODE - X VAR 7 RECODE 4

VAR 7 Values	VAR 25 Values 1		2		3		4		Total	
	fo	*fe*	*fo*	*fe*	*fo*	*fe*	*fo*	*fe*	*fo*	*fe*
51	11	9.2	13	15.7	7	6.8	3	2.3	34	34
52	78	70.5	117	120.3	44	51.7	21	17.5	260	260
53	17	13.0	22	22.2	6	9.5	3	3.3	48	48
54	29	30.9	51	52.8	24	22.7	10	7.6	114	114
55	17	23.5	50	40.3	19	17.3	1	5.9	87	87
56	27	34.7	59	59.2	30	25.5	12	8.6	128	128
64	17	13.6	19	23.1	13	9.9	1	3.4	50	50
66	17	19.5	37	33.3	15	14.3	3	4.9	72	72
67	16	14.1	23	24.1	10	10.3	3	3.5	52	52
Total	229	229.0	391	391.0	168	168.0	57	57.0	845	845

Chi-square	25.7
Degree of freedom	24
Critical value at 5% level of significance	36.4
Tau	.43%

Table 4.56 Crosstabulation - VAR 33 RECODE 1 X VAR 7 RECODE 4

VAR 7 Values	VAR 33 Values: 10 fo	10 fe	11 fo	11 fe	Total fo	Total fe
51	12	13.4	19	17.6	31	31
52	76	73.3	94	96.7	170	170
53	11	11.6	16	15.4	27	27
54	29	28.4	37	37.6	66	66
55	27	25.4	32	33.6	59	59
56	33	37.1	53	48.9	86	86
64	11	12.4	18	16.6	29	29
66	17	14.7	17	19.3	34	34
67	15	14.7	19	19.3	34	34
Total	231	231.0	305	305.0	536	536

Chi-square	2.4
Degree of freedom	8
Critical value at 5% level of significance	15.5
Tau	.063%

Table 4.57 Crosstabulation - VAR 44 RECODE 2 X VAR 7 RECODE 4

VAR 7 Values	VAR 44 Values 304 fo	304 fe	305 fo	305 fe	Total fo	Total fe
51	16	10.1	3	8.9	19	19
52	71	62.5	47	55.5	118	118
53	8	7.9	7	7.1	15	15
54	21	22.8	22	20.2	43	43
55	13	12.7	11	11.3	24	24
56	12	17.0	20	15.0	32	32
64	13	10.1	6	8.9	19	19
66	6	12.2	17	10.8	23	23
67	8	12.7	16	11.3	24	24
Table	168	168.0	149	149.0	317	317

Chi-square	25.5
Degree of freedom	8
Critical value at 5% level of significance	15.5
Tau	1.01%

Table 4.58 Crosstabulation - VAR 44 RECODE 4 X VAR 7 RECODE 4

VAR 7 Values	*VAR 44 Values* 330 *fo*	*fe*	331 *fo*	*fe*	332 *fo*	*fe*	Total *fo*	*fe*
51	6	4.1	2	3.7	4	4.2	12	12
52	22	23.1	20	20.5	25	23.4	67	67
53	4	3.8	0	3.4	7	3.8	11	11
54	8	11.4	13	10.1	12	11.5	33	33
55	10	7.2	5	6.4	6	7.4	21	21
56	19	14.5	14	12.9	9	14.6	42	42
64	2	4.1	3	3.7	7	4.2	12	12
66	6	5.9	6	5.2	5	5.9	17	17
67	4	6.9	9	6.1	7	7.0	20	20
Total	81	81.0	72	72.0	82	82.0	235	235

Chi-square	21.1
Degree of freedom	16
Critical value at 5% level of significance	26.3
Tau	.44%

Table 4.59 Crosstabulation - VAR 45 RECODE 1 X VAR 7 RECODE 4

VAR 7 Values	VAR 45 Values: 11 fo	11 fe	12 fo	12 fe	14 fo	14 fe	16 fo	16 fe	Total fo	Total fe
51	20	16.4	8	12.2	4	8.0	7	2.4	39	39
52	88	88.1	64	65.3	46	42.6	11	13.0	209	209
53	13	13.5	13	10.0	5	6.5	1	2.0	32	32
54	35	32.8	27	24.4	15	16.0	1	4.8	78	78
55	18	25.3	18	18.8	20	12.2	4	3.7	60	60
56	39	25.3	1	18.8	14	12.2	6	3.7	60	60
64	14	14.8	11	10.9	8	7.1	2	2.2	35	35
66	15	17.3	20	12.8	4	8.4	2	2.5	41	41
67	10	18.5	25	13.8	6	9.0	3	2.7	44	44
Total	252	252.0	187	187.0	122	122.0	37	37.0	598	598

Chi-square 73.0

Degree of freedom 24

Critical value at 5% level of significance 36.4

Tau 1.3%

Table 4.60 Crosstabulation - VAR 50 RECODE 1 X VAR 7 RECODE 4

VAR 7 Values	VAR 50 Values: 30 fo	30 fe	31 fo	31 fe	32 fo	32 fe	33 fo	33 fe	Total fo	Total fe
51	3	2.8	4	5.1	2	2.3	3	1.8	12	12
52	22	20.1	37	36.1	15	15.9	11	12.9	85	85
53	3	5.2	14	9.3	3	4.1	2	3.4	22	22
54	11	8.5	11	15.3	7	6.7	7	5.5	36	36
55	6	8.3	20	14.8	6	6.6	3	5.3	35	35
56	8	8.3	14	14.8	8	6.6	5	5.3	35	35
64	5	5.4	8	9.8	5	4.3	5	3.5	23	23
66	4	4.1	9	7.2	2	3.1	2	2.6	17	17
67	5	4.3	3	7.6	5	3.4	5	2.7	18	18
Total	67	67.0	120	120.0	53	53.0	43	43.0	283	283

Chi-square	19.8
Degree of freedom	24
Critical value at 5% level of significance	36.4
Tau	.76%

4D) INTERPRETATIONS OF CROSSTABULATIONS

The Chi-squares from all crosstabulations have been summarized in table 4.61. 22 crosstabulations show random distributions and 11 appear to be near random (*i.e.*, Chi-square exceeding critical value by less than 10). The tables in the latter group may for our purposes, also be considered random, since the strength of association is so low that they do not require a cultural explanation. Even some of the ostensibly non-random distributions have artificially inflated Chi-squares generated through an occasional low cell value. It is important to note that none of the tables has a Tau value exceeding 5% and most are less than 2% (table 4.62). This is indicative of a general tendency among all crosstabulations toward randomness.

Despite the apparent homogeneity of spatial distributions of attributes, several exceptions require explanation. One would expect that the variable *nature of specimen (VAR 15 RE 1)* would have a random distribution throughout the site. There should be no bias in the deposition of bowls, elbows, and stems within certain middens or houses. Indeed, this variable has no apparent correlations with house length *(VAR 7 RE 2)*, middens versus houses *(VAR 7 RE 3)*, or with any of our large middens *(VAR 7 RE 4)*. The crosstabulation *VAR 15 RE 1 X VAR 7 RE 1* has, however, one of the highest Chi-square and Tau measures in the entire study. Why variable 15 has such a relatively strong association with village expansions is interesting, considering the fact that it is not an attribute that we would expect to exhibit cultural variability.

Table 4.61 Chi-square summary

Crosstabulation			*Chi-square*	*Critical value*	*Distribution*
VAR 15 RE 1	X	VAR 7 RE 1	79.7	15.5	not random
VAR 16 RE 1	X	VAR 7 RE 1	3.7	15.5	random
VAR 18 RE 1	X	VAR 7 RE 1	16.1	9.5	near random
VAR 21	X	VAR 7 RE 1	38.7	15.5	not random
VAR 22	X	VAR 7 RE 1	69.5	9.5	not random
VAR 24	X	VAR 7 RE 1	28.8	15.5	not random
VAR 25	X	VAR 7 RE 1	56.7	21.0	not random
VAR 33 RE 1	X	VAR 7 RE 1	2.5	9.5	random
VAR 45 RE 1	X	VAR 7 RE 1	28.8	21.0	near random
VAR 50 RE 1	X	VAR 7 RE 1	12.8	21.0	random
VAR 15 RE 1	X	VAR 7 RE 2	11.7	9.5	near random
VAR 16 RE 1	X	VAR 7 RE 2	5.9	9.5	random
VAR 18 RE 1	X	VAR 7 RE 2	10.8	6.0	near random
VAR 21	X	VAR 7 RE 2	9.5	9.5	random
VAR 22	X	VAR 7 RE 2	19.5	6.0	not random
VAR 24	X	VAR 7 RE 2	11.2	9.5	near random
VAR 25	X	VAR 7 RE 2	18.6	12.6	near random
VAR 33 RE 1	X	VAR 7 RE 2	1.9	6.0	random
VAR 45 RE 1	X	VAR 7 RE 2	7.3	12.6	random
VAR 50 RE 1	X	VAR 7 RE 2	9.4	12.6	random
VAR 15 RE 1	X	VAR 7 RE 3	5.2	6.0	random
VAR 16 RE 1	X	VAR 7 RE 3	.3	6.0	random
VAR 18 RE 1	X	VAR 7 RE 3	2.6	3.8	random
VAR 21	X	VAR 7 RE 3	26.0	6.0	not random
VAR 22	X	VAR 7 RE 3	10.1	3.8	near random
VAR 24	X	VAR 7 RE 3	28.6	6.0	not random
VAR 25	X	VAR 7 RE 3	37.7	7.8	not random
VAR 33 RE 1	X	VAR 7 RE 3	.4	3.8	random
VAR 44 RE 1	X	VAR 7 RE 3	1.8	7.8	random
VAR 44 RE 4	X	VAR 7 RE 3	3.9	6.0	random
VAR 45 RE 1	X	VAR 7 RE 3	16.5	7.8	near random
VAR 50 RE 1	X	VAR 7 RE 3	12.3	7.8	near random
VAR 15 RE 1	X	VAR 7 RE 4	15.6	26.3	random
VAR 16 RE 1	X	VAR 7 RE 4	16.0	26.3	random
VAR 18 RE 1	X	VAR 7 RE 4	5.5	15.5	random
VAR 21	X	VAR 7 RE 4	38.5	26.3	not random
VAR 22	X	VAR 7 RE 4	5.7	15.5	random
VAR 24	X	VAR 7 RE 4	29.7	26.3	near random
VAR 25	X	VAR 7 RE 4	25.7	36.4	random
VAR 33 RE 1	X	VAR 7 RE 4	2.4	15.5	random
VAR 44 RE 2	X	VAR 7 RE 4	25.5	15.5	near random
VAR 44 RE 4	X	VAR 7 RE 4	21.1	26.3	random
VAR 45 RE 1	X	VAR 7 RE 4	73.0	36.4	not random
VAR 50 RE 1	X	VAR 7 RE 4	19.8	36.4	random

Table 4.62 Tau comparisons

	VAR 7 RE 1	VAR 7 RE 2	VAR 7 RE 3	VAR 7 RE 4
VAR 15 RE 1	4.49%	.91%	.19%	.11%
VAR 16 RE 1	.74%	2.41%	3.97%	.63%
VAR 18 RE 1	.8%	4.56%	.38%	.17%
VAR 21	.88%	1.24%	1.6%	.36%
VAR 22	.87%	1.13%	.36%	.03%
VAR 24	1.12%	1.09%	2.08%	.37%
VAR 25	3.06%	2.52%	2.86%	.43%
VAR 33 RE 1	.07%	.54%	.54%	.06%
VAR 44 RE 1			.32%	
VAR 44 RE 2				1.01%
VAR 44 RE 4			1.01%	.44%
VAR 45 RE 1	1.49%	1.46%	1.69%	1.3%
VAR 50 RE 1	.94%	3.75%	1.7%	.76%

Upon examining table 4.16, we find that the core village *(VAL 90)* had 57 too many stems *(VAL 12)* and 47 too few bowls *(VAL 10)*. ~~Nearly the~~ reverse is true for expansion 2 *(VAL 92)*. It is this situation which has been primarily responsible for the inflated Tau and Chi-square. Later in this chapter we will see that (based on the distribution of physical matches) much refuse transfer occurred between these two segments of the village. It is possible that the transfer of fractured elements in the systemic context may have been biased in favour of certain portions of a pipe's morphology. Reasons for this might be related to conservation practices which involved certain fragments of pipes being recovered and used for other purposes. The prevalence of such practices at Draper is discussed in chapter five.

The possibility that the non-random distribution of variable 15 is related to recovery in the archaeological context should also be considered. Yet, unlike many artifact classes, all portions of ceramic smoking pipes are easily recognizable, thus minimizing differences in recovery ratios among different excavators. Furthermore, even variations in the mechanics of excavation will not generate biases, since there are no appreciable differences between the average size of pipe bowls and stems.

A second crosstabulation illustrates an unusually strong association of material *(VAR 22)* with village expansions *(VAR 7 RE 1)*. Table 4.20 shows that both the core *(VAL 90)* and expansion 2 *(VAL 92)* have a significantly higher proportion of 'untempered' *(VAL 1)* and a lower frequency of 'tempered' *(VAL 2)* pipe fragments. The reverse is true for all other village expansions. Although it is possible that the inhabitants of different segments of the

Draper settlement may have used and discarded pipes that were made from different clays, the presence or absence of 'temper' probably had no cultural significance. The vast majority of tempered fragments involve particles with an average size of less than 1 mm, making it likely that the distribution of *VAR 22* is not linked to discrete selection processes during the manufacture of pipes. No ceramic pipe fragments (with the exception of two shell tempered examples) are composed of material that does not resemble one of the two fine-grained' clays occurring naturally in the Draper vicinity.

The high Chi-square in the crosstabulation *VAR 21* (stem surface texture) X *VAR 7 RE 3* (houses versus middens) also requires some comment. In table 4.40 we find that a relatively high proportion of polished stems *(VAL 2)* occur in middens *(VAL 99)*, while high frequencies of unpolished stems *(VAL 1 & 3)* occur in houses *(VAL 98)*. Since it seems unlikely that the contents of middens as contrasted with the contents of houses would reflect socio-cultural variability, anomalies in the distribution of attributes between these provenience units require some other explanation. A midden is a unit identified in the archaeological context as a centralized rich deposit of artifacts and organic matter usually located outside a recognized area of systemic occupation. Artifacts recovered within middens had probably already experienced their intended use-life and were consciously discarded as secondary refuse by their prehistoric owners. Chances are much higher that artifacts recovered in houses were still in use at the time of their loss or village abandonment. It is possible that stem surface texture is a function of use and age; 'older' elements will have undergone substantial polishing as a result of the prolonged transfer of sebaceous secretions to their surface. Many more of these heavily used artifacts would be expected in the refuse areas; while 'newer', less polished examples would still have been in use in the houses.

It is important to note that this suggestion is fortified considerably by the crosstabulation *VAR 24* (bowl surface texture) X *VAR 7 RE 3* (houses versus middens) which produced nearly identical statistics. The highest Tau measures for both stem and bowl surface texture also occur in *VAR 7 RE 3* (table 4.62).

Although non-random distributions occur when we examine individual Chi-squares, such anomalies are neutralized through the general tendency of all crosstabulations towards weak associations of attributes. As discussed earlier, the Tau calculation is a much better method of assessing general trends, since it allows us to compare all tables with each other.

Table 4.63 shows the relative randomness of specific attributes based on Tau comparisons. It indicates, for example, that the most non-random distribution in the village expansions *(VAR 7 RE 1)* is nature of specimen *(VAR 15)*, while the most random was lip shape *(VAR 33)*. Lip shape is an attribute which we would expect to exhibit some cultural significance; yet its spatial distribution appears consistently random in all our provenience recodes. Bowl surface evenness *(VAR 25)*, on the other hand, is the most consistently non-random attribute in all provenience recodes, including those which probably have no cultural significance in their variability (house lengths, middens versus houses). Indeed, no specific

Table 4.63 Relative Randomness of Specific Attributes Based on Tau Comparisons *

	VAR 7 RE 1	VAR 7 RE 2	VAR 7 RE 3	VAR 7 RE 4	VAR 7 ALL RECODES
↓ Increasing randomness	VAR 15	VAR 18	VAR 16	VAR 45	VAR 25
	VAR 25	VAR 25	VAR 25	VAR 16	VAR 16
	VAR 45	VAR 16	VAR 24	VAR 25	VAR 45
	VAR 24	VAR 45	VAR 45	VAR 24	VAR 18
	VAR 21	VAR 21	VAR 21	VAR 21	VAR 15
	VAR 22	VAR 22	VAR 18	VAR 18	VAR 24
	VAR 18	VAR 24	VAR 22	VAR 15	VAR 21
	VAR 16	VAR 15	VAR 15	VAR 33	VAR 22
	VAR 33	VAR 33	VAR 33	VAR 22	VAR 33

* excluding VAR 44 and VAR 50

Table 4.64 Relative Randomness of Contextual Attributes Based on Tau Comparisons *

VAR 15	VAR 7 RE 1	VAR 7 RE 2	VAR 7 RE 3	VAR 7 RE 4
VAR 16	VAR 7 RE 3	VAR 7 RE 2	VAR 7 RE 1	VAR 7 RE 4
VAR 18	VAR 7 RE 2	VAR 7 RE 1	VAR 7 RE 3	VAR 7 RE 4
VAR 21	VAR 7 RE 3	VAR 7 RE 2	VAR 7 RE 1	VAR 7 RE 4
VAR 22	VAR 7 RE 2	VAR 7 RE 1	VAR 7 RE 3	VAR 7 RE 4
VAR 24	VAR 7 RE 3	VAR 7 RE 1	VAR 7 RE 2	VAR 7 RE 4
VAR 25	VAR 7 RE 1	VAR 7 RE 3	VAR 7 RE 2	VAR 7 RE 4
VAR 33	VAR 7 RE 2	VAR 7 RE 1	VAR 7 RE 4	VAR 7 RE 3
VAR 45	VAR 7 RE 3	VAR 7 RE 1	VAR 7 RE 2	VAR 7 RE 4
All VAR	VAR 7 RE 2	VAR 7 RE 1	VAR 7 RE 3	VAR 7 RE 4

——— Increasing randomness ———→

* excluding VAR 44 and 50

attribute, with the exception of *VAR 15* (nature of specimen), is non-random solely within the culturally significant provenience recodes *(VAR 7 RE 1, VAR 7 RE 4)*.

The relative randomness of all provenience recodes based on the Tau comparisons is shown in table 4.64. This table is to be read in rows; each provenience unit is organized in order of increasing randomness as manifested in the distribution of each specific attribute. The general degree of randomness in the spatial distribution of specific attributes is not significantly different in our first three provenience recodes *(VAR 7 RE 1, RE 2, RE 3)*. *VAR 7 RE 4* (middens with significant samples) is, however, consistently random in all specific attribute distributions. It is interesting that a provenience recode which we would expect to exhibit at least some cultural variability and which involves a very large sample has the most random distributions of specific attributes. Indeed, culturally insignificant distributions involving houses versus middens *(VAR 7 RE 3)* or different house lengths *(VAR 7 RE 2)* show a stronger tendency towards non-random distributions.

Bowl decorative motif *(VAR 44)* is an attribute which we would expect to show variability governed by socio-cultural factors. Yet all our different classifications of motifs that had statistically significant samples have more or less random distributions within every recoded provenience unit. Bowl decorative technique *(VAR 45)* is much less random than motif, yet its non-randomness is not restricted to any particular provenience recode. Our categories of pipe types *(VAR 50)* were also scattered randomly throughout the settlement.

4E) DISTRIBUTION OF PHYSICAL MATCHES

Introduction

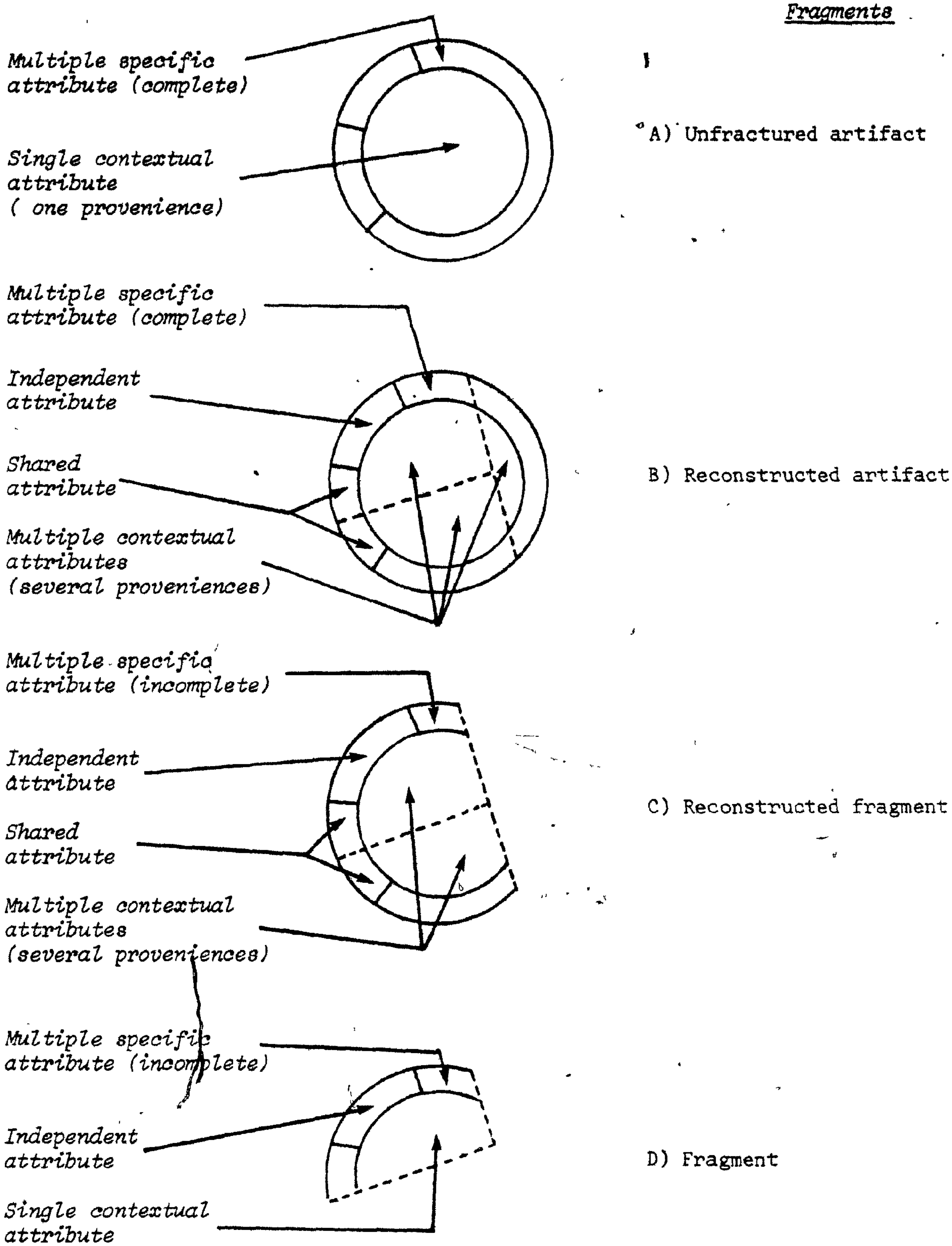
Although attributes are useful analytical units for studying artifacts, assessing relative degrees of artifact similarity, and investigating spatial distributions of artifacts, they are a somewhat arbitrary selection of entities which, when aggregated, comprise a much more complex level of material culture. The analysis of artifacts is largely dependent on the isolation of inessential, essential, and key attributes (Clarke 1978); yet the status of any specific attribute and its constituent values (or states) is often difficult to ascertain. Although it is usually possible to to assess statistically the degree of similarity between artifacts within a site through a comparison of their attributes, we are left in doubt when faced with the question of whether attribute similarity indicates a single mental template, a sphere of normative influences, or some other factor. Even the exceedingly rare intercorrelated attribute complexes that exhibit recurrent perfect associations of attributes leave such questions unanswered, since we cannot be sure that the artifacts were manufactured or stylistically conceived by the same artisan.

The only certain means of demonstrating that two or more fragments were manufactured by the same artisan is when the specimens can be physically matched with each other, thereby completely or partially reconstructing an item of material culture. Just as an artifact is a conglomerate of specific attributes, it also may be an aggregation of contributing fragments.

Complete artifacts, reconstructed artifacts and fragments of artifacts all have multiple specific attributes (figure 4.3). The degree of similarity between the specific attributes of reconstructed artifacts and their constituent fragments is dependent both on the kind of breakage and the extent of attribute survival. During fragmentation of elements in the systemic context and of artifacts in the archaeological context, some specific attributes may be split up (*e.g.*, decorative motifs); others will become independent, being present on one fragment and not the other (*e.g.*, pottery handles), while the remainder may be found consistently in all contributing fragments of an artifact (*e.g.*, temper size).

When dealing with Iroquoian pottery, some researchers feel that fragments do not adequately reflect artifacts and argue that the latter should be used as the basic unit of analysis. Wright (1974), for example, believes that significant differences exist between rim sherd and vessel analysis, although Finlayson (1977) and Pearce (1978) have provided evidence to the contrary. In the case of Huron pipes, however, variation in attributes between bowl fragments is minimal for two reasons. First, unlike pottery rimsherds, a pipe fragment usually represents a considerable proportion of the complete artifact. Second, pipe decorative motifs have a far greater consistency around the entire circumference of a bowl than does pottery decoration. Fragmentation in the upper portions of both pots and pipes occurs along lines of breakage generally perpendicular to the lip. Such consistency of horizontal motif and vertical fragmentation usually results in the sharing of the same attribute values among all contributing fragments of an artifact and this greatly facilitates the reconstruction of the bowl portions of pipes. Since non-bowl fragments are usually un-

Figure 4.3 Attribute Differences in Complete and Fractured Artifacts and Fragments



decorated, their reconstruction is much more difficult. Therefore, with large samples, it is inevitable that some fragments which were once part of the same pipe will be analyzed as separate artifacts.

Although many specific attributes will remain constant among all contributing pieces after breakage, single fragments and complete unfractured artifacts will have only one provenience, while reconstructed artifacts and reconstructed fragments may have several contextual attributes (figure 4.3). A variety of proveniences for a single artifact makes a study of spatial distributions much more complex; yet such cases have tremendous value for the analysis of intrasite variability, since we can be certain that a specific attribute originated from one artifact (and hence from one source) and somehow became dispersed.

Artifact reconstruction has recently been practised with considerable success by Cahen *et. al.* (1979) at the Late Upper Paleolithic Meer site in Belgium. The refitting of the lithic industry, although time-consuming, was seen as "an extremely powerful method for following the movement of artifacts during their lives" (Cahen *et. al.* 1979:663).

The data

Initial scrutiny of the 4,000 Draper pipe specimens made it apparent that plotting the distribution of fragments contributing to reconstructed bowls would be a valuable method of studying intrasite variability. Since the Draper excavations provided excellent provenience data control, plotting the exact location of each matching set of fragments was possible. The results are startling. A total of 144 pipe bowl fragments were fitted to reconstruct, at least partially, 48 specimens. Figure 4.4 and table 4.65 illustrate the nature of their distributions. It is important to note that 61% of the refitted fragments were found in different houses, middens, or other areas of the Draper settlement. Distances between matching fragments range from 0 to 332 metres. The average distance involving two-piece reconstructions is over 30 metres.

The questions are obvious. What processes caused two segments of a single pipe to become distributed over one third of a kilometre? Which fragment, if either, is representative of original disposal and which one is stray? Did they achieve their present provenience purposefully or by accident? Finally, are the distributions of the specific attributes which we analyzed in the above crosstabulations somehow linked to these arrangements of physically matching fragments?

Interpretations

It is obvious that the dispersal of physical matches occurred sometime between the use stage and the retrieval stage, as set out in our model of element/artifact flow. Some of the distributions may have come about during the initial deposition stage in the systemic context. Several cases of refitting involve matches between middens located near opposite ends of longhouses. Use of both middens may have resulted in fragments of the same pipe being discarded in completely different loci. During the lengthy occupation of the site, the village also underwent a series of major expansions with the population increasing from approximately 600 people to probably 2,500-3,000 people (Finlayson 1978:33). We may assume that an expansion of the village created additional middens, providing the occu-

Table 4.65 Draper Pipe Fragments: Spatial Distribution of Physical Matches

NATURE OF DISTRIBUTION	*CASES*	*FRAGMENTS INVOLVED*
INTRA HOUSE = HOUSE	4	8
INTRA MIDDEN = MIDDEN	11	25
INTRA AREA = AREA *	4	11
INTER HOUSE / HOUSE	0	0
INTER MIDDEN / MIDDEN	12	25
INTER AREA / AREA	1	3
INTER HOUSE / MIDDEN	3	6
INTER HOUSE / AREA	2	4
INTER MIDDEN / AREA	2	4
INTER HOUSE / HOUSE / AREA	2	6
INTER HOUSE / HOUSE / HOUSE	1	3
INTER AREA / MIDDEN = MIDDEN	1	3
INTER HOUSE / MIDDEN = MIDDEN	2	6
INTER AREA / HOUSE = HOUSE	1	6
UNKNOWN	2	4
TOTALS	48	114

* The term *area* here refers to excavated portions of the site not directly associated with a house or midden

= Same provenience unit

/ Different provenience unit

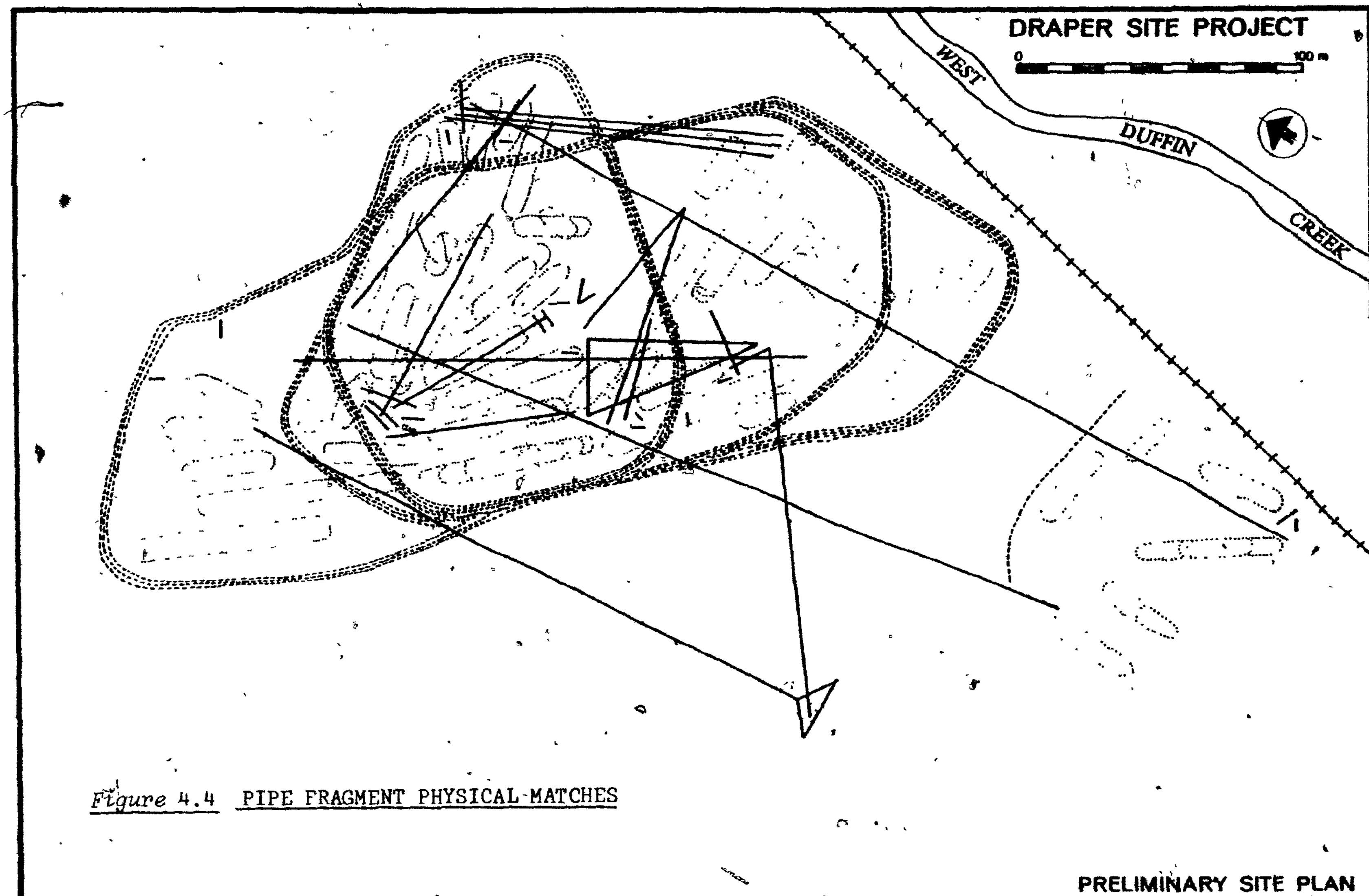


Figure 4.4 PIPE FRAGMENT PHYSICAL-MATCHES pants of some houses with more choices for refuse disposal.

We can be relatively certain that the fragments found in middens were not lost there, but were consciously deposited as secondary refuse away from their loci of use. It is expected that the majority of pipe fragments were discarded outside the family living areas to prevent refuse accumulation during the long-term occupation of a house. Ethnoarchaeologist Priscilla Murray believes "element discard location will equal use location at only one type of habitation site - that occupied by a migratory population. Sedentary populations who reside at one site for at least one season will throw their discarded elements out of the family living space, that is, away from the area in which they were used" (Murray 1980:497).

Several fragments found in middens match others recovered in houses. Many of the latter may have escaped sweeping and cleaning activities. Other fragments may have been carried from the middens to the houses. One case of artifact refitting involved three fragments of a pipe found inside three different houses. The specimen had a unusual combination of attributes and was stylistically unique; this may have led to the exemption of the fractured pieces from normal discard processes and the collection of these by various individuals.

In a study of ceramic disposal behaviour among the Huichol Indians of Western Mexico, Phil Weigand observed:

> Only seldom does a broken ceramic item reach the trash heap in a form which could be completely restorable. Parts are cannibalized long before it is discarded. Once parts are ready for discard, a variety of occurrences further disperse it either just before it is thrown away or shortly thereafter (Weigand 1969:24).

Among the Huichol, children often act as dispersing agents resulting in ceramic sherds being deposited as far as one-hundred metres from each other.

It is conceivable that the house areas were well trodden, thus limiting chances of a stray pipe being lost within the earthen floor. Some researchers suggest that "a nonpermeable substrate (stone, beaten earth, and the like) will not absorb cultural materials to any degree, increasing the probability on intensively occupied sites that all refuse will become secondary" (Gifford 1978:83).

Archaeologically, the Draper site reflects a diachronic segment of a behavioural system involving many changes over time. House expansions, contractions, super-positions, relocations, and occupations in areas where palisades previously had stood are all systemic processes that contributed to the formation of artifact distributions in the archaeological context. When the record hints at these changes, we must be especially cautious in analyzing intrasite variability, since it is often difficult to define or determine the period of refuse disposal. A Draper villager may have dropped a pipe fragment against a palisade as secondary refuse or it may have been lost as a primary deposition in a house that was later super-imposed on the previous defensive wall. These are interesting complexities which do not involve element/artifact flow but rather, alterations in depositional environments.

After the initial depositional stage, an element may either remain in the ground until it resurfaces as an artifact in the archaeological context or it may be scavenged and brought back into the systemic context (A-S transformations). If such scavenging involves fragments rather than unfractured elements, wide spatial distributions of physical matches may ensue. Possible reasons for scavenging, curio collecting, conservation, and re-use are discussed in chapter five.

A-A transformations comprise a third possible explanation for the formation of intrasite physical match distributions. These include the natural disturbance processes of pedoturbation (soil mixing) identified by Wood and Johnson (1978) as well as human modifications, such as recent farming. The Draper site is unusual in that large portions have remained relatively undisturbed for nearly 500 years. The entire north-eastern area of the site (which includes the largest proportion of our sample) was undisturbed and we can readily surmise that the bulk of pipe fragments from this area has not been subjected to A-A processes of human origin. Other portions of the site, however, have been plowed and it is here that we must consider recent modifications to the archaeological context.

Wood *et. al.* caution the archaeologist about the effects of both vertical and horizontal pedoturbation processes:

> The result can be a spurious association of artifacts, with concomitant distortion in interpretation. Before we proceed to make interpretations that depend on artifacts being in their original position, we must demonstrate that they were not moved by one or another form of soil mixing (1978:369).

It is, of course, improbable that natural disturbance processes (or even farming) are capable of displacing artifacts from one midden and depositing them in another. A midden at the north-east end of the Draper site contained three fragments of three different pipes, each of which matched a specimen recovered within a midden 125 metres distant. The chances against some form of A-A process contributing to this highly patterned distribution are phenomenal, especially since a wide gully separates the two refuse areas. It is probable that behaviour during or shortly after the depositional stage of the systemic context was responsible for the majority of physical match distributions.

4F) SUMMARY

In this chapter we have analyzed the intrasite spatial distribution of the majority of pipe fragments recovered at the Draper site. To do so, we initially defined several units of analysis which appeared to represent an adequate level of specificity. We then crosstabulated all specific attributes with contextual attributes and assessed, through statistical means, the amount of deviation from random distributions. Although we experimented with a number of different methods of classifying both specific attributes and provenience units, our *Tau* calculations indicated a general homogeneity of spatial distributions.

The *Chi-square* analysis did, however, produce several exceptions. It was found, for example, that unusual proportions of bowls and stems were recovered in two different areas of the settlement. This can best be explained through conservation practices in the systemic context to be discussed in chapter five. A second crosstabulation suggests that two different raw materials were used by different segments of the village. Yet the difference in clay is so minimal that it probably reflects a differential exploitation of clay sources rather than a conscious addition of temper during manufacture. We also found that high proportions of unpolished stems and bowls were recovered on house floors, while high frequencies of polished stems and bowls occurred in middens. Since the most significant deviation from the random distribution of polished and unpolished pipes occurs when we compare the contents of living floors with the contents of refuse areas, variability in this specific attribute may have resulted from the use rather than the manufacture stage of an element's flow through the systemic context.

The fifth section of this chapter already partially explains the general tendency of specific attributes towards random distributions. Through refitting fractured artifacts and plotting the distribution of fragments contributing to reconstructed bowls, we found that a considerable amount of refuse transfer occurred between points in the settlement which sometimes were as much as 332 metres distant. Such scattering of broken fragments obviously contributes to the overall homogeneity of attribute distributions. After suggesting some processes contributing to the formation of the physical match distributions, we concluded that behaviour during or shortly after the depositional stage of the systemic context was primarily responsible. In the next chapter, the nature of this behaviour will be discussed as we examine several special samples of pipe fragments also found at Draper.

CHAPTER FIVE

5A) *INTRODUCTION*

Of the 3997 pipe fragments recovered at the Draper site during the 1975 and 1978 field seasons, 461 specimens were not included in the computer analysis because their specific attributes were highly unusual. This special sample includes 68 effigy fragments, 26 special non-effigy fragments, 235 juvenile pipe fragments, 104 recycled pipe fragments, and 28 pieces of preforms and pipe manufacturing wastage. Although these frequencies can have little statistical significance, each of these special samples may contribute valuable information supplementing the computer analysis. The large number of pipe fragments recovered at Draper has allowed us to analyze sub-classes of artifacts as independent samples, and has even enabled us to isolate specific groups of artifacts for the first time. More importantly, the large sample has enabled us to recognize the significant contributions of each of these sub-classes toward the reconstruction of systemic contexts.

5B) *EFFIGY PIPES*

Introduction

As on many Iroquoian sites generally, the most complex form of artistic expression among Draper artifacts is manifested in modelled clay and carved stone effigy pipes. Why this particular artifact class was a favourite non-perishable object for the representation of zoomorphic and anthropomorphic forms remains uncertain, as is their functional status in relation to non-effigy devices.

Several explanations for specific effigy types have recently been attempted (Brasser 1980; Mathews 1976, 1978, 1979, 1981; Noble 1979). We will not use the Draper sample to address questions dealing with effigy style interpretation since we are primarily concerned with spatial distributions of artifacts rather than with the artifacts *per se*. Despite the wealth of recent research, it remains uncertain whether the stylistic variability and standardization of effigies was a reflection of patterned symbolic associations and it is unlikely that a study of pipe distributions would help to illuminate their function or meaning. If the decorative style were in essence a transfer from another perhaps perishable medium, the original symbolic associations may have been lost in the new object. In addition, the adoption of an effigy art form by a Draper Huron does not imply the acceptance of all the symbolic ideas attributed to the form by the manufacturer of the prototype. We also cannot ignore the possibility that during the life-span of the Draper settlement, a particular effigy style may have shifted meaning as it passed through a second generation of artisans. The obvious corollary is that a set of symbolic concepts could have remained stable while the art form changed. We often forget the similar observations already made by Franz Boas in reference to the art forms of North American Indians:

> The two groups of phenomenon — interpretation and style — appear to be independent...The idea which a design expresses at the present time is not necessarily a clue to its history. It seems probable that idea and style exist independently and influence each other constantly (Boas 1903:562).

Although we may never know what a particular style 'meant' to a Draper artisan, we can be relatively certain that these styles were governed by both cultural and idiosyncratic factors: that the selection of certain attributes by the manufacturers involved a constant struggle between complying with traditional norms and exhibiting personal preferences and talents. In the following analysis we will be studying the possibility of specialist production at the Draper site. Such a study is inextricably connected with the disentangling of cultural and idiosyncratic attributes.

Description of the material

A total of 68 effigy pipes and fragments was recovered during the excavation of the Draper site. After all possible reconstruction, this figure seems to represent a minimum of 59 different pipes. 25 fragments contributed to 24 anthropomorphic effigy pipes, 28 fragments were reconstructed as 20 zoomorphic forms, and 15 miscellaneous pieces were obviously of an effigy variety but were too fragmentary to allow accurate classification and identification. The 28 zoomorphic effigy fragments include 6 stone artifacts; all the others are ceramic. The anthropomorphic effigies include 5 humans with post-cranial features (in kneeling, squatting, and sitting positions), and 19 individuals with only cranial features. Prior to fragmentation many of these latter figures may also have had bodies. Both birds and mammals are represented among the zoomorphic forms. A detailed description of each specimen indicating the diversity of types and attributes is provided with the plates found at the end of this report.

Discussion

Ethnohistorical sources make no reference to specialist production of Iroquoian ceramics and it is commonly believed that these societies had what is referred to as a "domestic mode of production" (Sahlins 1972).

Rice believes there may be an archaeological method of determining the type of production in a given prehistoric community. She provides several expectations or test implications for a pre-specialization level of ceramic production. Among those which are relevant for our study she notes:

> 1) There should be little uniformity in technological characteristics, such as kinds and proportions of clays and tempers...
> 2) There should be small (*e.g.* household) concentrations of similar paste, form, design; not an even distribution over the site (1981:222).

Rice identifies the next step in the evolution of specialist production as the "incipient-specialization stage" (1981:223). This stage represents the development of a low level, informal specialization and may be recognized through the following test implications:

> 1) There should be somewhat greater skill evident in the technology of production and/or more consistency in manufacturing and firing.
> 2) Decorative motifs and styles should be less variable, with accepted conventions as to motif, color, placement, and execution.
> 3) There should be wider areal distributions of the increasingly standardized products (1981:223).

Although Rice's model is obviously dynamic and intended for use in diachronic studies, the criteria used to distinguish non-specialization and incipient-specialization production may be useful in our study of Draper effigy pipes.

Evidence for incipient-specialization

Although some characteristics of the Draper effigy pipes may be culturally-influenced (*e.g.*, human faces facing smoker, depiction of ribs on post-cranial segments, *etc.*), other attributes are probably reflections of idiosyncratic variation. A number of factors suggest that five (20.8%) of the 24 Draper anthropomorphic effigies were manufactured or stylistically conceived by a single artisan (plate 11 a, aa, b, bb, c, cc, plate 12 a, aa, c).

All five have a non-circular bowl shape at the lip, slit eyes and mouth, and a high brow. Four have ears depicted through morticing and a punctate ridge on the back (the fifth case is indeterminate). Three have a punctate ridge on the brow and horizontal incising on the back. Some even have the identical number of decorative incisions behind the face. This contradicts the typical Iroquoian predilection towards variation rather than standardization in human face portrayal. The high frequency of idiosyncratic attribute clusters can scarcely be coincidental and probably reflects either the 'mental template' of a single craftsman or conscious efforts to maintain personal consistency in form and decoration.

Furthermore, the five effigies have a style strikingly unique in their arrangements of attributes when one compares them with the remaining Draper anthropomorphic forms and those found on other Iroquoian sites (only one specimen found in Oro township, Ontario, bears a remote resemblance to these [see Boyle 1897:51]).

The technology of production and consistency in manufacturing and firing in these five cases tends to be somewhat superior to what is found with most other Draper pipes. This, coupled with the lack of stylistic variability, would suggest that we are dealing with a level of production much closer to the "incipient-specialization" than the non-specialization stage.

Spatial distributions

The distributions of those specimens which could be positively identified as zoomorphic effigy pipe fragments are shown in figure 5.1. The effigies were scattered throughout the site and the proportions of fragments found in each house or midden parallel the distribution of the Draper pipe sample as a whole. Two exceptions are notable, albeit statistically insignificant: midden 55 contained 5% of all pipe fragments recovered on the site, yet 12% of all effigy forms were found in this refuse deposit. Although only 12 pipe fragments were recovered in midden 81, two of these were effigies.

The distribution of particular effigy forms (such as rodents, humans with only cranial features, canids, *etc.*) is apparently random; no styles were recovered exclusively in one house or midden (figure 5.1, 5.2). Within the confines of house 19, both a rodent and a human effigy were found.

The distribution of the pipe style which, as we have suggested above, may have been manufactured by a single artisan seems equally random. Two of these specialized pipes were found in two different houses which were oriented in two different directions and stood in two different expansion segments of the village (figure 5.2). The only effigy form recovered in midden 66 belonged to this class of specialized pipes; the remainder were recovered in two other distant refuse deposits.

The most fascinating distribution involves fragments which could be physically matched with one another. Although there is always room for

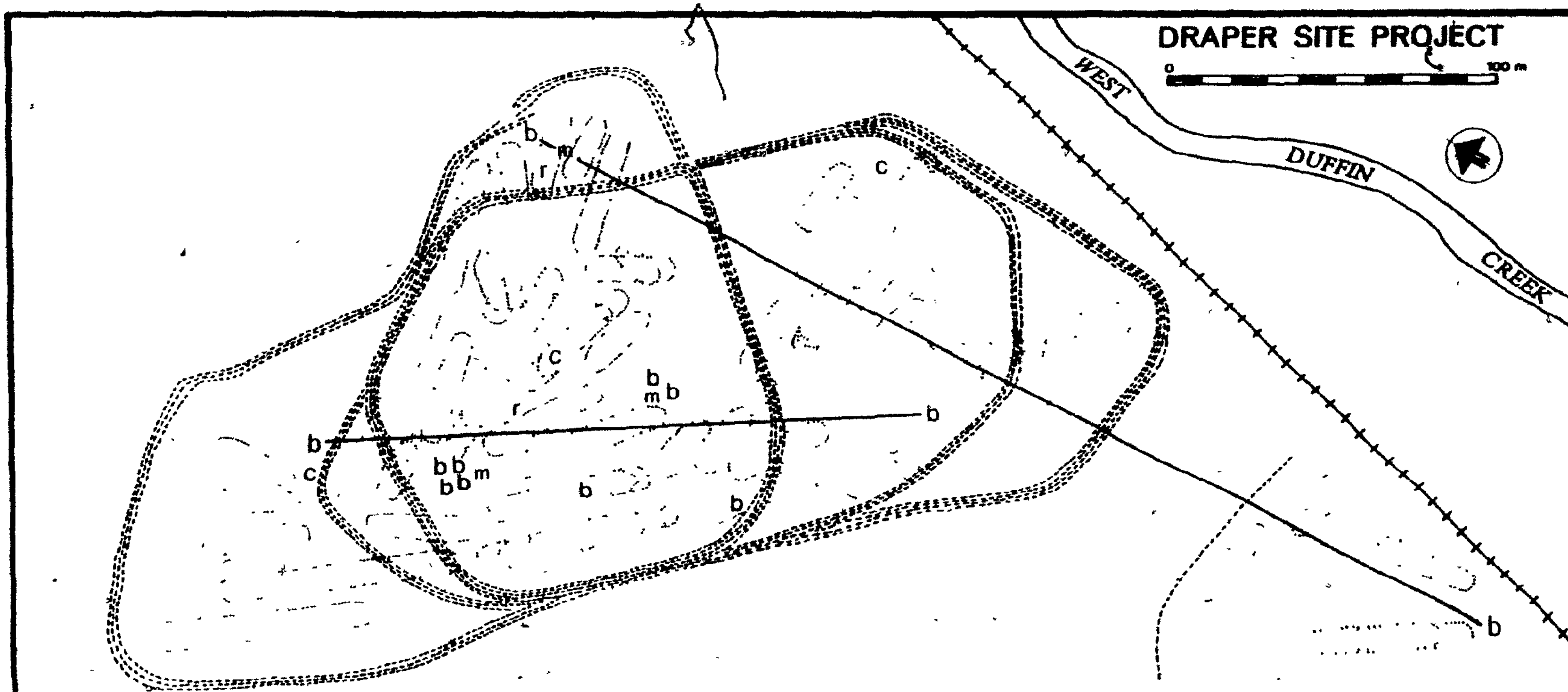


Figure 5.1 DRAPER ZOOMORPHIC EFFIGY PIPE DISTRIBUTIONS

b Open-mouthed bird beaks
r Rodents
c Canids
m Miscellaneous
— Match

PRELIMINARY SITE PLAN

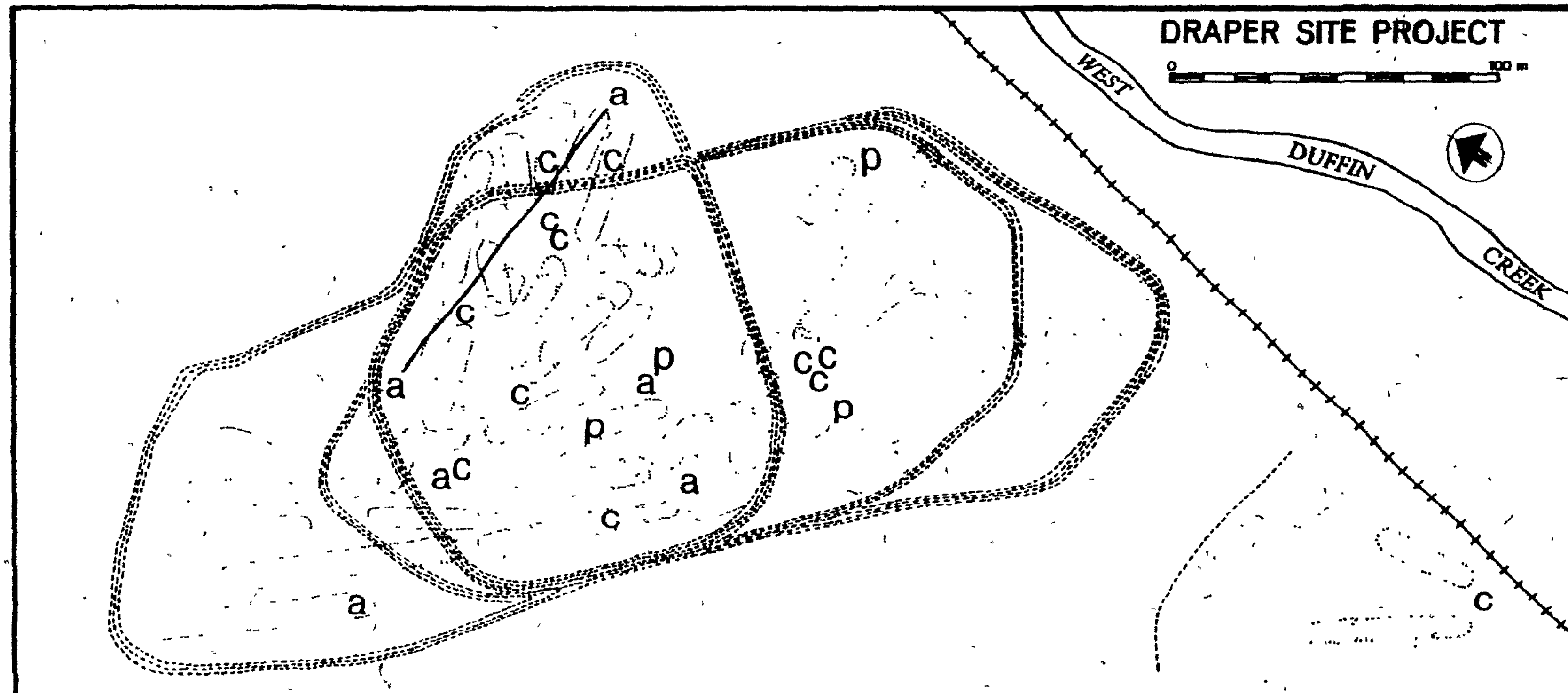


Figure 5.2 DRAPER ANTHROPOMORPHIC EFFIGY PIPE DISTRIBUTIONS

a Humans with post-cranial features

c Humans with only cranial features

p Faces probably designed by single artisan

— Physical match

PRELIMINARY SITE PLAN

error when suggesting that two or more pipes were created by the same individual, we can be absolutely certain that two fragments were manufactured by a single craftsman if these can actually be glued together. The two contributing pieces of one of our 'specialist' pipes were found 110 metres distant (figure 5.2). Four fragments of open-mouthed effigies were used to reconstruct two pipes. Distances between the contributing pieces ranged from 180 to 332 metres (figure 5.1).

Conclusions

Although effigy types have been defined on the basis of culturally-governed attribute combinations, few sample sizes have been large enough to enable the isolation of individual craftsmen within a single site.

At Draper an immense diversity of both types and attributes exists in the effigy sample, suggesting that these are products of a non-specialized mode of production. Yet over 20% of the anthropomorphic forms were manufactured or stylistically conceived by a single artisan. These effigies, which are characterized by superior skill in the technology of production, low variability in idiosyncratic decoration and morphology, and a wide areal distribution, fulfil all the criteria found in Rice's definition of 'incipient-specialization'; while the apparently random and widely separated loci of their deposition make it improbable that the manufacturer also used these pipes. The fact that the only effigy found in midden 66 was a pipe that was probably manufactured by a specialist is important, since, as will be demonstrated later, this same refuse area was likely a major centre for both pipe manufacture and recycling activities.

Since the proportion of effigies found in each midden or house parallels the distribution of the total pipe sample, it is probable that no special discard processes distinguished effigy from non-effigy pipes.

The fact that no effigy styles were restricted to a particular area and entirely different effigy pipe styles can be found in the same longhouse suggests that such styles had little to do with social composition. Noble argued that pipe effigies represent a man's matrilineal totem and suggested that if "excavators were to plot effigy pipes in relation to house structures and over entire villages, the pipes might reveal the locations of lineages represented within these settlement units" (1968:297). If the Huron were matrilocal and the men made the pipes, we would not expect a clustering of effigies in specific house structures and indeed, at Draper, no such patterning occurs. Our study of effigy style distributions also refutes the conclusions of an earlier study involving Draper material (based on 1% of our sample) that "real differences exist in the pipe assemblages of different houses, which may well relate to their social composition" (Arthurs 1979:89).

Finally, we may interpret the apparent homogeneity of spatial distributions of effigies in terms of our model outlined in chapter two. During the flow of elements from the *manufacture* stage to the *use* stage, some elements may have been redistributed as a result of some form of specialization; Schiffer has termed these transformations "lateral cycling" (1976:39). Secondly, after the *deposition* stage, scavenging activities may have taken place. Such A-S transformations result in the re-entry of elements (or fragments of elements) into the systemic context — often with a change of loci.

A-S transformations may explain the wide distributions of fragments contributing to reconstructed artifacts. Thirdly, between the *use* and *deposition* stages of element flow, some recycling activity occurred which may also contribute to loci changes. In two cases a fractured pipe was salvaged and a hole drilled through the bowl to replace a broken stem. Finally, it may be argued that an extremely complex network of social interactions created the apparent randomness of effigy distributions. If men made the pipes, post-marital residence changes in the systemic context may have produced an ostensibly random set of artifact proveniences in the archaeological context. It seems improbable, however, that a man relocated residences as frequently as the spatial distributions of our effigy sample would suggest. It is likely that these distributions are at least partially the result of other processes, such as specialist production, scavenging, or recycling.

5C) SPECIAL NON-EFFIGY PIPE BOWL FRAGMENTS

Introduction

In addition to the Draper effigy pipes, 26 bowl fragments (representing 23 different pipes) were recovered which are so unique morphologically that they require special attention.

Anomalies are bound to occur when artisans are producing art forms in a medium as plastic as clay. Unlike lithics or pottery, a wide diversity of morphological variables is possible with ceramic pipes without seriously impeding their function. No matter how stringent stylistic norms appear, individuals will occasionally sway from culturally influenced norms in favour of idiosyncratic variations. Many of these divergences are reflected in the Draper site pipe sample and, at times, several cases of one unusual form may be found.

Description of the material

The following descriptions of special non-effigy pipe bowl fragments are accompanied by a map showing their intrasite spatial distributions (fig. 5.3). Reference information follows each description.

Five pipes appear to have an affinity with what is commonly referred to as a 'coronet type', although they lack the corner mortices usually associated with these forms. The bowls and bowl orifices are round while the lip is collared and square when seen from above. The bowl widths at the lip are generally the same in each case and average 30 mm. Decorative motif code numbers 71, 116, 205 and 221 are represented (fig. 5.3A).

Two pipes involving an entirely rectangular bowl from the lip to elbow were recovered at Draper. One of these is plain, while the other is completely covered with 98 oblique incisions arranged in various combinations (plate 4d). This motif is the only resemblance Draper pipe decoration has to other ceramics. The stem had been broken off close to the bowl but was subsequently ground to prolong the functional value of the smoking device(fig.5.3B). Fitzgerald has hypothesized that this type of regrinding may have been an attempt to imitate *chillums* (1981: 161-2).

One pipe bowl sports a triangular bowl shape at the lip. The triangle is isoceles and its apex faces the smoker, thus forming a ridge which continues down to the elbow, causing the stem to resemble an inverted

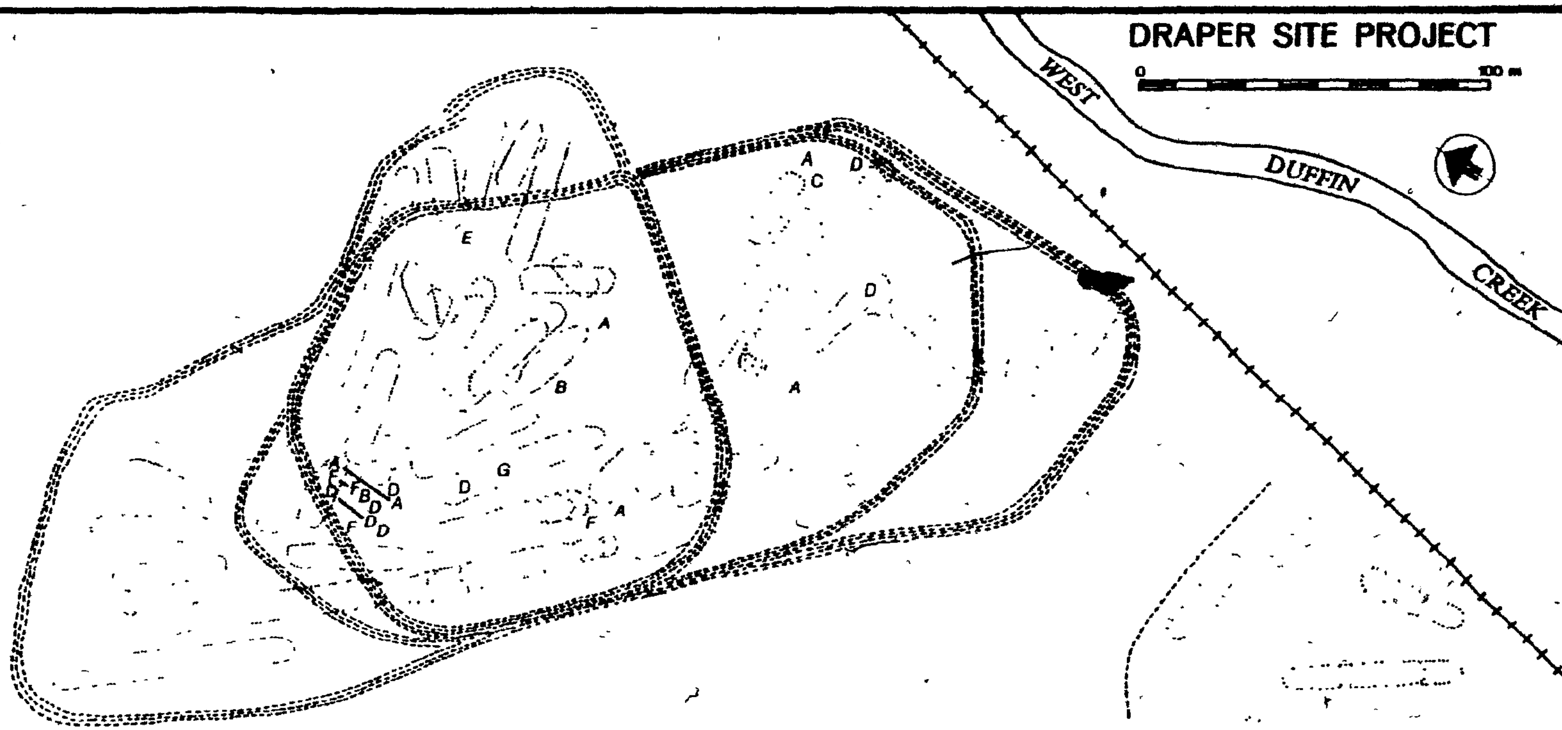


Figure 5.3 DRAPER SPECIAL NON-EFFIGY PIPE DISTRIBUTIONS

(explanation in text)

— match

PRELIMINARY SITE PLAN

keel. The pipe is undecorated, smooth but not polished (fig 5.3C; plate 4a).

Eight specimens appear to be fragments of castellated pipes — a possible transfer to smoking devices of the protuberances commonly occurring on Iroquoian pottery (the pipes also resemble open-mouthed bird beaks although they lack any zoomorphic features). One is decorated with motif code 2, while another has adapted motif 53 to the geography of a castellation (plate 6d). The other 6 pipes are undecorated, although 3 possess collars. One bowl fragment shows evidence of recycling, as the lip is ground smooth (fig. 5.3D).

One pipe bowl approximates a trumpet form, although the elbow and stem were never manufactured and the lower bowl comes to a point instead. A 5 mm diameter hole was made in the side of the bowl during the manufacturing process for the possible insertion of a non-ceramic stem. The bowl is decorated with a complex network of hastily applied incisions and depressions of inconsistent motif. Its heteromorphous moulding suggests a possible juvenile attempt, although there is no reduction in size. The bowl is shallow and was probably not functional (fig. 5.3E; plate 4b).

Another anomalous artifact in the Draper pipe collections also lacked both elbow and stem, even in its original design. The pipe is roughly wedge-shaped with a rectangular orifice in the top, a hole for a stem in one side and a drilled protuberance on the opposite side. The latter probably functioned as a safety device used to hold the bowl on a string should the inserted stem chance to break off. The two remaining sides are decorated, each with two very deep, elongated depressions or mortices. Near the bottom, on the side facing the smoker, an attempt had been made to drill a second hole. Yet the pipe had fractured in the process and the venture was abandoned. The reason for this attempted modification is unknown; the resultant hole would never have reached or entered the bowl cavity as it does in other cases of recycling, but more importantly, there seems no functional need for a second perforation. It is equally improbable that the second opening was intended for the insertion of a string and the subsequent wearing of the bowl as an ornament or amulet, since the aforementioned safety device is still intact and could have been used for such a purpose (fig 5.3F; plate 4e).

Two other fragments seem to be portions of pipes similar to the one described above. One involves the section with the hole for the insertion of a wooden stem while the other appears to be a broken safety device (fig. 5.3F). In many aspects, the last three pipes resemble ones illustrated by Boyle (1900:19, fig. 7; 1902:103, fig. 34; 1902: 105, fig. 35). Yet without the complete bowls, it is impossible to ascertain whether these were some type of zoomorphic effigy.

Another special non-effigy bowl fragment can only be described as a triangular bowl with a set of very large spines or frills along the edge facing away from the smoker. The only other known example with such spines is a pipe labelled "problematical" from the Neutral Cleveland site (AhHb-7) now in the McMaster University collections (fig. 5.3G; plate 4c)..

The last specimen is a conical bowl which sits on a flat platform stem. Decoration on the bowl is of common motif (motif code 74). The orifice is 18 mm wide and the bowl width at the lip is 35 mm. The stem is 36 mm wide, 13 mm thick, and of unknown length. Its immense surface area is decorated with a complexity of punctate/incision combinations. No other pipe in the Draper collections or from anywhere in Ontario resembles this fragment (plate 6g).

Conclusions

The proveniences of the special non-effigy pipe bowls parallel the general homogeneity of pipe attribute spatial distributions found in our general sample. One exception is notable: out of 3274 pipe fragments only 15 (.5%) were recovered in house 15, yet 3 of these are special non-effigy pipe bowls. Moreover, all 3 fragments may be physically matched with 3 others found in midden 52. It is possible that an occupant of house 15 retained certain special pipe portions, thereby allowing them to escape normal cleaning and sweeping activities. Since the six specimens represent three completely different pipes with absolutely no attribute correlations, it is conceivable that each was owned by a different individual living in house 15. Alternatively, one Huron may have been systematically scavenging unusual fragments from a nearby refuse area. It is virtually impossible to determine whether we are dealing with behaviour during discard or with post-depositional scavenging (A-S transformation).

5D) JUVENILE PIPES

Introduction

Excavations during the 1975 and 1978 field seasons at the Draper site led to the recovery of 235 juvenile pipe fragments. Although juvenile pipes have been identified in numerous site reports, the Draper site has had the only sample size large enough to allow an independent analysis and thorough treatment of this artifact sub-class. It was felt that this sample might provide information on the cognitive variables involved in the pre-manufacture stage of an element in the systemic context. If artifact types or attributes are to be useful in studying element transformations and prehistoric behavioural patterns, we must have a firm understanding of where these attributes of types originate in the first place. What are the spheres of influence which affect attribute application when a novice artisan first manufactures pipes?

It has long been recognized that Iroquoian pipes, like pottery, are not expressions of idiosyncratic art, but rather reflect certain cultural norms in the form of consistent combinations of attributes which enable archaeologists to identify similar 'types' both within and between sites. How these have been perpetuated through time and displaced through space is a question which is inextricably bound to the learning processes involved in element manufacture. Nearly 7% of the pipes at Draper were made by children and during the occupation of the site these same juveniles may have been responsible for a substantial number of the remaining 93%. For the first time it will be possible to analyze the amount of influence children and adults had on each other in the manufacture of Iroquoian smoking pipes.

Description of the material

The term 'juvenile' is obviously the result of a somewhat subjective distinction; it is, however, justified terminology if we agree that the following considerations imply manufacture by children:

A) The specimens are on the average much smaller — all objective measurements, such as bowl orifice widths and stem lengths, are considerably reduced from their 'adult' counterparts.

B) Decoration, when present, is simplistic, often randomly applied, and without consistency in motif.

C) Surface evenness and texture is highly irregular — striations and heteromorphous moulding are common.

D) The clay is often unfired.

E) The pipes are usually not functional and rarely show evidence of having been smoked.

F) The fingerprint of a small child was found on one specimen.

The suggestion that these may be crude attempts at pipe fabrication by adults or aborted discards during manufacture seems improbable, since a reduction in size would not be expected in either case.

Of the 235 specimens, 2 were whole pipes (plates 17b and 18a), 198 could be clearly identified as being either complete or parts of bowls, while 35 were mouthpiece, stem, or elbow fragments. This 6:1 ratio of bowl to non-bowl fragments deviates considerably from the nearly 1:1 proportions found in the adult sample. Reasons for this are probably not related to depositional processes in the systemic context but may reflect an artifact selection bias during retrieval in the archaeological context. Table 5.1 shows the general breakdown of the artifact subclass.

Discussion

The deduction of social interaction from the analysis of spatial stylistic variability requires a basic assumption: that artifact attributes, such as methods of manufacture or design motifs, were learned in the pre-

Table 5.1 Juvenile Pipes - General Sample Breakdown

	f
Decorated bowls and fragments	82
Undecorated bowls and fragments	118
Non-bowl fragments	35
Total juvenile pipe fragments	235

Table 5.2 General Decorative Technique Comparison

	Juvenile		*Adult*	
	f	%	*f*	%
Fingernail incising motifs	2	2.4	5	.6
Linear incising motifs	42	51.2	361	45.6
Punctate motifs	14	17.1	59	7.5
I/P combination motifs	24	29.3	328	41.4
Other complex motifs	0	0.0	39	4.9
Total decorated bowls	82	100.0	792	100.0

Table 5.3 General Morphological Comparison

	Juvenile		*Adult*	
	f	%	*f*	%
Conical and cylindrical forms	159	79.5	191	29.8
Trumpet forms	21	10.5	234	36.5
Other complex forms	20	10.0	217	33.8
Total	200	100.0	642	100.1

marital residence, thus being handed down within an isolated social segment. If this is the case it would be expected that juvenile attempts at artifact fabrication would at least partially approximate the adult counterparts made in their own home environment. In terms of matrilocal societies (as the Huron are thought to be) the reasoning can be stated in the following fashion:

> The attributes utilized by the adult male during the manufacture of elements in the longhouse of his wife's matriclan were learned when he was a child in the longhouse of his mother's matriclan.

We will assume that pipes were manufactured by men and will seek answers to two basic questions. Firstly, are attributes and stylistic constraints learned and applied on elements during the artisan's juvenile years of experimentation and play, or do they affect his work only later in his 'adult' life — at a time when he in all probability has married and relocated? Secondly, to what degree is the juvenile artist influenced by the attributes found on elements in his immediate surroundings (*i.e.*, longhouse of mother)?

Two interrelated studies of the juvenile pipe fragment sample have been generated to try to answer these questions. The first involves comparison of relative proportions of attributes with adult ratios to determine the degree of influence one had on the other. The second examines spatial distributions of attributes for possible hints of patterns or loci of high attribute frequencies corresponding with adult scatters.

Juvenile/adult sample comparison

Since the majority of attempted decorative motifs in the Draper juvenile pipes are too idiosyncratic and diverse for comparison, our first analysis is restricted to 4 decorative techniques (table 5.2). What becomes immediately apparent is that the proportions of incising/punctate combination motifs and other complex decorative techniques found on juvenile bowls are much lower than the adult ratios. The linear incision motifs, which are much simpler to produce, are 5.6% more popular among children than adults. The punctating attempts (which are created merely through the intermittent depression of a small stick or bone into soft clay), are more popular among children by nearly 10%. Although fingernail incising is a decorative technique which requires no tools, it is rare in Iroquoian ceramics. Of the 7 cases recovered at Draper, 2 involved pipes manufactured by children.

Whether juvenile pipes were created as toys or as trial pieces, it is clear that Draper children responsible for our sample were either not interested in the mimicry of adult decorative techniques or were as yet incapable of producing stylistically constrained motifs. Since only 41% of Draper juvenile bowls are decorated, there seems to have been no particular urge to elaborate their attempts at producing smoking receptacles in the first place. In fact, our data in table 5.3 give the impression that there was an even greater hesitancy (or inability?) to follow general morphological forms before decorative elaboration was attempted. Trumpet forms have an occurrence 26% lower than the adult sample; children preferred the conical and cylindrical forms and produced them in quantities that were as much as 50% higher than their parental counterparts.

Juvenile/adult sample distribution

In chapter four we noted that of the 114 pipe bowl fragments which could be refitted, over 50% were found in spatially distinct areas of the site: distances between matching fragments were sometimes over one-third of a kilometre. A further observation, which is perhaps important to note here, is that *not one* of these widely strewn pipes was manufactured by children. This leads us to the somewhat startling conclusion that juvenile refuse may be representing a much more primary deposition than the highly transient and often recycled adult pipe fragments.

One other piece of evidence seems to support this contention. Of all the adult pipes found at Draper 27% were recovered outside of middens while only 14% of the juvenile pipes had not been deposited in refuse areas. It is likely that an element which is still lying in the activity and living areas of a village had a higher susceptibility to re-location or recycling.

The proportion of juvenile pipes found in refuse deposits, generally paralleled the ratios of adult pipes. The sole exception was midden 56 which had a slightly higher 5.1% frequency of juvenile occurrences.

Although most juvenile motifs are too idiosyncratic to allow comparison with adult versions, there are several isolated exceptions in which it is obvious that some children had a familiarity with basic Draper designs; their spatial distributions have been studied and compared with adult motif scatters (figure 5.4).

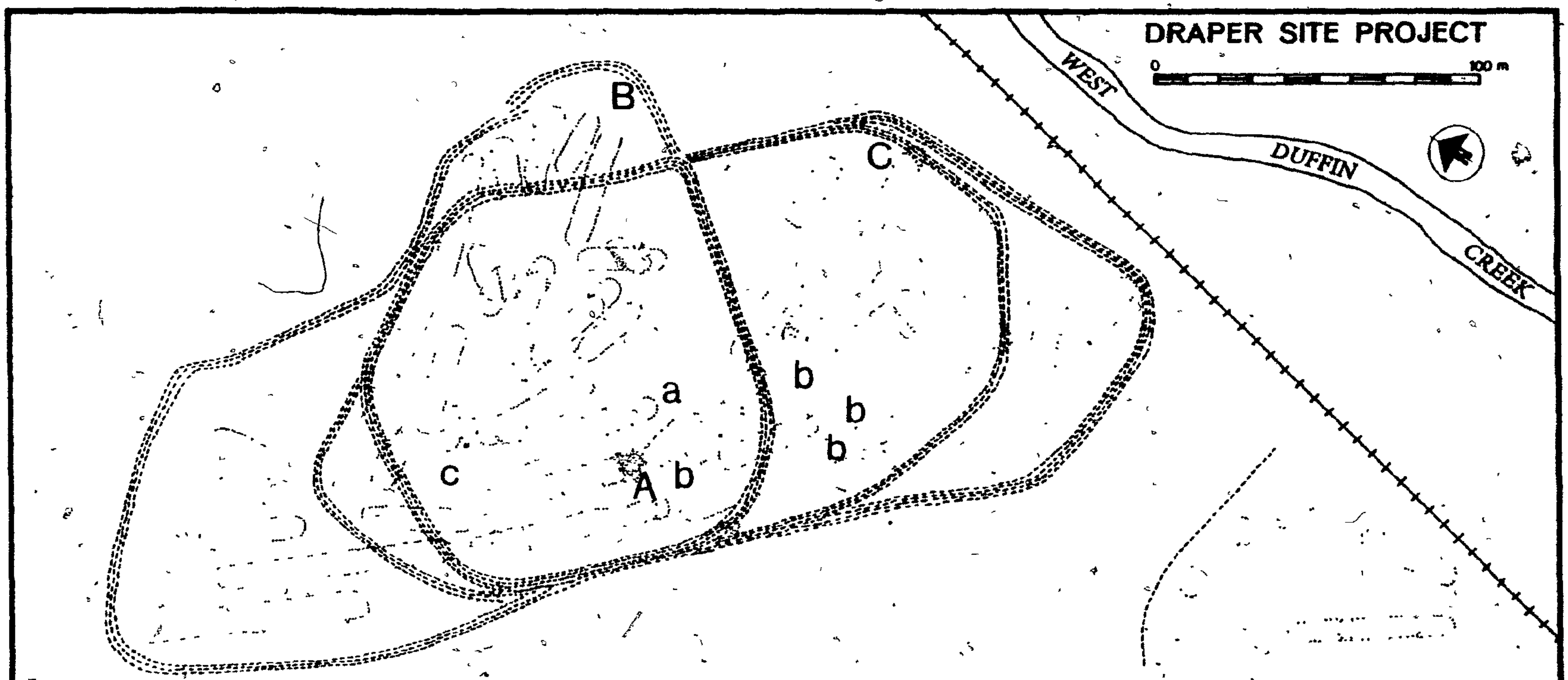


Figure 5.4 JUVENILE/ADULT PIPE COMPARISONS: popular motif distributions

A Adult motif #3 area of high popularity
a Juvenile correlate of #3 occurrence

B Adult motif #2 area of high popularity
b Juvenile correlate of #2 occurrence

C Adult motif #54 area of high popularity
c Juvenile correlate of #54 occurrence

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The most popular horizontal incising motif at Draper is no. 3.* This motif was found in high proportions in midden 66, while the only juvenile correlate was recovered in midden 55 (45 metres distant). The second most popular horizontal incising motif is no. 2 which has high proportions in midden 69; none of the four juvenile correlates was found in this vicinity. These were, in fact, recovered in areas 120-140 metres distant. The most popular incising/punctate combination motif among adult pipes (no.54) was most prevalent in a midden 180 metres from the only juvenile version.

In addition, four juvenile pipes represented attempts to copy three unusual adult motifs (71, 72, 74); only one case for each of these adult versions was recorded and no juvenile copies were found near them (figure 5.5).

It is obvious from the above analysis of motif distribution comparisons that: (A) the loci of juvenile element disposal did not equal the discard locations of those adult elements which may have provided the models; (B) the adult motifs are elaborations of earlier experimentation by the same artisan who later moved upon marriage; or (C) the sphere of influence which affected the selection of attributes by a juvenile was not restricted to his home environment. Given the lack of centralization and patterning in the distribution of similar motifs among juvenile pipe bowls (and the probability that these are primary refuse deposits), it is likely that our last explanation (C) is a more accurate reflection of the systemic context.

*Note: the adult motif popularity was ascertained by comparing the percentage of cases in each provenience unit with the total percentage of bowls recovered in each house or midden. See appendix II for motif descriptions.

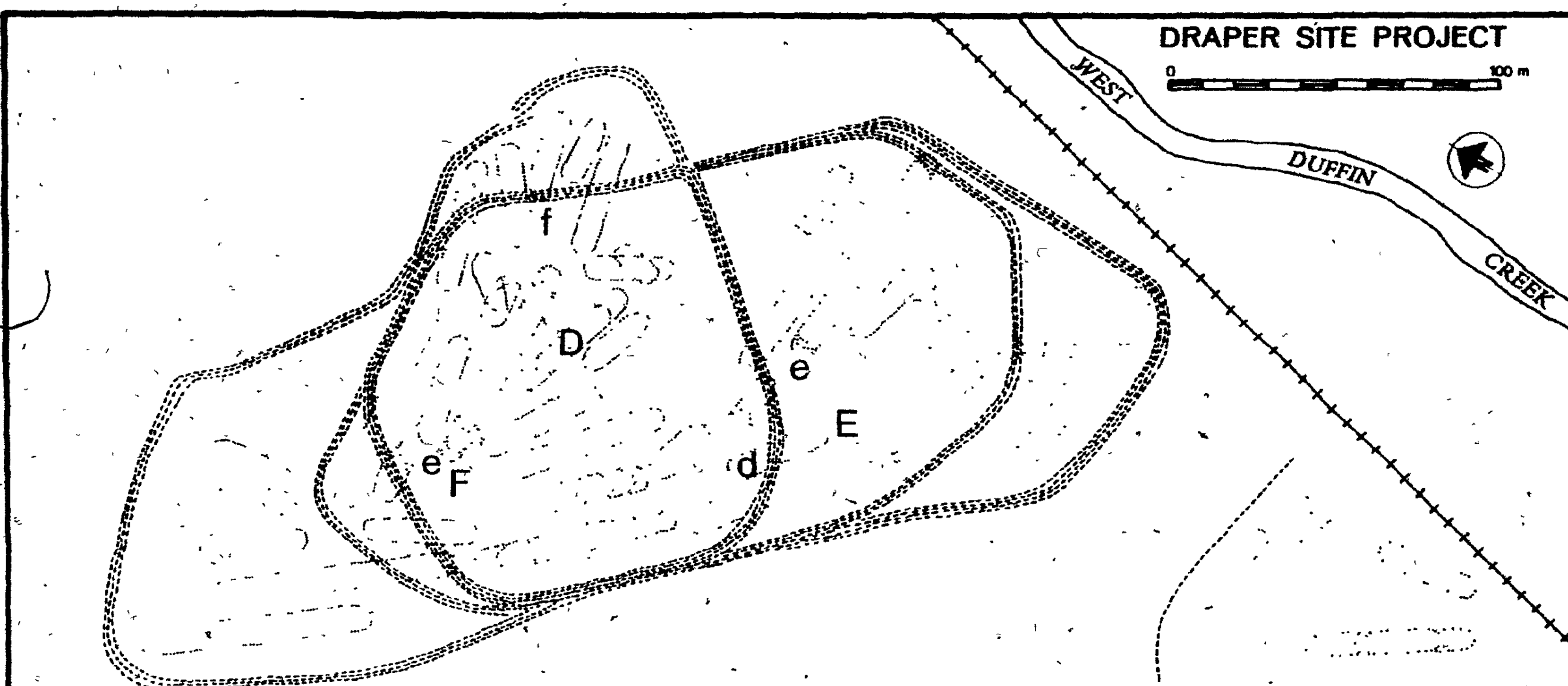

Figure 5.5 JUVENILE/ADULT PIPE COMPARISONS: Unusual motif distributions

D Adult motif #71 occurrence
d Juvenile correlate of #71 occurrence

E Adult motif #72 occurrence
e Juvenile correlate of #72 occurrence

F Adult motif #74 occurrence
f Juvenile correlate of #74 occurrence

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Conclusions

235 pipe fragments recovered at the Draper site belonged to elements manufactured by Huron children. These juveniles were either not particularily interested in copying familiar Draper pipe designs or were incapable of producing motifs and forms popular among older villagers. There was a tendency to produce very simple decorative motifs and these were often randomly applied. The few exceptions in which Draper motif attempts may be identified were discarded in areas up to 180 metres distant from adult versions. It is probable that the sphere of influence which affected the mimicry of attributes by juveniles was not restricted to their home environments.

The fact that we are able to identify two distinct sub-classes of artifacts (*i.e.*:'juvenile' and 'adult') indicates a shortage of transitional stages in the learning of element manufacture. I suggest that the line between 'juvenile' and 'adult' production occurred at the point when the *purpose* of the pipe changed from mere toy to functional smoking device; this was in all probability a sudden occurrence and may have had social motivations. It was only upon tobacco use, that serious efforts were made to produce the stylistically constrained motifs found on many Iroquoian sites. Whether the Huron had by this time moved to his post-marital residence is, of course, a matter of conjecture. A lack of 'transitional' stages may also suggest that members of the Draper community were not continuously engaged in the learning of pipe manufacture. Such activities may have been restricted to juveniles and specialists.

5E) *CLAY PIPE PREFORMS*

Introduction

During the preliminary stages of ceramic manufacture, a piece of clay is often given a rough shape such that finer modifications can proceed on an object which at least partially approximates the end product. It is at this *preform* stage that the disposal of the piece (perhaps because of imperfections in temper or clay composition) is more likely to occur, rather than at subsequent points when much time and effort has already been spent in the fabrication process.

At the Draper site no evidence exists to indicate that pipes were discarded between the preform stage and the point when they were ready to function as a smoking device. Although no partially finished pipes were recovered, numerous pieces of ceramic wastage (which were not catalogued as pipes) suggest that Draper pipe artisans sometimes aborted manufacture just prior to the application of the first diagnostic attributes.

Description of the material

Twenty-eight fragments of pipe preforms were recovered at the Draper site. A number of specimens which are probably failed pipe stem attempts were described by Robert Pearce in a volume on miscellaneous ceramic artifacts:

> These pieces have a tapered outline shape, a circular cross-section, a smooth surface texture, grit temper, and all have one end which is broken and rough while the opposite end is smooth (Pearce 1978:3).

Other pipe preforms in the Draper collections also show that the artisan experienced problems during initial stages of manufacture. Several stem holes were quite obviously not centrally aligned within the stem and occasionally reached the outside surface, thus rendering them unusable.

A number of bowl preforms are also easily recognized. In all cases, the bowl cavity is unfinished and consists of a shallow depression which never meets the stem. It is probable that these pipes were not discarded because of irregularities in bowl form but rather because of problems generated by the comparatively more complex stem hole fabrication process.

One very large preform (bowl length from lip to elbow, 65 mm) shows evidence of having experienced an accidental crushing while the clay was yet pliable; a large depression covering the entire side of the bowl has completely obstructed the bowl cavity. Much time and effort would have been required to restore the pipe to a functional form (plate 19g).

Spatial distributions

Of the 28 whole and fragmentary preforms, 23 were recovered in middens and 5 in houses. Figure 5.6 shows that preforms were discarded throughout the core village and the second expansion. The high frequency in midden 52 conforms with the high proportion of pipe fragments recovered there. The plethora of preforms found in midden 66 (the lower central cluster on the distribution map) is, however, startling; given a random distribution of preforms we would expect less than 4% to occur in this area, yet 29% of the sample was recovered in midden 66 and an adjacent house.

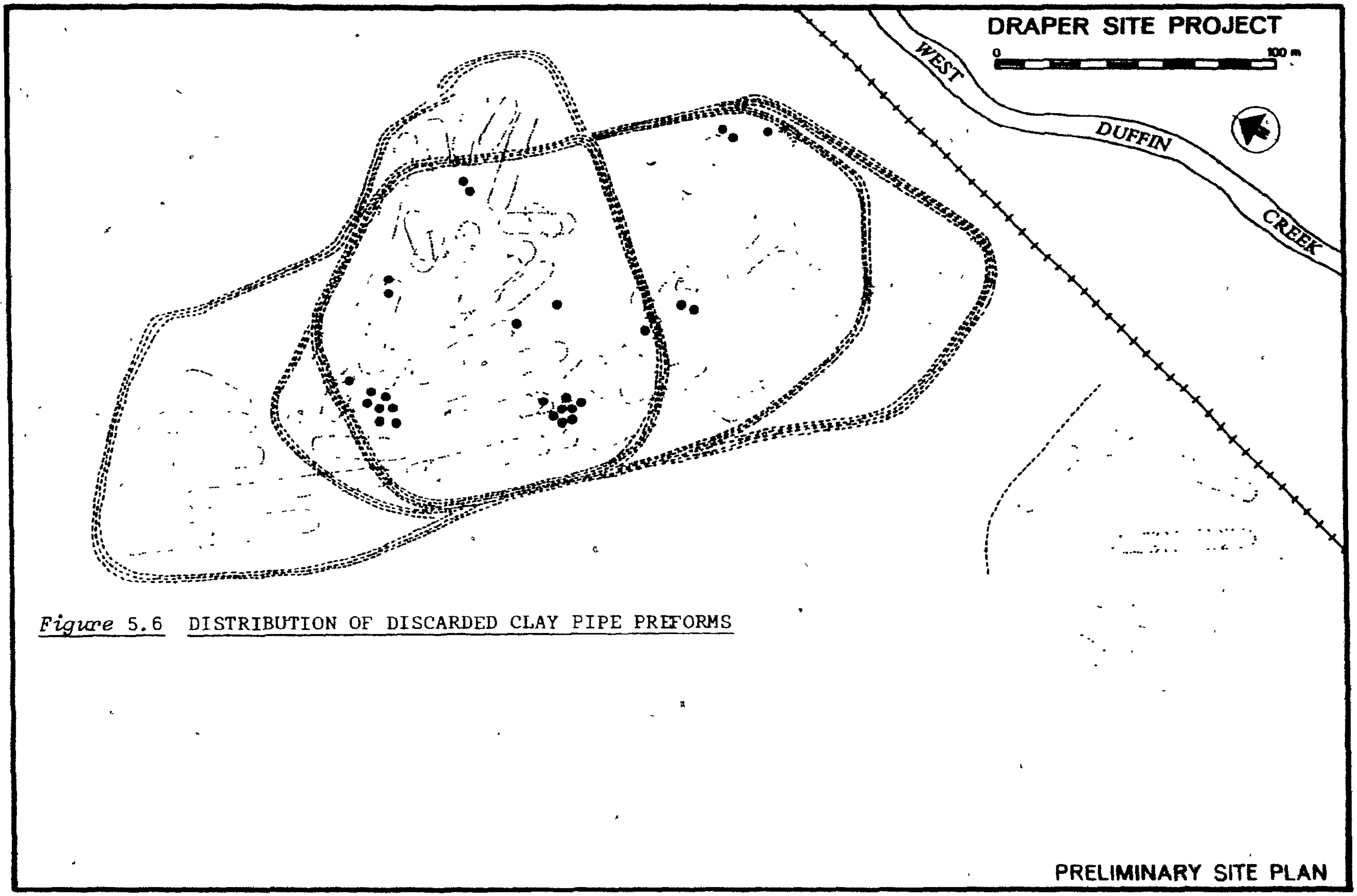

Figure 5.6 DISTRIBUTION OF DISCARDED CLAY PIPE PREFORMS

To conclude: the evidence at Draper suggests that pipes were manufactured in many areas of the town, although one group (specifically the users of midden 66) either accentuated ceramic pipe production or discarded pipe attempts at an abnormally high rate. Reasons for disposal probably varied from anomalies in temper to problems in stem hole manufacture. With preforms and ceramic wastage we can be relatively certain that the loci of manufacture equal (or are close to) the loci of deposition, since these fragments were probably not circulated further within the systemic context. It is possible that some form of specialist production took place in the vicinity of midden 66. This is the same area in which a 'specialist' effigy pipe and an unusually high proportion of recycled mouthpieces were recovered (see section 5B and F).

5F) RECYCLED PIPE FRAGMENTS

Introduction

In our model of element/artifact flow, we noted that after initial use and before final deposition elements may be recycled within the systemic context. In this study, the term *recycled material* will be used in reference to that portion of the sample which reveals evidence of attribute modifications not intended during the original conception and manufacture of elements. It will be assumed that such modifications were usually the result of attempts to maintain or restore the functional utility of fractured elements (*re-use*), or efforts to create entirely new elements from vestiges of older ones (*conservation*).

Examples of such activities are particularily frequent in lithic industries, where a single tool may have gone through several generations of recycling, each involving either an alteration in function or an improvement in use (such as the resharpening of dull working edges). Difficulties in the alteration of fired clay elements have made recycling much less prevalent in ceramics. Although modifications in Iroquoian pipes have been noted in the literature, the following study is the first to analyze them in any detail.

Description of the material

104 cases of recycling may be isolated as involving modification of Draper pipes. Of these, 78 retained their function as smoking devices, 22 were reworked into ceramic tubular beads, and 4 were modified for unknown purposes. The tubular beads have been examined elsewhere (Pearce 1978:9). It is interesting to note that 81.5% of the 27 cases recovered at Draper were originally pipe stems. We will be concerned only with the 82 cases of recycling which did not end their use-lives in the systemic context as beads.

Table 5.4 demonstrates that the majority of recycled cases show evidence of grinding fractured mouthpieces in order to reduce jagged edges at the line of breakage (plate 19a). When a pipe broke at a point where the stem cross-section was thicker than the mouthpiece, the new diameter had to be reduced to its original taper if the use of the smoking device was to be prolonged. Upon breakage of the original ceramic stem, some bowls even had a hole drilled through them, possibly for the insertion of a wooden replacement (the original stem holes would have been too small for such extensions). One pipe had fractures involving both the stem and the upper bowl region. Although the pipe was reduced to merely an elbow, the broken areas were re-worked and smoking was continued (plate 19c). The reason for

Table 5.4 Draper Recycled Pipes

Re-use

	f
Ground mouthpieces	63
Ground trumpet bowl lips	5
Other ground lips	8
Miscellaneous modifications	2
Sub-total	78

Conservation

Effigy modifications	4
Tubular bead manufacture	22
Total recycled pipes	104

grinding fractured bowl lips was probably less functional (plate 19b). The thin lips on trumpet bowls are especially susceptible to breakage. Although such fractures do not seriously impede normal use of the pipe, it is likely that such re-working was practiced to renew their symmetry.

Draper villagers may also have participated in a practice that we have defined above as *conservation*. In addition to the tubular beads, careful scrutiny of several stone and ceramic effigy fragments reveals evidence of attempted salvage. The specimens would not have had a functional value as smoking devices, yet they were repaired as much as possible and kept for unknown purposes. Some fragments also have holes drilled through them and jagged edges ground smooth. One case involves a squatting effigy figure from which all relief depicting details of body, arms, and legs had been carefully removed (these specimens have been described in our treatment of effigy pipes).

Spatial distributions

Of the 82 cases of non-bead recycling, 60 (73.2%) were recovered in middens while 13 (15.9%) were found in houses and 9 (11%) are of unknown provenience.

The spatial distributions of all modified pipes with known provenience are shown in figure 5.7. 12.3% of all mouthpieces found at Draper showed evidence of recycling. Upon closer examination, we find that one area has a much higher proportion of modified stems: 5 of the 19 mouthpieces (26.3%) found in midden 66 have been repaired. No other significant anomalies occur in ground mouthpiece distributions; the number found in each house or

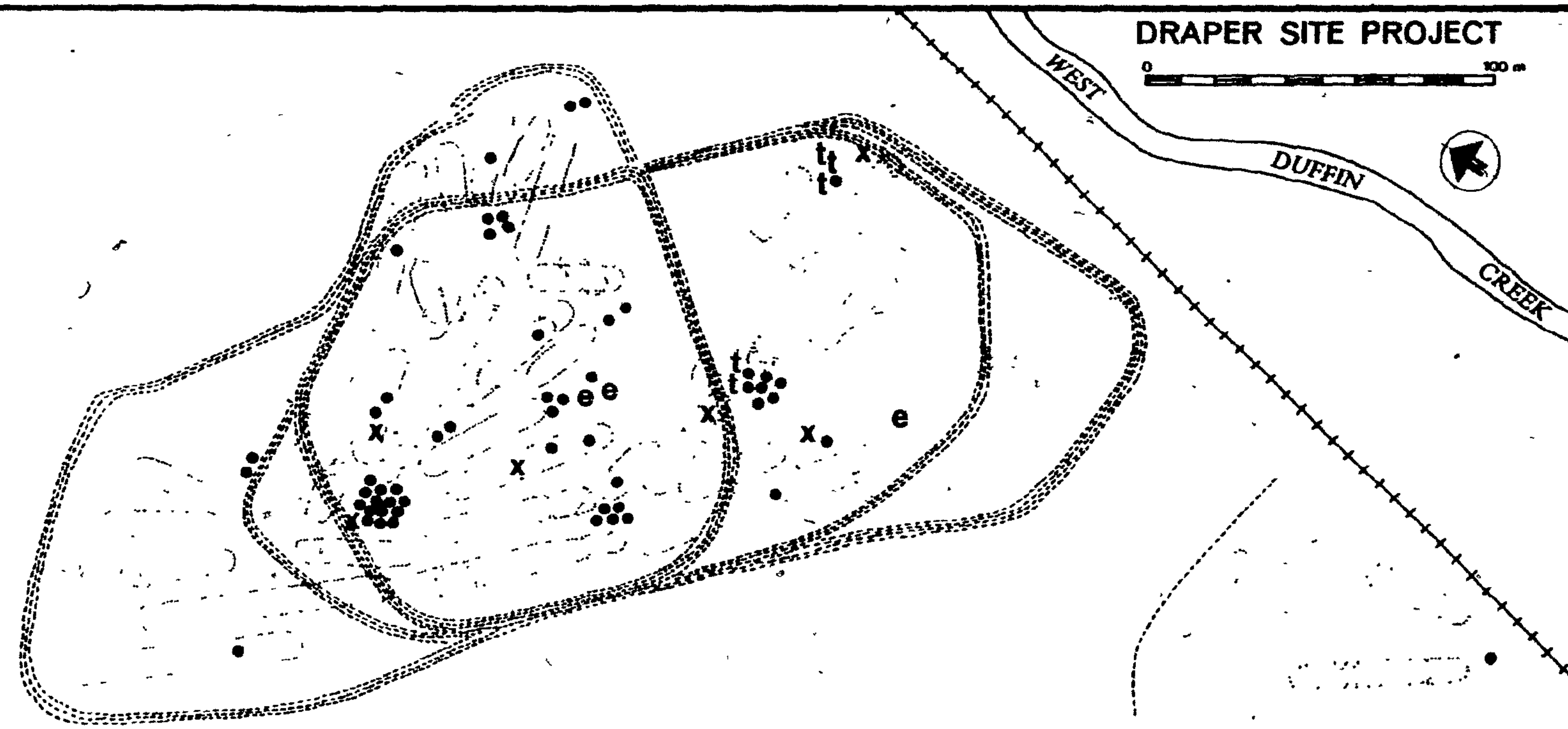

Figure 5.7 DRAPER SITE RECYCLED PIPE FRAGMENT DISTRIBUTIONS

- **e** Effigy Modifications
- **•** Recycled Mouthpieces
- **t** Trumpet pipes with recycled lip
- **X** Other bowls with recycled lip

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midden generally conforms with the proportions of all pipe fragments.

Curiously, recycling activity involving the bowl lip portion of trumpet pipes is non-random; *all* 5 cases of these were recovered in the two middens located at opposite ends of longhouse 17. Even more astonishing is the fact that both these middens have unusually *low* proportions of trumpet pipes in general.

Interpretations

The evidence for recycling in the Draper pipe sample is considerable and may be classified into *re-use* and *conservation* activities.

Of the 104 cases of recycling, 75% involved the re-working of functional smoking devices; the vast majority of these were stem modifications which were probably intended to prolong the use of the pipe, while most of the remainder represented cosmetic repairs to the bowl lip area. This relatively high frequency of re-use activity suggests that pipes were either: (A) highly valued personal possessions that were worthy of maintenance, or (B) difficult to produce from scratch because of limitations of time, skill, or raw material. Some smokers were obviously not concerned with the preservation of original pipe morphology. If the trumpet 'type' had any significant meaning to the user, a new copy would have been manufactured or otherwise procured; instead, upon breakage, the *trumpet* form was sometimes reduced to a *conical* bowl by grinding away the lip area. One case in particular (plate 19c) leaves the impression that the Huron responsible for its recycling was basically interested in the continuance of its function as a smoking device and in the preservation of its very basic symmetry.

That the purpose of recycling activity was to prolong functional utility rather than style is further evidenced by the presence of bowls which, upon the breakage of the original stem, had holes drilled through their sides, possibly for the insertion of a wooden replacement. In these cases repairs were made oblivious of any concerns even for symmetry.

Draper villagers were much less eager to manufacture ceramic beads from raw pieces of unfired clay than they were willing to modify short sections of used pipe stems. Not only were over 80% of their ceramic beads vestiges of smoking devices, but some of their pendants or amulates may have been partially conserved pipe effigies. The fact that effigy pipes were sometimes conserved for use as a completely different class of artifact suggests that these figures had at least one set of meaningful associations that were independent of pipe-smoking activities. Non-effigy bowls, on the other hand, were always recycled for *re-use* rather than *conservation*, indicating that these styles had little further use beyond their basic function as tobacco receptacles.

The one effigy pipe from which all relief depicting details of body, arms and legs had been carefully removed may have been the result of an iconoclastic ritual, or simply a preparation for a change in the symbolic associations attributed to the original smoking device.

Although recycling activity was prevalent throughout the settlement, midden 66 had twice as many ground mouthpieces as expected. This is of utmost significance since, as we saw in our study of discarded clay pipe preforms, this is the same midden which manifests an unusually high proportion of pipe manufacturing wastage. It is possible that the same specialist who manufactured new pipes also recycled fractured examples.

Since all cases of recycled trumpet bowl lips were recovered in two associated middens which contained unusually low proportions of trumpet pipes in general, one individual may have found it simpler to repair a certain pipe style rather than engage in the entire fabrication process. Such repairs may have been made by the owner or by some other individual wishing to prolong the use-life of a fractured element.

It is probable that fractured elements will undergo the transformation from use to deposition much more readily than those still in good condition. Given this, it is also likely that the chances for an ownership change are also higher with recycled elements. Schiffer warns that "recycling may or may not involve a change in user" (1976:38). If there existed a change in user during recycling behaviour, the attributes prevalent in the original manufacture of the element may not be associated with their original loci after deposition occurs.

We have found that during the flow of elements through the systemic context recycling occurs either before or after the deprivation stage. The elements are recycled back to the use stage by being either conserved for other purposes or re-used to prolong their pre-depositional life through maintaining their original function. The greater the extent of such recycling, the higher the probability will be that the loci of manufacture or use will not equal the loci of final deposition.

CHAPTER SIX

6A) INTRODUCTION

An analysis of the intrasite distribution of 4203 pipes and pipe fragments recovered at the Draper site has enabled us to derive some information about prehistoric Iroquoian Behaviour. Previous attempts with similar goals have been futile, since most Iroquoian sites have produced insignificant samples of smoking devices. More importantly, such efforts were unsuccessful because researchers failed to analyse processes contributing to the formation of archaeological sites and found no need to investigate the intellectual processes that enable archaeologists to link artifacts recovered in the present with socio-cultural patterns that existed in the past.

In dealing with the Draper pipes, we found it necessary to undertake a systematic analysis of site formation processes and to build conceptual models relating the present to the past. In chapter two, we demonstrated that archaeological concepts may be conceptualized as a hierarchical structure of dyadic sets (artifacts and elements, proveniences and loci, archaeological contexts and systemic contexts, present and past) and that the role of archaeology is to produce equivalence transformations between the components of each dyadic set. Such transformations are either constitution or reduction processes; the former involve the construction of the past from material recovered in the present, while the latter commence with some external information about human behaviour and end with an archaeological context.

During a transformation involving a constitution process, a particular patterning of spatial distributions of artifacts will only convey a significant message if the researcher has some knowledge of how behaviour in social complexes affects the arrangement of material culture. Every equivalence transformation must therefore begin with a reduction process involving some form of initial knowledge derived from an external model or analogy.

In chapter two, we introduced a model which illustrated the types of *message* and *noise* produced as elements and artifacts flow within or between systemic and archaeological contexts. Our analysis of the Draper sample was accomplished through a series of reduction/constitution oscillations in which we suggested that several kinds of *message* and *noise* (initially postulated in our model) could explain the intrasite distributions of pipe fragments. What follows is a synopsis of all message and noise found during our analysis. This information is organized in terms of our model of element/artifact flow. Each stage in this model involves an oscillation between ethnohistorical information about the past and archaeological information recovered in the present.

6B) PRE-MANUFACTURE: LEARNING PROCESSES

Archaeological information

At Draper the majority of juveniles were not interested in decorating their pipes and those who did were not particularily concerned with copying adult design motifs. The few exceptional cases, in which juveniles possibly did mimic adult motifs, involved pipes that were discarded up to 180 metres from the adult versions. Most juveniles who chose to decorate their pipes, however, were only interested in (or capable of?) producing designs with the most basic decorative techniques. These children had an even greater hesitancy (or inability?) to mimic the general morphological forms found in the adult sample (*sup.* 5D).

The sphere of influence which affected the mimicry of attributes by juveniles appears to have extended much further than their home environment (*sup.* 5D). Indeed, since the parameters of participant observation are dependent on the amount of liberty the child had in moving about the village, a child's influence sphere may not have been restricted to his natal residence. There is an additional possibility of extensive regional influence on Draper art forms, since the settlement may have grown through the amalgamation of villages. Moreover, the tremendous standardization of Iroquoian pipes over time and space suggests that a continuous interaction took place among villages at a regional level. A striking example of this involves an intricately decorated vasiform pipe found at Draper, which shares an astonishing number of attributes with a specimen found at the Dawson site in Montreal (plate 20a *cf.* plate 20b).

It is clear that attribute distributions may be affected by numerous complex interactions between the artisan and his natal, post-marital, village, or regional influence spheres. Indeed, learning processes were probably so complex that their results express themselves as "random" distributions of artifact attributes.

Finally, it was only when an individual was old enough to begin to use tobacco that serious efforts were made to produce stylistically constrained motifs and 'types' (*sup.* 5D). The individual may or may not have moved into his post-marital residence by this time.

Ethnohistorical information

From ethnohistorical records we know that Huron children not only moved freely about the village, but also were sometimes appropriated into fictive kin relationships. The Huron occasionally adopted captured children and integrated them into their own society. Men usually had trading partners among each of the tribes they visited and "some partners seem to have exchanged children as evidence of trust and goodwill" (Trigger 1976:64). Although female members of the matriclan offered some resistance to such practices, the evidence suggests that children may have been transient and any ceramics that they manufactured would not necessarily have involved attributes associated with one particular social unit. Some researchers have also observed that Amerindian children apparently learned through example rather than formal instruction (Tooker 1964:124n). If ostentation (the act of showing or demonstrating) was indeed the primary learning mechanism, juveniles may have been influenced by pipe manufacturing techniques observed almost anywhere in the village.

6C) MANUFACTURE

Archaeological information

Although we cannot know for certain what percentage of all pipes used at Draper were recovered in the archaeological context (or what the average use-life of a pipe was), the number of smoking devices is not overwhelming, considering the size of the population and length of site occupation.

The frequent reuse of fractured pipes suggests that smoking devices may have been difficult to manufacture from scratch (*sup.* 5F). Both adults and juveniles made pipes and it is probable that functional tobacco receptacles and toy versions were not manufactured by the same individuals (*sup.* 5D). Smoking pipes were manufactured by initially producing preforms that were modelled to approximate the end product, but which lacked any diagnostic attributes. Although defective preforms were abandoned, no evidence exists that pipes were discarded between the 'preform' stage and the point when they were ready to function as smoking devices (*sup.* 5E). Although pipes were manufactured throughout the core village and the second expansion, one midden and an adjacent house contained unusually high proportions of ceramic preforms, suggesting that they may be the locus of some form of specialist production (*sup.* 5E). Pipe manufacture at Draper possibly occurred through a low level, informal specialization: "incipient specialization" (*sup.* 5B). Such specialist production is characterized by superior skill in the technology of production, low variability in idiosyncratic decoration and morphology, and a wide areal distribution of resulting products (Rice 1981:223).

Over a decade ago, Noble surmised that women designed and manufactured pipes (1968:297). He currently believes that "while Iroquois men carved or fashioned their own pipes, women probably fired the clay examples" (1979:23). This shift from a division of labour based on raw materials to a division of labour based on manufacturing stages is remarkable, given the fact that researchers have reported a significant quality distinction between pipe and female associated pottery manufacture. Trigger (following Kidd 1952:73) hypothesized that "pipes were better made than pottery vessels because clay was either more carefully selected or better fired" (1969:35). It appears that qualitative differences in ceramic manufacture not only may be related to division of labour or variation in the function of products but also may be linked to the possibility that pipe-making involved a higher degree of specialization than pottery manufacture.

Ethnohistorical information

Ethnohistorical accounts written shortly after European contact with native North Americans provide little information about the manufacture of smoking devices. Calumets, which were used by some Amerindian groups, were manufactured by men (Thwaites 67:167). For the Huron, it remains uncertain whether men or women made the enormous quantities of clay pipes (Trigger 1976:45). Boucher noted that men made the pipes (Boucher 1664:101), yet this passage has been the subject of considerable controversy since he does not specify whether these pipes were of stone or clay. Although there appears no reason why one sex should manufacture only one portion of the artifact class (and more importantly, Boucher did not note such an unusual distinction), ceramics are generally identified with feminine activities. In any case, we do know that all items related to smoking were not manufactured by men: tobacco pouches were the products of female skill (Thwaites 44:265; Wrong 1939:102).

6D) POST-MANUFACTURE/PRE-USE

Archaeological information

Since it is probable that at least some pipes were made by specialists (*sup.* 5B; Trigger 1969:35), it is likely that much of the Draper sample was laterally cycled shortly after manufacture and just prior to use. Such lateral cycling caused by specialization increases the probability that the loci of manufacture do not equal loci of use.

Ethnohistorical information

It is possible that pipes which had not entered the use-stage were offered as presents. Evidence of gift-giving and other redistributive mechanisms among the Huron is discussed in section 6E below.

6E USE

Archaeological information

Based on the intrasite distribution of pipe fragments, smoking was probably not confined to any particular area of the settlement. Pipes were used as tobacco receptacles by adults, while juveniles seemed to have used them merely as toys or for practice (*sup.* 5D).

It is possible that variations in pipe bowl and stem surface texture are a function of use rather than manufacture. Those ceramic pipes which had been used extensively would have undergone substantial polishing as a result of the prolonged transfer of sebaceous secretions to their surface. At Draper, high proportions of polished fragments were found in the middens, while "newer" examples were recovered in houses (*sup.* 4C).

There is no archaeological indication that effigy pipes (when used as smoking devices) were accorded special treatment or had significant socio-cultural meaning that was different from "regular" pipes (*sup.* 5B). Such effigies, however, were sometimes reused as objects other than tobacco receptacles such as amulets (*sup.* 5F). This suggests that the figures had at least one set of meaningful associations that were independent of pipe-smoking activities.

In 1968, Noble argued that pipe effigies represented a man's matrilineal totem. If by lineage, Noble meant clan segment, then the argument is certainly attractive, since the male members of such clans probably lacked residential unity and may have depended on totems to provide them with identification and solidarity. Some aboriginal groups (*e.g.* Creek Indians) had matriclans that were associated with animals. Yet whether such a totemic complex was part of Huron social structure is debatable and most agree with Trigger that "more detailed evidence and more sophisticated analysis are needed before Noble's claim can be accepted" (1976:439n). We must also remember that, although there is a marked diversity of animal species present on effigy pipes, the number of different styles found on all Huron sites, including Draper, is far less than the estimated number of clan segments. Mathews has noted:

> For too long these sculptured pipes have been the object of an attempt at pigeon-holing which simply does not work...until recently no one seemed bothered by the fact that there were animals without clans and clans without animals (1976:27).

Despite this, Wright claimed that "evidence now exists that certain pipe styles, particularily the effigy pipes, are probably associated with specific units of Iroquois society such as clans" (1972:56). This is based on as yet unpublished site report data (Wright: personal communication). It is likely that such evidence is dependent upon Noble's suggestion that effigy pipes recovered in houses might reveal the locations of lineages (1968:297). As our present study shows, however, it is unlikely that the context of use consistently equals the context of deposition. Others have noted that the lineage group occupying the structure may change during the life of the house (Kapches 1979:26). Moreover, if men made and used the pipes and the Huron were matrilocal, any lineage-house associations would disappear during post-marital residence changes.

Ethnohistorical information

Unlike the manufacture of pipes, a tremendous number of ethnohistorical references illuminate the use of tobacco and smoking devices. The Jesuits noted that native North Americans often expressed their love for pipes and tobacco (Thwaites 5:113; 7:137,139; 17:81,83,127; 18:187; 20:187; 29:157; 44:279; 65:209) and it seems that smoking was a regular and habitual practice (Wrong 1939:121). Jesuit descriptions of native people include references to tobacco pouches and pipes (Thwaites 15:155) and they seldom appeared without tobacco (Wrong 1939:85).

Although the prevalence of smoking is stressed in almost every early European account of native practices, precisely who used tobacco in Huron society is unclear. Sagard observed that there was "nobody who does not take tobacco" (Wrong 1939:88) and others noticed that tobacco pouches were carried by "nearly all" (Thwaites 5:131). We know that women sometimes demanded tobacco (Thwaites 17:173) and that Jesuit Fathers occasionally gave children tobacco in return for bringing water (Thwaites 7:139). Yet since tobacco was used for a myriad of different purposes, simple possession of the substance does not imply smoking. In a letter dated 1723, Father

Sebastien Rasles noted that the Abnakis "are devoted to tobacco; men, women and girls, all smoke the greater part of the time" (Thwaites 67:141). We must remember, however, that Rasles was working with a different Amerindian group over 200 years after Draper was occupied.

The Jesuits also postulated a number of reasons why tobacco smoking was an essential part of everyday living. Some suggested that smoking was a replacement for food (Thwaites 7:137; 10:203; 32:229-31; 58:31; Wrong 1939:113,199), satisfied hunger (Thwaites 7:139; Wrong 1939:62), warmed the stomach, broke up indigestible matter (Wrong 1939:88), and maintained a general state of good health (Thwaites 18:187). In addition to these biological explanations, the Jesuits observed that pipe smoking facilitated socializing (Thwaites 27:249; 58:187-9; 59:119) and served to demonstrate solidarity between friends (Thwaites 27:301; 40:207; Wrong 1939:88). During meetings, pipe smoking took the place of conversation (Thwaites 26:161), "appeased the passions" (Thwaites 10:219), and enabled them to "see clearly through the most intricate matters" (Thwaites 10:219; 15:27).

A considerable number of ethnohistorical accounts also reveal the time and place of pipe smoking. Although some merely note that pipe smoking occurred "perpetually" (Thwaites 27:285; 38:253) during the day or evening (Thwaites 12:117), others specify certain occasions: before going to sleep, in the middle of the night, during journeys, upon re-entering the house, and while paddling a canoe (Thwaites 7:137). Pipes were also used at meetings (Biggar 1925:283,284; 1929:182,183; Wrong 1939:150), councils (Thwaites 10:219; 28:295; 38:253), during "talks, treaties, welcomes and endearments" (Thwaites 3:117), and at festivals during which "nothing is consumed except tobacco in pipes" (Wrong 1939:112). Pipes were smoked during the torture of prisoners (Thwaites 14:269; 39:65; 40:133) and smoking devices were actually used to torment captives by thrusting the tips of fingers into lighted pipes (Thwaites 24:281; 40:135; 47:85) or by searing prisoners with red-hot bowls (Thwaites 26:43; 40:135). Since pipes were also used to hit prisoners (Thwaites 40: 135) there was probably a much greater chance of breakage during torture activities.

It appears then that a considerable amount of time was spent smoking (Wrong 1939:96; Thwaites 3:117) and that this practice was not confined to any specific locale (*c.f.* Hayden's statement that pipes were "used by men on ceremonial occasions" [1976:5], and Mathews' erroneous observation that "in the early literature on the Iroquoians, tobacco is never cited as having a secular function; in all cases it is associated with ritual and ceremonial events" [1978:161]). A great deal of smoking occurred in the houses of friends and relatives. Since individuals would often bring their own pipes (Thwaites 7:137), it is quite conceivable that smoking devices were frequently broken outside the residence in which their owners usually lived. Moreover, pipes were used during journeys (Wrong 1939:99) and in settlements quite distant from their original place of production (Thwaites 21:47; 27:255-7; 48:261). In short, pipe smoking did not merely occur around one's campfire (Thwaites 3:117; 46:27); rather, as one Jesuit wrote, it was practiced "everywhere" (Thwaites 38:253).

Finally, one ethnohistorical source raises the possibility that the same effigy figures found on pipes were also present on perishable objects (Wrong 1939:98). This fortifies the archaeological evidence (above) that some figures had meanings unrelated to smoking. It is also reminiscent of Franz

Boas's contention that symbolic ideas and style may exist independently of each other (*sup.* 5B).

6F) <u>*POST-USE/PRE-DEPOSITION*</u> *(S-S Transformation: redistributive mechanisms)*

Archaeological information

Before elements reach the depositional stage they may, for a variety of reasons, be redistributed within the systemic context. Although the reasons for various redistributive mechanisms cannot be accurately deduced from archaeological remains, their results may be manifested in the distribution of artifacts within the site.

Some redistribution of elements may be linked to Binford's (1973) notion of "curate behaviour"; objects for various non-social reasons are cycled laterally through space in all cultural systems, often resulting in the homogenization of artifact distributions.

Pre-deposition redistribution may also be related to social composition. According to Longacre (1964), Deetz (1965), and Hill (1966), different decorative attributes should occur in spatially distinct areas if the society was matrilocal and the artisans were women. Conversely, one would expect to find a random distribution of male-conceived or manufactured attributes in matrilocal societies, since the men moved in with their wives taking their possessions with them. In addition to such physical circulation of finished objects, there may have been a movement of mental templates, as villagers changed residence and took their manufacturing knowledge with them. Yet, even a complex network of matrilocal residence changes could not have been responsible for the tremendous homogeneity of spatial distributions observed at the Draper site (*sup.* 4D). We must survey the ethnohistorical record for clues.

Ethnohistorical information *

Pipe sharing seemed to occur frequently in Huron life (Wrong 1939:88), whether it was between friends (Thwaites 27:301) or occasionally between a chief and a prisoner (Thwaites 13:55). Although pipes were passed from hand to hand (Thwaites 3:117), it is likely that such temporary redistributions of personal possessions did not involve a change of ownership.

Among many native North Americans, however, pipes were distributed as presents (Thwaites 26:157,163; 40:203,207; 58:97) and smoking devices appear to have been an acceptable gift (Thwaites 27:271). Presents were often exchanged during visits to distant regions, during feasts held for deceased chiefs (Thwaites 10:287-9), and at the general 'feast of the dead' (Thwaites 10:299-301). Hurons were obliged to fulfill the desires of sick individuals and to do so offered them a vast diversity of desired objects (Biggar 1929:148-50; Thwaites 10:173; 15:179; 33:193,205; Wrong 1939:118), including tobacco (Thwaites 17:173) and probably smoking pipes. The desires of the sick sometimes resulted in the refurnishing of entire houses, so that nothing remained but a "wooden plate" (Thwaites 17:193).

Seventeenth-century missionaries also described an important Iroquoian midwinter ceremony which involved groups of Hurons running into a longhouse and telling the occupants that they had 'dreamed'. The occupants were obliged to

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* For detailed discussions of Huron property redistributive processes see Herman (1956) and Trigger (1976).

offer the objects of the ostensible dream as presents to the dreamer, which the latter was under no obligation to reciprocate (Biggar 1929:164-5; Thwaites 10:177). During such dream guessing ceremonies, nothing was refused (Thwaites 58:209) and Sagard observed that pipes were among the objects offered to the dreamers (Wrong 1939:203).

As part of the reparation for murder, thirty to forty presents were made (Thwaites 10:217-221; 33:243), including all the types of articles the deceased might have used during his lifetime. The relatives of a Huron who was killed in war would offer presents to encourage warriors to form groups and avenge his death (Thwaites 10:271-3). Such payments were also extended to medicine men, who occasionally demanded pipes in return for curing services (Thwaites 13:33).

In addition to these redistributive mechanisms, the Huron often gambled to the extent of losing all of their personal possessions. Numerous pipes may have been lost in this fashion through the years since, as Sagard noted, "gambling is so frequent and so customary a practice with them, that it takes up much of their time" (Wrong 1939:96). Others remarked that the natives, in a constant struggle to regain what they had once lost, "stake tobacco pouches, robes, shoes, and leggings, — in a word, all that they have" (Thwaites 17:205).

The Hurons certainly experienced numerous incidents of theft. Compensation for theft was a redistributive mechanism in itself: the victim was permitted to claim all of the thief's personal possessions (Thwaites 10: 223). Moreover, "a person was legally entitled to claim as his own anything that he found lying about unattended" (Trigger 1969:81). Although there are no references implying the theft of pipes, one young boy was caught stealing tobacco (Thwaites 24:151).

6G) DEPOSITION

Archaeological information

Ceramic pipes were deposited in almost all areas of the Draper settlement. Juvenile refuse probably has remained in much more primary depositions than the highly transient and often recycled adult fragments (*sup. 5D*). Preforms and other attempts at pipe manufacture were discarded during the manufacture stage (*sup.* 5E). It is possible that in these cases the locus of manufacture is equal or close to the locus of deposition, since such elements were not circulated in the systemic context. Most pipes entered the depositional stage after their normal use-life and were consciously discarded either as primary refuse at their loci of use or as secondary refuse away from the area in which they were used. Pipes were discarded either because they were fractured to a point were they were non-functional, or after they had suffered repairable damage. Some smoking devices entered the depositional stage during their normal use-life as a result of being lost in houses or other areas of the settlement. Complete and unfractured pipes recovered in middens are probably secondary refuse and may represent the disposal of a deceased individual's property, *de facto* refuse created through village abandonment, or they may have been simply thrown away. No evidence for the ritual disposal of smoking pipes was found at the Draper site and no special discard processes distinguish effigy from non-effigy pipes (*sup.* 5D). Alterations in depositional environments have changed some refuse from primary to secondary (*sup.* 4E). House cleaning, expansions, contractions, super-positions, relocations, and occupations in areas where palisades previously had stood are all processes which have affected the relation between an element's contexts of manufacture, use, and deposition.

The existence of pipe fragments which may be refitted, but which were recovered in areas up to 332 metres distant, indicates that a considerable amount of refuse transfer occurred at Draper (*sup.* 4E). Part of this may be attributed to scavenging with the intent to re-use or conserve elements (as discussed below); other cases involved dispersing agents during the deposition stage. Among the latter is the use, during cleaning activities, of two middens at opposite ends of a longhouse. The village expansions at Draper probably created additional middens and therefore more choice for refuse disposal (*sup.* 4E).

Ethnohistorical information

The ethnohistorical record provides virtually no data on Huron refuse disposal patterns. We do know that the loss of elements was likely a common phenomenon, since one of the jobs of medicine men was to locate missing objects (Thwaites 10:195).

6H) ***POST-DEPOSITION*** *(A-S transformations: scavenging)*

Archaeological information

At Draper there were a number of efforts to maintain or restore the functional utility of fractured elements (*re-use*) or to create entirely new elements from vestiges of older ones (*conservation*). Although many of these activities may have been practiced by the original owner, others must surely have involved scavenging after the deposition stage (*sup.* 5F).

Pipes with broken stems were reused after grinding the broken edges to their original taper, and, if stems became too short, holes were drilled into the bowls for the insertion of wooden replacements. Even if pipes were so badly damaged that their major morphological features had become unrecognizable, they were often reused. The form of the 'trumpet type' for example, may have had little significance for some users, since upon breakage such pipes were sometimes ground down and reduced to a 'conical' bowl. In fact, during recycling, the Hurons were often primarily interested in the continuation of a pipe's function as a smoking device and in the preservation of its basic symmetry (*sup.* 5F).

One particular area of the village had unusual proportions of recycled mouthpieces. Since this area coincides with our postulated locus of specialist production, it is conceivable that the same individual who manufactured a pipe may have offered to repair it after it had fractured (*sup.* 5F).

At Draper, conservation practices were equally popular. Over 80% of all ceramic beads recovered were originally pipe stems. Since the core village has far too many stems, it is possible that some individuals systematically scavenged certain pipe fragments from other areas for conservation purposes (*sup.* 4D). Occasionally, special pipe fragments found in houses physically match examples found in nearby middens. Occupants either scavenged portions of pipes for non-smoking purposes or cannibalized a selection of fragments, thus keeping them from immediately entering the refuse areas (*sup.* 5C).

Portions of effigy pipes were often salvaged, transformed into completely different classes of artifacts, and kept for purposes unrelated to smoking (*sup.* 5F). There is also some evidence for consistent and patterned scavenging: three fragments of three different pipes each match a specimen recovered in a midden 125 metres distant (*sup.* 4E). Many of these widely spread distributions of physically matching fragments and other refuse could have resulted from scavenging, motivated through re-use and conservation practices. It should be noted that there is a higher probability that the locus of manufacture will not equal the locus of final deposition with reused, conserved, or otherwise recycled elements.

Scavenging activities were not merely restricted to elements deposited during the life of the settlement, or within the palisade. During the early excavations of the Draper site in the 1960s, a fragment of a clay platform pipe was found which was obviously not part of the indigenous pipe pool (plate 9m). Ramsden hypothesized:

> ...only a highly improbable sequence of events could result in the possession of the pipe by an inhabitant of the Draper Site. Perhaps it was brought to Ontario during Middle Woodland times, broken and lost, and found later by an Iroquoian curio gatherer (1968:117).

Examples of curio collecting in other artifact classes at Draper also exist. A copper knife and Late Archaic/Early Woodland projectile points considerably predate the Huron middens in which they were found. The vertical context suggests that these do not represent earlier occupations at the site.

Ethnohistorical information

There is ethnohistorical evidence that the Huron glued broken pipe fragments together with blood drawn from the incisions made in their arms (Wrong 1939:197). Although this seems a rather curious practice, pipes could be satisfactorily repaired in such a fashion. When platelets found in human blood come in contact with a rough surface, the production of fibrin results. Fibrin is a collagenous substance that is strongly adhesive and capable of bonding porous and non-porous materials.

Hurons also systematically picked up stones with peculiar shapes or any objects which appeared to have unnatural attributes (Thwaites 33:211). There is no reason why fragments of pipes might not have been included in this collecting activity and transformed into some of the charms said to have been carried by nearly all individuals (Thwaites 15:181).

6I) SUGGESTIONS FOR FUTURE RESEARCH

In the course of our analysis of the Draper pipes we have meandered through a complexity of both theoretical and substantive issues. Draper has provided us with a unique opportunity to analyze a fascinating portion of Iroquoian material culture and simultaneously to scrutinize the mental operations carried out in archaeological constructions. In both these endeavors, however, we have but merely skimmed the surface; what lies beneath is an intricate sedimentation of relations between data and theory.

Future research involving spatial distributions of Iroquoian artifacts should investigate site formation processes and develop models of element/artifact flow. Such models must systematically isolate all stages of an artifact's pre- and post-depositional life that effect its archaeological provenience. Although most archaeologists automatically engage in what we have defined as *reduction/constitution oscillations* between models of the past and data recovered in the present, the routinization of this intellectual activity is seldom questioned. Any further work with similar goals should be accompanied with a continuous awareness of how material examined in the present suddenly becomes transformed into information about the past. It is only then that Iroquoian research may finally begin to make significant contributions to the general corpus of archaeological theory.

Future researchers dealing specifically with Iroquoian pipes should pay closer attention to juvenile artifacts, preforms, and evidence for recycling. Work on the isolation of idiosyncratic *vs.* normative and essential *vs.* inessential attributes is also recomended. Determination of the extent of regional interaction on pipe morphology and a systematized nomenclature of pipe 'types' are also desperately needed. Such work requires exhaustive inter-site comparisons and hence lies outside the scope of the present study.

APPENDIX I

Code for the Description and Analysis of Draper Site Pipe Fragments

Variable code	*Variable label*	*Value code*	*Value label*	*Figure ref.*
1	Data class code	5		
2	Card type code	1		
3	Catalogue number	1-999,999		
4	Subcatalogue number	a-z		
5	Sub subcatalogue no.	1-99		
6	Site	3		
7	House/midden number	1-49	Houses	
		50-99	Middens	
8	Square number	1-999,1-999		
9	Post number	1-999		
10	Feature number	1-999		
11	Level number	1-999,1-999		
12	Stratum number	a-z		
13	Quadrant number	1-4		
14	Subfeature number	1-99		
15	Nature of specimen	1	Whole pipe	7.1A
		2	Bowl	7.1B
		3	Bowl with elbow	7.1C
		4	Bowl with elbow and stem	7.1D
		5	Elbow	7.1E
		6	Elbow and stem	7.1F
		7	Elbow with stem and mouth.	7.1G
		8	Stem	7.1H
		9	Stem with mouthpiece	7.1I
16	Mouthpiece shape	1	Tapered - flat	7.2A
		2	Tapered - flared	7.2B
		3	Pointed - round	7.2C
		4	Tapered - angular	7.2D
		5	Straight - flat	7.2E
		6	Pointed - flat	7.2F
		7	Straight - flared	7.2G
		8	Straight - irregular	7.2H
		9	Grooved	7.2I

Variable code	*Variable label*	*Value code*	*Value label*	*Figure ref.*
17	Method of stemhole manufac.	1	Reed - 1 hole	
		2	Reed - 2 holes	
		3	Reed - 3 holes	
		4	Reed - 4 holes	
		8	Untwisted fibre - 1 hole	
		9	Twisted cord - 1 hole	
18	Stem cross-section shape	1	Round	7.2J
		2	Ovoid	7.2K
		3	Keeled	7.2L
		4	Rectanguloid	7.2M
		5	Triangular	7.2N
		6	D-shaped	7.20
		7	Irregular	7.2P
19	Stem decorative motif	1-20	Motif	Appendix II
20	Stem decorative technique	1	Pigmentation	
		2	Incising	
		3	Punctates - round/blunt	
		4	Punctates - round/pointed	
		5	Punctates - irregular	
		6	Incising - punctates	
		7	Other	
21	Stem surface texture	1	Smooth	
		2	Polished	
		3	Grainy	
22	Material	1	Clay - untempered	
		2	Clay - grit tempered	
		3	Clay - shell tempered	
23	Average temper size	0	less than 1 mm	
		1	1 mm	
		2	2 mm	
24	Bowl surface texture	1	Smooth	
		2	Polished	
		3	Grainy	
25	Bowl surface evenness	1	Even - unstriated	
		2	Even - striated	
		3	Uneven - unstriated	
		4	Uneven - striated	
26	Dominant exterior bowl colour		(not used in this analysis)	
27	Pipe height	1-99	Millimetres	7.3A
28	Pipe length	1-99	Millimetres	7.3B

Variable code	Variable label	Value code	Value label	Figure ref.
29	Bowl orifice shape	1	Round	7.4J
		2	Ovoid	7.4K
		3	Rectanguloid	7.4L
		4	D-shaped	7.4M
		5	Triangular	7.4N
30	Bowl length	1-99	Millimetres	7.3C
31	Bowl width	1-99	Millimetres	7.3D
32	Angle of stem axis to bowl axis	1	90 degrees	7.3E
		2	95 degrees	7.3E
		3	100 degrees	7.3E
		4	105 degrees	7.3E
		5	110 degrees	7.3E
		6	115 degrees	7.3E
		7	120 degrees	7.3E
		8	125 degrees	7.3E
		9	130 degrees	7.3E
33	Lip shape	1	Flat - level	7.4A
		2	Flat - insloping	7.4B
		3	Flat - outsloping	7.4C
		4	Round - symmetric	7.4D
		5	Round - insloping	7.4E
		6	Round - outsloping	7.4F
		7	Pointed	7.4G
		8	Round - flared	7.4H
		9	Pointed - insloping	7.4I
34	Exterior bowl shape	1	Constricted	7.5A
		2	Vertical	7.5B
		3	Outflaring	7.5C,D
35	Exterior surface curvature (profile)	1-21	as per diagram	7.6A - 7.6U
36	Bowl shape at lip	1	Round	7.4J
		2	Ovoid	7.4K
		3	Rectanguloid	7.4L
		4	D-shaped	7.4M
		5	Triangular	7.4N
37	Location of bowl decoration	1	Entire bowl	7.7A
		2	Upper bowl	7.7B
		3	Middle bowl	7.7C
		4	Lower bowl	7.7D

Variable code	*Variable label*	*Value code*	*Value label*	*Figure ref.*
38	Extent of bowl decoration	1	Entire circumference	
		2	At 0 degrees	7.3L
		3	At 180 degrees	7.3K
		4	At 0 and 180 degrees	
39	Data class code	5		
40	Card type code	2		
41	Catalogue number	1-999,999		
42	Subcatalogue number	a-z		
43	Sub subcatalogue number	1-99		
44	Bowl decorative motif	1-999	as per diagram	Appendix II
45	Bowl decorative technique	1	Pigmentation	
		2	Incising	
		3	Incising - punctates	
		4	Incising - punctates - pigment.	
		5	Incising - pigmentation	
		6	Punctates	
46	Lip decorative motif	1-99	as per diagram	Appendix II
47	Lip decorative technique	1	Pigmentation	
		2	Incising	
		3	Incising - punctates	
		4	Incising - punctates - pigment.	
		5	Incising - pigmentation	
		6	Punctates	
		7	Mortice	
		8	Incising - moulding	
		9	Fingernail incising	
48	Interior decorative motif	1-99	(no Draper cases)	
49	Interior decorative technique		(no Draper cases)	
50	General pipe type	2	Iroquois Ring	
		4	Elongated Ring	
		5	Conical Plain	
		6	Plain Trumpet	
		9	Decorated Trumpet	
		10	Ring Trumpet	
		11	Collared Ring	
		13	Vasiform	
		18	Bulbous Ring	
		19	Decorated Bulbous	
		23	Apple Bowl Ring	
		24	Conical Ring	
		25	Plain Apple	
		27	Cylindrical Plain	
		29	Cylindrical Decorated	

Variable code	*Variable label*	*Value code*	*Value label*	*Figure ref.*
51	Collar height	1-99	Millimetres	7.3F
52	Orifice width	1-99	Millimetres	7.3G
53	Orifice length	1-99	Millimetres	7.3H
54	Lip thickness	1-99	Millimetres	7.3I
55	Completeness of bowl	1	Complete	7.8A
		2	Near complete	7.8B
		3	Fragment	7.8C

Note: Variables 51 - 55 have not been used in the intrasite analysis

Figure 7.1

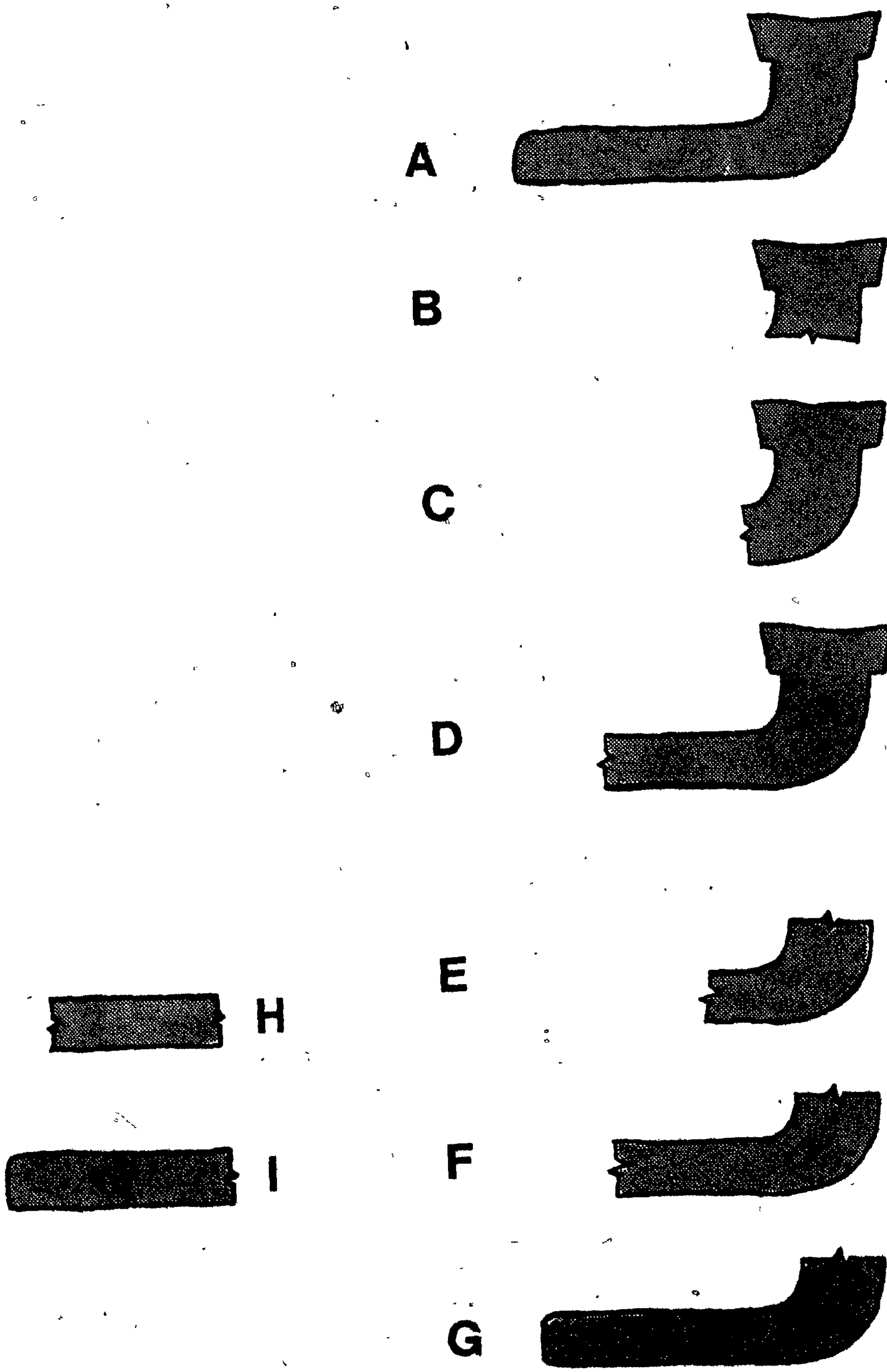


Figure 7.2

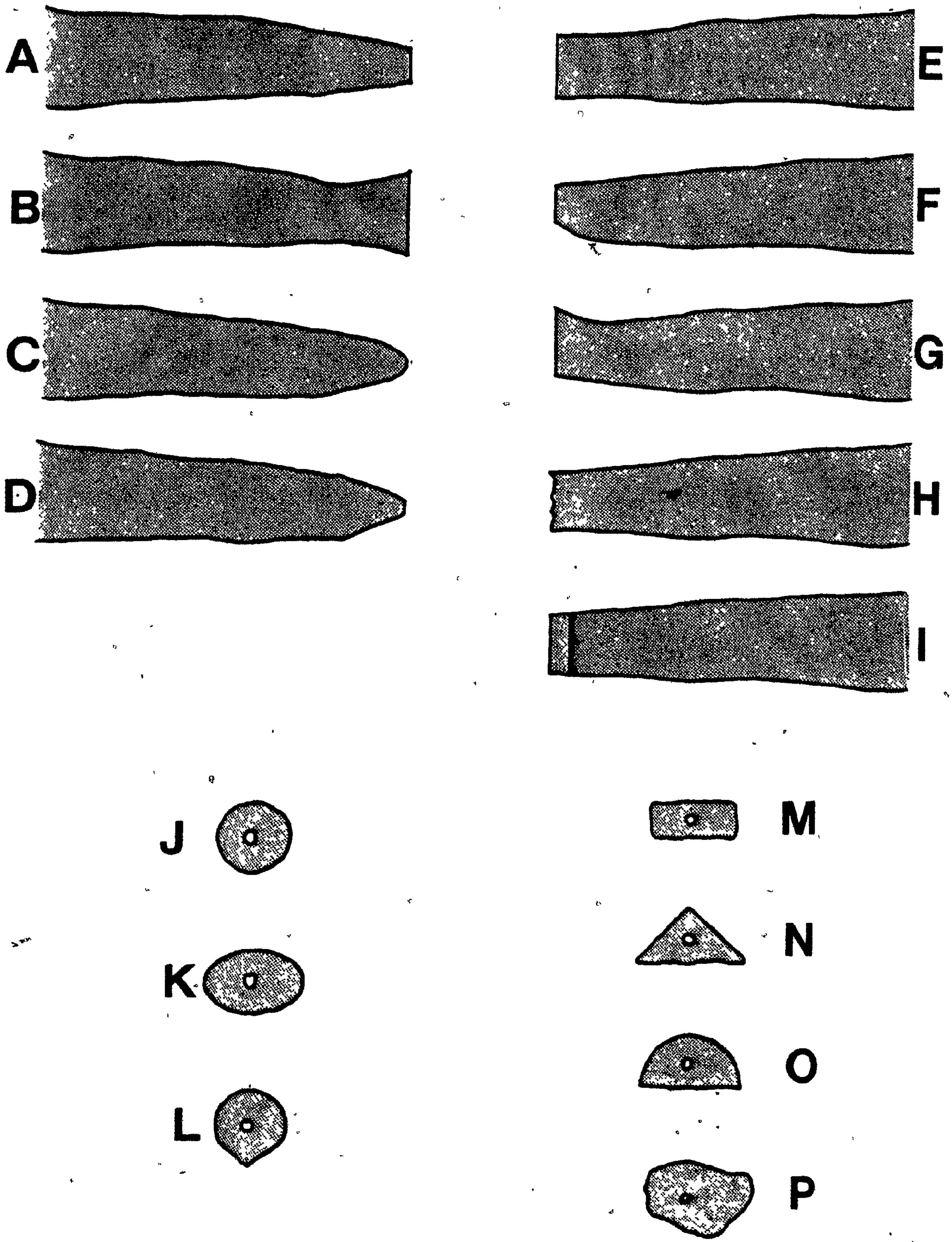


Figure 7.3

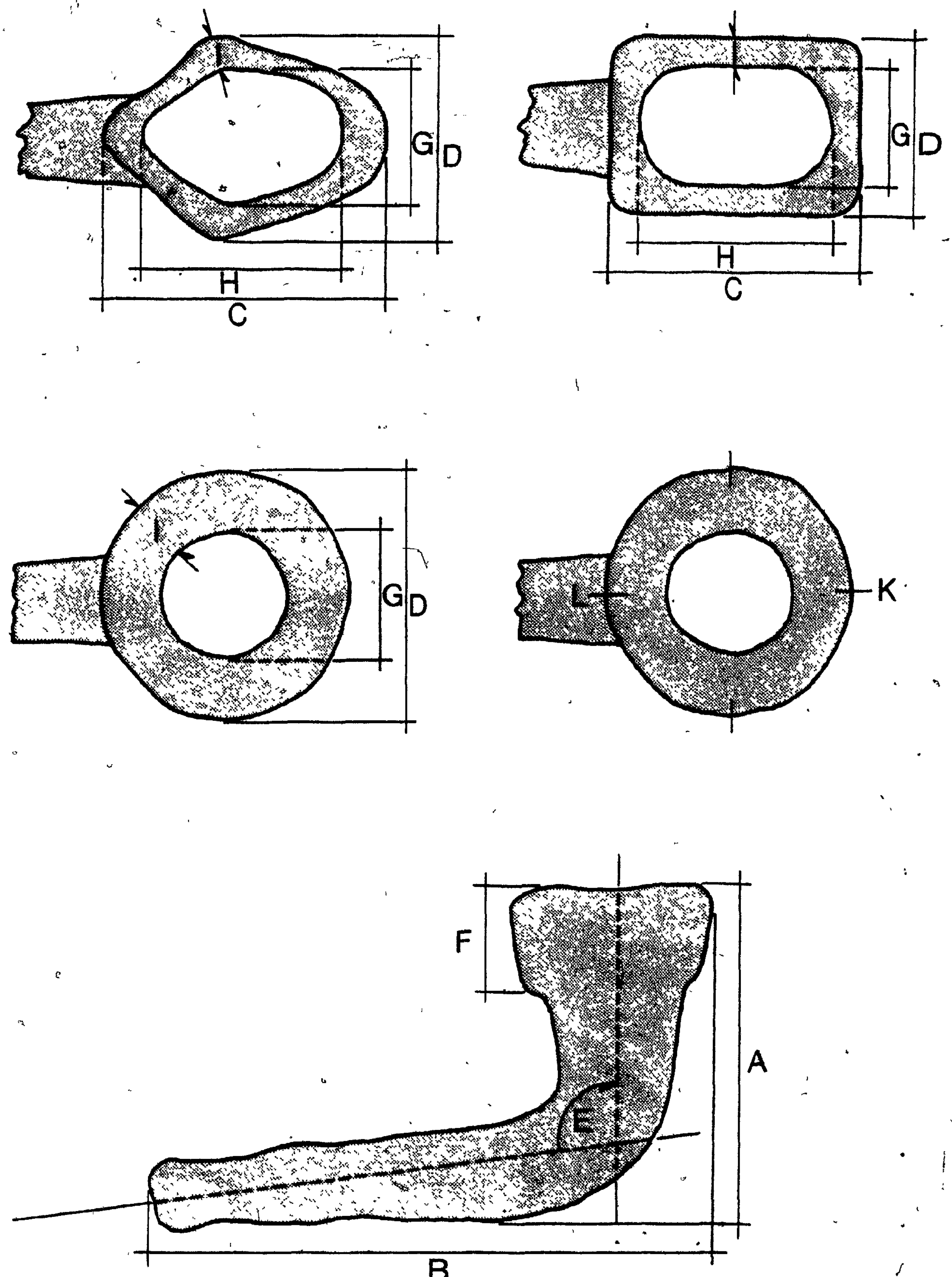


Figure 7.4

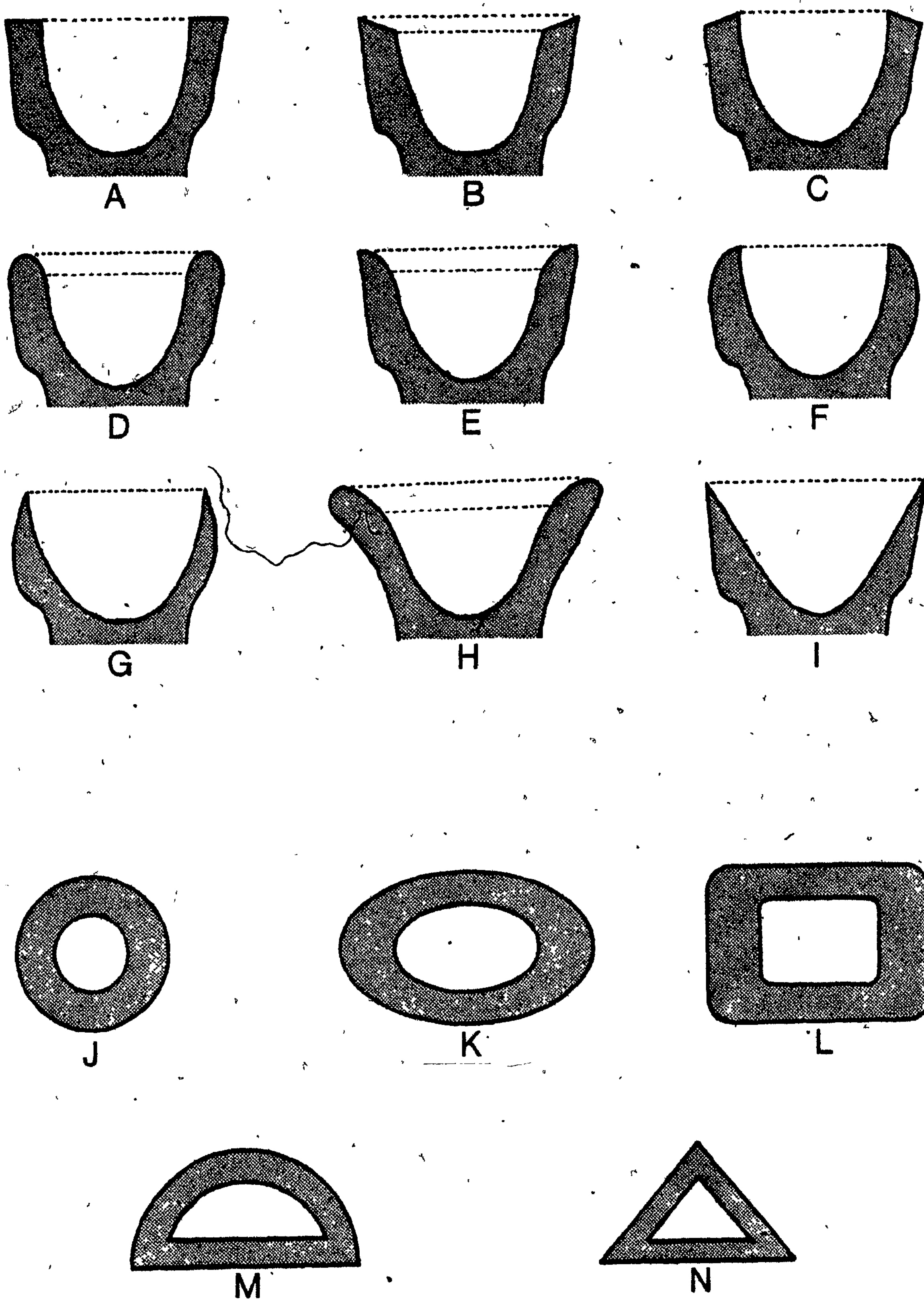


Figure 7.5

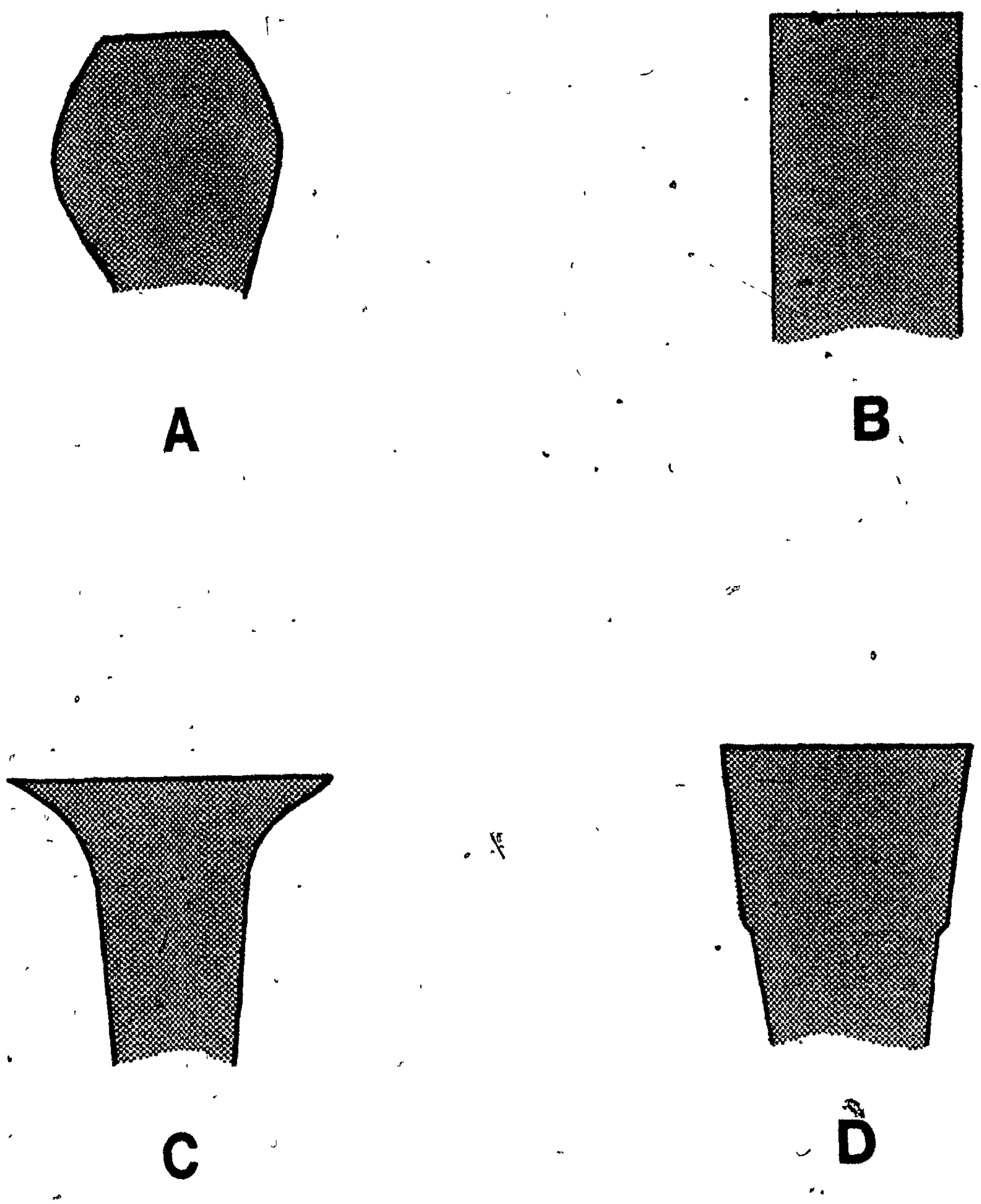


Figure 7.6

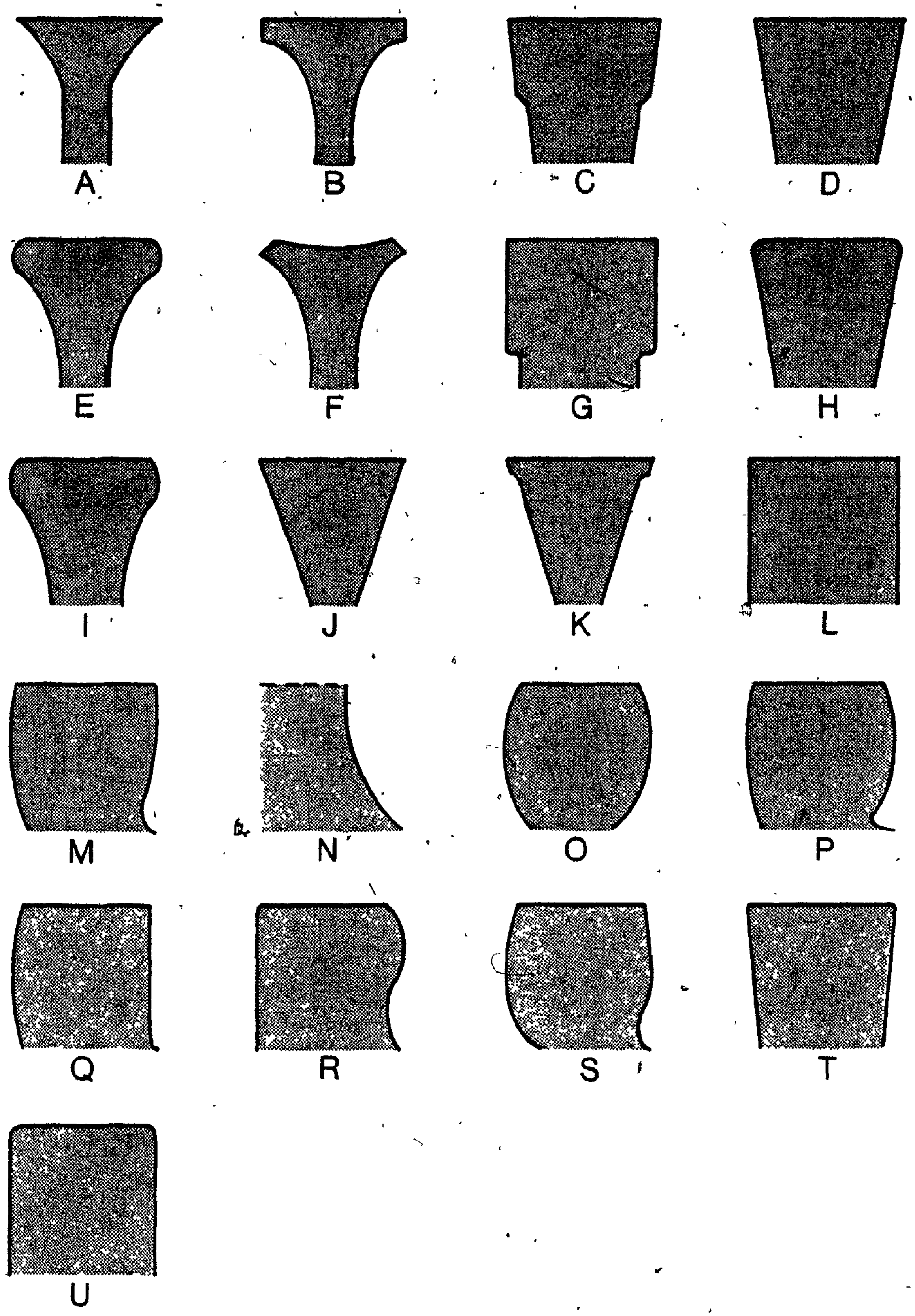


Figure 7.7

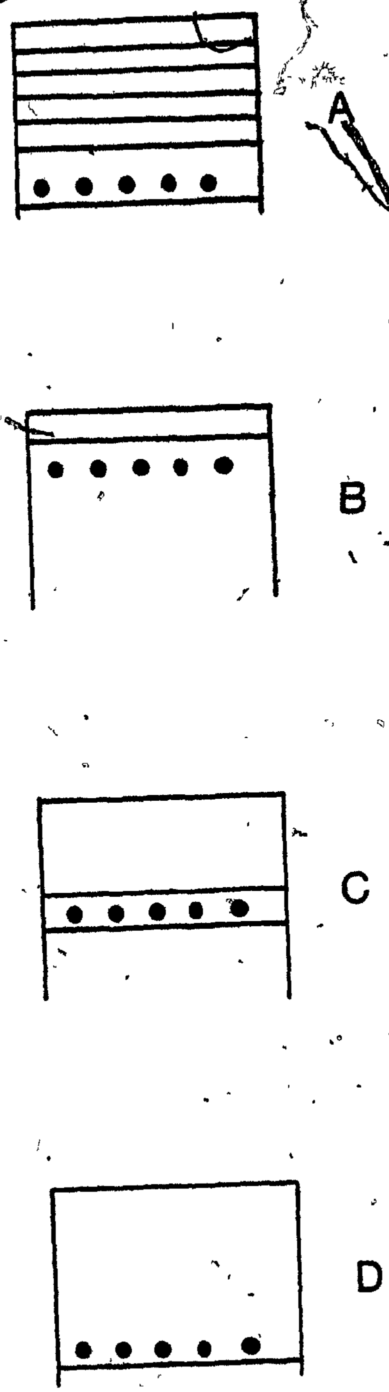
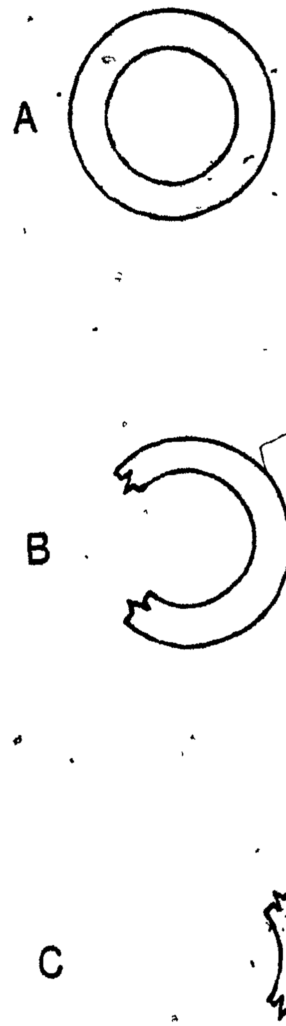
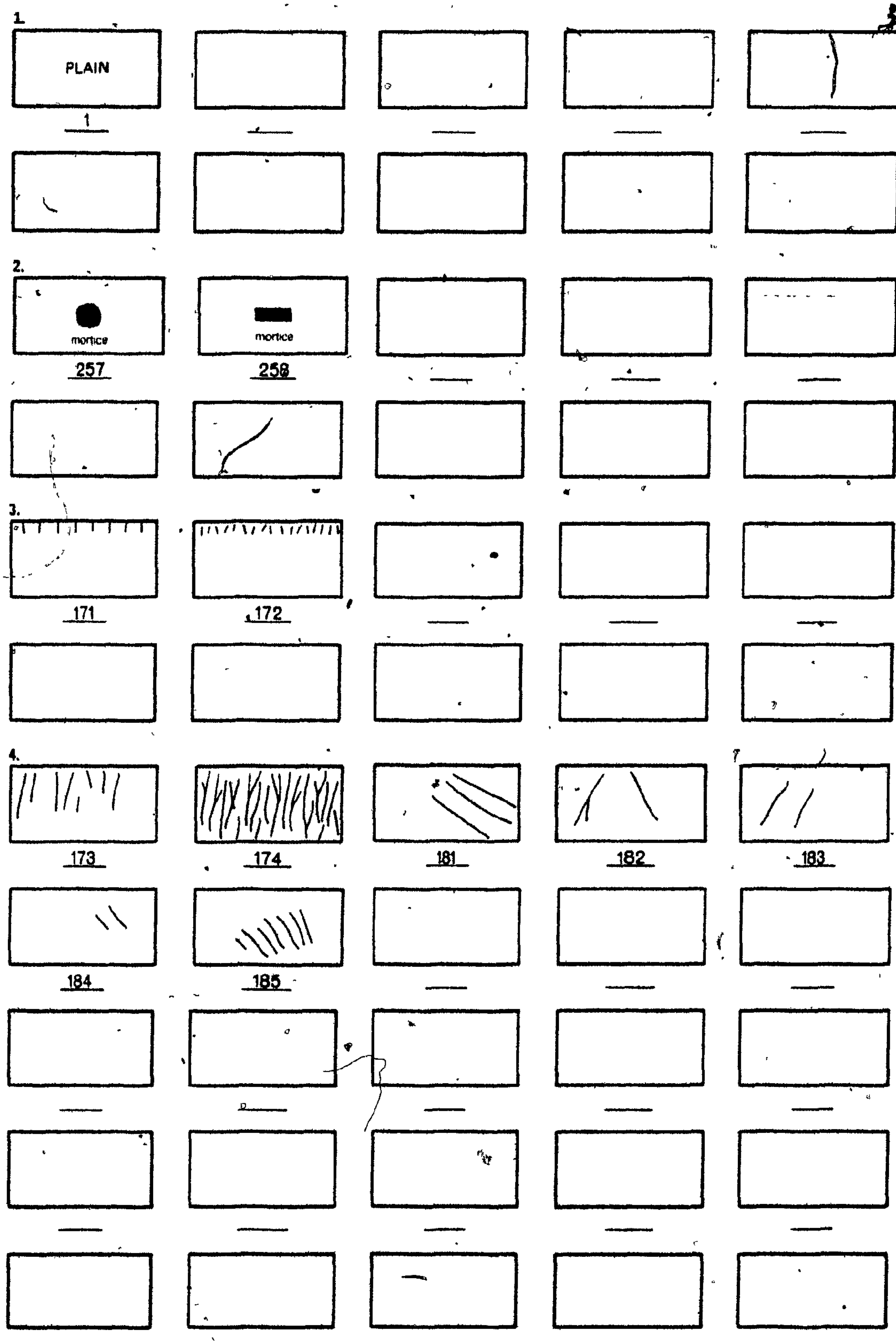


Figure 7.8

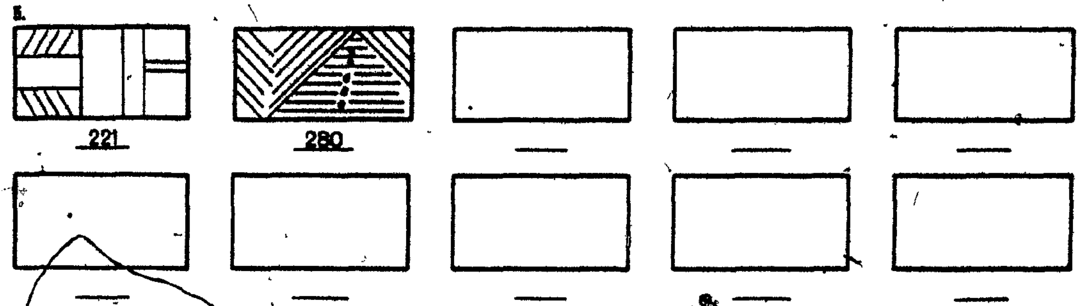


PLAIN AND SIMPLE PIPE MOTIFS



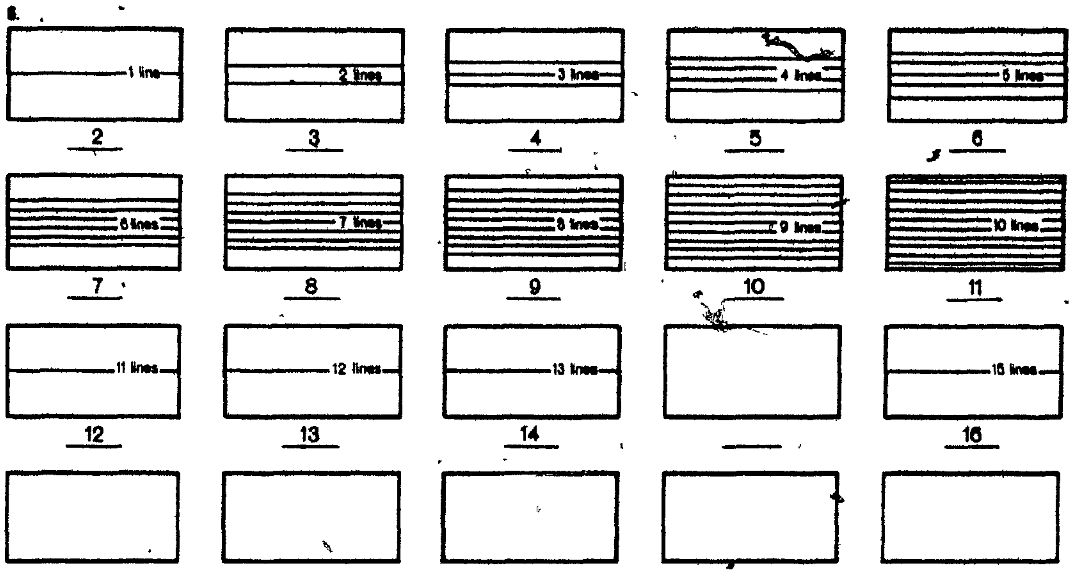
OPPOSED PIPE MOTIFS

5.



HORIZONTAL PIPE MOTIFS

6.



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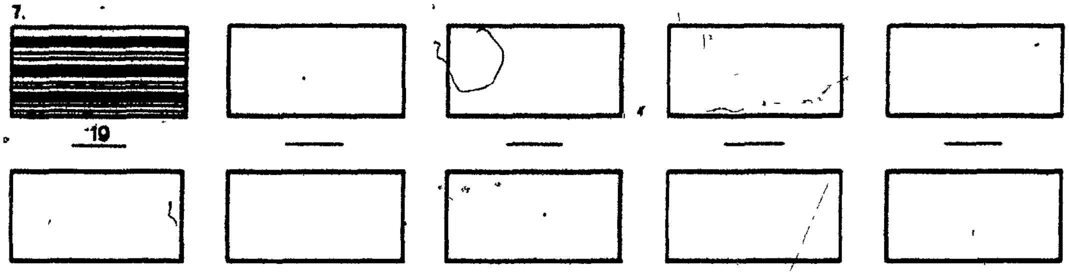

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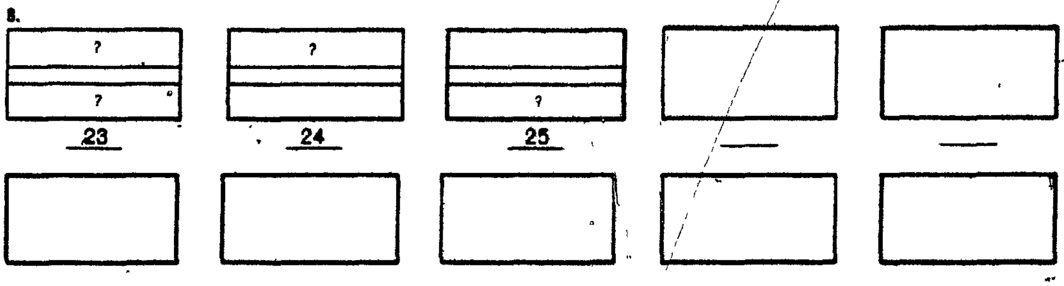

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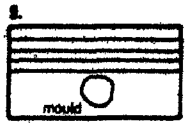
HORIZONTAL PIPE MOTIFS (continued)

9.



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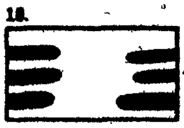

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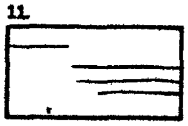

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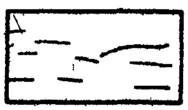

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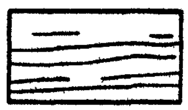

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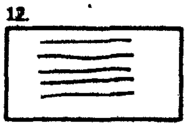

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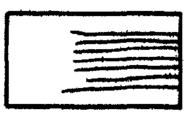
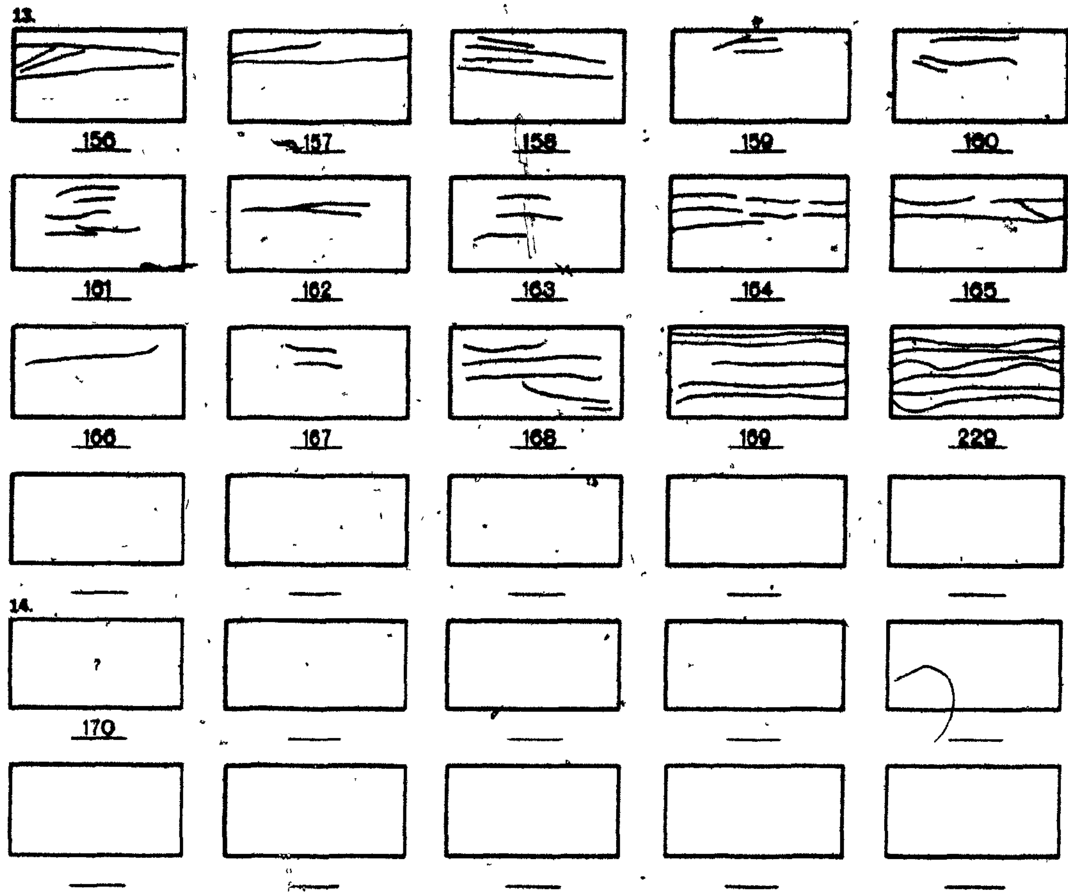
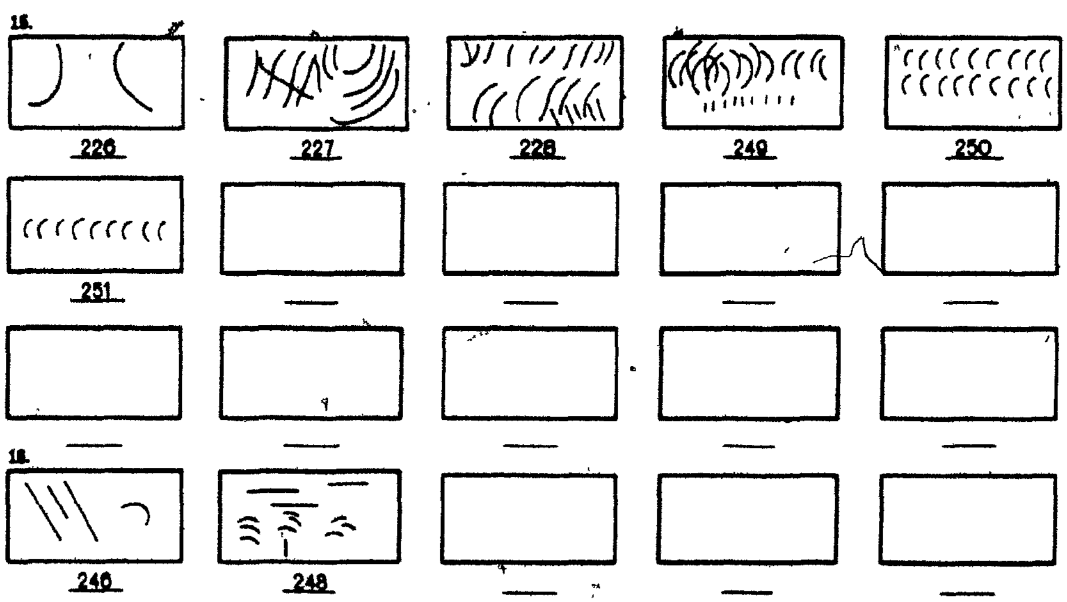


241

HORIZONTAL (scratching) PIPE MOTIFS

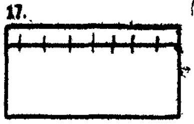


CURVILINEAR PIPE MOTIFS



HATCHED HORIZONTAL PIPE MOTIFS

17.



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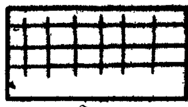

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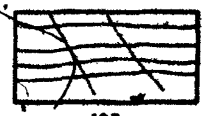

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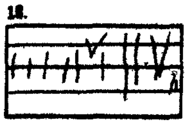

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COMPLEX PIPE MOTIFS

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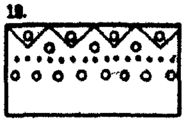

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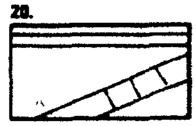

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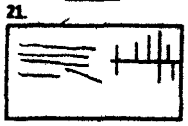

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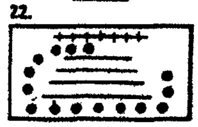

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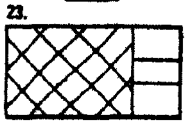
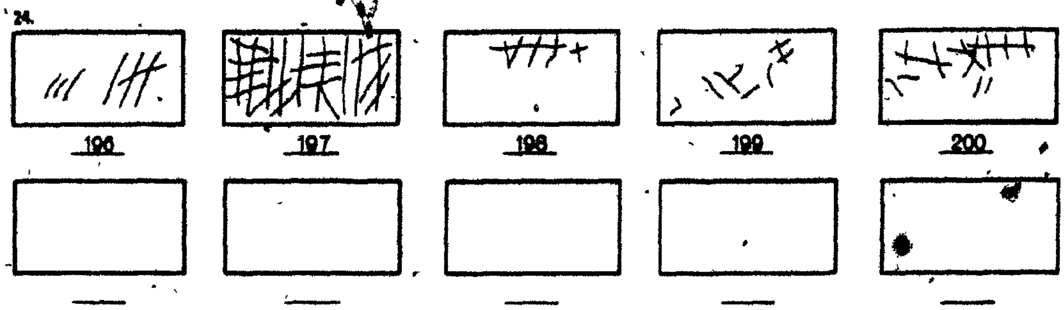
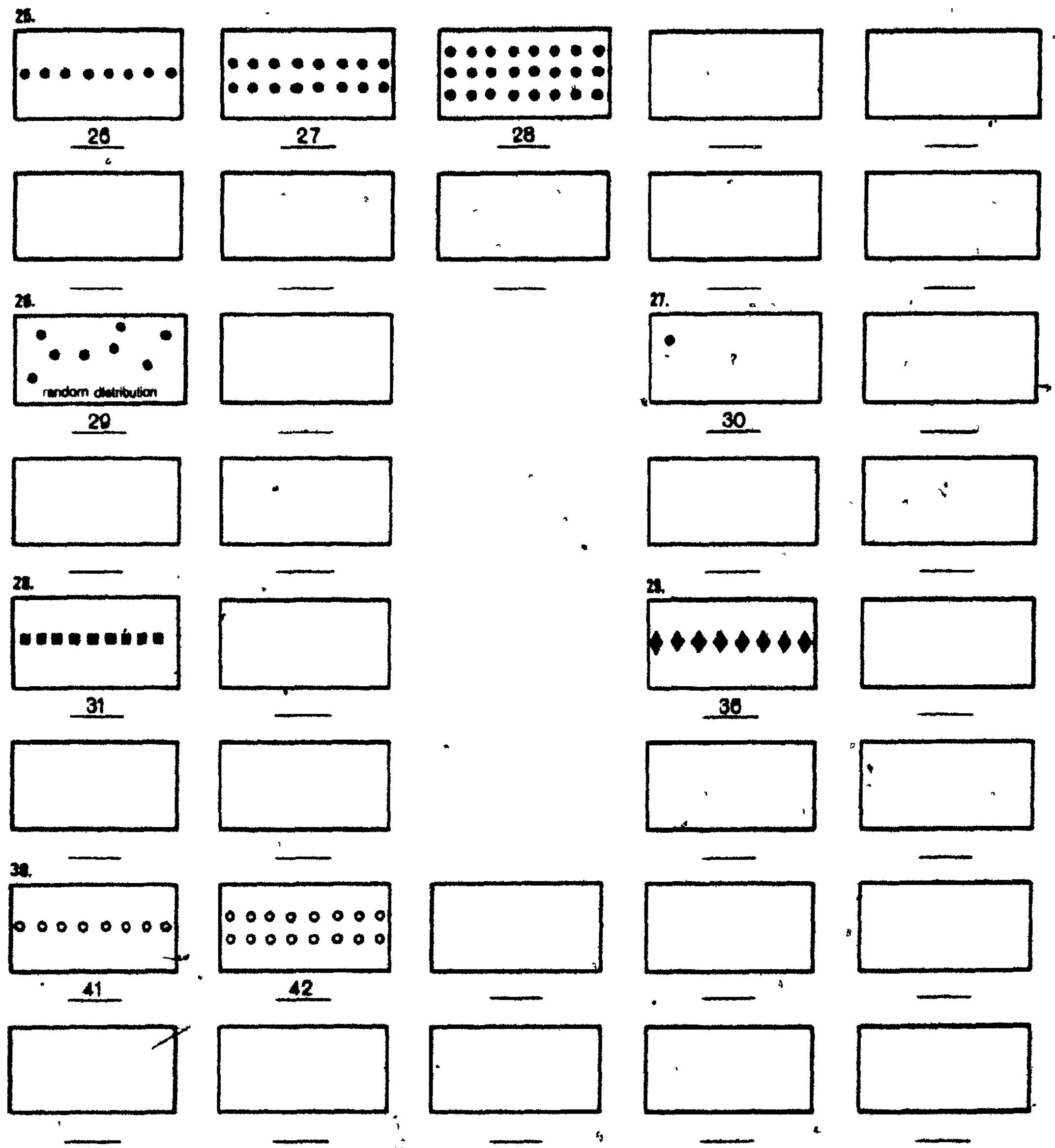


289

RANDOM (scratching) PIPE MOTIFS



PUNCTATE PIPE MOTIFS



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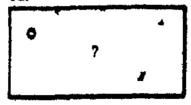
PUNCTATE PIPE MOTIFS (continued)

31.

43

32.



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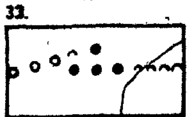

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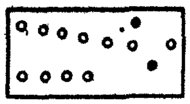

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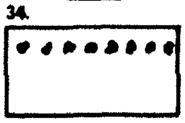

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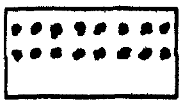

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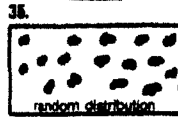


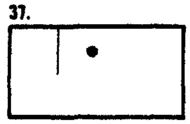
48

SIMPLE AND PUNCTATE PIPE MOTIFS

36.

146

37.



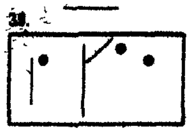
147

148

38.

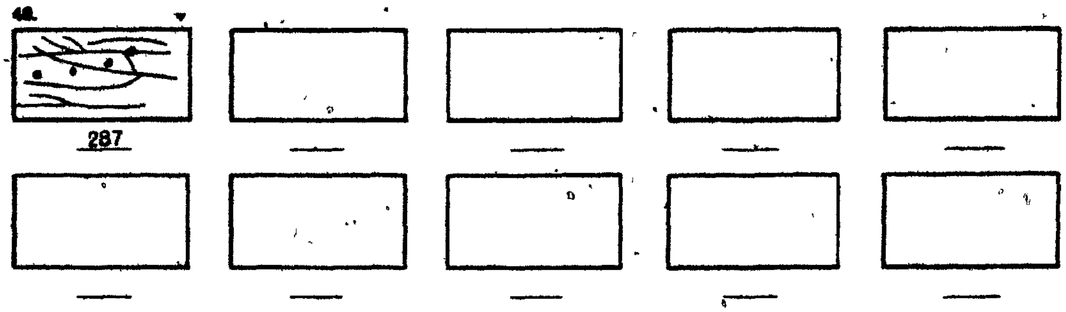
149

39.

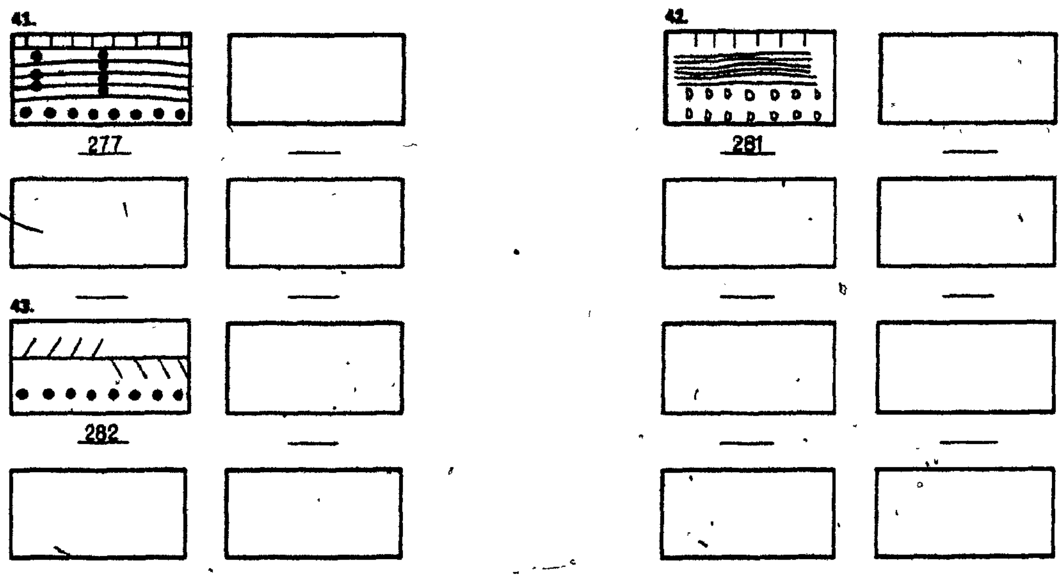


150

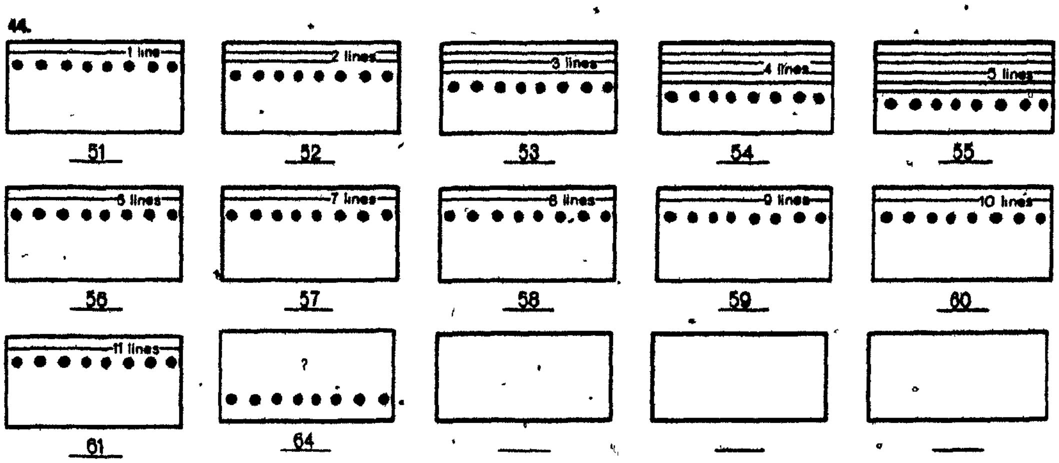
HORIZONTAL (scratching) AND PUNCTATE PIPE MOTIFS



SIMPLE AND HORIZONTAL AND PUNCTATE PIPE MOTIFS



HORIZONTAL AND PUNCTATE-PIPE MOTIFS



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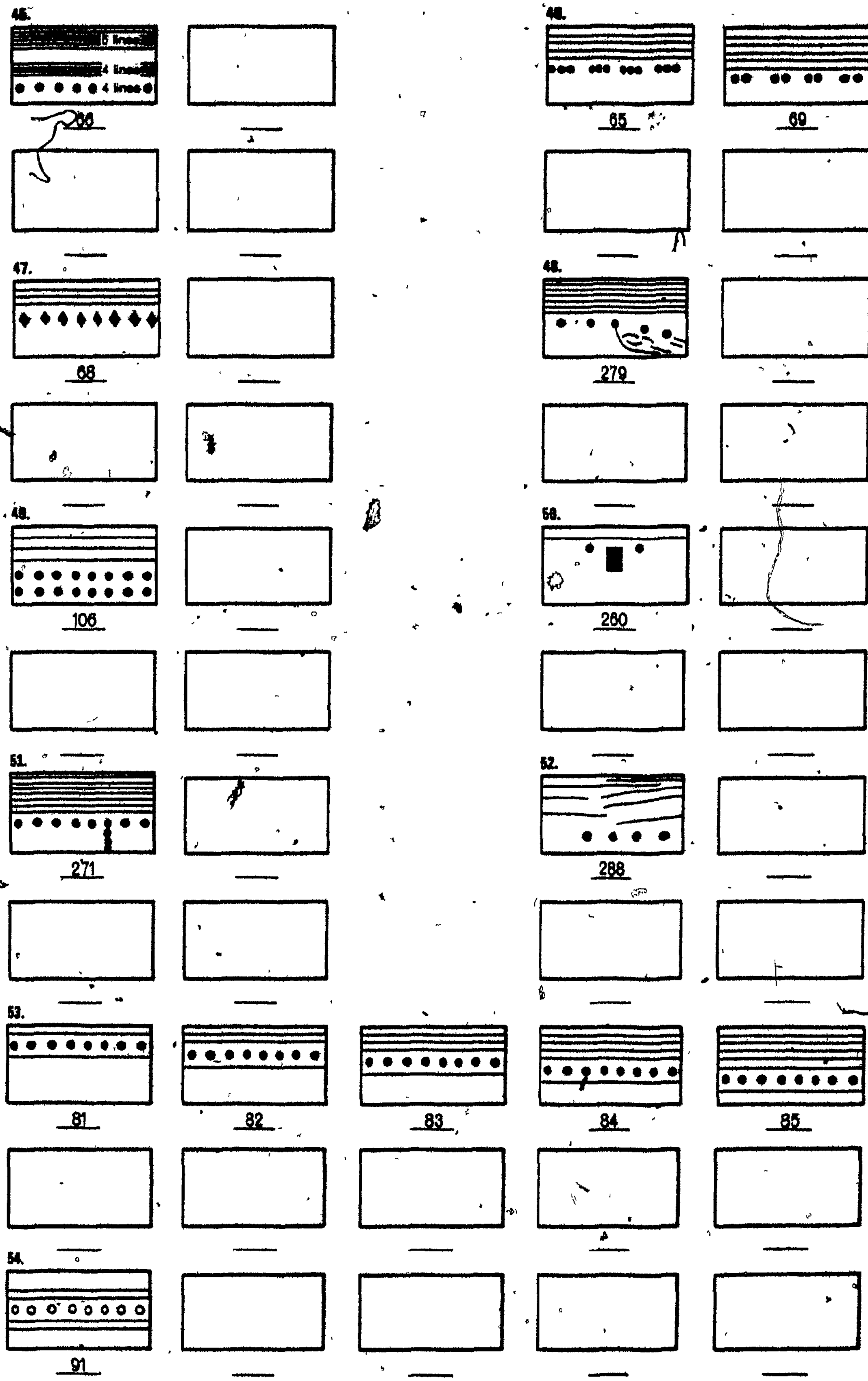
HORIZONTAL AND PUNCTATE PIPE MOTIFS (continued)



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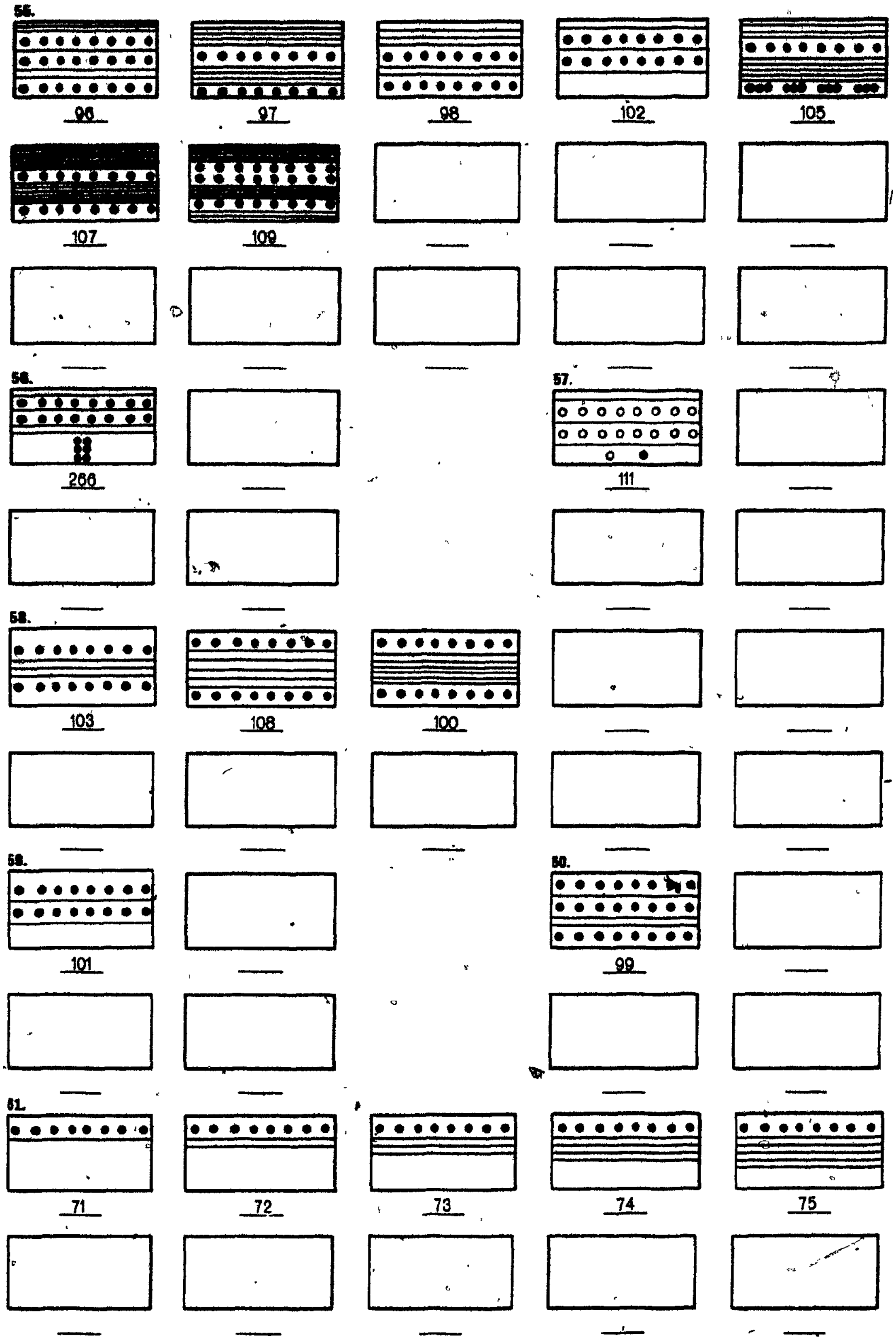
HORIZONTAL AND PUNCTATE PIPE MOTIFS (continued)



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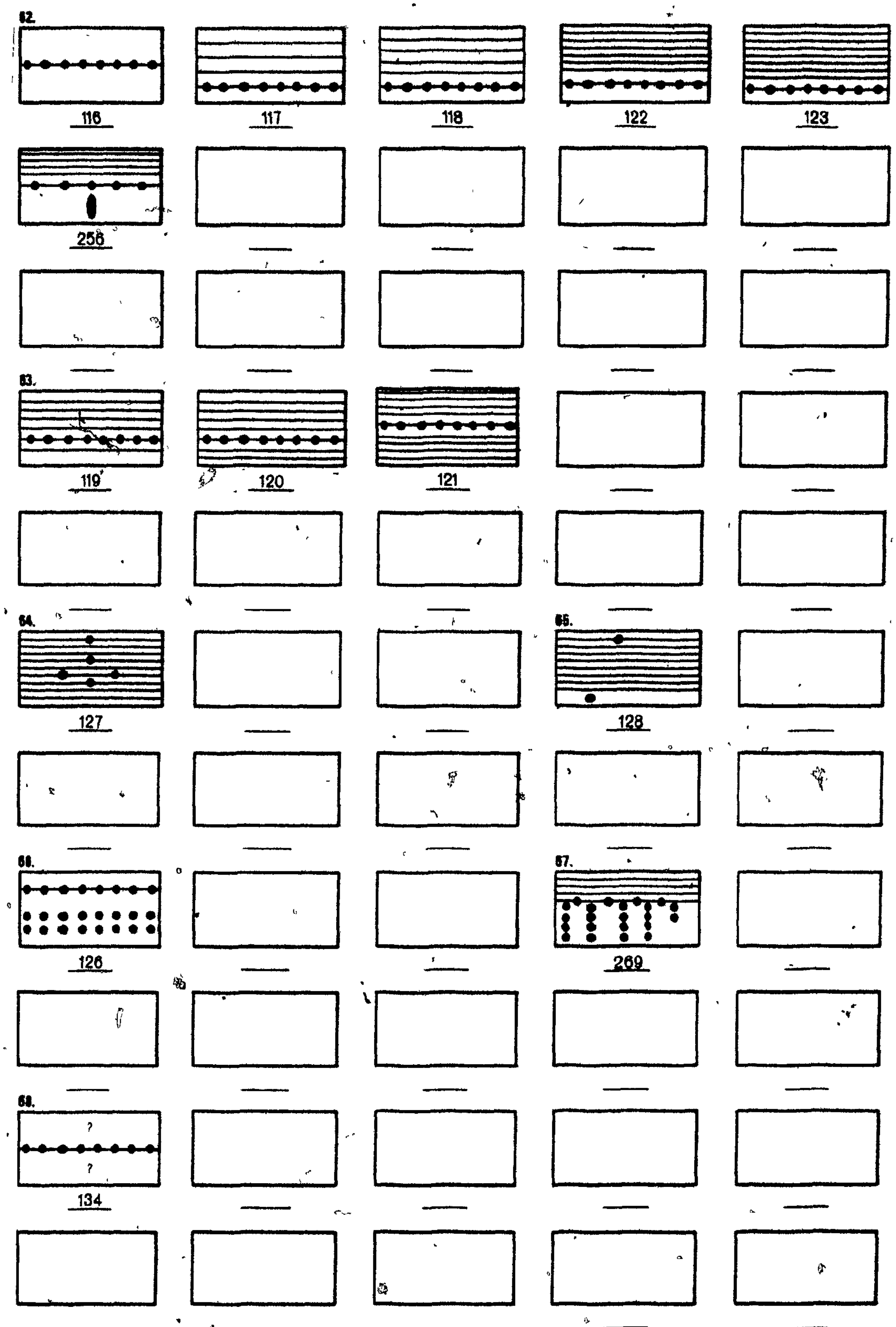
HORIZONTAL AND PUNCTATE PIPE MOTIFS (continued)



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HORIZONTAL AND PUNCTATE PIPE MOTIFS (continued)

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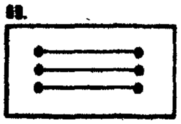

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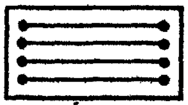

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138

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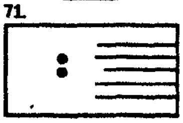

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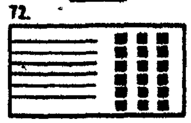

270

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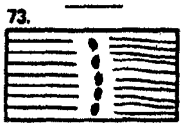

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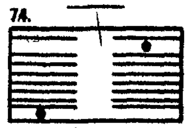

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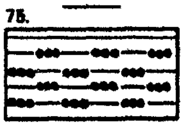
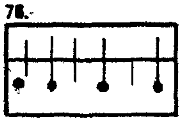


278

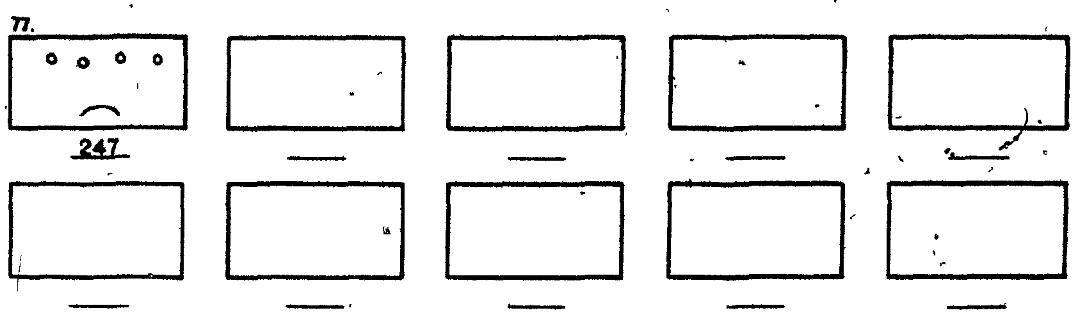
HATCHED HORIZONTAL AND PUNCTATE PIPE MOTIFS

76.

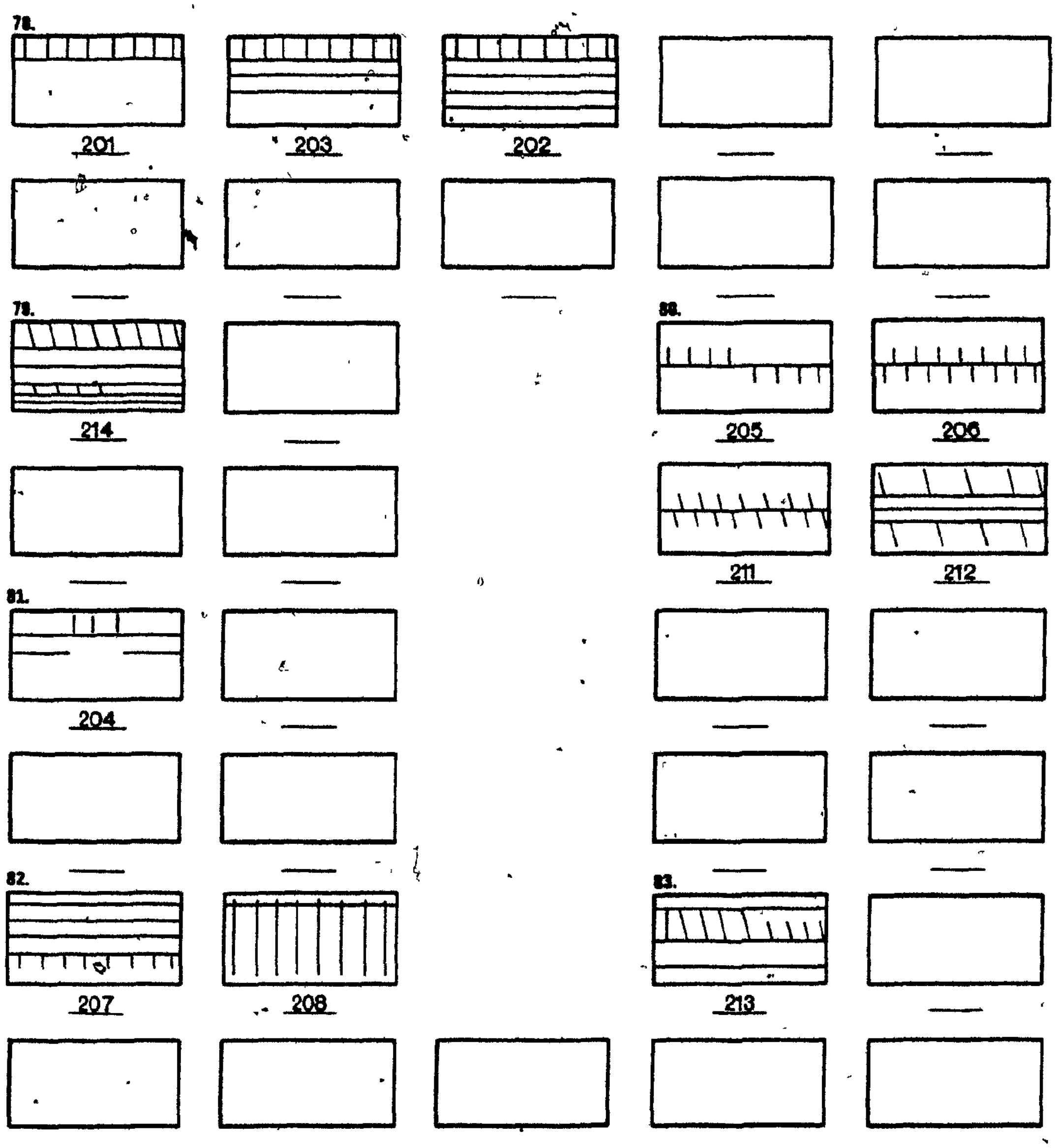


286

CURVILINEAR AND PUNCTATE PIPE MOTIFS

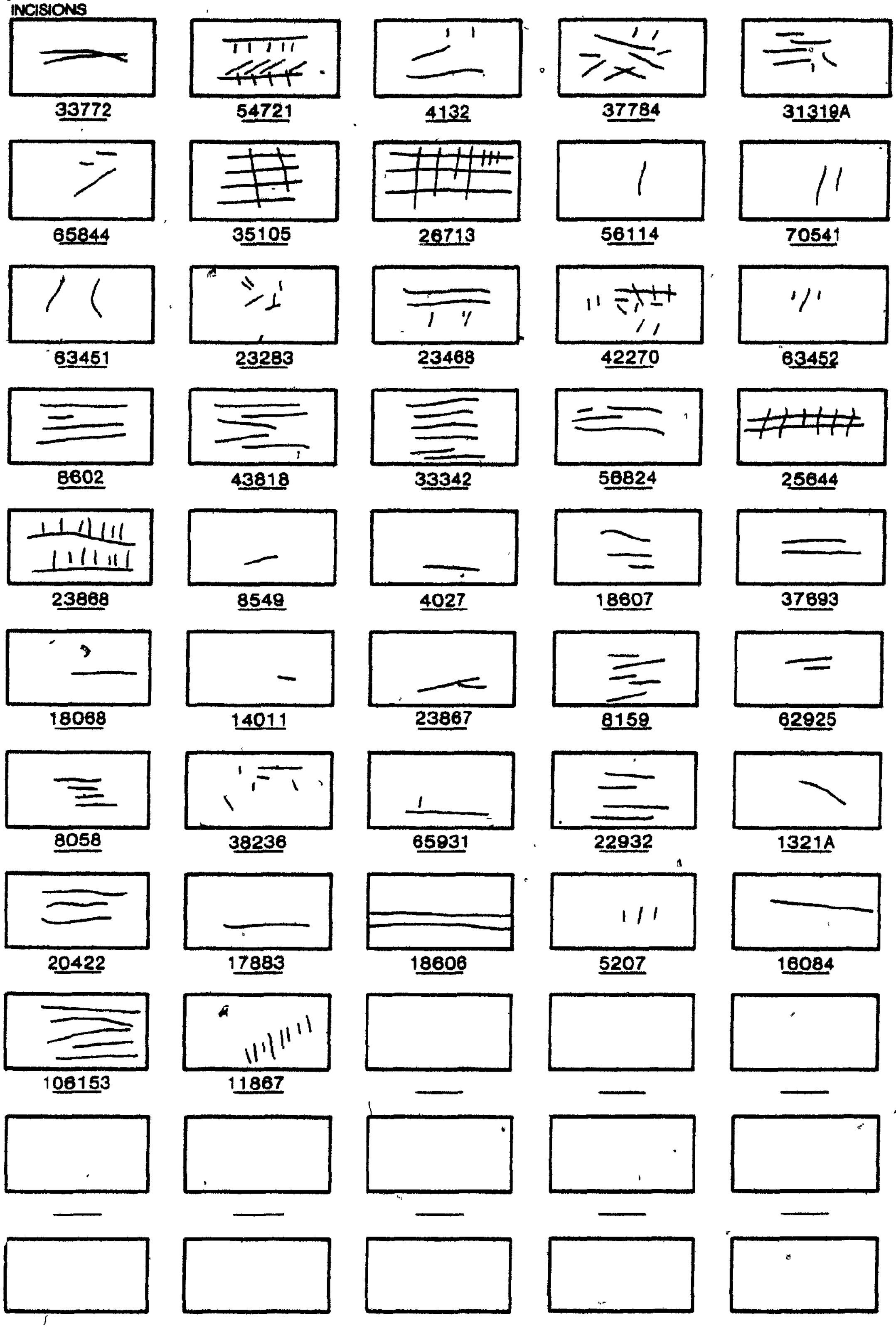


SIMPLE AND HORIZONTAL PIPE MOTIFS



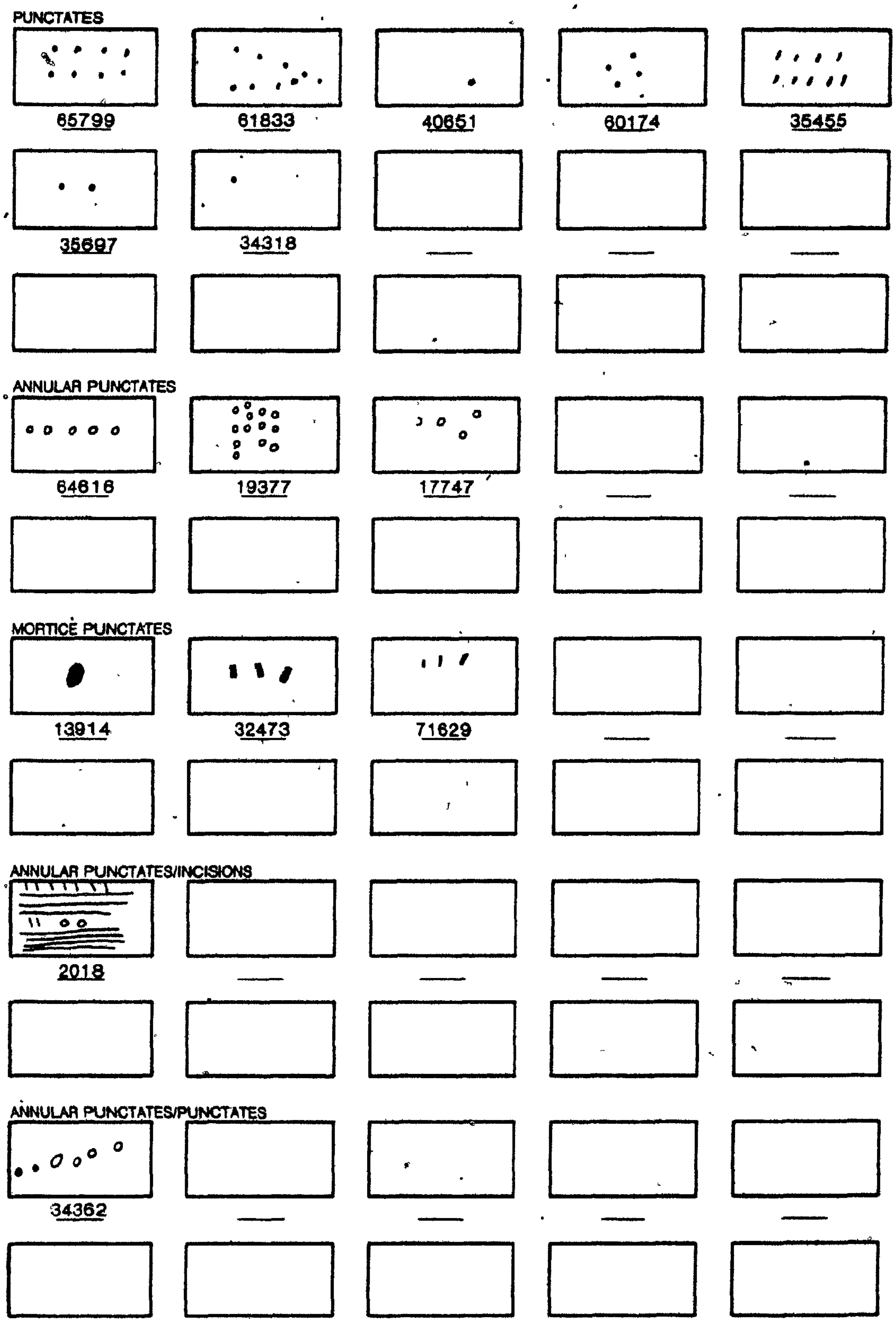
DRAPER JUVENILE PIPE BOWL MOTIFS

INCISIONS



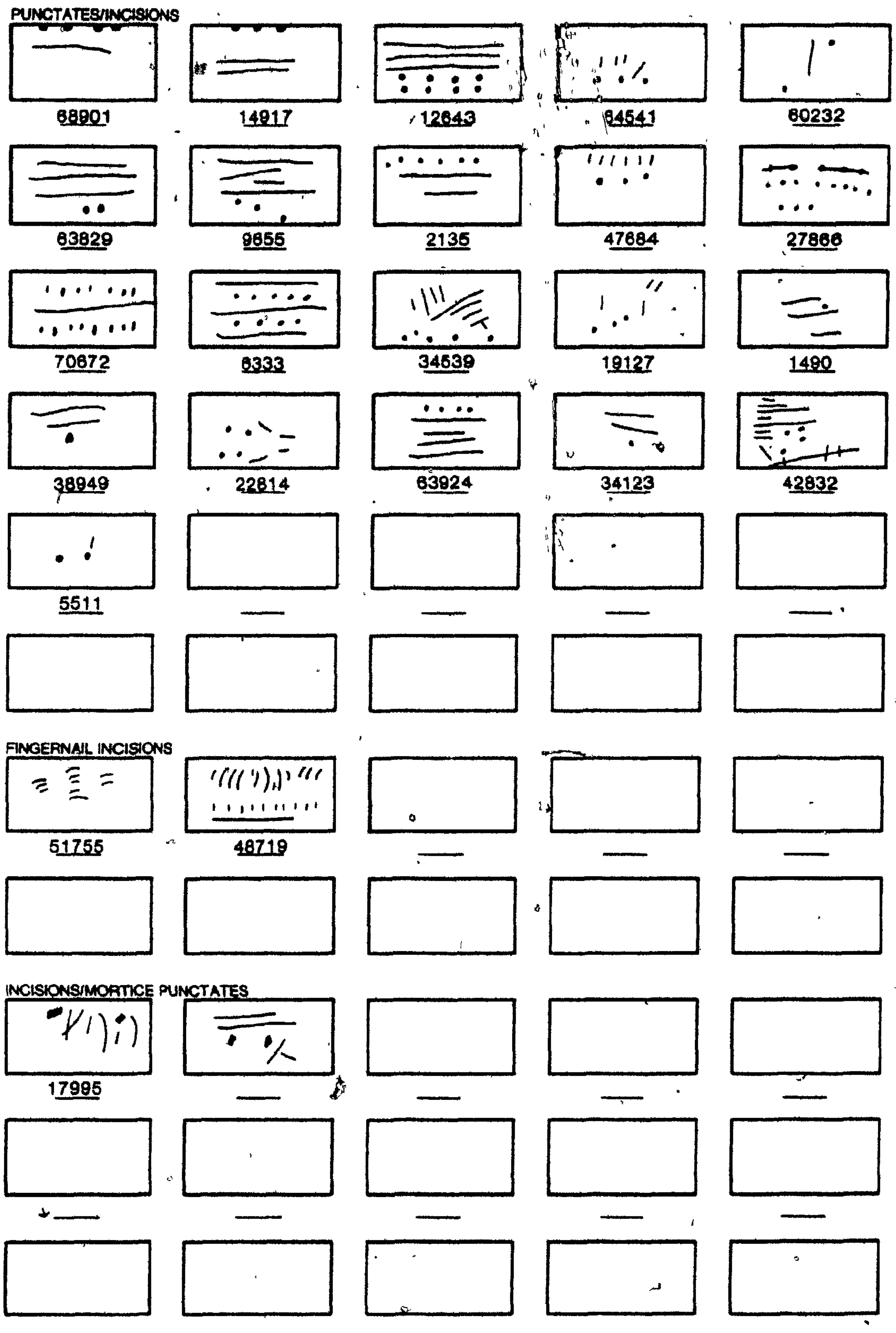
(NOTE Numbers shown are catalogue numbers with the prefix AlGt - 2)

DRAPER JUVENILE PIPE BOWL MOTIFS



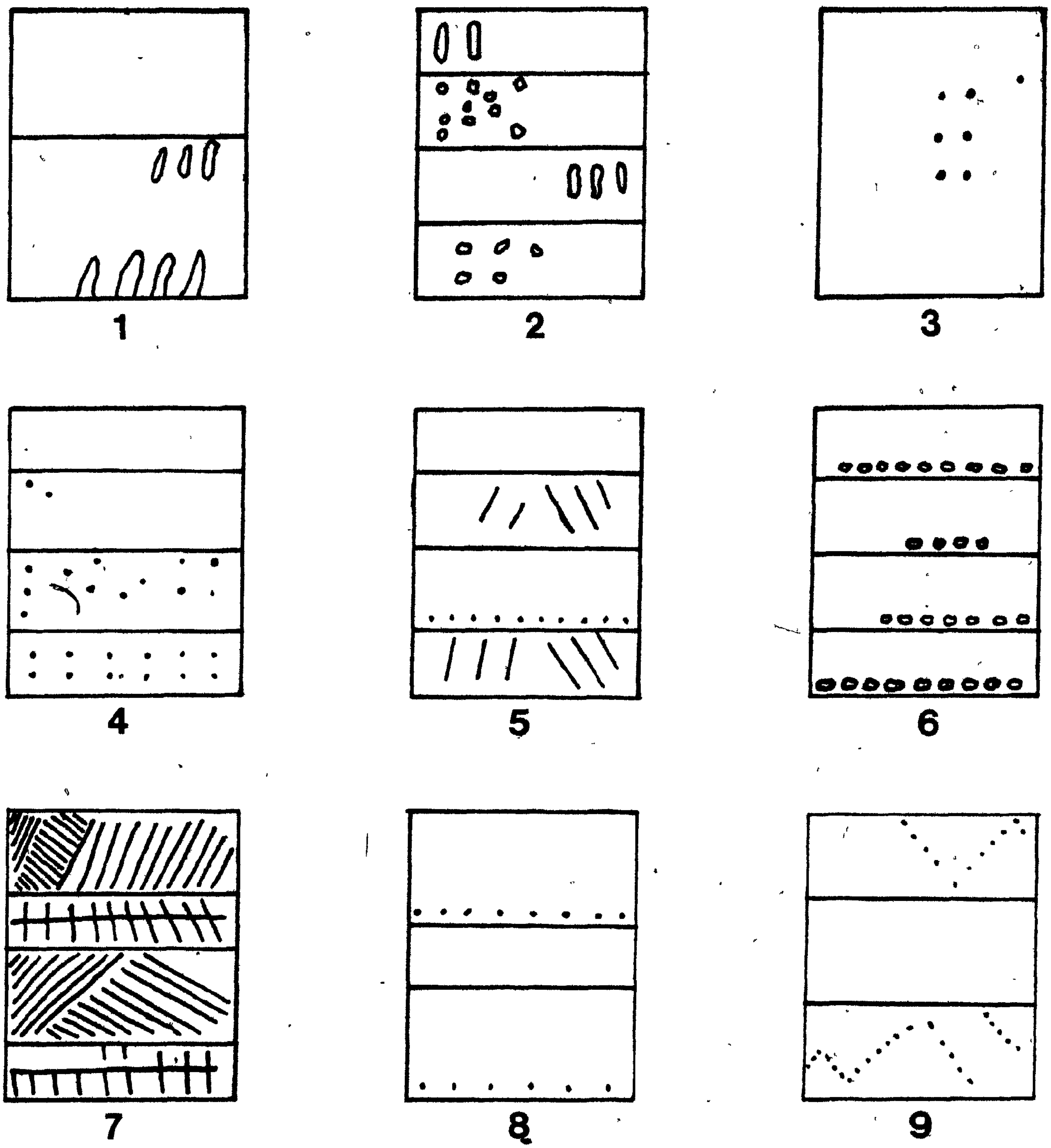
(NOTE Numbers shown are catalogue numbers with the prefix AlgI - 2)

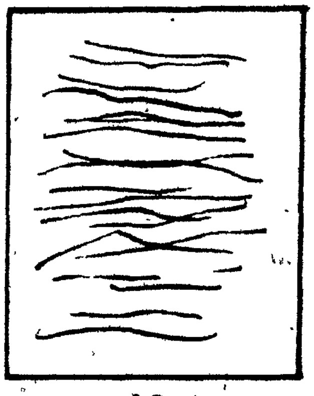
DRAPER JUVENILE PIPE BOWL MOTIFS

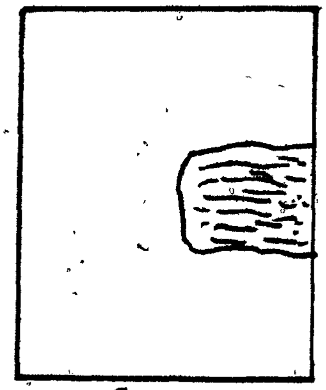


(NOTE: Numbers shown are catalogue numbers with the prefix AlGt - 2)

STEM DECORATIVE MOTIFS




10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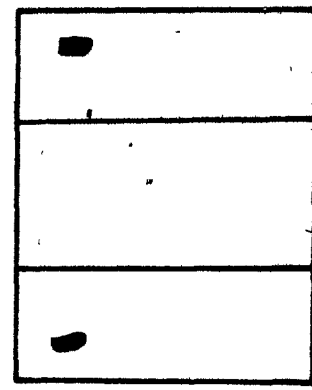
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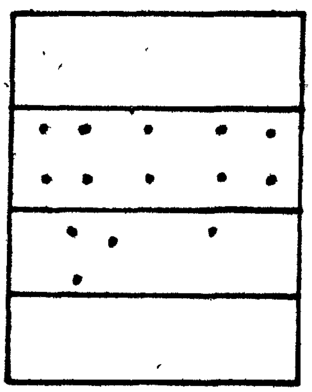
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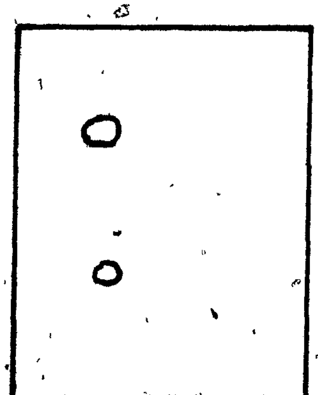
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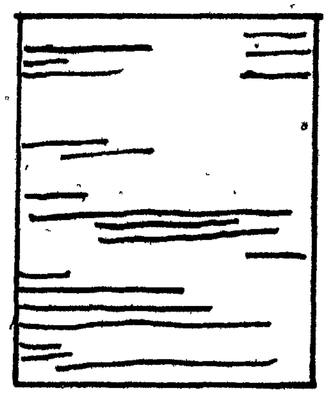
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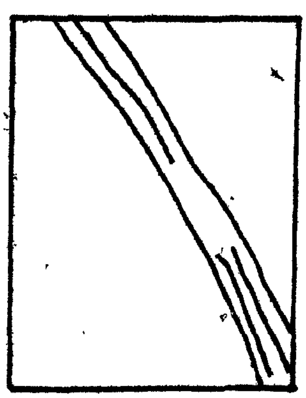
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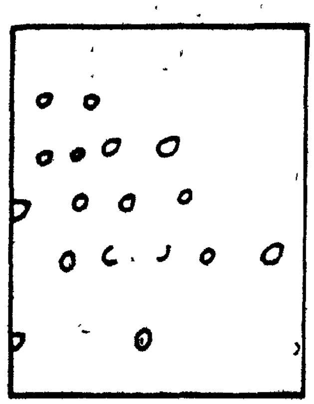
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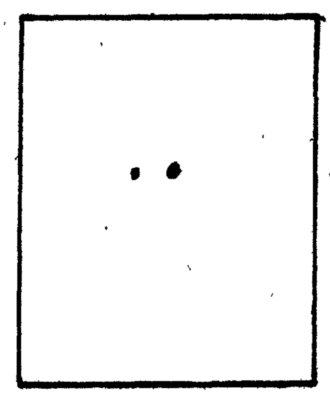
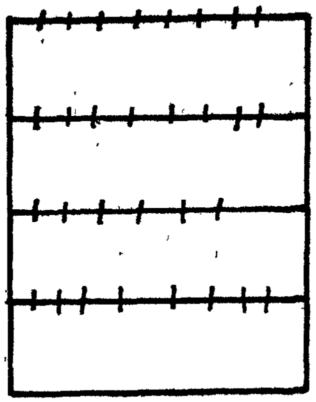

18

Stem Decorative Motifs cont.



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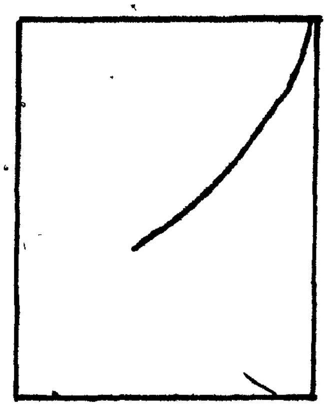
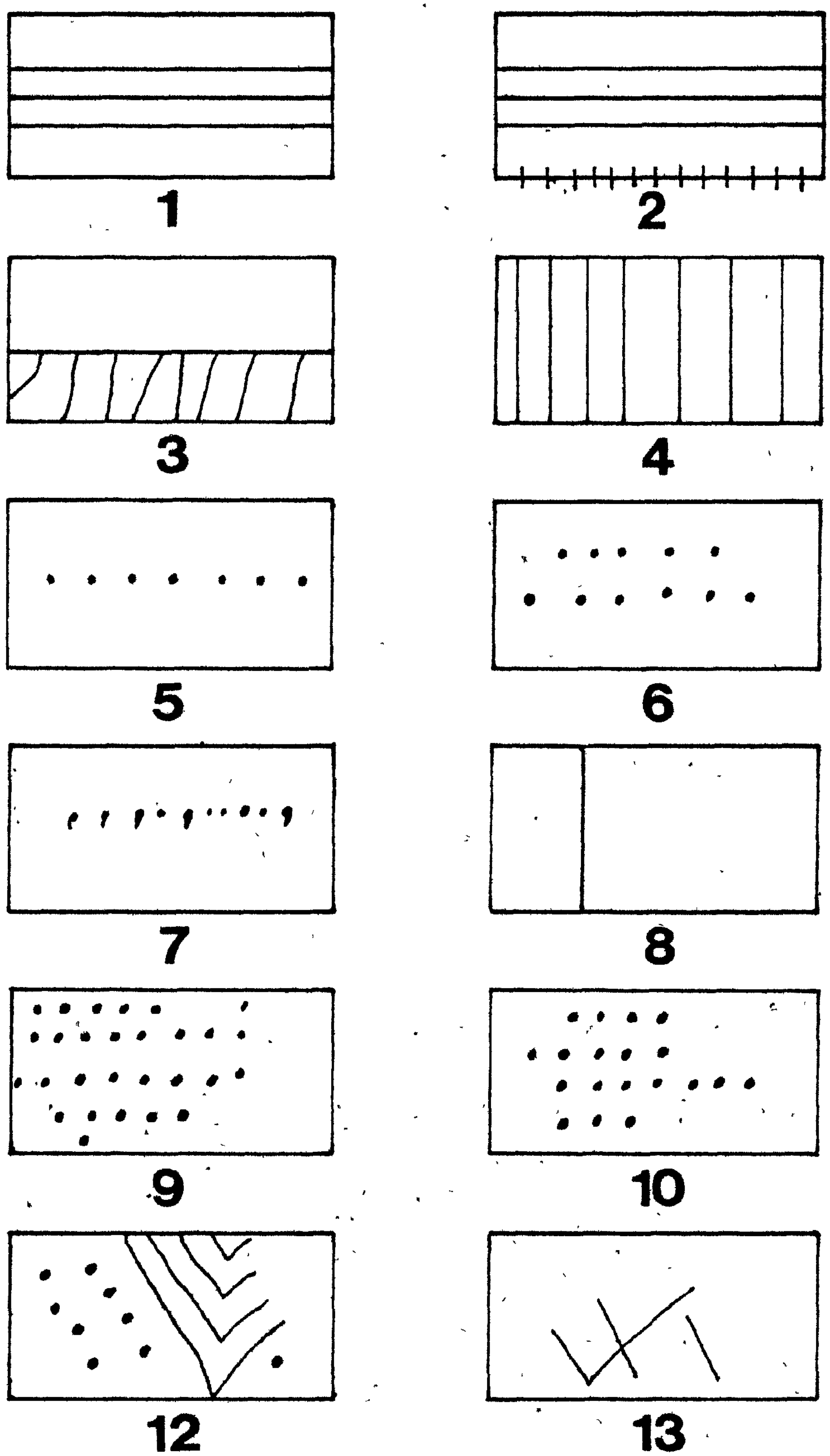
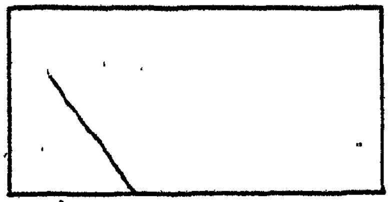


20

LIP DECORATIVE MOTIFS



LIP DECORATIVE MOTIFS (cont.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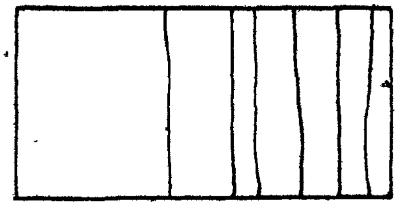
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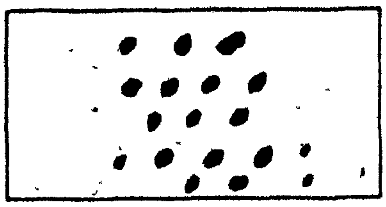
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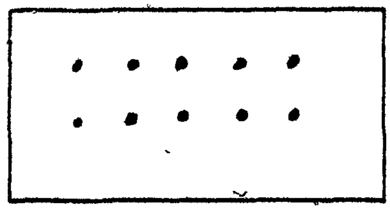
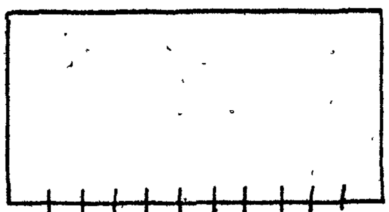
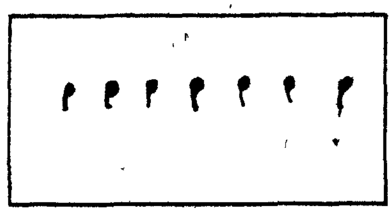
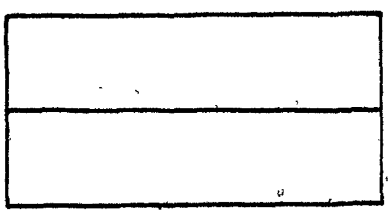
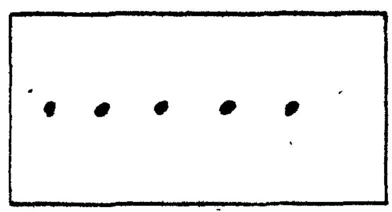
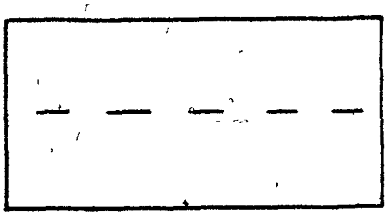

17

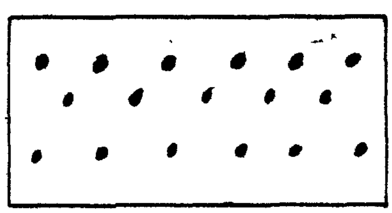

18


19


20


21


22


23

APPENDIX III

CROSSTABULATIONS: RAW PROVENIENCE DATA *

Table 9.1 . Crosstabulation - Variable 15 Recode 1 X Variable 7

VAR 7 Values	VAR 15 Values 10 fo	11 fo	12 fo	Total fo
1	3	3	2	8
3	4	2	6	12
4	1	1	5	7
5	22	13	34	69
6	25	5	23	53
7	1	2	-	3
8	6	1	2	9
9	11	9	13	33
10	15	8	29	52
11	28	6	28	62
12	40	14	36	90
13	4	-	-	4
14	1	-	1	2
15	7	1	5	13
16	2	1	5	8
18	3	-	1	4
19	13	2	9	24
20	7	-	8	15
21	2	-	2	4
22	-	-	2	2
25	2	-	1	3
26	1	-	5	6
27	1	-	2	3
28	1	1	1	3
29	4	-	3	7
30	-	-	2	2
33	-	-	1	1
35	-	-	3	3
36	-	-	1	1
37	2	-	-	2
38	6	1	5	12
40	1	-	1	2
41	3	1	2	6
42	8	1	5	14
45	-	1	-	1

cont.

* Data only for those variables used in the intrasite analysis

Table 9.1 cont.

VAR 7 Values	VAR 15 Values 10 fo	11 fo	12 fo	Total fo
51	38	10	45	93
52	232	61	336	629
53	34	19	66	119
54	81	23	118	222
55	57	25	68	150
56	101	28	132	261
57	11	6	24	41
58	1	1	-	2
59	9	1	21	31
60	3	2	11	16
62	30	5	17	52
64	36	11	51	98
65	22	5	29	56
66	40	19	59	118
67	38	13	60	111
68	4	-	1	5
69	15	2	11	28
70	8	2	8	18
71	-	-	2	2
72	1	-	1	2
75	8	1	3	12
76	3	1	5	9
77	11	3	3	17
78	18	13	6	37
79	1	2	3	6
80	3	1	3	7
81	4	-	-	5
82	5	3	2	10
85	-	-	1	1
Total	1038	330	1334	2702

Table 9.2 Crosstabulation - Variable 16 Recode 1 X Variable 7

VAR 7 Values	*VAR 16 Values* 10 *fo*	11 *fo*	12 *fo*	Total *fo*
1	1	-	-	1
3	2	-	1	3
4	-	-	1	1
5	7	5	-	12
6	4	3	-	7
9	2	1	-	3
10	10	-	1	11
11	8	-	1	9
12	5	1	4	10
14	1	-	1	2
15	-	2	-	2
16	1	-	-	1
19	1	1	-	2
20	1	-	-	1
21	1	-	-	1
25	1	-	-	1
26	1	-	1	2
27	-	-	1	1
29	1	-	-	1
30	-	-	1	1
35	2	1	-	3
38	-	-	2	2
40	-	1	-	1
41	1	-	-	1
51	6	4	3	13
52	59	26	13	98
53	19	4	1	24
54	27	7	8	42
55	12	6	5	23
56	35	10	4	49
57	7	-	2	9
59	5	2	-	7
60	2	1	-	3
62	5	2	3	10
64	11	4	3	18
65	10	2	4	16
66	12	3	1	16
67	9	4	6	19
69	3	1	3	7
70	1	1	1	3
72	2	1	-	3
75	-	-	1	1
77	2	-	-	2
78	6	-	-	6
81	3	-	-	3
82	3	-	-	3
83	1	-	-	1
Total	290	93	72	455

Table 9.3 Crosstabulation - Variable 18 Recode 1 X Variable 7

VAR 7 Values	VAR 18 Values 10 fo	11 fo	Total fo
1	1	2	3
3	2	3	5
4	-	10	10
5	9	10	19
6	7	7	14
8	1	-	1
9	2	4	6
10	8	5	13
11	16	4	20
12	9	5	14
14	2	-	2
15	2	-	2
16	3	-	3
19	2	-	2
20	4	-	4
21	-	1	1
22	1	-	1
25	-	1	1
26	3	-	3
27	1	1	2
28	-	1	1
29	1	1	2
30	1	1	2
33	1	-	1
35	2	1	3
38	2	-	2
40	1	-	1
41	1	-	1
42	2	-	2

cont.

VAR 7 Values	VAR 18 Values 10 fo	11 fo	Total fo
51	13	11	24
52	87	70	157
53	20	15	35
54	34	25	59
55	16	21	37
56	31	32	63
57	4	4	8
59	2	7	9
60	-	4	4
62	9	3	12
64	11	15	26
65	7	12	19
66	11	16	27
67	15	15	30
69	3	6	9
70	-	4	4
71	2	-	2
72	1	2	3
75	1	-	1
76	2	-	2
77	-	1	1
78	6	2	8
79	1	-	1
80	1	-	1
81	4	-	4
82	4	-	4
83	1	-	1
85	1	-	1
Total	371	322	693

Table 9.4 Crosstabulation - Variable 21 Recode - X Variable 7

VAR 7 Values	VAR 21 Values 1 *fo*	2 *fo*	3 *fo*	Total *fo*
1	-	2	1	3
3	4	3	1	8
4	-	5	-	5
5	13	12	14	39
6	17	3	10	30
8	2	-	-	2
9	9	1	6	16
10	22	5	9	36
11	17	10	10	37
12	26	11	9	46
14	-	2	-	2
15	5	1	1	7
16	5	1	-	6
18	2	-	-	2
19	10	-	1	11
20	7	-	2	9
21	2	-	-	3
22	2	-	-	2
25	-	-	1	1
26	5	1	-	6
27	2	1	-	3
28	2	1	-	3
29	-	1	2	3
30	-	1	-	1
33	-	-	1	1
35	2	-	1	3
36	-	-	1	1
38	6	-	-	6
40	2	-	-	2
41	4	-	-	4
42	6	1	-	7

cont.

Table 9.4 cont.

VAR 7 Values	*VAR 21 Values* 1 *fo*	2 *fo*	3 *fo*	Total *fo*
51	22	16	17	55
52	162	148	77	387
53	49	25	6	80
54	69	54	19	142
55	26	41	19	86
56	67	54	35	156
57	11	16	-	27
59	20	3	-	23
60	5	1	6	12
62	10	4	6	20
64	23	24	14	61
65	6	17	12	35
66	39	19	13	71
67	41	25	8	74
68	2	-	-	2
69	7	8	3	18
70	4	5	1	10
71	2	1	-	3
72	-	1	3	4
75	4	-	1	5
76	6	-	-	6
77	5	1	-	6
78	13	2	-	15
79	5	-	-	5
80	2	-	1	3
81	9	1	-	10
82	4	2	-	6
83	-	1	-	1
85	-	1	-	1
Total	785	532	312	1629

Table 9.5 Crosstabulation - Variable 22 Recode - X Variable 7

VAR 7 Values	VAR 22 Values 1 fo	2 fo	Total fo
1	3	5	8
3	9	7	16
4	6	3	9
5	42	29	71
6	25	29	54
7	-	3	3
8	3	6	9
9	16	16	32
10	27	25	52
11	34	29	63
12	42	57	99
13	-	5	5
14	2	1	3
15	4	10	14
16	2	6	8
18	-	4	4
19	-	24	24
20	-	15	15
21	3	3	6
22	2	-	2
25	1	2	3
26	5	1	6
27	2	2	4
28	1	2	3
29	3	4	7
30	2	-	2
33	1	-	1
35	1	3	4
36	-	1	1
37	1	2	3
38	3	10	13
40	2	2	4
41	-	6	6
42	3	13	16
45	-	1	1

cont.

VAR 7 Values	VAR 22 Values 1 fo	2 fo	Total fo
51	49	41	90
52	336	289	625
53	71	46	117
54	125	105	230
55	81	73	154
56	130	131	261
57	25	13	38
58	1	1	2
59	19	16	35
60	12	3	15
62	13	41	54
64	60	46	106
65	31	29	60
66	65	65	130
67	69	51	120
68	1	4	5
69	14	17	31
70	8	11	19
71	2	-	2
72	4	2	6
75	-	13	13
76	-	9	9
77	4	19	23
78	-	42	42
79	-	6	6
80	2	7	9
81	-	12	12
82	-	13	13
83	-	1	1
85	-	1	1
Total	1367	1433	2800

Table 9.6 Crosstabulation - Variable 24 Recode - X Variable 7

VAR 7 Values	VAR 24 Values 1 fo	2 fo	3 fo	Total fo
1	2	4	-	6
3	7	2	-	9
4	1	-	5	
5	16	14	7	37
6	9	6	11	26
7	1	1	1	3
8	5	1	1	7
9	9	8	-	17
10	11	5	6	21
11	18	10	6	34
12	32	19	8	59
13	2	2	1	5
14	-	2	-	2
15	7	1	1	9
16	2	-	-	2
18	3	-	-	3
19	13	-	-	13
20	7	-	-	7
21	1	1	-	2
25	1	-	1	2
26	-	-	1	1
27	2	-	-	2
28	1	1	-	2
29	1	1	2	4
37	2	-	-	2
38	5	1	-	6
40	-	-	1	1
41	1	1	1	3
42	7	-	1	8
45	1	-	-	1

cont.

Table 9.6 cont.

VAR 7 Values	*VAR 24 Values* 1 *fo*	2 *fo*	3 *fo*	Total *fo*
51	18	15	9	42
52	124	133	17	274
53	17	28	7	52
54	55	50	4	109
55	31	40	9	80
56	62	55	11	128
57	5	10	-	15
58	1	-	1	2
59	11	4	-	15
60	-	2	2	4
62	17	14	17	48
64	27	21	5	53
65	12	9	5	26
66	27	21	8	56
67	31	25	1	57
68	3	2	1	6
69	9	7	4	20
70	5	4	-	10
72	2	2	-	4
75	6	5	1	12
76	2	2	-	4
77	9	7	-	16
78	13	10	2	25
79	1	1	-	2
80	2	2	-	4
81	3	2	1	6
82	4	3	1	8
Total	665	557	155	1377

Table 9.7 Crosstabulation - Variable 25 Recode - X Variable 7

VAR 7 Values	VAR 25 Values 1 fo	2 fo	3 fo	4 fo	Total fo
1	3	2	-	1	6
3	3	3	-	-	6
4	-	2	1	-	3
5	17	14	1	3	35
6	9	7	1	4	21
7	1	2	-	-	3
8	1	4	1	1	7
9	8	12	-	-	20
10	4	8	2	6	20
11	11	15	5	-	31
27	19	2	4	52	
13	-	3	-	-	3
14	-	2	-	-	2
15	3	3	1	1	8
16	-	2	-	-	2
18	4	-	-	-	4
19	13	1	2	1	17
20	5	-	3	-	8
21	-	1	-	-	1
25	-	2	-	-	2
26	-	-	-	1	1
27	-	1	-	-	1
28	-	1	-	1	2
29	3	1	-	-	4
37	5	-	1	1	7
40	1	-	-	-	1
41	1	-	1	1	3
42	9	1	-	-	10
45	1	-	-	-	1

cont.

Table 9.7 cont.

VAR 7 Values	VAR 25 Values 1 fo	2 fo	3 fo	4 fo	Total fo
51	11	13	7	3	34
52	78	117	44	21	260
53	17	22	6	3	48
54	29	51	24	10	114
55	17	50	19	1	87
56	27	59	30	12	128
57	3	8	-	1	12
58	-	1	-	-	1
59	5	7	1	-	13
60	1	2	1	-	4
62	13	11	4	3	31
64	17	19	13	1	50
65	11	9	7	4	31
66	17	37	15	3	72
67	16	23	10	3	52
69	4	4	2	3	13
70	7	2	-	1	10
72	-	-	-	1	1
75	7	-	4	-	11
76	3	1	-	-	4
77	8	2	4	-	14
78	17	2	4	1	24
79	-	1	-	-	1
80	3	1	-	-	4
81	3	-	1	1	5
82	4	-	4	-	8
Total	450	548	221	97	1316

Table 9.8 Crosstabulation - Variable 33 Recode 1 X Variable 7

VAR 7 Values	*VAR 33 Values*		
	10 *fo*	11 *fo*	Total *fo*
1	3	1	4
3	1	2	3
4	1	-	1
5	10	6	16
6	8	12	20
7	-	1	1
8	2	2	4
9	2	6	8
10	6	11	17
11	8	19	27
12	18	13	31
13	1	3	4
14	1	1	2
15	1	2	3
16	1	1	2
18	-	1	1
19	7	3	10
20	1	2	3
21	-	1	1
25	2	-	2
27	-	1	1
28	2	-	2
29	2	2	4
38	2	1	3
40	-	1	1
41	2	1	3
42	2	2	4
45	1	-	1

cont.

VAR 7 Values	*VAR 33 Values*		
	10 *fo*	11 *fo*	Total *fo*
51	12	19	31
52	76	94	170
53	11	16	27
54	29	37	66
55	27	32	59
56	33	53	86
57	4	6	10
58	4	6	10
59	2	2	4
60	-	2	2
62	11	12	23
64	11	18	29
65	10	9	19
66	17	17	34
67	15	19	34
68	2	2	4
69	5	7	12
70	5	-	5
72	1	-	1
75	3	4	7
76	1	1	2
77	3	3	6
78	3	3	6
79	1	-	1
80	-	1	1
81	2	2	4
82	1	2	3
Total	369	456	825

Table 9.9 Crosstabulation - Variable 44 Recode 1 X Variable 7

VAR 7 Values	*VAR 44 Values* 300 *fo*	301 *fo*	302 *fo*	303 *fo*	Total *fo*
1	-	-	1	2	3
3	3	-	1	-	4
4	-	-	1	-	1
5	4	3	3	2	12
6	11	1	4	1	17
7	-	2	1	-	3
8	1	-	2	-	3
9	2	-	4	-	6
10	6	1	4	1	12
11	7	-	6	3	16
12	12	3	10	2	27
13	-	-	-	1	1
14	-	-	2	-	2
15	3	-	-	-	3
16	-	-	1	-	1
18	2	-	-	-	2
19	5	-	3	-	8
20	2	-	3	-	5
25	-	-	1	-	1
27	1	-	-	-	1
29	-	-	2	-	2
37	1	-	1	-	2
38	2	-	2	-	4
41	1	-	-	1	2
42	2	2	-	-	4
45	1	-	-	-	1

cont.

Table 9.9 cont.

VAR 7 Values	*VAR 44 Values* 300 *fo*	301 *fo*	302 *fo*	303 *fo*	Total *fo*
51	16	5	2	1	24
52	71	9	38	9	127
53	8	-	2	5	15
54	21	6	14	8	49
55	13	1	9	2	25
56	12	4	13	7	36
57	1	6	2	1	10
58	1	-	1	-	2
59	-	2	2	-	4
60	-	1	-	-	1
62	10	-	7	-	17
64	13	1	5	1	20
65	10	1	1	-	12
66	6	2	13	4	25
67	8	3	14	2	27
68	3	-	1	-	4
69	5	2	3	1	11
70	2	-	2	-	4
75	2	-	1	-	3
77	3	2	1	-	6
78	3	-	1	-	4
79	1	-	-	-	1
81	3	-	-	-	3
82	1	-	-	-	1
Total	279	57	184	54	574

Table 9.10 Crosstabulation - Variable 45 Recode 1 X Variable 7

VAR 7 Values	VAR 45 Values 11 fo	12 fo	14 fo	16 fo	Total fo
1	2	1	-	-	3
3	3	1	1	-	5
4	-	1	-	-	1
5	7	13	1	4	25
6	15	8	1	2	26
7	-	1	-	2	3
8	1	3	1	-	5
9	2	7	2	-	11
10	8	6	1	1	16
11	11	15	3	-	29
12	15	21	5	3	44
13	1	-	3	-	4
14	-	3	-	-	3
15	4	-	1	-	5
16	-	1	-	-	1
18	2	-	1	-	3
19	5	4	2	-	11
20	2	6	-	-	8
21	-	-	1	-	1
25	-	1	-	-	1
27	1	-	-	-	1
28	1	-	-	-	1
29	-	4	1	-	5
37	1	1	-	-	2
38	3	3	-	-	6
40	-	-	1	-	1
41	-	1	-	-	1
42	2	-	3	2	7
45	1	-	-	-	1

cont.

Table 9.10 cont.

VAR 7 Values	VAR 45 Values 11 fo	12 fo	14 fo	16 fo	Total fo
51	20	8	4	7	39
52	88	64	46	11	209
53	13	13	5	1	32
54	35	27	15	1	78
55	18	18	20	4	60
56	39	1	14	6	60
57	2	3	3	[illegible]	14
58	1	–	–	–	1
59	–	4	2	2	8
60	1	–	–	1	2
62	10	18	3	–	31
64	14	11	8	2	35
65	12	3	4	1	20
66	15	20	4	2	41
67	10	25	6	3	44
68	3	1	–	–	4
69	6	7	2	2	17
70	2	3	–	–	5
75	2	1	2	–	5
76	1	–	2	–	3
77	4	1	3	2	10
78	5	3	10	–	18
79	1	–	–	–	1
80	1	–	2	–	3
81	3	–	–	–	3
82	2	–	1	–	3
Total	395	332	184	65	976

Table 9.11 Crosstabulation - Variable 50 Recode - X Variable 7

VAR 7 Values	*VAR 50 Values* 2 *fo*	4 *fo*	5 *fo*	6 *fo*	9 *fo*	10 *fo*	11 *fo*	13 *fo*	18 *fo*	19 *fo*	23 *fo*	24 *fo*	25 *fo*	27 *fo*	29 *fo*	Total *fo*
1	1	1										1				3
3	2			1								1				4
4							1									1
5	3	1		1					1			2				9
6		2		1			1				1					5
8		1		1			1									3
9	2	1		3			2				3			1		12
10	2	1		1			2					3		1		10
11	5	1		3			2		1		3	2	1			18
12	6	2		5			3				3	1		1		21
13				3												3
14									1							1
15				1			1									2
16											1					1
18				1												1
19				1							1	1				3
20	1															1
21			2													2
25	2															2
27							1									1
28						1										1
29	1							1								2
38		1														1
40		1														1
41											1					1
42				3							1					4

cont.

Table 9.11 cont.

VAR 7 Values										VAR 50 Values						
	2 *fo*	4 *fo*	5 *fo*	6 *fo*	9 *fo*	10 *fo*	11 *fo*	13 *fo*	18 *fo*	19 *fo*	23 *fo*	24 *fo*	25 *fo*	27 *fo*	29 *fo*	total *fo*
51		3	1	4			2			1		2	1			14
52	19	3	3	35	1	1	15	1	2		2	8	1			91
53	1	1		12	2		3					2		1		22
54	10	1	2	11			7	3	1		1	5				41
55	4	1	1	19	1		6	1			2	2		1		38
56	2	4	2	11	3		8	1			1	3	1	1	1	38
57	1	1		3								1				6
59				2												2
62	9	2					2									13
64	4	1	2	8			5		1			3				24
65	3		1	3	1		1									9
66	3	1	1	8	1		2	1			2	1				20
67	4	1	1	3			5				1	4				19
68							1									1
69	1			2								4				7
70	2		1											1		4
75		1		1								1				3
76				1												1
77		1		2			1									4
78	1			5			3	1								10
79											1					1
80				2												2
81												1				1
82				1		1										2
Houses	25	12	2	25	-	1	15	-	3	-	14	11	1	3	1	113
Middens	64	21	15	133	9	2	61	8	4	1	10	37	3	4	1	337
Total	89	33	17	158	9	3	76	8	7	1	24	48	4	7	2	486

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Plate 1 Whole pipes

a Possible juvenile attempt with vertical incisions
b Common Iroquois Ring type; the second most popular form at Draper
c Form resembling Bulbous Ring type
d Common Collared Ring type; the third most popular form at Draper
e-f Horizontal incisions with single inferior punctate row; popular decorative motifs

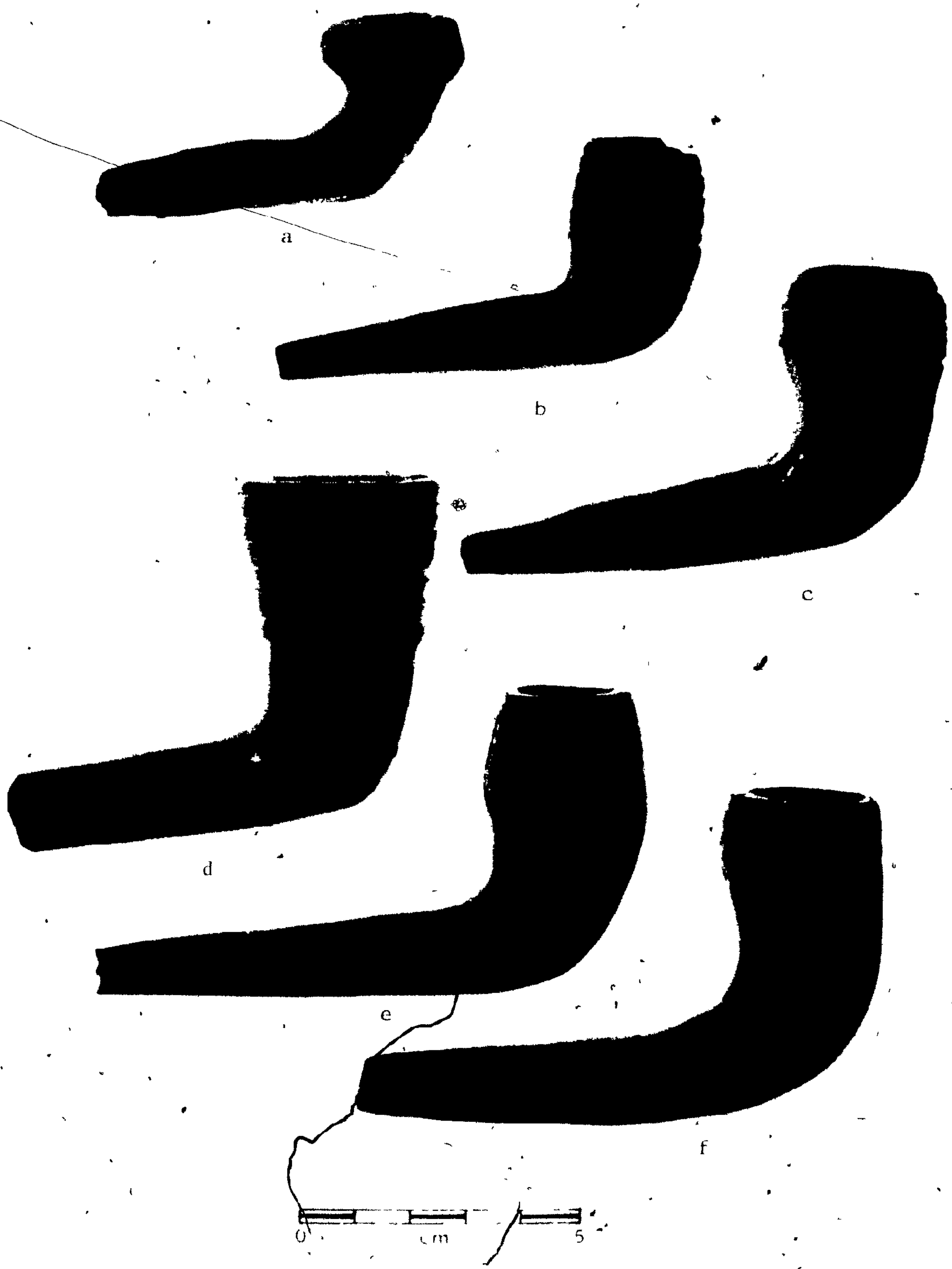


Plate 1

Plate 2: Common pipe bowls

a-c Varieties of undecorated bowls

d-i Varieties of decorated bowls

Plate 2

Plate 3 Trumpet forms

a-b Fragments of Trumpet Types with vertical incisions on lip
c Conical Plain type
d Example of narrow, undecorated collar
e Trumpet type with single horizontal incision on collar
f Common Plain Trumpet type; The most popular form of pipe recovered at Draper

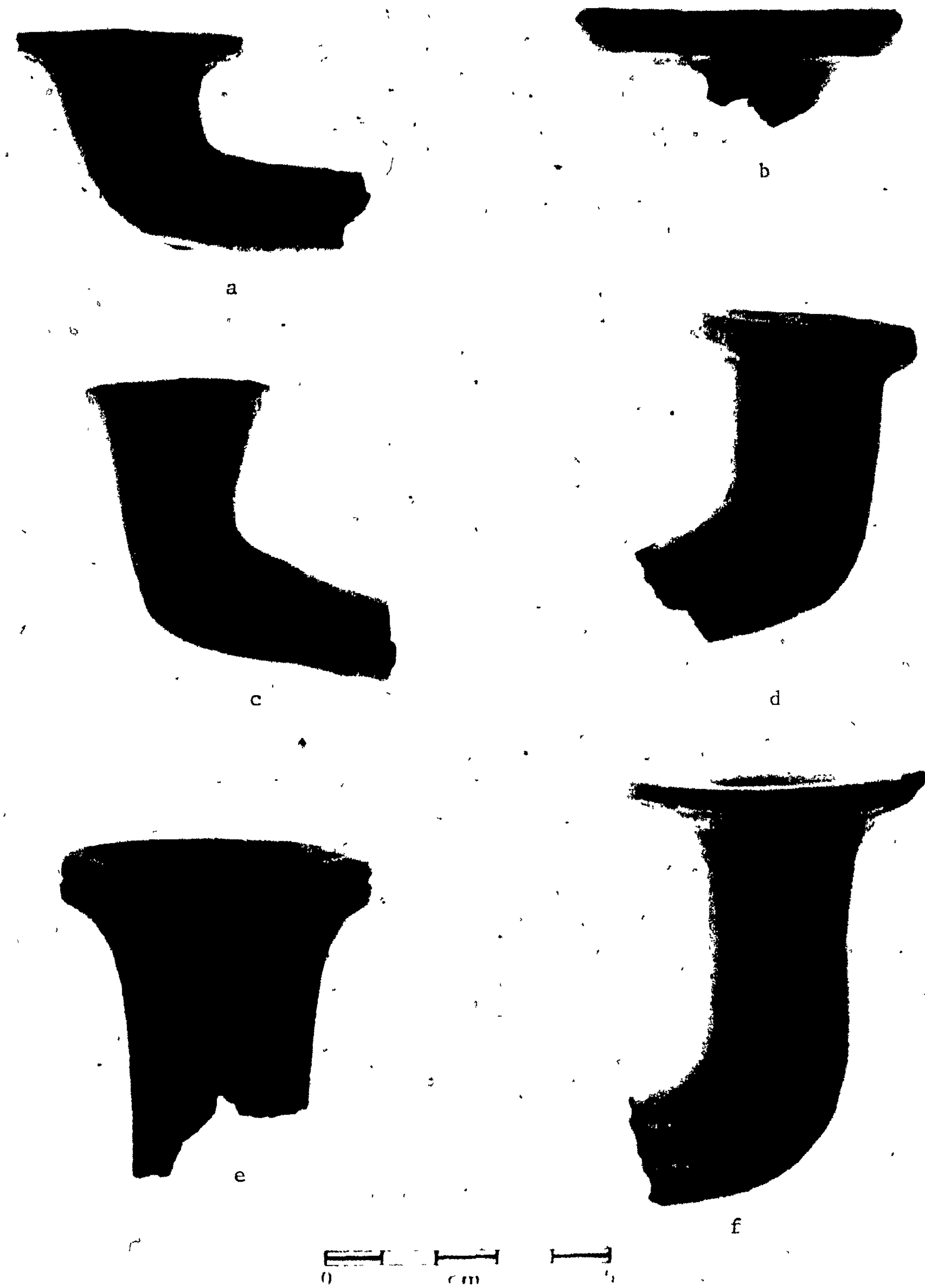


Plate 3

Plate 4 Idiosyncratic pipe bowls

a Bowl with triangular shape at lip (discussed in text pp.126-127)
b Trumpet form without elbow or stem (discussed in text p.127)
c Triangular bowl with spines (discussed in text p.129)
d Bowl covered with oblique incisions (discussed in text p.126)
e-f Stemless ceramic bowls; possibly effigy fragments (discussed in text pp. 129)
g-h Pipe bowls with unusually large diameters

Note: *Plate 5* was not included in this study

Plate 4

Plate 6 Idiosyncratic pipe bowls

a Unusual bowl with cross-hatched decorative motif
b-c Very small bulbous forms
d Castellated pipe (discussed in text p. 128)
e Motif with intersecting horizontal incisions
f Elongated bowl with one row of punctates
g Fragment of pipe with unusual decorative motif and morphology (discussed in text pp. 129-130)
h Elongated bowl with vertical incisions and one horizontal ring near lip

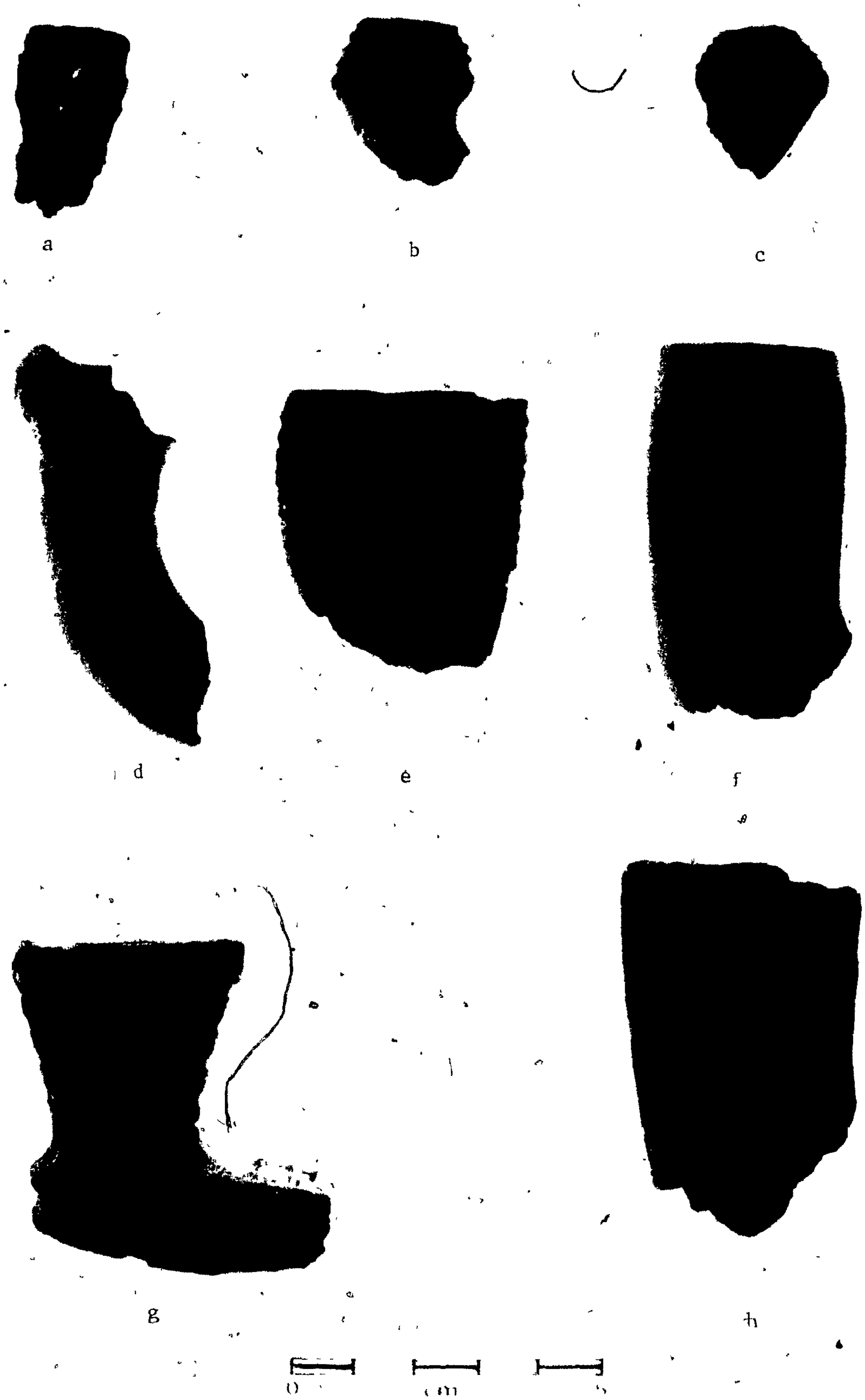


Plate 6

Plate 7 Idiosyncratic pipe bowls

a Bowl decorated with fingernail impressions
b Bowl showing remnants of elbow/stem decoration
c Fragment of miniature platform pipe
d-m Unusual decorative motifs on otherwise common bowl forms

Plate 7

Plate 8 Pipestems and mouthpieces: common

a Example of bowl cavity and stemhole angle of intersection
b Elbow section showing use of multiple reed insertion; only the upper reed produced a successful intersection with the bowl cavity
c,e,f Stem sections showing use of multiple reed insertion; of the 1402 determinate cases found at Draper, over 13% showed evidence of unsuccessful stemhole/bowl cavity intersections
d Example of single hole reed technique; in this case the stemhole was so large that the pipe fractured lengthwise revealing this section
g Straight - flared mouthpiece
h Straight - flat mouthpiece
i Tapered - flared mouthpiece
j Tapered - flat mouthpiece; this form accounted for 50% of the Draper sample

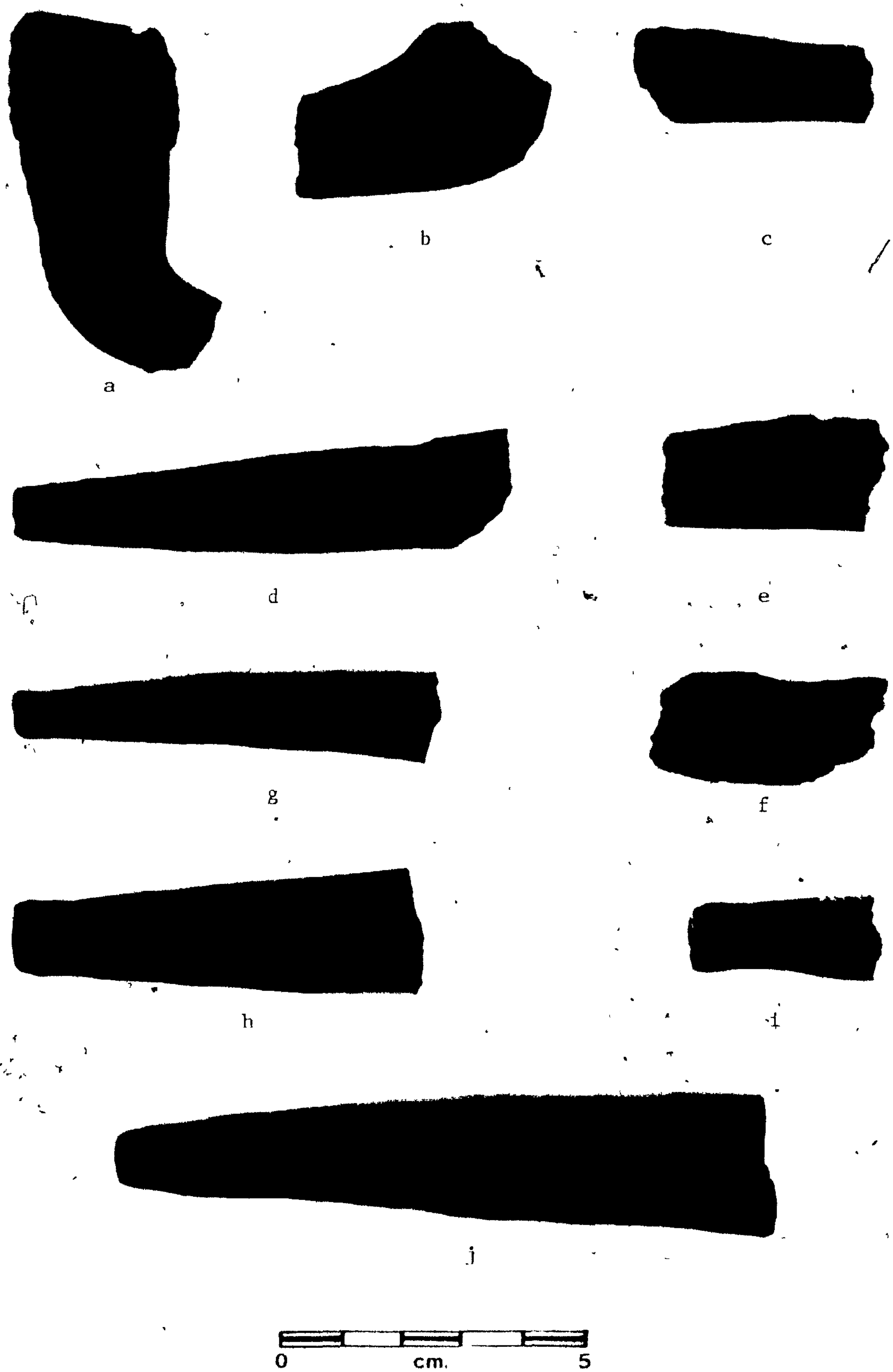


Plate 8

Plate 9 Pipestems and mouthpieces: unusual

a Rectangular stem without decoration
b Undecorated rectangular stem with ground mouthpiece
c Keeled stem
d-g, Decorated pipestems; these may once have been parts of
j,l effigy pipes
h,i,k Mouthpieces with unusual forms
m Platform pipestem with complex decoration (discussed in text p. 169)

Plate 9

Plate 10 Anthropomorphic effigy pipes: Humans with post-cranial features

a Front view of kneeling figure in high relief with head and stem missing; large punctate accentuates navel; 5 shallow horizontal incisions adorn a very humped back; figure is facing away from smoker (cat. no. 2019)

aa Side view of a

b Front view of squatting figure with legs pulled up to chest; stem and head missing; vertical row of 8 punctates interrupts 6-7 horizontal incisions on back; figure faces smoker and is likely of the Pinchface variety; digital extremities are well shown (cat. no. 19184)

bb Side view of b

c Front view of squatting figure with legs pulled up to chest; only half of bowl present; head and stem missing; facing away from smoker (cat. no. 62527)

cc Side view of c

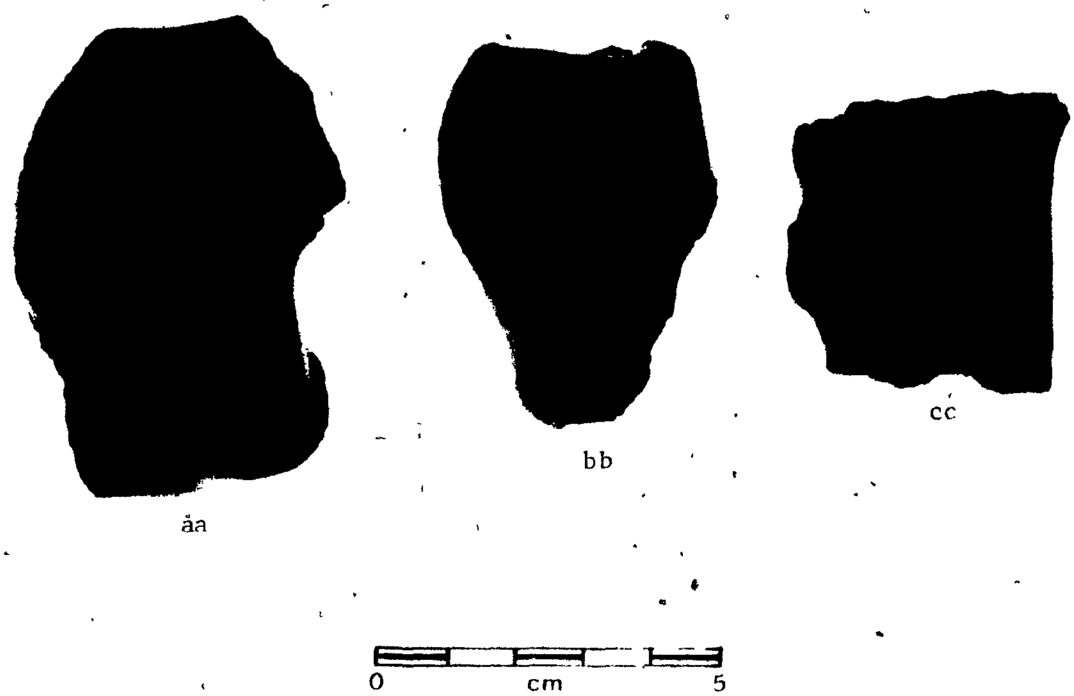


Plate 10

Plate 11 Anthropomorphic effigy pipes: Humans with only cranial features

a Front view of head with trance-like slit eyes and mouth; high forehead; nostrils depicted; ears shown with mortices; very small vertical incisions along top of bowl; very angular forehead protrudes like a collar above all facial features (cat. no. 68054;104212) The fragments used to reconstruct this specimen were recovered 110 metres from each other

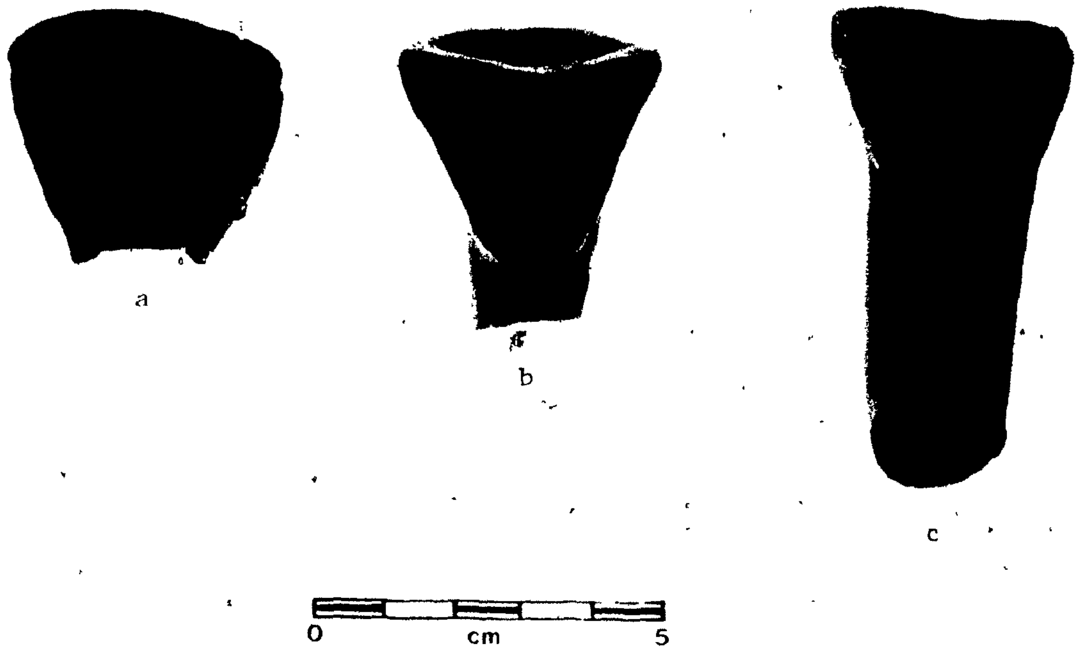
aa Side view of a

b Front view of a pipe almost identical to above, including punctate row with 4 horizontal incisions (cat. no. 20222)

bb Side view of b

c Front view of effigy similar to last two; slit eyes and mouth; nostrils; morticed ears; protruding forehead with punctate row; back of effigy - punctate row with 4 horizontal incisions; figure faces smoker (cat. no. 60704)

cc Side view of c



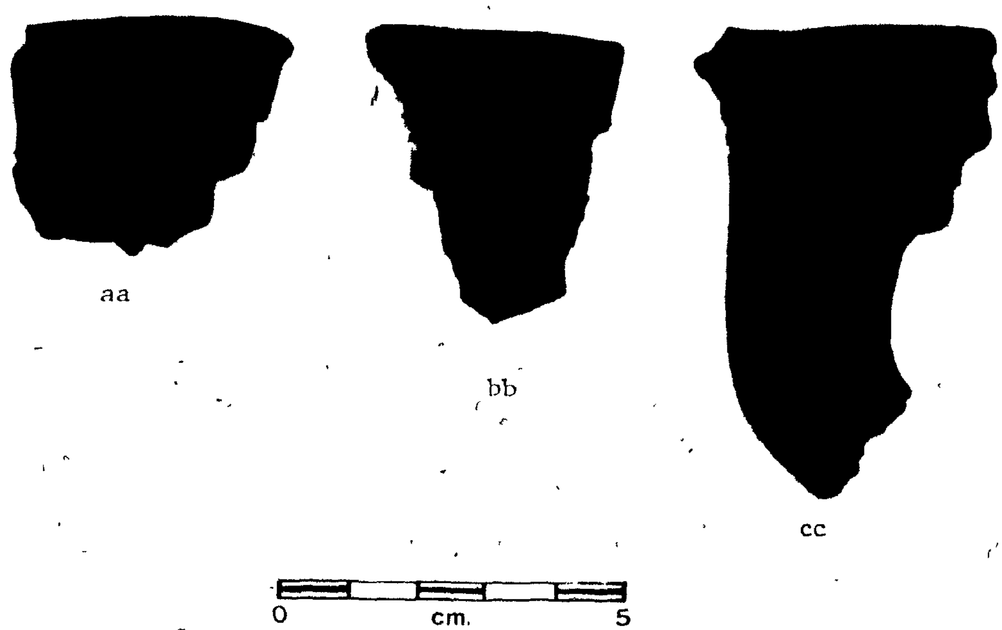


Plate 11

Plate 12 Anthropomorphic effigy pipes: Humans with only cranial features

a Front view of trance-like human effigy with slit eyes and mouth; ears depicted with mortices; unusual bowl shape with castellated lip; horizontal incision with inferior punctate row on forehead; 3 horizontal incisions framed above and below with punctates; head originally faced smoker but a hole was drilled in the back for the insertion of a new stem and the face was thus reversed. Boyle (1897:51 fig. 12) depicts a vaguely similar specimen from Oro township (cat. no. 19751)

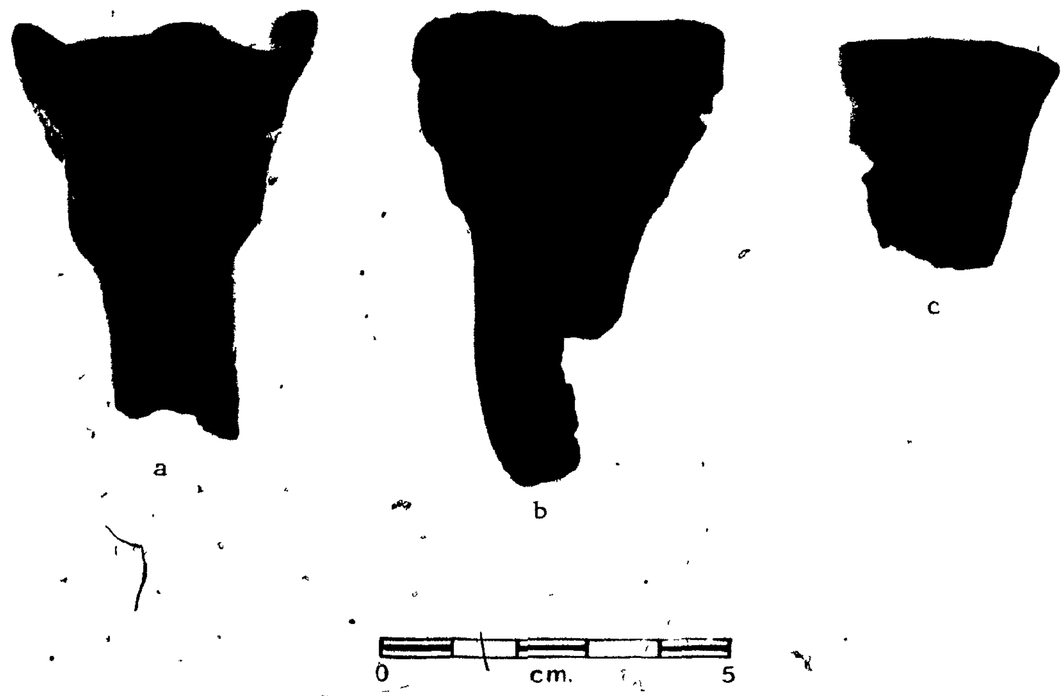
aa Side view of a

b. Front view of unusual 3-faced pipe bowl; trance-like slit eyes and mouth; nostrils depicted; each figure facing different direction and separated by a large mortice. Bowl shape at lip is roughly triangular; a triple-headed specimen was found at the protohistoric Irwin site (Boyle 1898:17). See Mathews (1981) for possible interpretation of these forms. (cat. no. 111167)

bb Side view of b

c Front view of facial fragment from similar pipe as above; slit eyes; protruding collar/forehead (cat. no. 10443)

cc Front view of an extremely large effigy pipe; one eye, measuring an astonishing 24 mm x 16 mm, and a portion of the nose are the only identifiable remains (cat. no. 104215)



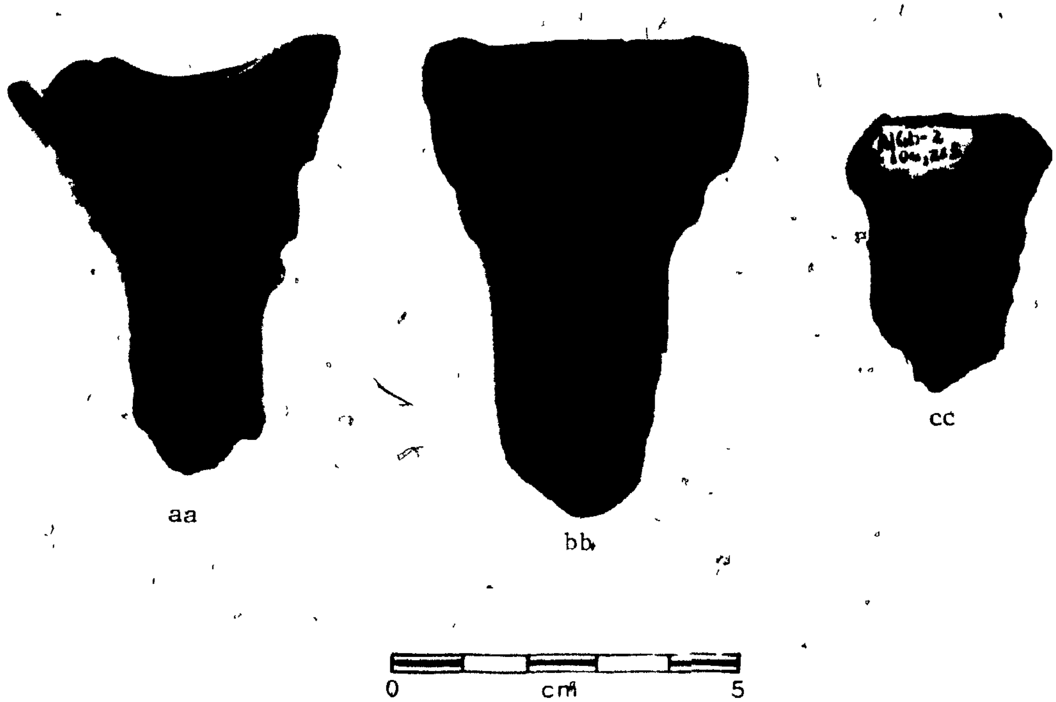


Plate 12

Plate 13 Anthropomorphic effigy pipes

a Mask-like face with deeply set eye sockets; smiling expression; very high and protruding forehead; small incisions depict ears (cat. no. 100611)

b Crude face; deep punctates used for eyes; nostrils and teeth shown; fine incisions on cheeks and forehead possibly reflecting Iroquoian facial painting. (cat. no. 112593a)

c Face with deeply set eye sockets and frowning expression (cat. no. 26790)

d Head with deeply set eye sockets and pinched cheeks (cat. no. 103841)

e Crudely modelled protrusion on small bowl merely showing eyes and mouth; possibly juvenile (cat. no. 40650)

f Head with circular punctates used for eyes and mouth; capped head (cat. no. 61753)

g Very crude but discernible face depicted on small hetero-morphously modelled bowl; possibly juvenile

h Fragment of top of head; hat or horn with 3 horizontal incisions; much like specimen 10015 R.O.M. collections, specimen VIII-F-8494 in Nat. Mus. Man. collections, and other post contact Huron pipes (cat. no. 29748)

i Face with deeply set slit eyes; moulded ears; hollow cheeks; mouth depicted with horizontal incision crossing 5 small vertical incisions (teeth); evidence for red pigmentation (cat. no. 15257)

j Face with simple oval depressions for eyes and mouth; face covered with 25 punctates as if attempting to depict a dermatic disease (cat. no. 37712)

k Face on half bowl fragment; eyes horizontally incised in deeply set sockets; mouth very widely opened; head faces away from smoker and is slightly tilted upward; rest of bowl has 4 horizontal incisions (cat. no.19183)

l Squatting figure from which all relief showing details of body, arms and legs has been carefully removed; 80% of head and face present; protruding eyes, high cheekbones; large hole drilled in side of effigy (cat. no. 104318)

m Sitting figure with thigh and shin at 90 degree angle; figure faces smoker; small vertical incision depicts proctal region (cat. no. 48759)

n Figure with small cap or horn; ears and neck are present; six horizontal incisions adorn neck; figure faces smoker (cat. no. 61347)

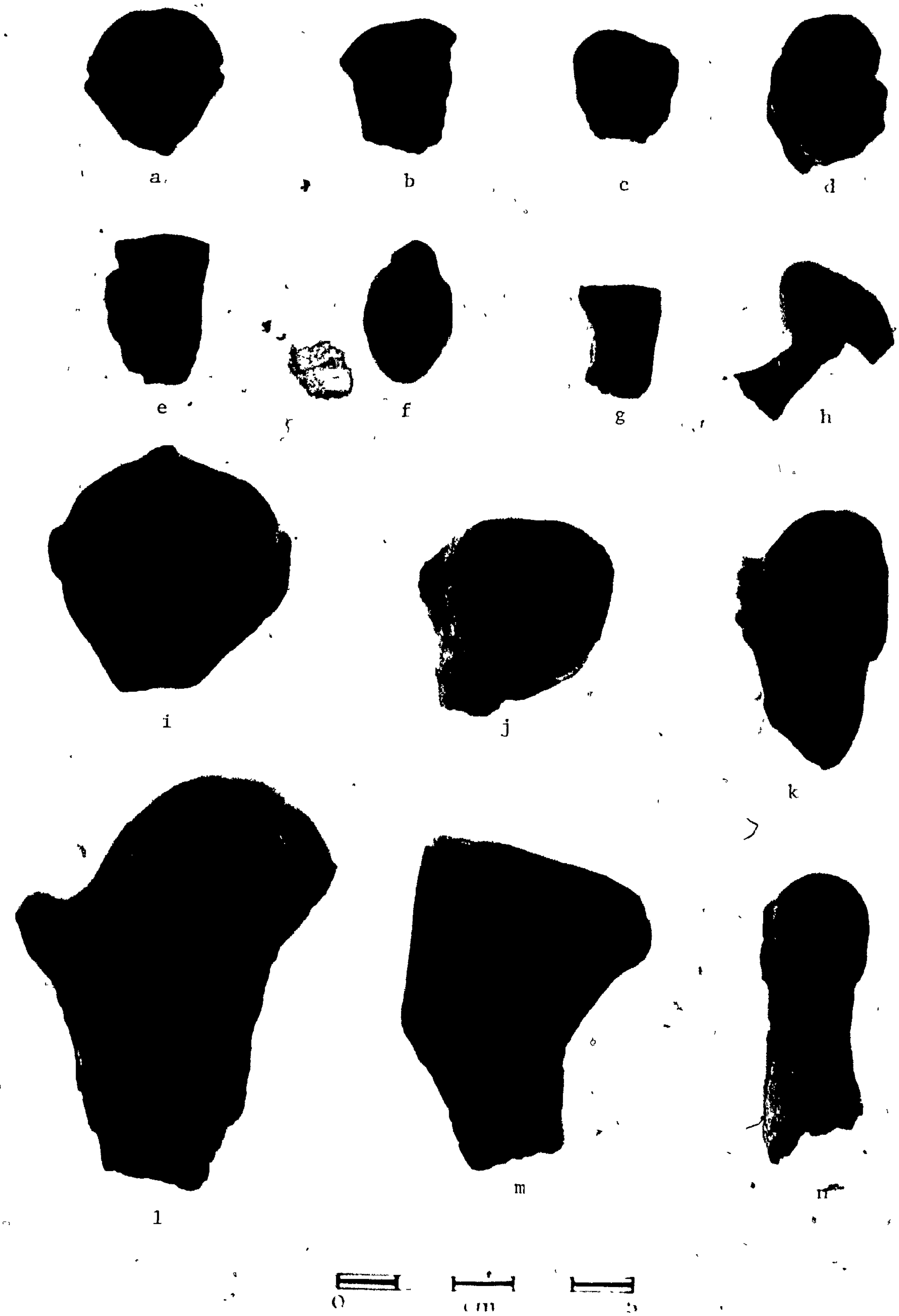


Plate 13

Plate 14. Zoomorphic effigy pipes

a Complete bowl shaped in the form of an open-mouthed bird; eyes are faintly discernible and the presentation does not seem abstract or stylized. The literature often identifies open-mouthed zoomorphic effigies as reptilian; many of the Draper examples, however, appear to be birds (cat. no. 65974)

b Complete pipe; bowl has 5 horizontal incisions with single inferior punctate row; stem is undecorated and tapered; angle of bowl axis to stem axis is 105 degrees; the naturalistically portrayed head of an owl is depicted on the side facing the smoker; the pipe is 81 mm long and 42 mm high; orifice width is 8 mm which is below normal at the Draper site (cat. no. 1262)

c Similar to a; this may, however, be reptilian since possible attempts at teeth portrayal are evident (cat. no. 16746)

d Bird beak with two incisions lining lip; the two fragments of this pipe were recovered 332 metres from each other (cat. no. 110599; 112905)

e Bird beak or reptile; the head is distinguished from the neck through an increase in diameter; eyes and nostrils are depicted; the two fragments of this pipe were recovered 180 metres from each other (cat. no. 18129; 103879)

f Very large fragment of open-mouthed bird beak; roof of mouth has been left unfinished as are most bowl interiors; large eyes are depicted with punctates; this partially reconstructed bird effigy has the astonishing height of 119 mm. it is suspected that the original was of even greater size (cat. no. 17468; 19406)

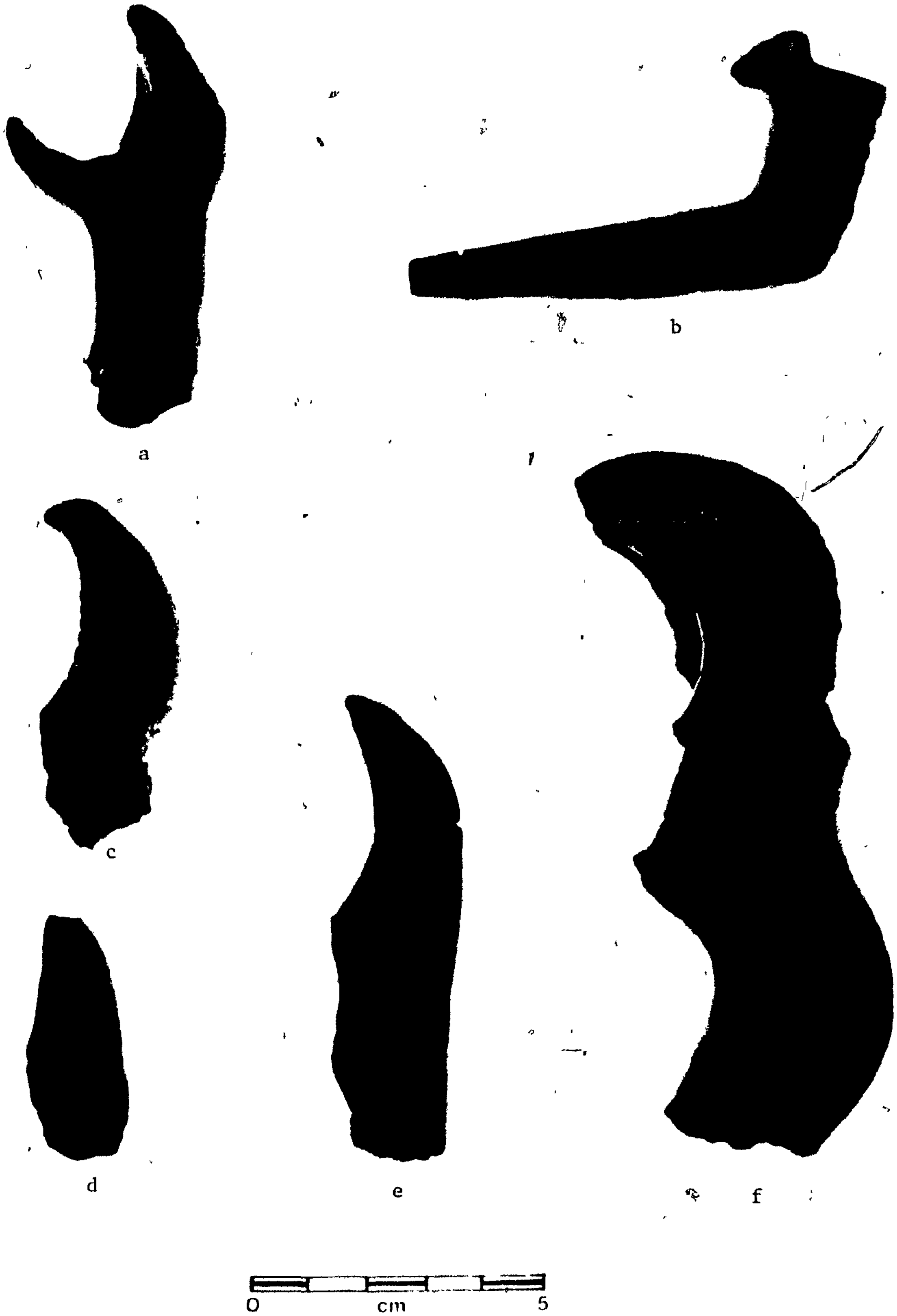


Plate 14

Plate 15 Zoomorphic effigy pipes

a Lower portion of canid; appears to have been a complete effigy of sitting dog; front paws formed separately from back; ceramic stem was never existent and would have been impractible given the extremely naturalistic pose of an entire mammal. A hole was however made for the insertion of a wooden stem. The animal faced away from the smoker (cat. no. 31787)

b Mammal head; possible rodent; mouth and one eye present (cat. no. 100287)

c Complete head of mammal; possibly rodent; mouth and eyes clearly depicted (cat. no. 41253)

d Probable canid snout with nostrils and mouth (cat. no. 56202)

e Small and crude version of beak 16746 but lacking nostrils (cat. no. 8450

f Small, crude bird beak; possibly juvenile (cat. no. 65442)

g Large bird beak with finished mouth roof and 4-6 incisions lining side. The beak end had been broken and was subsequently ground down to approximate original shape (cat. no. 117842; 111947)

h Fragment of another very large bird beak; too fragmentary for further comment (cat. no. 5025)

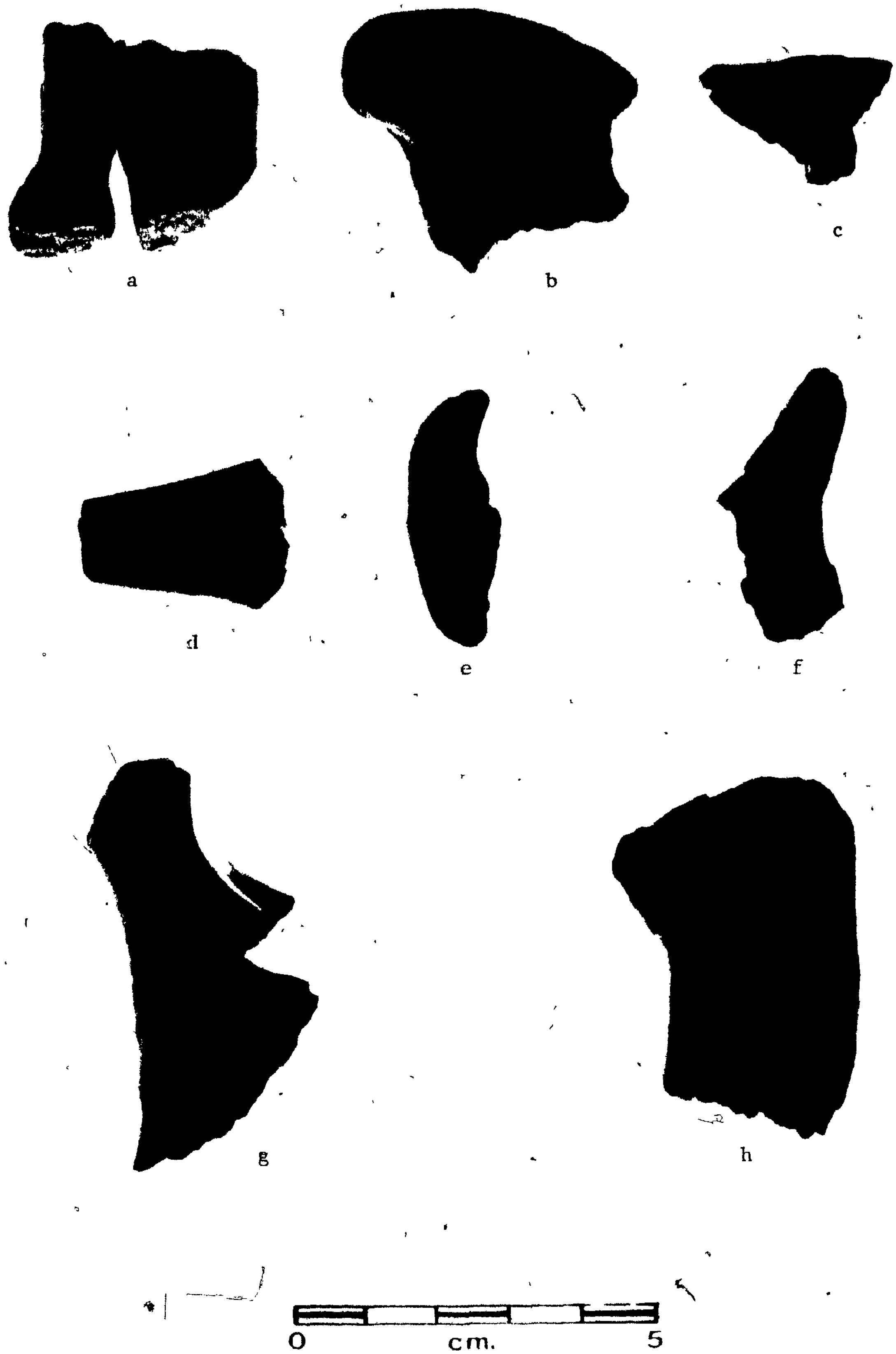


Plate 15

Plate 16 Stone pipes

a Head of canid; this slate dog or wolf head is one of the most spectacular artifacts recovered during all the seasons at the Draper site. The eye sockets have been expertly drilled and other facial features are of remarkable symmetry. The inferior side of the lower jaw clearly shows the V-shaped mandible. The artisan went to great lengths in the accurate reflection of a canid's anatomy. A small depression on the side of the neck is of unknown function. (cat. no. 19995)

b Body of canid; possibly fragment of 19995. Ground slate with legs in relief (cat. 66756)

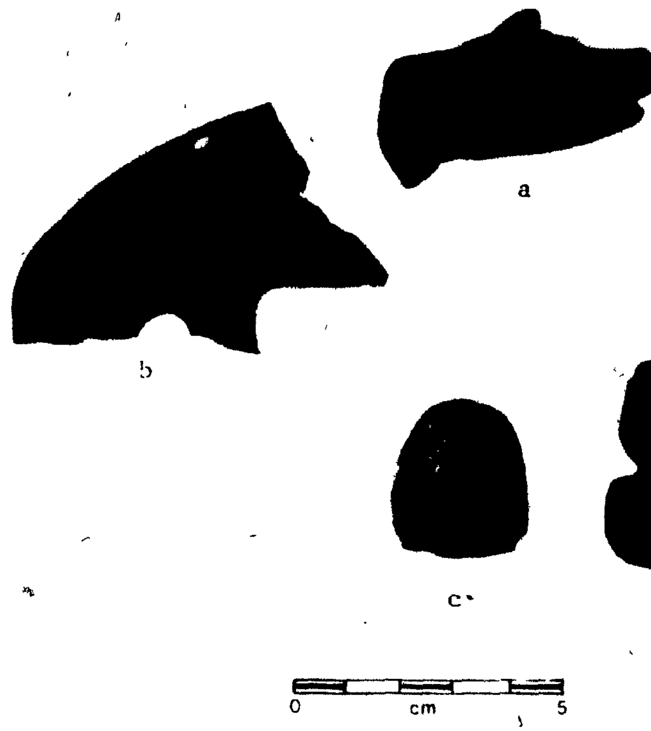
c Fragment of zoomorphic effigy made from fossiliferous stone. This specimen is one of a few in which it is difficult to tell whether they had once been parts of smoking devices

cc Side view of c

d Slate head; although the entire head of this stone effigy is present; it is far too stylized to deduce its species accurately. The face has an almost human appearance although the ears rest on top of the head. The side of the pipe bowl sports a complex array of fine incisions; Broken portions of the pipe have been ground down to remove any jagged edges, although no attempt was made to restore original symmetry. The piece has no known affinity with any specimen recovered in Iroquoian archaeology. (cat. no. 19753)

dd Side view of d

e-h Miscellaneous stone pipe fragments



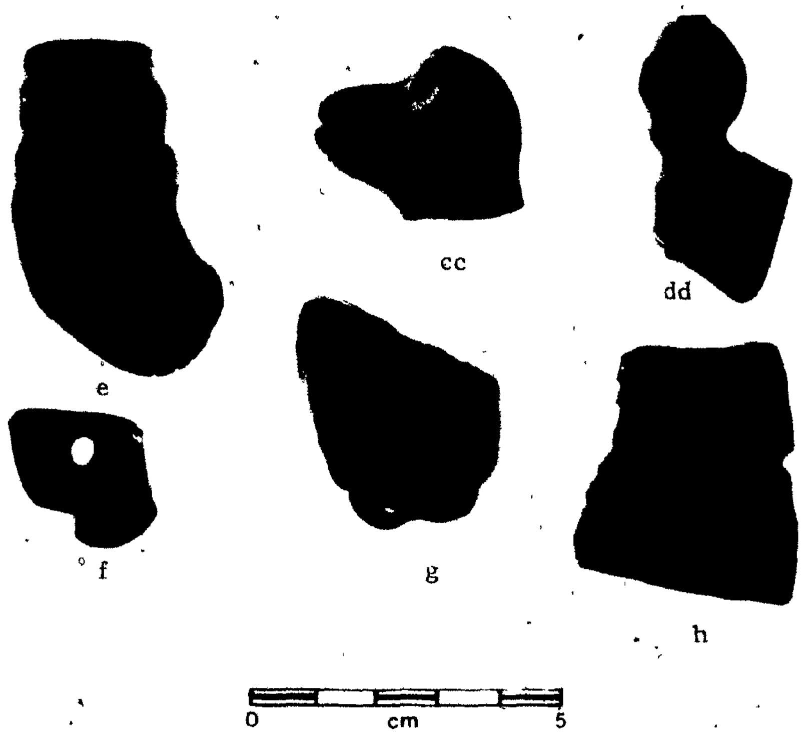


Plate 16

Plate 17 Juvenile pipes

a-l Varieties of undecorated pipe fragments manufactured by children. None were used for tobacco smoking.

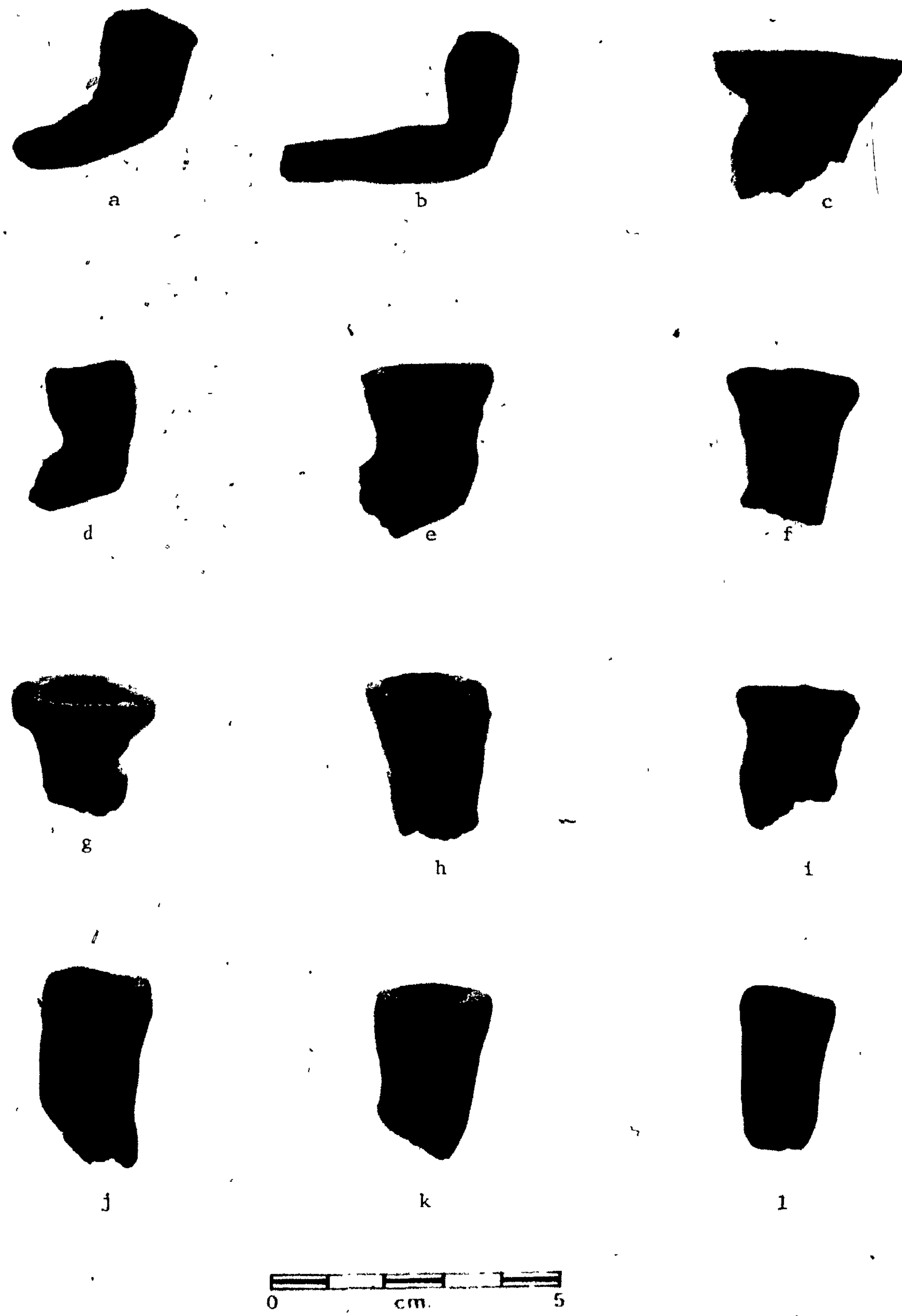


Plate 17

Plate 18 Juvenile pipes

a-n Varieties of decorated pipe fragments manufactured by children. The decorative motifs or specific morphological forms were not copied from 'adult' versions (see text pp. 130-140).

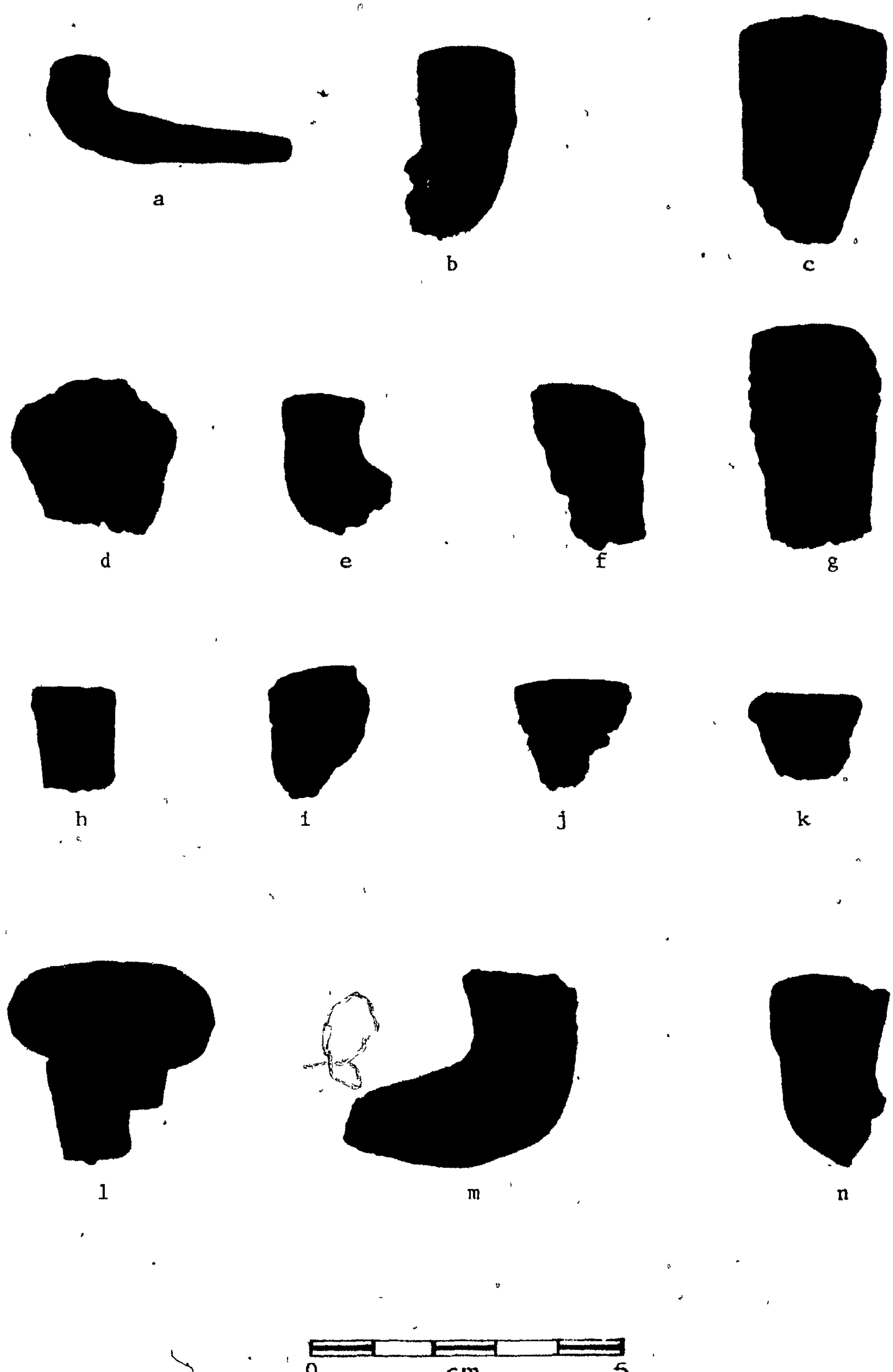


Plate 18

Plate 19 Recycled pipes and preforms

a Mouthpiece which had broken and was subsequently ground to its original taper

b Fragment of trumpet with lip ground in an attempt to reduce broken edges and restore basic symmetry

c Pipe which originally had a broken stem and fractured upper bowl; these areas were ground and the pipe was reused. During such recycling the Hurons were often not interested in preserving a pipe's original morphology but only in maintaining its basic functional form. (see discussion in text pp. 144-151)

d-f Ceramic pipe stem preforms; these were discarded after unsuccessful attempts at stemhole manufacture (see discussion in text pp.141-144).

g Ceramic pipe bowl preform showing accidental crushing while the clay was still pliable. If serious problems arose during this early stage of manufacture, the attempts were abandoned (see discussion in text pp. 141-144)

h Stone pipe preform

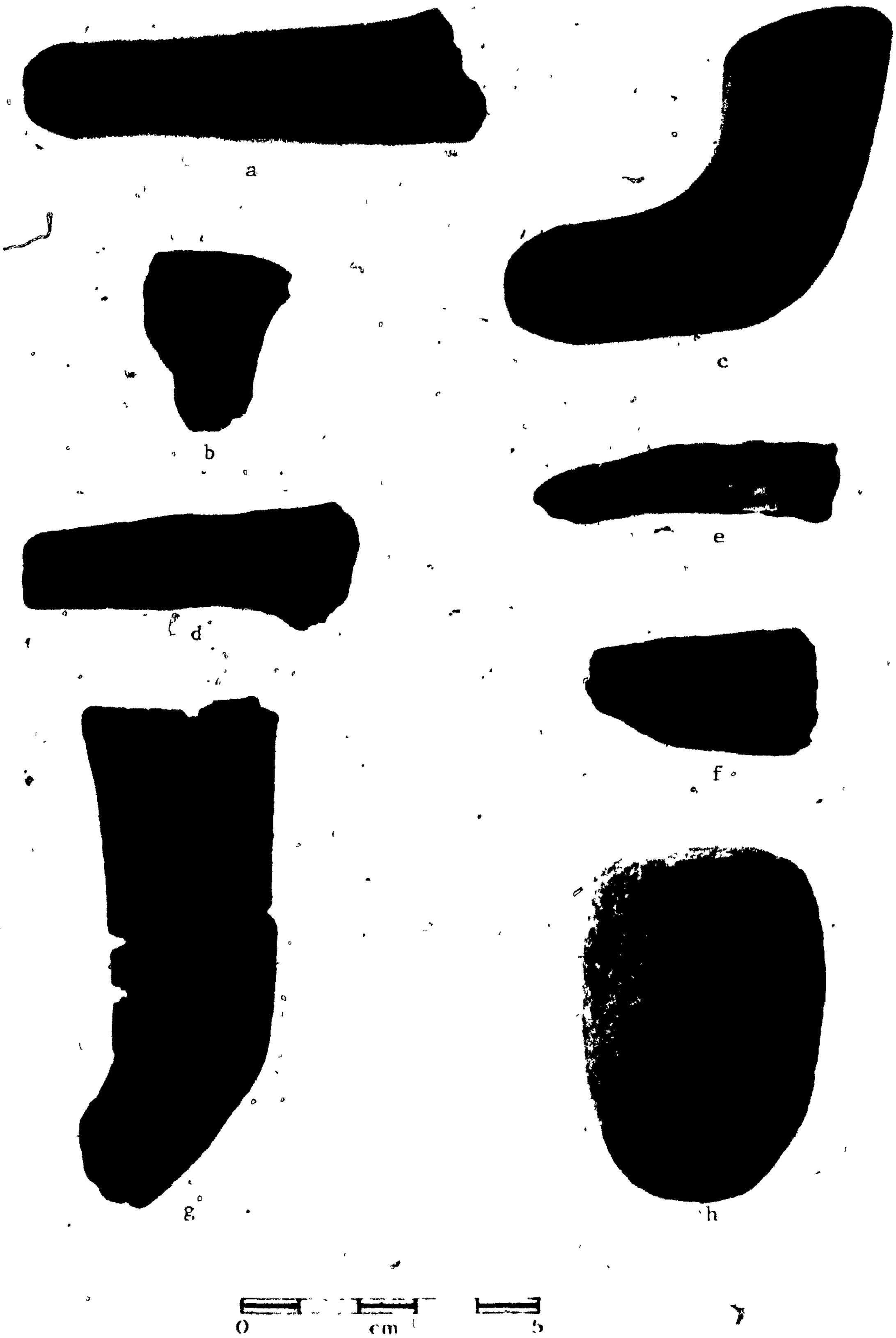


Plate 19

Plate 20

a Fragment of vasiform pipe found at Draper. This decorative motif occurs only once at the site.

b Fragment of vasiform pipe found at the Dawson site in Montreal. The resemblance with the Draper specimen is striking and may be indicative of interaction among different Amerindian groups at a regional level (see discussion in text p. 154). (Drawing by J.W. Dawson. Reprinted in Cartier's Hochelaga and the Dawson Site by J.F. Pendergast and B.G. Trigger, McGill-Queens University Press 1972

c Unusual tri-collar bowl recovered at the Draper site. Such forms have also been found on St. Lawrence Iroquois sites.

Plate 20