NORTHWEST COAST KERFED CONTAINERS:

A Formal Study

by

Margaret Jean Patterson
B.A., University of British Columbia, 1970

A Thesis Submitted in Partial Fulfilment of
The Requirements for the Degree of
Master of Arts

in the Department

of

Anthropology & Sociology

We accept this thesis as conforming to the
required standard

The University of British Columbia
October, 1975

In presenting this thesis in partial fulfilment of the requirements for an advanced degree at the University of British Columbia, I agree that the Library shall make it freely available for reference and study. I further agree that permission for extensive copying of this thesis for scholarly purposes may be granted by the Head of my Department or by his representatives. It is understood that copying or publication of this thesis for financial gain shall not be allowed without my written permission.

Department of Anthropology & Sociology

The University of British Columbia
2075 Wesbrook Place
Vancouver, Canada
V6T 1W5

Date 29/10/75

ABSTRACT

This study examines a large collection of artifacts, Northwest Coast kerfed containers. A terminology is developed with which to describe the physical traits of these artifacts. These data are analysed using numerical taxonomy, and clustered according to their affinities. The typology thereby produced strongly reflects pre-existing intuitive typologies. As well, the newly discovered ability formally to describe construction traits opens new possibilities for determining the provenance of these containers.

TABLE OF CONTENTS

ACKNOWLEDGMENTS

This thesis owes its completion to the support and stimulation of many people. The first debt is to the National Museum of Man, Canadian Ethnology Services, and its staff and collections. The containers were a challenge and stimulation, and I am grateful to have had the opportunity to work with them. The tolerance shown to the presence of large chests in crowded aisles and dishes in odd corners is appreciated. The granting of three months' study leave allowed me to return to this university in early 1975 to proceed with the analysis, for which I thank Denis Alsford, Dr. Barrie Reynolds, and Dr. Bill Taylor,Jr. Of a less official nature, the support of Annette McFadyen Clark and David Keenleyside, and their generous teaching and criticism gave me much-needed perspectives on how to deal with the collection I had chosen.

The members of my committee, in different ways, have each contributed. Dr. Harry Hawthorn and Dr. Marjorie Halpin have provided advice and encouragement and the assistance needed by students who live, work and do research 3,000 miles from their university. R.G. Matson instructed me in the use of the programs which ordered the data, and Wilson Duff provided lessons in looking at designs.

On May 7, 1975, Bill Holm pointed out a distinctive box motif which he claimed was Bella Bella, leading me to the

Plate 1

interesting analysis and results discussed in Chapter 4.

Many friends have helped with different stages of the thesis, but the greatest debts are owed to Andrea Laforet for her assistance in the final editing, and to Bill Simpson for his photographic, analytic, and literary observations and labours.

Chapter 1

Introducing the Problem and the Artifacts

Material culture has long been ignored as a source of hard data in anthropology. Surprisingly, this neglect exists equally among ethnologists and their museum colleagues, the people whose work theoretically involves constant handling of material culture, or descriptive study of everything regarding its manufacture and use. In the case of curators, this neglect may largely be due to the pressures of keeping collections intact and in reasonably good condition, and of maintaining whatever documentation is available. The reasons for the neglect are less obvious in the case of other anthropologists, but may be explained historically.

In early North American anthropology, the museum was a centre of teaching, and a research tool or funding body for the new discipline. It was also a popular institution for education and display. Many anthropologists received funding or direct employment at some time or another in their careers, and contributed to the formation of the great museum and university museum collections of ethnological material (e.g., Barbeau at the National Museum at

the end of this era). Native North Americans were believed to be on the verge of extinction, or at least their life-style was, and the work of the anthropologists was supplemented by such professional collectors as the Newcombes from Victoria.

The Boasian emphasis on fieldwork which characterized this period meant, however, that non-material data was gathered, and was of more interest to the anthropologist returning from the field. Notes were kept and analysed, monographs published, often based primarily on informants (Boas 1921). The very early tradition of Boas, in which there were lengthy although often generalized discussions of material culture, shifted. The short descriptive ethnological papers (Emmons 1908) began to disappear from the journals (Reynolds 1973:2). Few giants of contemporary anthropology concern themselves with artifact studies (Mori and Mori, 1972:189). Exceptions to this neglect may be found, primarily in the museum field, where Sturtevant has restated the need for and value of descriptive artifact analysis. Holm's study of Northwest Coast art (Holm 1965) establishes a high standard for current research.

Archaeologists (Binford, Watson et al.) have been examining ethnology in search of techniques of interpretative analysis to apply to their artifact assemblages.

The syntheses they are making of their tradition of organization and description with ethnological explanation (Binford 1962:217) holds great promise for complete descriptive analyses of ethnological collections. It is this recent trend in archaeology which presents the tools with which a museum ethnologist may transcend both the old single object or small sample descriptions and vague sociological generalizations. Data derived by trait analysis (Deetz 1965) may be used to define types and forms, to borrow Taylor's earlier terminology (Taylor 1948:116), as well as to organize temporal and spatial data. Ultimately, more complex problems of population movement, contacts, trade patterns, etc., may be examined, based on these data.

Archaeologists, more than anthropologists, are accustomed to operating within a specific framework, although it has been severely limited in terms of potential derivation of cultural data. The old research pattern, at its best, can provide the beginnings of the analytic framework whose absence has been noted by Halpin (1973:ix). At its worst, of course, it is only another ubiquitous catalogue disguised as a site report.

This study proposes, therefore, to examine in detail the construction and design of a particular and unusual set of artifacts, Northwest Coast kerfed containers, and

to develop a terminology with which to describe the parts of each container. This will then enable statistical comparison of these artifacts and definition of sub-types within the collection. The testing of this method is as valuable as the actual development of the typology, since its success opens a new area of artifact analysis to the museologist and anthropologist.

Defining the sample

The first problem faced in a study of material culture is the definition of a practical and useful sample. The specimens must form a discrete set, must each contain several traits which may be defined and studied, and must be available in large enough numbers to exhibit a reasonable variation over time, space and type. Trait is used throughout this study to mean a discrete characteristic which varies from artifact to artifact. The set of Northwest Coast Indian containers from the collections of the National Museum of Man, Canadian Ethnology Service, is the broad sample chosen.

These containers, however, constitute an enormous and unwieldy set, including boxes, bowls, bags, and stone bowls and mortars. Further, the concept "container" is difficult to define and therefore does not usefully and clearly

delineate a sample for analysis. When is a tray a container, and must spoons be included?

Material as a limiting trait is somewhat more useful, though still limited. If all non-wooden containers are eliminated, 450 containers remain. This still leaves many variations of size and shape and use, and too large a sample.

Documentation is not sufficiently reliable to allow functional details to be applied to the sample. Even in those instances where a container is of a style or type generally accepted to have been a storage box or a grease bowl, alternate uses are often documented.

There are, however, constructional traits which provide a means of whittling the sample to a qualitatively and quantitatively workable size. These are traits which are easily visible, may be defined (see Chapter 3), and which are not dependent on the whims of collectors for their presence. Kerfing is such a trait.

A kerf is a notch which permits or assists the bending of a material, in this case a plank, and thereby the creation of a corner. By requiring the presence of this trait, two types of wooden containers are eliminated from the sample: those whose corners are all joined, and those carved from a single block of wood. Of the former, certain chests and grease dishes are similar to those constructed

by kerfing, but most of these were more recent in origin. Of the latter, there is still a great variation of size, shape, and decoration, and these carved containers would themselves constitute the sample for another study.

Both the type of collection and the nature of its component artifacts argue for its use as a sample for this study. The most obvious reason is that the National Museum of Man, Canadian Ethnology Service, retains one of the largest and most important collections of Northwest Coast containers, a collection which has not been studied and is poorly known. Thus, there is a need for an important collection to be studied.

In terms of the methodology proposed, that is, a formal, statistical survey of traits, several requirements are more than adequately met. The first of these is size. A collection of 258 artifacts, each sharing at least one trait, that is, the presence of at least one kerfed corner, is large enough to produce statistically useful results. It is in fact, larger than necessary, and the final analysis used only 99 of these. The other prerequisite in terms of the trait analysis is that the containers may be treated as items each of which possesses traits which may be defined and compared. A kerfed container, as any artifact, contains certain obvious traits, notably of both construction

and decoration. This allows comparison of construction even in those cases where decoration is absent or obliterated. It also means that there is a wealth of traits from which several may be selected at some time for a limited analysis.

History of the collection

The National Museum of Man, Canadian Ethnology Service, collection of kerfed containers, while it has widely varying quality of documentation, represents, in the history of its own formation, most of the types of collecting practiced by North American museologists and anthropologists. While this does not mean there is no bias in terms of its content, it does indicate that it suffers from no worse faults than most museum collections. Also, the sheer size and number of the different collections which together comprise the total collection in some ways compensate.

The specimens were gathered mainly between 1879 and 1930, the period when anthropology was beginning to become established in North America and museums were being built. Native peoples were believed to be on the verge of extinction, as the Northwest Coast was experiencing the severest blows of the European immigrations.

The locale and an approximate date of collection, known within five years, are available for many items. The peculiar role of these containers, as described below, makes this data less useful than might otherwise be the case (Ch. 4).

The collectors, while a varied lot, were, for the most part, individuals possessing some familiarity with the Northwest Coast. The vast bulk of the collecting was done by professional ethnologists such as Boas, Barbeau, Sapir, H. I. Smith, and by professional collectors, particularly the Newcombes, father and son. The collections are also mainly from the northern coast, but all areas are represented.

Perhaps the greatest bias of the collections is that most items were chosen, in part, for their aesthetic interest (see Plates). There is likely an under-representation of purely utilitarian items (Plate 2). Also, there is virtually nothing which is documented as Bella Bella - only a coffin front and a small box.

Northwest Coast containers, because of their beauty and of their prevalence in the collections of larger museums, have been widely published, but never examined in terms of their general construction and its variations.

Holm (1965) has begun the analysis of design by breaking the northern designs into their component elements and extracting certain rules concerning the use of these elements. He did not compare the structures of different boxes in terms of their overall designs, and no discussion of construction of the containers was made. As the subject for analysis, these are very satisfying artifacts. Their complexity allows the researcher several directions from which to work, and their beauty and excellence of craftsmanship are an added bonus throughout the process.

Containers of the Northwest Coast

Wooden containers are highly significant artifacts in Northwest Coast life, as is elaborated below. Briefly, however, it must be noted that part of the argument for their legitimacy as a subject for study is their widespread and changing use, extensive trade, and varied type. Their importance in the economic life of the northern cultures, both as items of trade and as packaging for other important products for exchange cannot be overstated.

Containers were literally and symbolically fundamental artifacts, especially among the northern tribes. They were used in all ceremonial gatherings, representing wealth as well as being containers of food, wealth goods, etc. They

appear in many different roles with many meanings in myth. Their designs have depths of meanings which are lost to us. These are issues which could themselves constitute the subject of another thesis or two. I will briefly outline some examples of the above, using data from several sources, to illustrate some of the depths of meaning and the level of importance.

Among the Tlingit, the concept of container is basic and pervasive. There is a Tlingit word "that expresses the meanings of box, coffin, bivalve shell, womb, outside, opposite moiety" (Sturtevant 1974:12). That is, the concept "container" unites symbols of lineage membership (birth), death (coffin), the origin of humans (for the Haida, at any rate, from a cockle shell), the separation of inside from outside parts of the world, and the group of humans whose reponsibility it is to provide mates, boxes, and even the coffins in which the body rests after the end of life. Some of these meanings are reflected in myths.

For example, among the Tsimsian (Boas 1902:7-13), containers play a number of important roles as transformers. TxamsEm's genealogy exhibits this very clearly. His grandmother, a chief's wife, had a lover, and pretended death. She was placed in a large box in a tree, as she had requested. While there, her lover visited her, and

she became pregnant. Later named Sucking-intestines, he turned himself into a cedar leaf in a basket full of water, and was swallowed by the daughter of the chief in the sky. She therefore became pregnant, and gave birth to TxamsEm, though he was called Giant.

A box, then, was the home of his grandparents in their illicit marriage. It was his grandmother's false and later real coffin. It became his father's womb, cradle, and home as he was born in it after the killing of the chief's wife. The box became his life, and her death, and his human home and the symbol of his parent's rejection of and by the accepted relationships of the village, since it was their only home.

Later in his adventures (ibid.:13-16), the young Giant cries for the max, the box which contains the daylight and is hanging in a corner of his mother's father's house. He is given it, plays with it and runs away with it. Daylight is coming to the Nass. When the ghosts refuse to give him anything that they were catching (leaves in nets), he breaks the max. The ghosts flee, and he sees boxes floating on the water. These were the canoes of the ghosts.

Boxes contained the light which is of great value to human life, and which also frightens away ghosts. They also, (quixotically,) contained the ghosts, or perhaps were

the remains when the ghosts left and their canoes became transformed. It is not clear whether the canoes were actually boxes, transformed only by being seen in their true form, or whether the canoes were actually changed when they were in daylight and were seen.

The adventures of TsEgu'ksk^{u} (Boas 1902:231) explore another situation in which containers act as transformers in the relations between antagonists. The shaman, TsEgu'ksk^{u}, seeking revenge, goes to the chief at the bottom of the sea. The chief gives him "a club in shape of a land otter and a small box, the lid of which was carved in the shape of a fin of a whale (ibid.)." Back in his canoe, TsEgu'ksk^{u} threw the club into the river. It swam ahead and broke the ice, but became tired. He then put the box on the ice. It became shaped like a killer whale and moved over the ice, breaking it (ibid.: 232). The whale also stole the daughter of the shaman who had killed his friends and on whom the revenge was sought. This box-whale allows revenge to be accomplished by clearing a path and then fulfills the revenge by stealing a woman.

Later, TsEgu'ksk^{u} is killed by smallpox (ibid.:233). Once infected, he goes into a box and dies there. On the fourth night after he was buried, he appeared on top of the coffin box as a white owl. Before the owl fell back

into the box, it warned the people: "Nobody will be left." This was the first smallpox. The power of the box to transform remained, but the shaman did not live. The transformations seen in Txä'msEm's story have weakened. Death and separateness are no longer changed to life within the coffin; instead, there is only a temproary rebirth in animal form.

Boxes and dishes do not only appear in the myths of the Tsimsian as important mediators or symbols. They are also mentioned as dowry (ibid.:125), food containers (ibid.:192), weapons (when full of boiling water) (ibid.: 131), feast containers (ibid.:60), and so on. That is, many of the non-mythical uses of containers appear either as part of the description of a scene, or as some part of the events of the stories.

It may therefore easily be understood that, as a collection defined by a single constructional trait, kerfed containers are homogenous enough to analyse, and are important as a large and beautiful collection. As well, they are characteristic artifacts from the Northwest Coast, and of great importance in the life of their makers.

Chapter 2

The Method: Numerical Taxonomy

Within Anthropology, there have been several methods of analyzing a collection of artifacts, but these have been dominated by two, as follows. The method used in the early period of the discipline and now being reintroduced and redeveloped (Duff:1975, Gerbrands:1967) makes careful statements about cultural context, where known (Gerbrands, of course, gathered much of his data in the field). Drawing together this information, historical data, and data derived from visual aspects of the artifacts, explanations and hypotheses are presented which contribute to the realm of knowledge of symbolism and meaning for the total culture as well as for the particular artifact or artifacts being discussed. These statements utilize the ethnographic record, from social systems to mythology. Such studies, well-founded, often embody exciting and courageous leaps in our understanding of visual symbolism and its context. This method will be examined more closely below in the discussion of iconography.

The other method of analysis of artifacts is formal, drawing heavily from biology and from archaeology. The descriptive catalogue studies mentioned in Chapter 1 are not discussed here as they do not attempt analysis beyond the most superficial organization, usually functionally based (Clark et al., 1974) and deriving from assumed typologies which are strictly intuitively based. By contrast, Tippett's study of Fijian material culture (1968) is a careful attempt to formulate a functional typology which is based primarily on field data, and which he sets in contrast to Churchill's previous (1917) study of Fijian clubs. The latter, based solely on the morphology of the clubs, failed in Tippett's eyes because it ignored function for the sake of form (op. cit.:21). It also sought to explain the differences between clubs and types of clubs by making statements of their evolution, much as a physical anthropologist would have done.

There are two main criticisms which can be directed at this procedure and its conclusions. The first, as elucidated by Tippett (ibid.:20), is that locality and function were ignored. The clubs were treated as a unit, neglecting considerations of the trade and diffusion which caused clubs from different regions to be included in Churchill's study as Fijian clubs. The second, which

reflects Tippett's comments about using only formal aspects of the clubs, is that, on the contrary, Churchill did not go deeply enough into the construction and ornamentation of the clubs before making what Tippett referred to as a meticulous formal classification (ibid.:20). Furthermore, he forced his data into an evolutionary scheme. A thorough enumeration and study of traits should have clearly separated those clubs which were not made in the traditional Fijian style.

The above discussion of studies unrelated to the Northwest Coast serves to illustrate three major orientations found in formal studies of material culture. The first is the old formal arrangement based on the notions of biology. Classification, naming, and relating by descent were attempted by an analysis using a combination of obvious characteristics or traits, and with the presupposition that differences were part of an evolutionary sequence (Sokal and Sneath:1963). The latter operates in the analysis even though the actual evolution of the artifact form is unknown, and its presence on Fiji is assumed to be an indication that it was made on that island and belonging therefore to the traditions of the Fijian carver or user of the club.

The second orientation is, of course, Tippett's. The typology used by his informants, which was functional, provides the basis for his analysis. "To view an object functionally is to place it as a meaningful object within a context" (Tippett, ibid.:27). The classification or ordering of the artifacts is not simplified, but has an added depth. Often, however, this ordering is not based on informants' categories, but is based on categories determined by the researcher from inspection of the artifacts under study. Thus, for example, a curator building an exhibit on "functional" categories would place hamatsa whistles and drums used during gambling with a variety of other objects and call them musical instruments. Tippett's excellent use of informants as well as of museum resources avoided this pitfall, but it has been all too common in the past.

The third orientation for the classification of material culture is that hinted at above with the statement that Churchill did not go deeply enough into the typology of the clubs. Recently, with the aid of computers, and with the new consciousness of information theory and the new possibilities developing for numerical analysis of artifact assemblages or collections, there has been a re-examination of the traditional means of analysis of

material culture. To date, this has been restricted in anthropology mainly to archaeology. Deetz (1965) divided pottery into component parts, varying over time, which he called stylistic attributes. All attributes which varied within his sherds were coded, except those which were only a result of the purely technological aspects of pottery manufacture (ibid.:46), although these presumably could be considered at some time. He defined stylistic attributes as those resulting "from a choice on the part of the manufacturer from a number of possibilities, made to produce a certain effect on the finished vessel" (op. cit.). Nineteen classes of attributes were derived, each containing from two to eighteen traits or characters, as Sokal and Sneath refer to them (Sokal and Sneath, 1963:34). The computer then calculated the degree of association of the traits in each stylistic class, and the analysis of these relationships proceded.

Sokal and Sneath (ibid.) outline the basic theory of numerical taxonomy from their perspective in the sciences, especially botany and biology. Their work forms the basis from which the technique of analysis used within the present study was derived, and is therefore outlined below. At the same time, definitions will be clarified. Numerical taxonomy involves a broad analysis seeking to derive

taxonomies, as opposed to the object of Deetz' study, which was concerned specifically with the "manner in which stylistic attributes combine and recombine through time" (Deetz, 1965:45).

First, we need to understand the terminology of ordering which is being used. Anthropology, including archaeology, has historically produced many more or less imaginative successive terminologies which, whether formal or functional, have claimed to be the best, most logical, most all-inclusive, or whatever possible means of referring to a body of data and its ordering (including Binford 1962, Rouse 1960, etc.). The simple Boolean terms, set and sub-set, seem to have been superseded by type, mode, trait, and a plethora of other terms, reflecting the bias of the scholar in question, more than the data which they ostensibly are best able to deal with.

In an attempt not to complicate this further, this study uses terminology derived from two major sources. The first is the archaeologists, and those biologists whose work serves as their model, who are proceeding with formal, statistical analysis of artifacts (Sokal and Sneath 1963, Sokal 1974). The general terminology derived by Rouse (1960, 1967), especially as used by Jones (1968) in her study of Northwest coast basketry, is a useful framework

on which to begin the derivation of the traits which form the basis of this analysis. I prefer, however, to substitute the more specific term, trait, for Rouse' mode. The other primary source of terminology for this paper is, of course, the work of those anthropologist museologists who deal with ethnographic collections, especially of the Northwest Coast. This includes scholars having a strong sense of the visual impact of the artifacts, as justified in his call for connoisseurship by Sturtevant (1973:46).

Taxonomy is the "theoretical study of classification, including its bases, principles, procedures, and rules" (Simpson 1961:11, in Sokal and Sneath 1963:3), and classification is the "ordering of organisms into groups (or sets) on the basis of their relationships, that is, of their associations by contiguity, similarity, or both" (Sokal and Sneath 1963:3). Both terms have been and will continue to be used to indicate the results of the process which bears their name. This study seeks to order Northwest Coast kerfed containers into sets, or subsets of the total container collection (Ch. I), and thereby to test the appropriateness of taxonomic analysis on such a collection. That is, the containers will be divided to create a taxonomy.

As Sokal and Sneath point out in the case of biological taxonomists, the identification of taxonomies has been made on the basis of resemblance, sharing of characteristics which are a result of a common origin, and sharing a line of descent. Within anthropology, this is also a problem, as the definition of the latter two, though based in part on the visual evidence of the former, is often circular in nature and leads to the development of taxonomies in which sets are designated by both formal and functional traits, without any clear distinction being made.

Taxonomies should be built on a calculation of the affinities of specimens (taxonomic units), clustering them numerically with an awareness that the divisions are arbitrary at some level, and that within a grouping or cluster of artifacts which have a high affinity in terms of shared traits there may be no one single trait which defines the cluster and each of its members. Numerical taxonomy, then, is "the numerical evaluation of the affinity or similarity between taxonomic units and the ordering of these units into taxa on the basis of their affinities" (Sokal and Sneath 1963:48). The characters or traits on which these affinities are calculated are selected without weighting, and as many as possible should be used, at least sixty

(ibid.:51) being preferable. It is therefore possible to form clusters of artifacts strictly on the basis of their traits, and then to apply the type of seriation used by Jones, and by Kaufmann (1969) once the types were defined. Without careful and logical definition of similarities, comparisons over time and space become weakened.

Cluster analysis is a "more or less automatic method for establishing and defining clusters of mutually high similarity coefficients" (Sokal and Sneath:52). They are best illustrated by dendrograms (Figs. 5, 6, 7), the length of the horizontal lines being the measure of the distance of the affinity between units or groups of units. That is, within the limitation of this linear representation, the kerfed containers will be placed in clusters according to their level of similarity.

The physical traits of the Northwest Coast containers were coded. As well as the prediction that they would cluster according to their similarities, it was hoped that this would allow some strengthening and clarification of present typologies, which are loosely defined and intuitively derived. One of the greatest difficulties with this method of analysis, shared, I suspect, equally by the botanist or zoologist and by the ethnologist or archaeologist, is the problem of defining the characters or traits. They

must be variables which can be observed, and their identification must be repeatable. Sokal and Sneath (1963:62) give two definitions: First, a "character is a property or 'feature which varies from one kind of organism to another' (Michener and Sokal, 1957) or 'anything that can be considered as a variable independent of any other thing considered at the same time' (Cain and Harrison, 1958; we assume the independence referred to is logical rather than functional or mathematical)." The variations which a character may demonstrate are called values or states of the character. Furthermore, a unit character is "defined as an attribute possessed by an organism about which one statement can be made, thus yielding a single piece of information" (Sokal and Sneath:63). This is a strictly operational definition.

Each character, or each alternative represented by that character (trait) will be represented in the data as a single piece of information. It should not be a logical consequence of any other character (trait) as that would be redundant and possibly weight the results in the direction of the character (trait) in question. It should not be invariant within the sample, and it can possibly be included if it is partially a logical correlate of another trait, depending on the factors affecting the second (ibid.:

66, 67). Inclusion of the invariant character would reduce the differences among the units, and the calculated coefficients.

There is another issue within the question of how to choose traits. That is the question of environmentally determined traits. Sokal and Sneath (ibid.:92) note that "It is generally considered that only genetically determined characters should be used in orthodox taxonomy, and with this we concur. However, a study to investigate the influence of environment using numerical taxonomic methods could legitimately include environmentally determined characters." That is, regarding Northwest Coast containers, the original (box) traits are analogous to genetic traits, which were created and are fundamental characteristics of the container. Additions, such as nails to replace pegs, more paint, etc., although they do not reflect the original construction and design of the specimen, indicate details of its history. They may reflect events in its use and variations imposed by successive owners. If one were intending to create a pure analysis of the original manufacturing, these traits should be omitted. Often, however, it is difficult to determine the precise time at which a trait was added or changed.

Once these questions are settled and the traits are defined and recorded, the computing proceeds on the basis of similarities and differences, either among the over-all operational taxonomic units, or by associating the pairs of these units (in this case, each container is a unit) over all the traits in the matrix of units and traits. The coefficients thus calculated may indicate association, correlation, or distance, or coefficients of resemblance or similarity (ibid.: 125).

The clusters derived, and the taxonomic systems constructed from them, are representations of the affinities among the units in the study. These systems are themselves shorthand -- convenient means with which to refer to collections of units, and to clarify the relationships among them.

The clustering I have used in the following discussion is constructed using furthest neighbour or complete linkage (ibid; Matson and True 1974:57), which was found to give the clearest results. The hierarchical cluster analysis (HCLUS) program was designed by Wood (1974). Matson (pers. comm.) wrote the portion of the program which calculates the similarity coefficients matrix. The multi-dimensional scaling program

which provided such useful supplementary data was derived from Torgerson (1958).

Chapter 3

Application of the Method

The objective here is to describe, using the theories of trait analysis and definition outlined above (Ch. 2), and in some detail, the process of dealing with the specific artifacts (taxonomic units) and their traits (characters). Before attempting to describe a set of artifacts in terms of logically-derived components or traits, it is essential to be familiar with the artifacts. In this study the boxes and dishes were all handled and examined, bearing in mind the questions: "What traits appear?" and "How can they be dealt with systematically?" A list of all logically possible traits drawn up by someone having only a vague familiarity with the containers would include both inappropriate and absent traits. Each container divides into trait categories, such as kerf, join, finish, motif, etc. (Fig. 3). The variations within these categories are the actual traits of the containers. Both the trait categories and the traits within each must be carefully selected.

To demonstrate the difficulties involved, consider the possibly nearly infinite variety of kerfs and corner finishes. All asymmetric kerf shapes could appear in mirror image. In reality, in this sample, there are limited shapes of cuts, each repeated (Fig. 3, H). Simiarly, the undersurface of a lid, if considered as a combination of many traits, would have a large number of possible configurations. The presence or absence of a notch, its nearness to the outer edge, whether it was positive or negative, and the shapes of the central portion, when multiplied together, create a long list of logically possible traits, based on the combinations. In reality, certain of these aspects never combine and it is possible to make a short list of the actual traits of lower lid configurations (Fig. 3, N). The parts of a lid, as presently defined (upper/lower/edge) may vary independently (see Fig. 3:M, N, O).

The problem of overlapping or related traits arises, within the latter example above, where the traits (Fig. 3, N) could be sub-divided and those parts called traits. There must be a limit arbitrarily set. The traits which are used for analysis must be neither too all-inclusive (such as "shape of box" would be) nor too detailed and therefore dependent on traits from another

trait category (see Ch. 2).

The assignment of these limits is tested in the actual application of the trait categories and the traits to the containers. It was found that certain traits either had to be expressed as new traits which were close variations of already defined ones, or as combinations of these. For example, a lip which is strongly defined and slightly rounded, yet still maintaining a rather rectangular cross-section may be described as a combination of a squared lip and a rounded one (Fig. 3, E). However, if one lip is specified which is both curved and protruding, there still exist variations which are more curved or more squared. The anonymous statement of the combination is an arbitrary yet satisfactory compromise. While it may be argued that this, in effect, is combining traits, and pretending that the new configuration so formed is only one trait, the system was found to make adequate definition of all parts of the containers. Furthermore, in an artifact as complex as these containers, there is a large number of traits, even when some seem to be combinations. To attempt to break down all the corners into their traits in this way, which would be an incredibly complex task and not particularly rewarding, would create

a monster. There would be so many traits that they would be impossible to deal with. Also, even then there is no logical limit. The angles of each small line on wall, base, rim, lip, lid, lid edge, or whatever, could be included...the list is endless. I have therefore arbitrarily established twenty-two trait categories (Fig. 3). Each of these can have from two to fifteen possible traits, the number varying with each trait category. There is an entry for each trait category, though it sometimes may be "absent" or even a combination of the possible traits.

When the survey was being established, because the work began in Ottawa, it was not known exactly what format was used by the program. The coding required is a presence-absence-no comparison coding, which would allow the elimination of all the "absent" categories. They would be coded as any other absent trait. And if they were indeterminable, they would be coded "no comparison." It was also not known that more than one entry could be coded within any trait. Therefore, the initial attempt was to keep the traits as separate as possible. In the interests of shortening the coding process, there was some attempt made to combine variations. The number of entries under kerf (corner) was reduced by including only

those which were symmetric or cut to the right of the corner, and adding an extra entry "reversal of handedness" (Fig. 3, H:8). Left as it presently is established, the coding system could be analysed by a punch card-sorting method, although computer sorting would be more useful because of the large number of variables.

Another problem which could not be adequately dealt with until the survey had been completed and the exact requirements of the program known relates to frequency of occurrence of any one trait. In numerical taxonomic analysis, a character (trait) which is present only once, or a few times, need not be used. Unfortunately, there are several such traits remaining in the sample. Certain of the lid undersurface configurations appear only a few times, as do some kerf types and some configurations of the base upper surfaces (Fig. 3, N:9, 10; H:9; J:11). These contribute little to the statistical analysis of the data.

Much of the logic upon which the above-described division of a container into traits, is derived from Deetz' descriptions of pottery analysis (1965) and the current work of D. Keenleyside, Archaeological Survey of Canada, National Museums of Canada (pers. comm.), also on pottery. The problems of dealing with the parts of a pot

are somewhat similar to those of describing any container, and the attempt at establishing trait categories within which there may be variation is identical to mine. A pot lip is distinguished from the section of the wall beneath it, and the wall from the area at the base. Similarly, the rim of a box wall is coded separately from the cross-section of the wall, and from the cross-section of the base of the wall. Indeed, the current study differentiates between vertical and horizontal cross-sections of wall rims.

Perhaps the greatest long term question which arises when an artifact is described using a formal coding of traits is that of terminology. There is no adequate and entirely satisfactory terminology available to describe the division of the artifacts into their component parts. These have been called traits, modes, etc. but here are parts which themselves contain variations which are the actual traits. My solution is to call them trait categories, and the variations are called traits. Thus, the traits correspond to Sokal and Sneath's characters (see Ch. 2).

Each of the traits could require a name, although most are best described by a diagram. Each trait category should be named. We have already referred to vertical and

horizontal cross-sections, and to upper and lower surface configurations. Type of join, kerf, rim and lip are common enough terms in any material culture analysis.

Before traits on each wall could be coded, whether of construction or decoration, some means of naming the walls had to be established. Arbitrarily, the walls were numbered one, two, three, and four, clockwise from the joined corner. This neutral reference proved convenient and quick, and involved no relative evaluation of importance of decoration.

There was considerable difficulty in describing the surface decoration, both in terms of dividing it into trait categories and of limiting and defining the variations within each of those. Four trait categories were settled on: type of finish, type of decoration, colour, and motif.

The first, type of finish (Fig. 3, R), describes the surface on which ornamentation is to be placed. In some cases, the finish is itself the decoration, especially when there is particularly fine and even adzing. The variations are (1) rough, (2) adzed/knifed (Plate 2), (3) sanded/fine finish (Plate 6), (4) pierced (Plates 5, 7, 8). The last entry applies more perhaps to a construction category, such as sewing/ties (Fig. 3, β) but placing

it in a trait category which is applied separately to each wall and to the lid, if present, allows the recording of the location of a hole or holes. The other three traits reflect decisions about the degree and kind of care with which the container was finished. They are independent traits, although there is a tendency for the roughly finished containers to be undecorated, and for the adzed ones to be similarly unadorned or decorated with parallel, straight incised lines. These relationships are not, however, invariant.

The type of decoration posed greater difficulties (Fig. 3, S). It required revision which was made possible by the program's ability to code more than one trait present within a trait category. The eight traits are: (1) none, (2) incised, (3) painted solidly, (4) painted design, (5) beaded, (6) low relief, (7) sculpted, (8) inlaid. As discussed above, the first is made unnecessary by the type of coding the program requires, but does allow possible future use of other sorting processes (Plate 2, 6). The second describes any line made by a knife or other sharp implement, and which has no shape other than that made by a cut (Plate 3, 4, 5). Included are lines which are parallel and straight, those which form complex designs, and those which outline a design or

the surface being worked. Certain containers are stained or painted solidly black or red or a combination of the two paints. These are coded as such. If there is any sort of design, either of solidly painted forms, or of fine form lines creating a design, it is described as painted design (Plates 10-38). The next three variations refer to carved decoration. Beaded surfaces appear either on two or four walls, and both as an overall finish and as a "filler", above another carved design (Plates 51-54). This motif strongly resembles Tlingit slat armour, and is adjacent semi-circles , evenly carved. A design in low relief is distinguished from one which is merely incised by the variation in the depth and, usually, the width of the lines which form it (Plates 1, 27, 29, etc.). Sculpted designs are an attempt to bring a figure out of the flat surface of the wood (Plates 9, 49). They may still be flat relative to the model from nature, but are molded, with lines not clearly defined in a formal manner. Inlay refers both to opercula and to abalone (Plates 1, 14, 16, 29, 63, 65). Inlay on the rim is coded into the wall it is above. Inlay on the lid is coded merely as present or not. No differentiation is made among the types of inlay. If the walls and rims were coded separately, this distinction would be redundant since in my sample, only opercula

were used on rims, and abalone on walls.

It seemed that, although the presence or absence of paint was indicated by the third and fourth entries under type of decoration, more data would be useful for comparative purposes. For example, many of the secondary motifs on the boxes are in only one colour, and should be distinguished from those in two colours. The traits were thus defined: (1) none, (2) one, and (3) two or more colours. The appearances of three colours on one wall were limited, and were either on a chest (Plates 27, 29), on a drum with a configurative design (see below for discussion of term), (Plates 10, 11) or on a box with some features which were aberrant in terms of the final clusters.

The greatest difficulty of trait definition was experienced in the Motif category (Fig. 3, U). This is one of the most complex, the most difficult to describe and the least satisfactory trait categories. After an initial attempt to break the internal construction of the more complex designs and motifs by examining the elements of which they were constructed, a rather general division was formulated. This allowed comparison of levels of complexity within certain gross divisions, and has proven itself useful, if somewhat limited by the difficulty I

had in defining the entries for certain characteristic and ambiguous designs. This peculiar problem will be outlined below. Fifteen traits within this trait category were established: (1) none, (2) symmetric, (3) corner-centred, (4) edge-parallel lines, (5) other parallel lines (overall), (6) simple forms, (7) complex forms, (8) configurative/realistic being, (9) expansive being, (note: all following are distributive designs) (10) double-eyed figure, (11) single-eyed figure, (12) head/tail, (13) body profile, (14) orientation to left, (15) orientation to right. Numbers 2, 14 (Plates 14, 16) and 15 (Plates 15, 17) are general characteristics and could be applied to any design. Their inclusion, however, greatly reduces the number of separate traits listed, and adds some data which describes the relation of the sides to each other. The first trait is self-explanatory (Plates 2, 6). Symmetry is usually bilateral and on a vertical axis, and only refers to the side being observed (Plates 8, 9, 12, 13, etc.). A corner-centered design is one which is symmetric about a corner (Plates 14-17, 63-66). This trait accomplishes a number of interesting objectives, including giving depth to the design (one can almost imagine a beak or nose on the corner), and strengthening the implication of two creatures, since these

are always found in pairs, back-to-back, encompassing the box without a break.

The next two traits are generally incised, and the first may be in association with a more complex design. The overall or other parallel lines are any which make use of more of the field than the border (Plates 3, 7). They may change direction or be broken asymmetrically by an undecorated area (Plate 7). Although both types of design based on parallel lines are generally only found on Kwakiutl and Nootka containers, this is not a definitive characteristic of boxes from this area, nor is it limited to them. It appears, at least in the edge-parallel variation, on boxes and pails and bowls from the Haida and the Tsimsian (Plates 51-54). Indeed, it is a recurring motif on bowls of the Tlingit and northern Haida which have been carved from a solid block of wood.

The simple and complex forms may be readily distinguished from each other, but again the division is somewhat arbitrary, and the judgement subjective. The simple forms are generally composed of one single or a combination of the elements of Northwest Coast design, as outlined by Holm (1965), which are the "alphabet" of the northern style. They are most often found on two sides of storage boxes

which have distributive designs on the other two sides (Plates 21, 23, 25). They may be, for example, a pair of ovoids, or a single one. The ovoids may be supplemented by a curved line, like a flattened "s", or by a "u-form." Simple stars, circles with crosses, or other lines also are placed in this trait. The more complex forms are those in which the elements combine to form a motif which may be recognizable and which is composed of several elements. The salmon head is one of these, and the so-called whale tail often found on the ends of a chest, such as VII-C-128 (Plates 28, 30), in which there is an ovoid supplemented at opposite corners by a u, and containing a salmon head.

Holm's categories of design define the next two traits (ibid.:11). A configurative or realistic being is one which is recognizable as some specific creature. The representation of a configurative being is in traditional Northwest Coast elements, but the parts of the body are not rearranged to fit the space on which the design rests, nor are they placed out of order. They may appear proportionally altered (Plate 11). The realistic being is just that, such as the frog and raven on VII-C-1132, the drum (Plate 10).

Expansive beings are in a recognizable form, but their parts have been expanded to cover the surface on which the design is placed. This is a little-used trait, except on certain of the sculpted dishes and drums (Plate 9).

Within the motifs, the greatest complexities, obscurities and problems were found among the distributive designs. It was hoped that, with a careful analysis of the composition of the various designs, rules could be developed which would go beyond Holm's basic work, and which could be elucidated to explain the composition of any distributive design. Some rules may be appearing, but none which is absolute. Perhaps this formal analysis will add a tool to be used in the future to continue that particular search. For example, the location and direction of corner ovoids seem to be indicators of the over-all type of design on a side, and its vertical orientation (up or down).

Attempting such a break-down of designs contributes to our understanding of what they mean and how they work, but continues to be limited by our present lack of understanding of just what precisely the designs are about and what they are doing. If most dishes, for example, were a visual representation of two creatures in perpetual back-to-back transformation or giving birth to each other, or emerging from each other's mouth, that fact would explain many of the apparent anomalies in dish designs (Plates 40, 42).

We do not know very much about Northwest Coast distributive designs, although they have received much study, beginning with Boas (1955).

The first two motifs, the double and single-eyed figures, are usually found on carved or painted boxes and chests (Plates 14-20, 22,24,27,29,31,33,63,68). They are invariably symmetric, whether on a side or about a corner, and include a large head plus elements which represent bodies, limbs, ears, etc. The head/tail design is most often found on the ends of dishes (Plates 40,42,44,46,47,51-58) and often cannot be clearly defined as one or the other. A body profile is a portrayal of elements which usually represent the body, minus the head, and may point in one direction or the other, or be ambiguous, in which case it should be coded as both directions.(Plates 39, 41,43,45,48,50). This design is usually found on dishes.

Even with an outline of the traits possible, there were problems with the coding. One particular motif on dishes posed great difficulties, as the dishes bearing this motif were coded at different periods over two months, and some variation was found within my decision-making as the work progressed and I became more sensitive to the ambiguities in the designs. This design (Plate 35-38) is very regular, all four sides seemingly dominated by a single large ovoid which is right side up and raised to the right. At first it was recorded as head/tail,

oriented to right (Figs. 14, 15). As time passed, and more bowls were surveyed in detail, it seemed that this statement about direction was unnecessarily bold, and the leftward orientation was added. With further exposure to these incredibly varied and ambiguous dishes I became less bold, and, I like to believe, wiser, and began adding body profile as well, creating the notation: 12, 13, 14, 15 to describe this distinctive design. Unfortunately, in the coding process the earlier error was forgotten until the computer analysis. The results were surprising: very similar designs did cluster together very strongly, but they did so in several identical groups, instead of all joining as identical. Further error was discovered. One dish had its ends coded as head/tail (Plates 35, 37) and its sides as body profile (Plates 36, 38), in an amazingly presumptuous statement. Unfortunately these errors have not been corrected and the sample re-run with the correct data, but it is not necessary to do so at present, because the dishes clustered together (Cluster X), if less strongly than otherwise, and the reasons for this are known.

Once the containers had been examined and their traits determined and recorded, the traits were translated into the presence/absence/no comparison coding outlined above, and analysed (see Chapter 2). The program, among other operations, produced dendograms ordering the containers according to their affinities. These visual representations of

the relationships of the containers also record the "level" at which they join. That is, on a scale from 0.0 (identity) to 1.0 (absolute difference), a vertical line is drawn between adjacent containers or clusters of containers (figures 5-7).

Separate runs were made of 10, 45, 26 and 99 containers, each of which contributed to the understanding of the process and of the results. In each case, the traits for design were run separately from those describing construction, and then a third run combined them. One of the runs, discussed at greater length below (ch. 4), was of boxes chosen for their external homogeneity. None of these 25 storage boxes were included in the final runs. An attempt was made to have a somewhat random sample of 99 containers chosen for this run, but without complete success.

There are several skews in the final selection of 99 containers. The collection from which they were chosen is heavily biased, as stated earlier, in the direction of the aesthetically pleasing, and also very strongly toward the north. Of the total collection, over 1/3 (104) are documented as Haida. When the undesignated containers are eliminated, this rises nearly to ½ of the total. There are about 23% Tshimsian (56), and about 8% each Bella Coola (21) and Kwakiutl (20), with miscellaneous Nootka (10), Tlingit (4), Coast Salish (7), and undesignated (32). Clearly, then, to chose a proportion of the containers as represented herein would be to analyse many Haida and Tsimsian containers and few from the more southern coasts. I therefore have rather arbitrarily selected many of the Bella Coola (21), Kwakiutl (16),

and Nootka (7), as well as the Salish (6) and Tlingit (4) containers. There were only 2 items from the Bella Bella, at least which were documented as such, and one was included. None of the undesignated containers were included, except in the special run described in Chapter 4. An attempt was made to include reasonable proportions of each intuitively defined type, so that the resulting typology would not lack representation. Because of my interest in the complex designs and constructions of dishes, I attempted to include many of these, though not all. Most are Haida. Through an oversight, none of the few Tsimsian dishes were included. All of the chests are included, that is, all containers with rectangular walls whose width exceeds their height and which are usually large, carved and painted.

When the 99 containers were run, with all traits, the dendrograms divided into approximately 10 clusters (figure 5). This is not to say that there are 10 definitive types of NWC containers, though it would be delightfully simple if that were so. Some of the clusters are of distinct types of containers, and some appear to be residual categories, holding several containers which do not join with any pre-existing cluster. This could have been somewhat avoided, if fewer traits had been included, especially within certain of the constructional trait categories. Furthermore, some adjacent clusters which are clearly separate from each other overlap, which is not well expressed until the mapping provided by the multi-dimensional

scaling is examined (figure 4). The clusters are useful to a fair degree, as is shown below, for, even with the anomalies and inconsistencies produced by the coding errors and by the linear nature of the results, strong clusters have appeared. Sometimes they confirm pre-existing intuitive judgements, and sometimes they expand on it.

Clusters: Clusters I to VII are composed of boxes, with rectangular or square walls, straight sides, and 90° angles.

I ab This cluster is comprised of 2 smaller clusters, of 5 and 6 boxes. They are rectangular storage boxes, with painted designs. The first 5 have corner-centred designs (plates 14-18), and the 6 are a mixture which includes a cup and 2 drums (plate 11), which are documented Kwakiutl and Bella Coola. These have unusual designs. Three boxes documented Haida and Tsimsian have the "standard" single and double-eyed figures on opposite walls (similar to plate 18).

II All 8 entries are chests, with greater width than height, and designs which are both carved and painted (for example, plates 27-30). One has only the single-eyed figure on opposite sides, but the others all show the double-eyed motif. Four are documented as Tsimsian, 3 as Haida, and 1 chest was collected at West Saanich in 1929 by Harlan I. Smith. One of the striking aspects of these final clusters is the manner in which the designs over-ride the constructional variations which, for example, had placed chests in several different clusters.

III ab These are residual clusters of boxes, chests and 2 dishes which have some of the straight-sided traits of the boxes. The first joins at a high level to the preceding cluster but is also a chest, although only painted, as are the next 2. The 2 Tlingit telescopic chests are in this "cluster" (plates 31-34, 1, 67-70). The nearest pair joins at 0.1157, as compared to the above clusters in which most of the pairs joined at values around when mapped as their high level of joining would suggest (figure 4).

IV There are 6 containers which join fairly closely, plus 2 extras. They seem to share certain traits. None has a painted design except the last, which is a chest, but which was painted black overall after some use. Several are undecorated, and most are of fairly simple construction, used as canoe boxes, etc. One total anomaly is a Nootka telescopic box, which maps in the direction of the rest of the telescopic boxes, but closer to several canoe boxes (figure 4, item 90). This will have therefore a different construction from the others.

V A tight cluster, this contains only one box documented as Haida which is a canoe box. The rest are Bella Coola (5), plus one each of Nootka, Kwakiutl (both at the end) and Tsimsian. All are boxes and pails with simple parallel lines incised either around the edges or overall (e.g. plates 4,5).

VI ab The next pair of clusters contains boxes collected almost exclusively in the southern, central, and north-central regions. None are documented as Haida or Tlingit. All but the first

2 are covered with parallel incised lines (plates 3,7), and have lipped lids, which latter is the diagnostic trait, insofar as one can tentatively name a diagnostic trait within the context of numerical taxonomic analysis (see chapter 2). This cluster exhibits considerable homogeneity of construction traits as well as of design traits, as will be discussed below.

VII The last cluster of boxes are undecorated, usually simply constructed, at least in the early part of the cluster (VII-C-1276, VII-D-353, VII-G-221). The remainder are an assortment of pails, a canoe box, rectangular boxes, and a box whose upper base is concave (VII-C-1833). None are documented as Haida; most are Tsimsian (4) and Kwakiutl (3), with 2 from Bella Coola and one Coast Salish.

All of the above clusters join with the clusters below at a level of 0.3007, which indicates a high degree of dissimilarity, the highest within this run, effectively dividing the sample into 2 very distinct large clusters. One of these is the boxes, as outlined above (clusters I to VII), and the other is of dishes, below (clusters VIII to X). There are a few containers which appear to be misplaced, as mentioned. These are pails with curved rims, etc. They appear in border regions between the boxes and dishes on the MDS mapping (figure 4, numbers 19,28,86,31), and in the boxes in the clusters. Again, this indicates some of the problems inherent in (linear) dendrogram clustering as a way of

expressing relationships.

VIII ab The first part of this cluster is composed of 3 dishes, all having bilaterally symmetric designs on each side (plates 55-58). The designs are carved and incised, but not painted. There is little obvious similarity among these according to construction, except the general traits shared by all dishes, such as curved walls and rims. Of interest in the designs is that there are at least 2 inverted faces on each dish, and the latter 2, both Haida, have a wide border (plates 51-54). The first is Tlingit.

The designs on the rest of the containers in this cluster follow a definite pattern, and are rather ambiguous. Each has back-to-back symmetric designs, on sides 1 and 3, and asymmetric sides between, which are mirror images of each other (plates 47-50). In an attempt to formulate rules about the layout of designs on boxes and dishes, it was postulated that the most important or frontal design would not be on a side adjacent to the joined corner (see chapter 4). In half of these, the face is on side one, such as VII-E-318. We are again reminded that we must regard both ends as potentially of equal importance in the interpretation of the design. The last 2 are anomalies. VIII-B-343 has symmetric faces on sides 2 and 4, but has profiles on 1 and 3. VII-B-728 has asymmetric forms on sides 1,2, and 4. Side 3 is a symmetric representation of the head and tail of a whale. With these dishes, as with the boxes described above, the general construction divided the clusters or groups of clusters, but it is the layout and organisation of the designs which

dictates the location within the clusters or groups of clusters. All but 3 of the total 11 are documented as Haida.

IX There is only one obvious trait which separates this cluster from the above. The 2 bilaterally symmetric sides are 2 and 4. The first 5 are rather more angular in construction (plates 39-46), and the last one is both carved and painted. Six are documented as Haida and one as Kwakiutl. The next 2 containers are by themselves a residual category. Although they have most of the general constructional patterns of dishes, one is undecorated (Bella Bella pail, plate 6), and the other has only the edge-parallel lines usually found on boxes. The pail has straight outer walls, and the dish's walls are nearly straight. These clearly fit closer to the boxes in many ways, which again is corrected on the mapping of the multi-dimensional scaling wherein they appear between the dishes and the boxes.

X This cluster is clearly distinguished in terms of its designs (see discussion above, this chapter; plates 35-38), and also in terms of its constructions. Many of the dishes appeared together in the dendrogram of constructions, and the result is a fairly tight cluster, with one anomaly. In the middle of these painted dishes, there is one which is also carved, and which has 2 symmetric sides. I have at present no explanation for this.

At the end of this dendrogram, describing in a linear arrangement the relationships among 99 containers, are 2 dishes. The first, VII-B-727, has 4 asymmetric carved walls, with profiles all facing to the

right. Its construction is somewhat similar to that of the first 5 dishes in cluster IX. The last is a magnificant feast dish. Its side 3 is sculpted and painted, representing an animal head. The other 3 sides are only painted. The rim is inlaid and there are very clearly articulated rim lips and other construction traits.

In summary, it is difficult to assign names to most of these clusters, and the linearity of the visual representation limits the accuracy of the placement of those containers which do not fit any obvious clusters. It was found that the results were dominated by the design traits, though in many instances the constructions caused rearrangments. The results of the analysis using all traits closely approximated the intuitive divisions previously used. The division into traits in this manner did increase my understanding of the construction of the containers and their designs. It is now possible to make statements about the relative complexity of construction in terms of the types of kerfs, configurations of inner walls, rims, and inner faces of base and lid. It is also obvious from the mixture of tribal designations that documentation accompanying these containers is highly suspect at best.

Chapter 4

Further Conclusions

One of the fundamental assumptions underlying this study is that the artists and craftsmen who made these containers were not making arrangements of randomly selected traits. That is, a certain bowl would be made according to an idea which would reflect some cultural pattern in the carver's mind. Such a pattern could be individual and idiosyncratic, used only by the one carver, but it would demonstrate similar traits to those employed by carvers of similar training and experience. That is not to deny the possibility of independent invention and the incorporation of previously unused traits. On the contrary, anyone who has worked with the arts of the Northwest Coast will acknowledge the kind of rule-breaking innovation which produced the raven box design (Duff et al, 1967, Plate 293).

Furthermore, borrowing of ideas surely was part of the trade and movement of containers. I maintain, however, that, when the designs and constructions are considered, although some containers will stand but as experiments or as poor examples, there will still be clearly visible individual or group trends.

Overall, intuitively, there seemed to be certain clearly established trends and patterns. The clusters, as described in Chapter 3, confirm this. Although the northern style containers were separated by their decoration, and also their construction, the clusters so formed bore little relation to the tribal designation. Haida, Tlingit, Tsimsian, and some Kwakiutl and Bella Coola boxes and dishes mixed throughout. There is, however, a striking separation within clusters V-VII. Cluster V is mainly composed of artifacts from Bella Coola, and VII is a mixture, with several Tsimsian area containers mixing with those collected farther south. Cluster VI, however, is dominated by boxes collected from the Nootka and Kwakiutl. When mapped (Fig. 4), this cluster interlocks with a portion of cluster V, near cluster VII, but is quite separate. This was the cluster which most nearly reflected any tribal designation. It must therefore be concluded that the documentation found with most such collections, which primarily relates to the location at which the artifact was collected, tells us nothing about the actual time and place of its manufacture.

There may be an exception to this sad conclusion, which will be outlined below, but first, there are two points which need to be cleared up. At the outset of this

project, Duff (pers. comm.:10/6/74) postulated certain relationships between the construction and the decoration of boxes and of dishes.

First, he designates the four-eyed design found on many boxes as the Gonaqadet (Plates 1, 18, 19, 22, 24, 29, 32, 33, 63-66), and suggests that the two-eyed design usually found on the opposite side is its back (Plates 26, 27, 31, 67, 68, 70). This is a speculation which it is not in the realm of this study to prove, but I will note the existence of boxes with two of the two-eyed figures (V11-B-121, not illustrated), and also the corner-centred designs (Plates 14-17). Often these are two four-eyed creatures back-to-back (Plates 63-66). Either the two-eyed figure is not the back of the Gonaqadet or there is a very complex relationship being represented between the two on the corner-centred design. I can, however, deal with Duff's statement that the four-eyed design, where present, will not be found adjacent to a joined corner. That is, in fact, an invariant rule, according to the sample which has been studied.

The comments on dishes are not so easily dealt with, for reasons which are reflected in the difficulty I found in coding the designs on the dishes (see for example Chapter 3). He states that the "front" and "back" are

the walls whose rims, viewed directly, are convex, and the "sides" are those which are concave. The "principal face of the creature depicted is opposite the joined corner" (ibid.).

There is a general trend for the convex-rimmed walls to be those with bilaterally symmetric designs, usually with a face- or tail-like design. However, with the present limitations in our understanding of the symbolism of these designs, it is impossible to make any consistent statements about which end is the front and which the back. It is entirely possible that, in many instances, neither was intended as "front" or "back" since they often both contain ovoids which could mean head or tail (Plates 40, 42, 51-58).

With the clue suggested by Duff, that is, that the most important or "face" end would not be adjacent to a join, I attempted to order these dishes with symmetric ends and asymmetric sides. There is a tendency for the "head" to be carved in 3-dimensions on certain bowls, forming an animal's head (Plate 49). This is easily identified. However, rules created on the basis of several dishes fall apart when several more are examined. Either the dishes are incredibly ambiguous, or the carver did not concern himself so greatly with the relative location

of joins and "faces" in dishes as in boxes (Plates 35-62).

One tendency, although not a firm rule, is demonstrated by side four in VII-B-334 (Plate 42). On the "tail" wall, the ovoids may be inverted. The whole question of the arrangement of the parts of a creature or creatures on the walls of a dish is further complicated by VII-A-126, and VII-B-736, all of which have four walls of two-eyed "faces", opposite walls being somewhat, although not necessarily exactly, similar (Plates 51-58).

VII-B-739 (Plates 59-62) is a masterpiece, and also poses the greatest problems of analysis. Sides two and four are the usual more or less ambiguous "front" and "back". Sides one and three, however, are also symmetric, and side one, adjacent to a join as it is, and in utter disregard for all the rules of good design management, either depicts two separate heads, or the four-eyed Gonaqadet. Side three, to compound the irony of these unusual concave-rimmed walls, has at its centre a small, upright grinning face similar to those found on the Gonaqadet side of several chests (e.g., virtually identical to VII-C-128, side three; Plate 29). Duff's hypothesis on the arrangement of walls and joins on dishes, I must therefore conclude, is unprovable, and likely should be withdrawn until the interpretation of the designs is

further advanced.

All this discussion arises more from a familiarity with the containers than with any results of the numerical taxonomic analysis. The attempt at rigorous coding and the separation of traits did, however, increase my perception of the designs, and, likely, allowed them to be dealt with in a general way. The solution to the coding problem, calling those symmetric ends of dishes "head/tail" unless there is a very clear indication, such as a carved beaver face (Plate 49), that they are one or the other, stands as a satisfactory means of dealing with dish motifs.

The Bonus

All the work with design was not so frustrating, however, as is proven by the following discussion of analysis carried out separately on a small group of boxes distinguished by their special decoration.

Although the initial objectives of this project only included the testing of a methodology and the outlining of a typology, or the attempt thereof, it became increasingly obvious that there was another result. This is possibly the most important aspect of the analysis, and is most exciting in terms of future research and the gleaning of

information from artifacts. To date, much has been said and written (Duff et. al. 1967, Glatthaar 1970) about the individual styles of certain carvers or schools of carvers. Sizes, shapes, and organizations of the formal elements of northern Northwest Coast design have been compared and dissected as our recognition of stylistic variations became sharper. At no time, however, has there been an attempt to deal with the non-decorative aspects of the artifacts bearing these designs. It is now possible to compare containers, according to these constructional traits, and with reasonable accuracy.

Insofar as each artist was also the craftsman who constructed the box or dish which he then carved or painted, those containers would each bear the individual stamp of the maker whether or not the decoration was present. A craftsman has, over time and with variations and innovations, his own way of turning a corner, fitting a lid, or sewing a joint. If these are compared, they may provide a strengthening of the decorative evidence for the origin of the artifact, or a new insight into previously held assumptions about it.

Bill Holm (pers. comm.) has isolated a variation on the decoration found painted on northern storage boxes, for which he postulates a Bella Bella origin. There are

twenty-five boxes bearing this design or a variation of it in the Northwest Coast kerfed container collection of the National Museum of Man, Canadian Ethnology Service. These were analysed separately, identical operations being made on them as on the larger run of ninety-nine already discussed. Because of the large number of redundant characters in this sample, all of which would be eliminated by the computers, a dummy was added. This was a dish with curving sides and rims, and a carved design, thereby being very different from rectangular, painted, uncarved boxes.

The so-called Bella Bella motif is the usual single or double-eyed creature, bilaterally symmetric, but lacking any black ovoids in the lower corners (Plates 20, 22, 24, 26). This creates an impression of a simpler design, and the rest is accordingly modified. The head and mouth are often of greater height than normal, leaving a shorter lower portion of the surface. The lines creating the trunk of the body, which in other instances may meet above the base of the box side, forming a closed space (Plate 18), here drop to the bottom of the side. The lower portion of the design is thus divided into three nearly equal areas. There may be motifs in red in this lower portion, or a black dot in a red circle, but there will be no primary black forms. The exception I have included in this sample

is the presence of a simply-drawn hand or paw in the outer two areas of this lower space (Plate 19).

It must be noted that none of these boxes in this study are documented as Bella Bella. Twelve are said to be Haida (including six with hands), eight Tsimsian (including two with hands), three Bella Coola (one with hands), and two are without documentation. There is considerable variation in the motifs on the other two sides, and in the painting, although all are finely made.

When the dendrogram for the constructions of these was examined (Fig. 7), it was noted that several small clusters appeared, and the boxes divided roughly into three clusters plus several residual artifacts. The dish, of course, was joined to the rest at a very high level (0.6757). The results of the design analysis were more startling (Fig. 6). Two very strongly separated dendrograms appeared, plus the dish and a box (VII-B-121) which differed from the others in having no double-eyed figure and more complex motifs on the other two sides. The first cluster was that in which the double-eyed figure was on side three and the single-eyed on side one (plate 20), and the other cluster placed them on sides two and four, respectively (plate 24).

Closer examination of the relationships among the constructions yielded interesting results. It was found that several of the boxes with similar construction had very similar designs, notably on the simple motifs on two sides. Further, it was noted that another pair with strikingly similar designs had constructions which varied only in that the kerfs were reversed. Such evidence of constructional similarity supplements the design evidence and corroborates it. For example, VII-B-1274 (Fig. 20-22) and VII-B-1283, both collected in good condition in Masset in 1919 by Harlan L. Smith, were identical except for the reversal of kerf direction. That is, the maker formed the walls, and in one case, turned them upside down before they were decorated. Furthermore, the designs are moved 90 degrees clockwise in VII-B-1283. They share the same ovoid motifs on the simply painted sides, possibly made with the same template (Fig. 21). VII-B-1283, however, is in the same small cluster as VII-C-1852 (Fig. 24-26). The latter has identical construction except that its joints are nailed together as well as pegged. Again, similar ovoid motifs are present, though there is some variation in the supplementary lines. The Tsimsian box, VII-C-1852, was collected in Kitsegukla between 1950 and 1971 by W. H. Birmingham. It is very worn, and the nails were added as pegs fell out or loosened. Clearly then, it

was used considerably more than those collected at Masset in 1919.

Other similar boxes, either in the ovoid motifs, in construction, or in style of design (intuitively judged), are from Masset and Port Simpson. These could be shown to be closely related to each other, but with differences which are more significant than those of the above trio. In this way, supplementing the decoration analysis with the construction analysis, stronger statements may be made about the origin of the boxes. It does not necessarily mean that identical construction will imply an identical maker, but the possibility is increased. Conversely, the lack of a complete identity of construction does not imply a different maker. The carver will change the traits used over time, through experimentation, increased skill, borrowing, or even boredom. This analysis does, however, make more data available with which to examine the origins and movements of these boxes.

In the case cited, the age and obvious use of the box from Kitsegukla compared to the relatively unused appearance of the Haida box strongly implies a Haida, Masset, source for these. On the other hand, if another of nearly identical construction and design were collected new in Port Simpson in 1910, one would have to temper the

certainty of the attribution. There still could be the possibility that they were manufactured in Bella Bella, as Holm suggested (pers. comm.).

A test such as the above is tantalizing, but inconclusive. The conclusions, based on analysis of boxes with a single design, are tentative at best. The test of a possible Masset origin for these boxes would have to be a detailed analysis of the constructions of all the boxes with the Gonaqadet/creature and simple motif sides. Those with lower ovoids must be included, and a comparison to Holm's large Bella Bella collection must be made. If there are still early, documented boxes collected at Masset, it would be possible to postulate a Masset origin for many of them. Such a conclusion would continue to be tentative because of the inadequacy of most documentation.

Conclusion

Traits have been established which allow detailed and formal description and statistical comparison of Northwest Coast kerfed containers. A tentative typology was outlined, which reflected and confirmed most of the previously-held intuitive classifications. Furthermore, as shown in the mapping of the large sample (Fig. 4), many of the distinct clusters overlap and interlock, again, as in the case of the boxes, reflecting intuitive conclusions. The ability to deal in a systematic and consistent way with the traits found in container construction will not lead to interpretation of the designs represented on their exteriors, but it will increase our ability to order collections, and opens a possible new route for examination of origins. It is to be hoped that, with some future clarification of the meanings of the designs, especially on dishes, a more precise definition of motifs and their components will be possible. This will allow designs to be analysed with the same accuracy of detail as is now possible for the constructions. The formal analysis and description provided the means of dealing with a large, important ethnographic collection. Similar trait definition applied to other collections should be attempted, and the results compared to those for which good documentation was available.

BIBLIOGRAPHY

Binford, L.R.
1962 Archaeology as Anthropology.
American Antiquity 28:217-225.

1964 A Consideration of Archaeological Research Design.
American Antiquity 29:425-441.

Boas, Franz
1902 Tsimshian Texts. Bureau of American Ethnology.
Bulletin 27. Washington, D.C.:Smithsonian Institution.

1921 Ethnology of the Kwakiutl, Volumes I and II.
35th Annual Report of the Bureau of American Ethnology,
1913-1914.

1955 Primitive Art. New York: Dover Publications Inc.

1966 Helen Codere, ed. Kwakiutl Ethnography.
Chicago: University of Chicago Press.

Cain, A.J. and G.A. Harrison
1967 An Analysis of the Taxonomist's Judgement of Affinity.
Proceedings of the Zoological Society, London 131:85-98.

Chang, K.C.
1967 Major Aspects of the Interrelationship of Archaeology and
Ethnology. Current Anthropology 8:227-243.

Churchill, W.
1917 Club Types of Nuclear Polynesia.
Washington, D.C.: Carnegie Institute Publication 255.

Clark, A. et al
1974 Athapaskans: Strangers of the Far North.
Ottawa: National Museum of Man.

Cole, G.H.
1954 A Study of the Tlingit Boxes of the Rasmussen Collection.
B.A. Thesis. Reed College, Portland, Oregon.

Collier, D. and H. Tschopik J.
1954 The Role of Museums in American Anthropology.
American Anthropologist 56:768-779.

Cuisenier, J.
1971 The Processing of Ethnographic Data.
International Social Science Journal 23:175-187.

Dawson, G.M.
1878-9 On the Haida Indians of the Queen Charlotte Islands. Ottawa: Geological Survey of Canada Progress Report. Appendix A.

Deetz, J.
1965 The Dynamics of Stylistic Change in Arikara Ceramics. Illinois Studies in Anthropology 4. Urbana: The University of Illinois Press.

Deetz, J. and E. Dethlefsen
1965 The Doppler Effect and Archaeology. A Consideration of the Spatial Aspects of Seriation. Southwestern Journal of Anthropology 21:196-206.

1966 Death's Heads, Cherubs, and Willow Trees: Experimental Archaeology in Colonial Cemeteries. American Antiquity 31:502-510.

Driver,H.
1965 Survey of Numerical Classification in Anthropology. In the Use of Computers in Anthropology. Hymes, ed. The Hague: Mouton & Co. pp. 301-344.

Drucker, P.
1950 Culture Element Distributions XXVI, Northwest Coast. Anthropological Records 9:3. Berkeley: University of California Press.

1951 The Northern and Central Nootkan Tribes. Bureau of American Ethnology, Bulletin 144 Wahington, D.C.: Smithsonian Institution.

Duff, W.
1967 Arts of the Raven; Masterworks by the Northwest Coast Indian. Vancouver, B.C. Art Gallery.

1975 Images Stone, B.C.: Thirty Centuries of Northwest Coast Indian Sculpture: an exhibition originating at the Art Gallery of Greater Victoria. Saanichton, B.C.: Hancock House.

Dunnell, R.C.
1970 Sabloff and Smith's "The Importance of Both Analytic And Taxonomic Classification In The Type-Variety System." American Antiquity 35:305-319.

Emmons, G.J.
1908 Copper Neck Rings of Southern Alaska. American Anthropologist 10:644-649.

Ericson, J.E. and E.G. Stickel
1973 A Proposed Classification System for Ceramics World Archaeology 4:357-367.

Friedrich, M.H.
1970 Design Structure and Social Interaction: Archaeological Implications of an Ethnographic Analysis. American Antiquity 35:332-343.

Ford, J.A.
1954 The Type Concept Revisited. American Anthropology 9:452-453.

Gardin, J.C.
1971 Archaeology and Computers: New Perspectives. International Social Science Journal 23:189-203.

Garfield, V.
1955 Making a Box Design. Davidson Journal of Anthropology 1:

Gerbrands, A.
1957 Art as an Element of Culture, Especially in Negro-Africa. Medelingen Van Het Rijksmuseum Voor Volkenkunde, 12. Leiden: E.J. Brill.

1967 Wow-Ipits. Eight Asmat Woodcarvers of New Guinea. The Hague: Mouton & Co.

Glatthaar, T.C.
1970 Tom Price (c. 1860-1927): The Art and Style of a Haida Artist. M.A. Thesis, University of British Columbia, Vancouver.

Goldman, I.
1975 The Mouth of Heaven. An Introduction to Kwakiutl Religious Thought. New York: John Wiley and Sons.

Gunther, E.
1972 Indian Life on the Northwest Coast of North America. Chicago: University of Chicago Press.

Halpin, M.
1973 The Tsimshian Crest System: A Study Based on Museum Specimens and the Marius Barbeau and William Beynon Field Notes. Ph.D. Thesis, University of British Columbia, Vancouver.

Hawthorn, A.E.
1967 The Art of the Kwakiutl Indians and Other Northwest Coast Tribes. Seattle: University of Washington Press

Heider, K.
1969 Attributes and Categories in the Study of Material Culture: New Guinea Dani Attire. Man n.s. 4:379-391.

Holm, B.
1965 Northwest Coast Indian Art, An Analysis of Form. Thom Thomas Burke Memorial Washington State Museum Monograph no. 1. Seattle: University of Washington Press.

1972 Crooked Beak of Heaven. Seattle: University of Washington Press.

Hodson, F.R.
1970 Cluster Analysis and Archaeology: Some New Developments and Applications. World Archaeology 1: 299-320.

Jones, J.M.
1968 Northwest Coast Basketry and Culture Change. Burke Museum Research Report no. 1. Seattle.

Kaufmann, C.
1969 Changes in Haida Indian Argillite Carvings, 1820 to 1910. Ann Arbor: University Microfilms Xerox.

King, J.L. and R.S. Moll
1972 Set Theory Models: An Approach to Taxonomic and Locational Relationships. In Models in Archaeology. Clarke, ed. London: Methuen & Co.

Klejn, L.S.
1973 On Major Aspects of the Interrelationship of Archaeology and Ethnology. Current Anthropology 14: 311-320.

Krieger, A.D.
1944 The Typological Concept. American Antiquity 9:271-288

Matson, R.G.
1974 Clustering and Scaling of Gulf of Georgia Sites. Syesis 7: 101-114.

Matson, R.G. and D.L. True
1974 Site Relationships at Quebrada Tarapace, Chile: a comparison of clustering and scaling techniques. American Antiquity 39:51-75.

Michener, C.D.and R.R. Sokal
1957 A Quantitative Approach to a Problem in Classification Evolution 11: 130-162.

MacDonald G.F.
1973 Haida Burial Practices: Three Archaeological Examples. National Museum of Canada, Mercury Series. Archaeological Survey of Canada 9. Ottawa.

McFeat, Tom
1965 The Object of Research in Museums. National Museum of Canada. Bulletin 204:91-99. Ottawa.

Mori, J. and J.
1971 Modern Hopi Coiled Basketry. The Masterkey 46:4-17.

1972 Revising our Conceptions of Museum Research. Curator XV:189-199.

Munn, N.D.
1962 Walbiri Graphic Signs: An Analysis. American Anthropologist 64:972-984.

1966 Visual Categories: An Approach to the Study of Representational Systems. American Anthropologist 68:936-950.

Oswalt, W.
1972 Habitat and Technology: The evolution of hunting. New York: Holt, Rinehart and Winston.

Reynolds, B.
1973 Curatorial Research. Notes for Sessional Paper delivered at the meeting of the American Association of Museums. Milwaukee.

Rouse, I.
1960 The Classification of Artifacts in Archaeology. American Antiquity 25:313-323.

1967 Seriation in Archaeology. In American Historical Anthropology: essays in Honor of Leslie Spier. Carroll L. Riley and Walter W. Taylor, eds. pp. 153-195. Carbondale: Southern Illinois University Press.

Scott, S.D. and P.K. Segmen
1970 On Museums and Anthropological Research. In A Handbook of Methodology in Cultural Anthropology pp. 1004-1007. Garden City, New Jersey: Natural History Press.

Simpson, G.G.
1961 Principles of Animal Taxonomy.
New York: Columbia University Press.

Sokal, R.R. and P.H.A. Sneath
1963 Principles of Numerical Taxonomy.
San Francisco: S.H. Freeman & Co.

1974 Classification: Purposes, Principles, Progress, Prospects. Science 185:

Spier, R.F.G.
1973 Material Culture and Technology. Minneapolis: Burgess Pubiishing Co.

Steward, J.H.
1954 Types of Types.
American Anthropologist 56:54-57.

Sturtevant, W.C.
1973 Museums as Anthropological Data Banks.
In Anthropology Beyond the University.
Alden Redfield, ed. Athens, Ga. Southern Anthropological Society Proceedings no. 7.

1974 Boxes and Bowls, decorated containers by nineteenth century Haida, Tlingit, Bella Bella and Tsimshian Indian artists. Washington: Published for the Redwick Gallery by Smithsonian Institution Press.

Swanton, R.
1905 Contributions to the Ethnology of the Haida
American Museum of National History Memoirs 5:
Part 1. Jesup North Pacific Expedition.

1908 Social Conditions, Beliefs and Linguistic Relationships of the Tlingit Indians. 26th Annual Report of the Bureau of American Ethnology, 1904-5:391-486. Washington, D.C.: Smithsonian Institution.

Taylor, J.G.
1974 Netsilik Eskimo Material Culture. The Roald Amundsen Collection from King William Island. The Norwegian Research Council for Science and Humanities.

Taylor, W.
1948 A Study of Archaeology.
American Anthropologist, Memoir no. 9.

Tippett, A.R.
1968 Fijian Material Culture, A Study of Cultural Context, Function and Change. B.P. Bishop Museum, Bulletin

232. Honolulu: Bishop Museum Press

Torgerson, W.S.

1958 Theory and Methods of Scaling.

New York: John Wiley and Sons.

Wardwell, A. and L. Lebov

1970 Annotated Bibliography of Northwest Coast Indian Art. Primitive Art Bibliographies no.VIII. New York: The Library, The Museum of Primitive Art.

Watson, P.J., S.A. LeBlanc, and C.L. Redman

1971 Explanation in Archaeology. An Explicitly Scientific Approach. New York: Columbia University Press.

Wood, J.R.

1974 A Computer Program for Hierarchical Cluster Analysis. Newsletter of Computer Archaeology 9: 1-11.

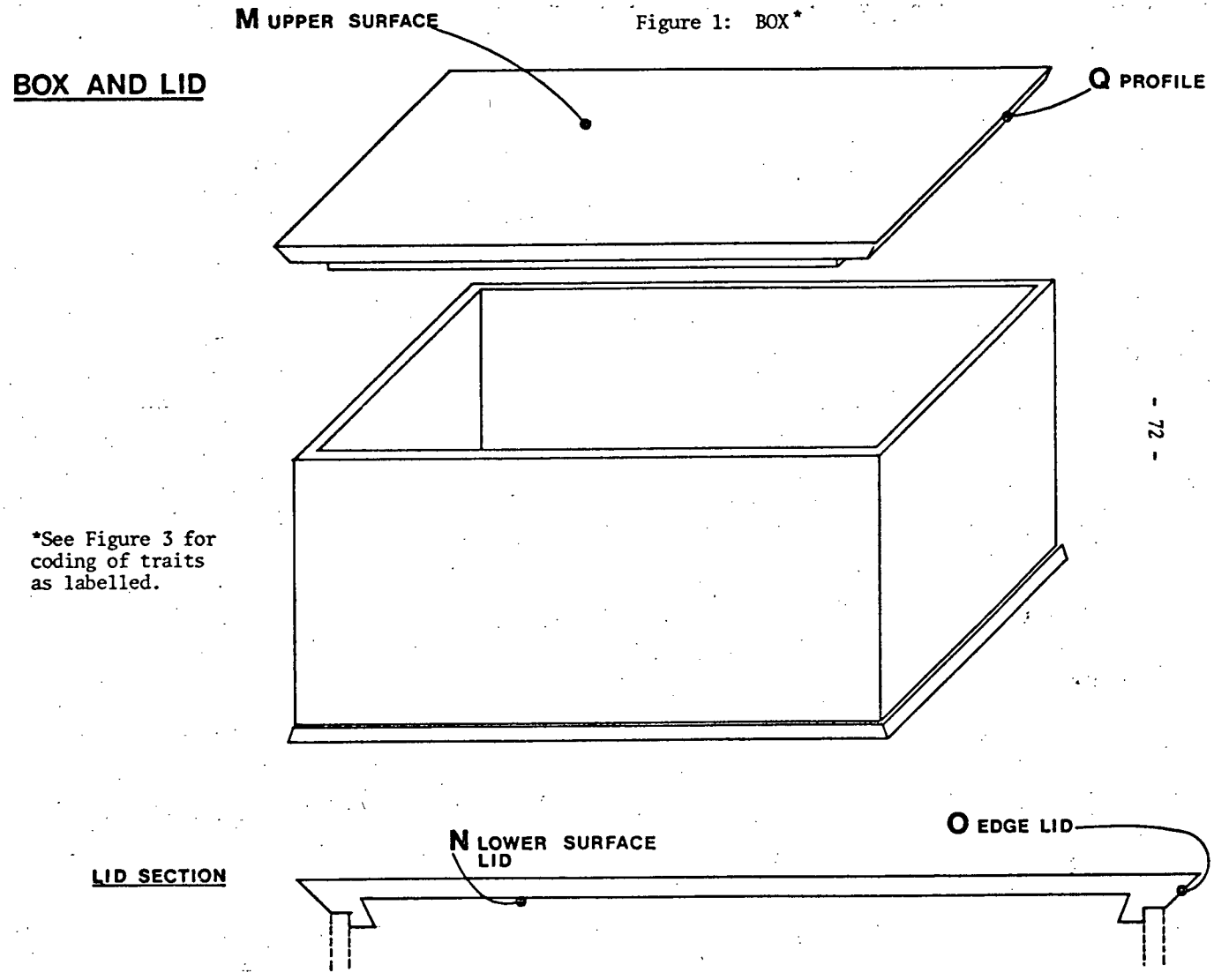
APPENDIX 1

Figure 1: Box

Figure 2: Dish

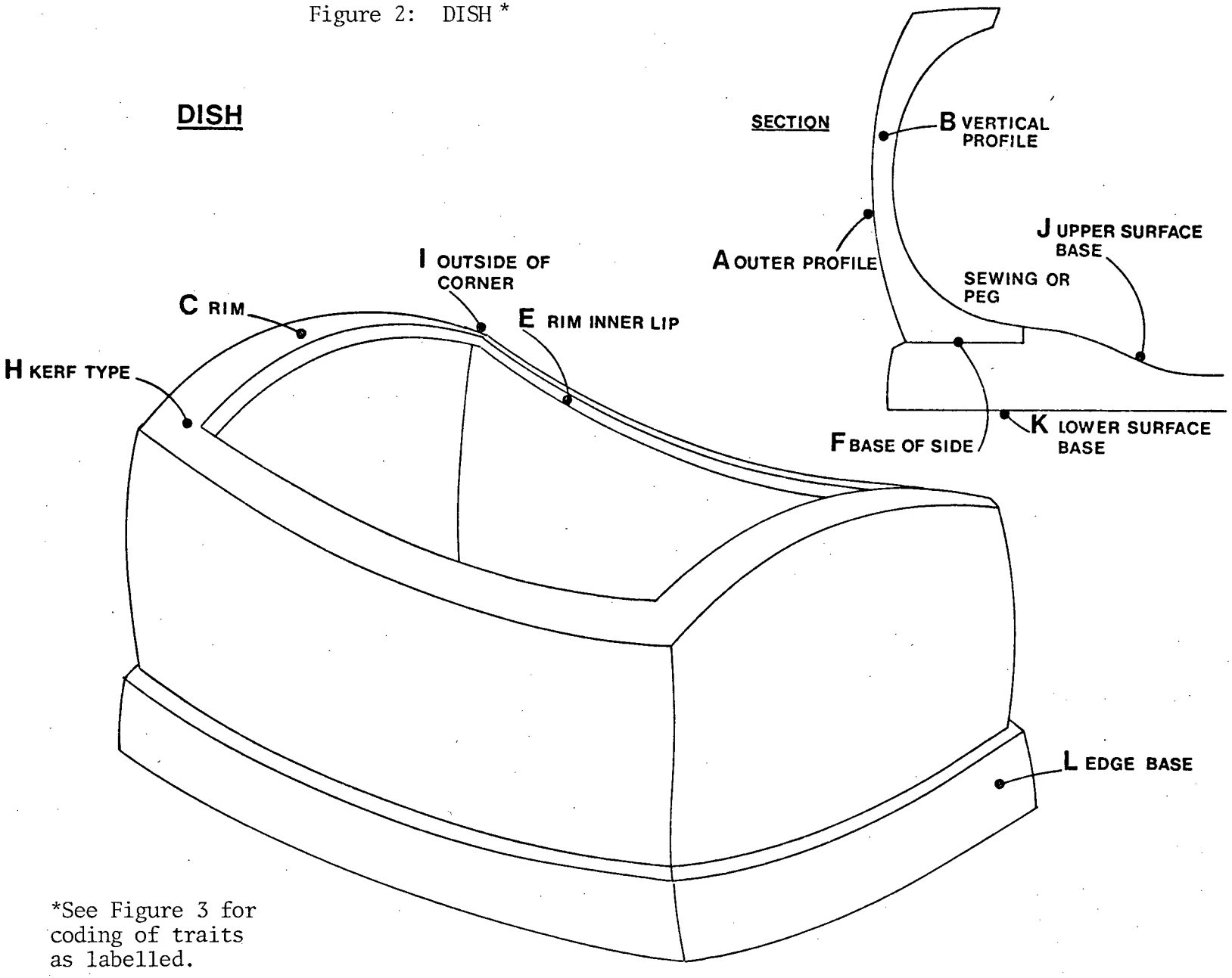
Figure 3: Traits

Figure 1: BOX*



*See Figure 3 for coding of traits as labelled.

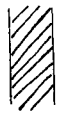
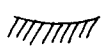
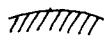
Figure 2: DISH *



*See Figure 3 for coding of traits as labelled.

Figure 3: Traits

← outside of container | inside of container →

TRAIT CLUSTER		TRAITS
α:	Type	1. rectangular 2. double 3. other
β:	Sewing/ties	1. none 2. withes 3. sinew/gut 4. babiche 5. cedar bark rope 6. other (including mat cover)
A:	Outer profile (side view)	1.  2.  3. other
B:	Vertical profile (side view)	1.  2.  3.  4.  5. 
C:	Rim (side view)	1.  2.  3. 
D:	Rim (cross-section)	1.  2.  3.  4.  5.  6.  7.  8. 
E:	Rim (inner lip)	1. none 2.  3. 
F:	Base of side (cross-section)	1.  2.  3.  4.  5.  6. 
G:	Method of join	1. kerfed 2. sewed 3. sew/peg 4. sewed 5. sew/peg 6. pegged 7. nailed 8. sewed 9. paired stitch 10. other

H: Kerf type

1. 8. reversed direction

2. 3. 4. 5.

2+8. 3+8. 4+8. 5+8.

6. 7.

6+8. 7+8.

9. 10. 11.

I: Outer corner

1. 2. 3. 4. (as cut)

5. 6. 7. other 8.

J: Upper surface base

1 2. 3. 4.

5. 6. 7. 8.

9 10. 11. 12. other

K: Lower surface base

1. 2. 3.

L: Edge base

1. 2. 3. 4.

5. flush with wall 6. projecting

M: Upper surface lid

1. 2. 3. 4. other

N: Lower surface lid

1. 2. 3. 4.

5. 6. 7. 8.

9. 10. 11. other

O: Edge lid

1. 2. 3. 4. 5.

Q: Profile (from top)

1. 2.

R:	Type of finish	1. rough 2. adzed/knifed 3. sanded/fine finish 4. pierced (other than at join)
S:	Type of decoration	1. none 2. incised 3. painted overall 4. painted design 5. beading 6. low 6. low relief 7. sculpted 8. inlaid
T:	Colour	1. none 2. one 3. two or more
U:	Motif	1. none 2. symmetric 3. corner-centred 4. edge-parallel lines 5. other parallel lines: overall 6. simple forms 7. complex forms (eg. salmon head motif) 8. configurative/realistic being 9. expansive being (Distributive) 10. "Gonaqadet" (double-eyes) 11. "creature" (single-eyes) 12. head/tail 13. body profile 14. *orient to left 15. *orient to right (*indicate both if ambiguous)

APPENDIX 2

Catalogue numbers for containers analysed, figures 4 & 5:

Code #	NMC #	Code #	NMC #
1	VII-A-125	41	VII-B-736
2	VII-A-126	42	VII-B-737
3	VII-A-127	43	VII-B-738
4	VII-A-289	44	VII-B-741
5	VII-B-97	45	VII-B-1158
6	VII-B-105	46	VII-C-106
7	VII-B-118	47	VII-C-107
8	VII-B-119	48	VII-C-109
9	VII-B-120	49	VII-C-128
10	VII-B-129	50	VII-C-667
11	VII-B-140	51	VII-C-1276
12	VII-B-142	52	VII-C-1311
13	VII-B-316	53	VII-C-1480
14	VII-B-318	54	VII-C-1744
15	VII-B-319	55	VII-C-1833
16	VII-B-320	56	VII-C-1851
17	VII-B-321	57	VII-D-35
18	VII-B-326	58	VII-D-37
19	VII-B-328	59	VII-D-39
20	VII-B-329	60	VII-D-113
21	VII-B-330	61	VII-D-136
22	VII-B-331	62	VII-D-138
23	VII-B-333	63	VII-D-161
24	VII-B-334	64	VII-D-186
25	VII-B-338	65	VII-D-228
26	VII-B-340	66	VII-D-308
27	VII-B-341	67	VII-D-339
28	VII-B-342	68	VII-D-353
29	VII-B-343	69	VII-D-359
30	VII-B-346	70	VII-E-21
31	VII-B-348	71	VII-E-46
32	VII-B-440	72	VII-E-50
33	VII-B-459	73	VII-E-90
34	VII-B-656	74	VII-E-113
35	VII-B-681	75	VII-E-293
36	VII-B-701	76	VII-E-295
37	VII-B-707	77	VII-E-317
38	VII-B-727	78	VII-E-318
39	VII-B-728	79	VII-E-320
40	VII-B-732	80	VII-E-359

Code #	NMC #
81	VII-E-360
82	VII-E-368
83	VII-E-375
84	VII-E-388
85	VII-E-769
86	VII-EE-28
87	VII-F-9
88	VII-F-193
89	VII-F-221
90	VII-F-222
91	VII-F-234
92	VII-F-363
93	VII-F-387
94	VII-G-1
95	VII-G-221
96	VII-G-297
97	VII-G-342
98	VII-G-343
99	VII-G-349

TRIBAL ATTRIBUTIONS

As indicated by catalogue numbers,
National Museum of Man,
Canadian Ethnology Services

VII-A: Tlingit

VII-B: Haida

VII-C: Tsimsian

VII-D: Bella Coola

VII-E: Kwakiutl

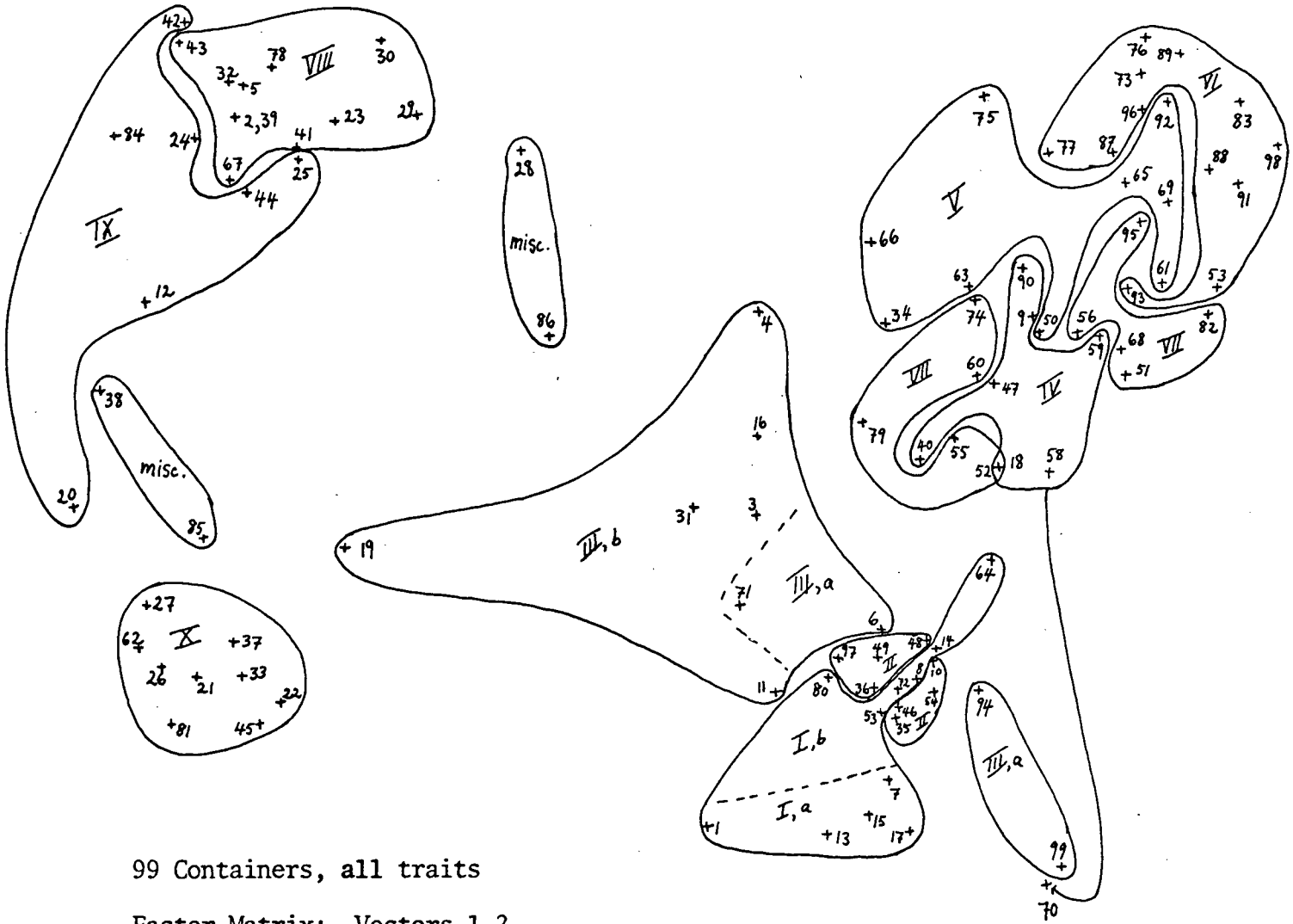
VII-EE: Bella Bella

VII-F: Nootka

VII-G: Coast Salish

VII-X: Unknown

Figure 4: Multi-dimensional Scaling

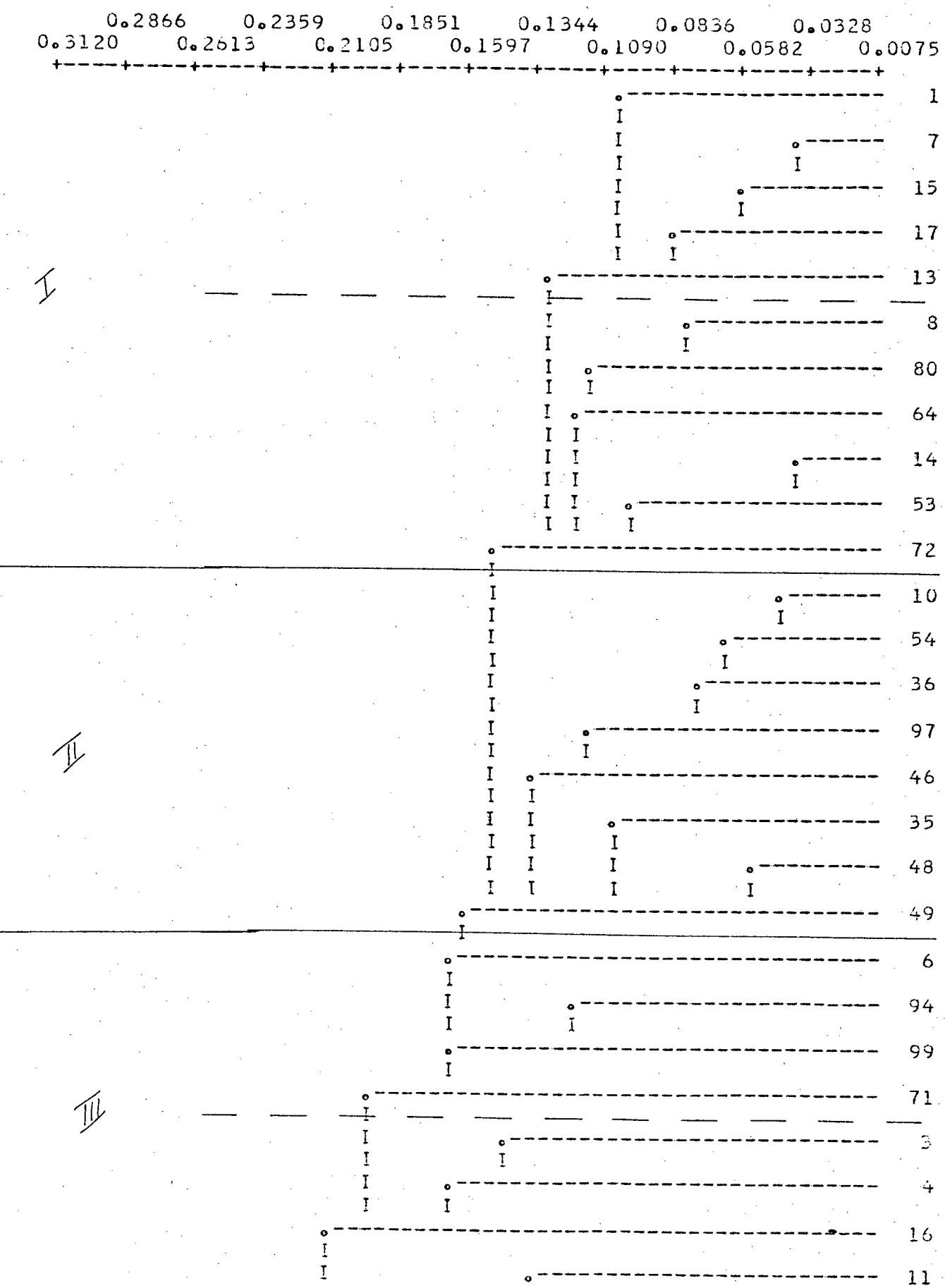


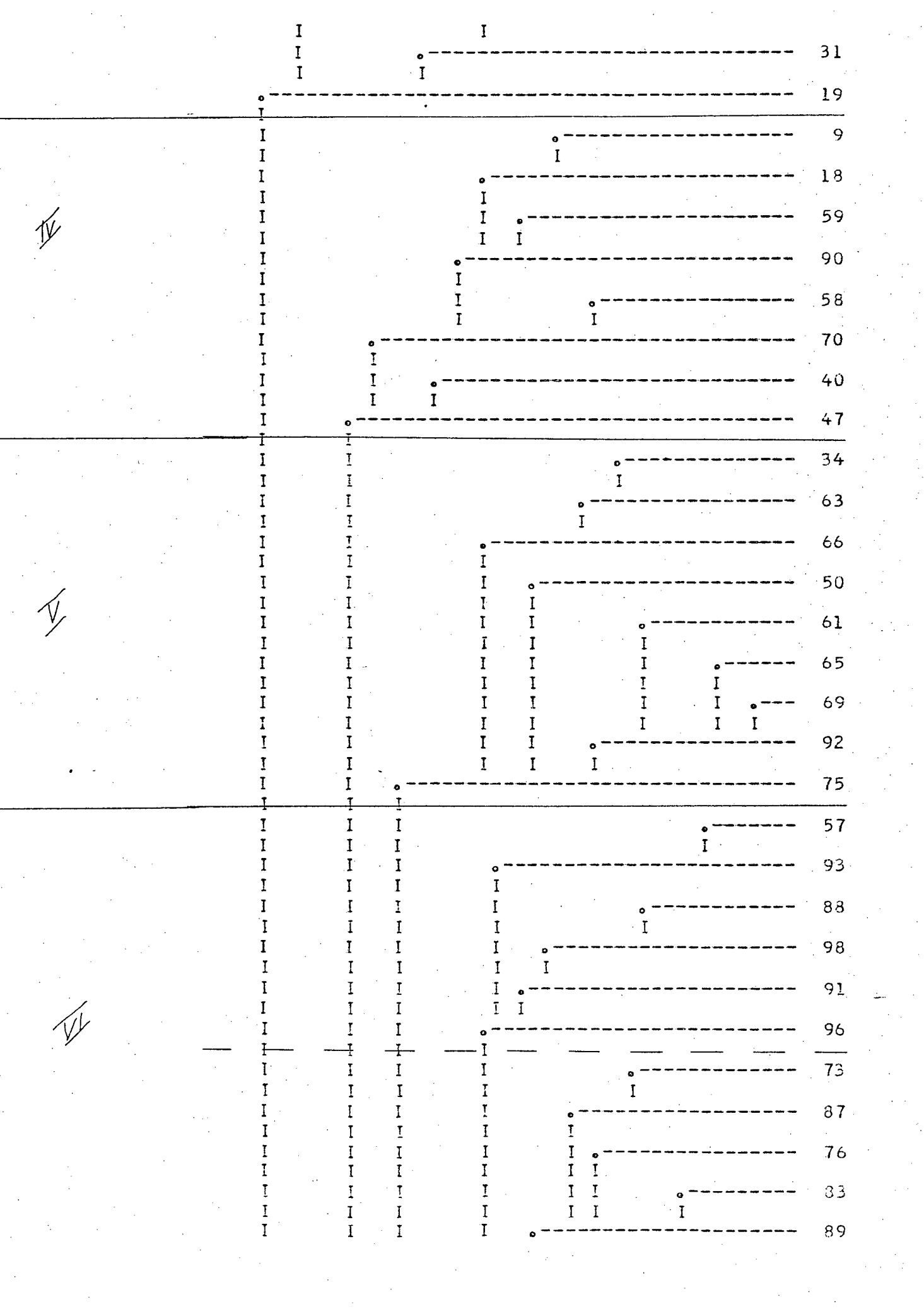
99 Containers, all traits

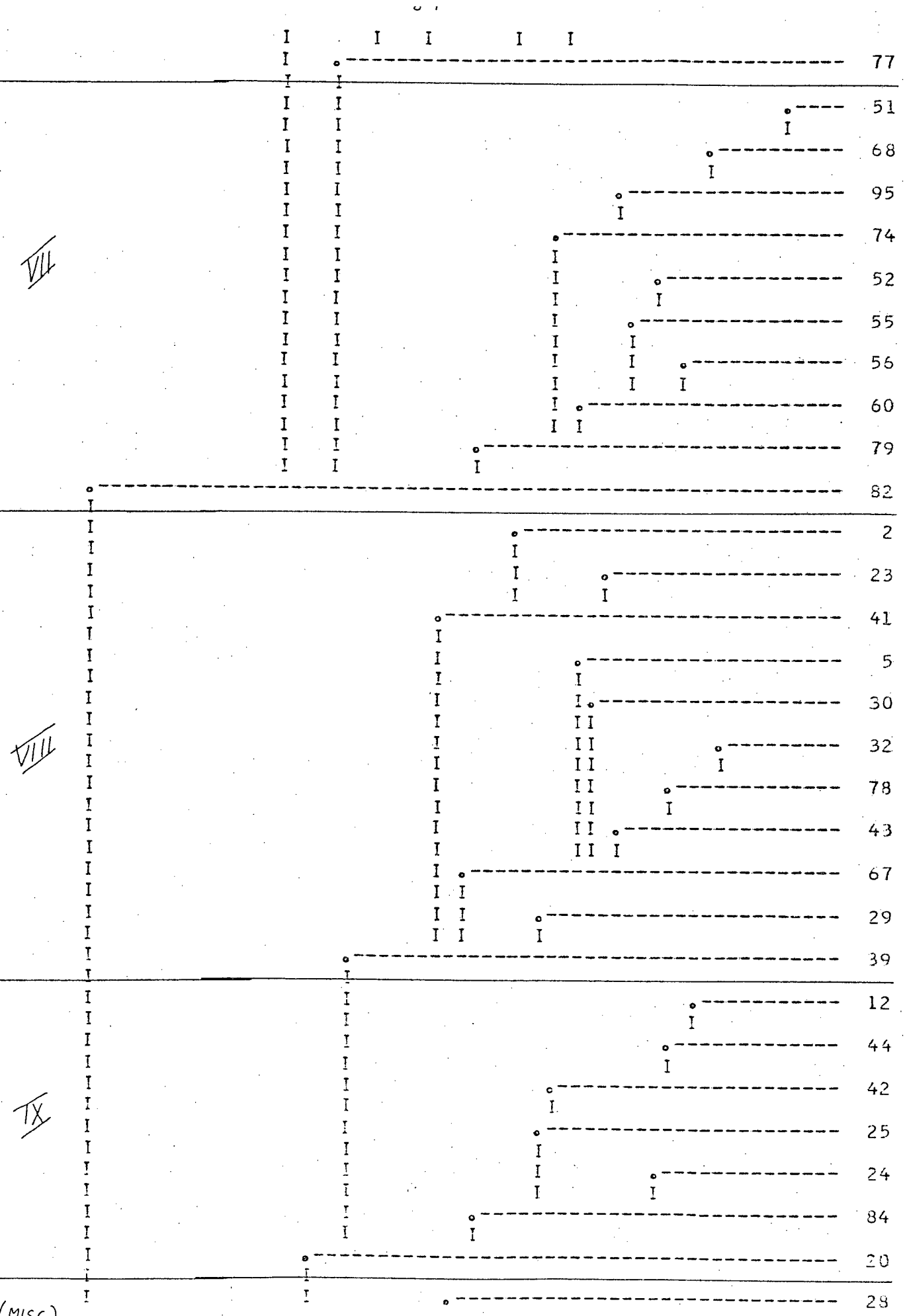
Factor Matrix: Vectors 1,2

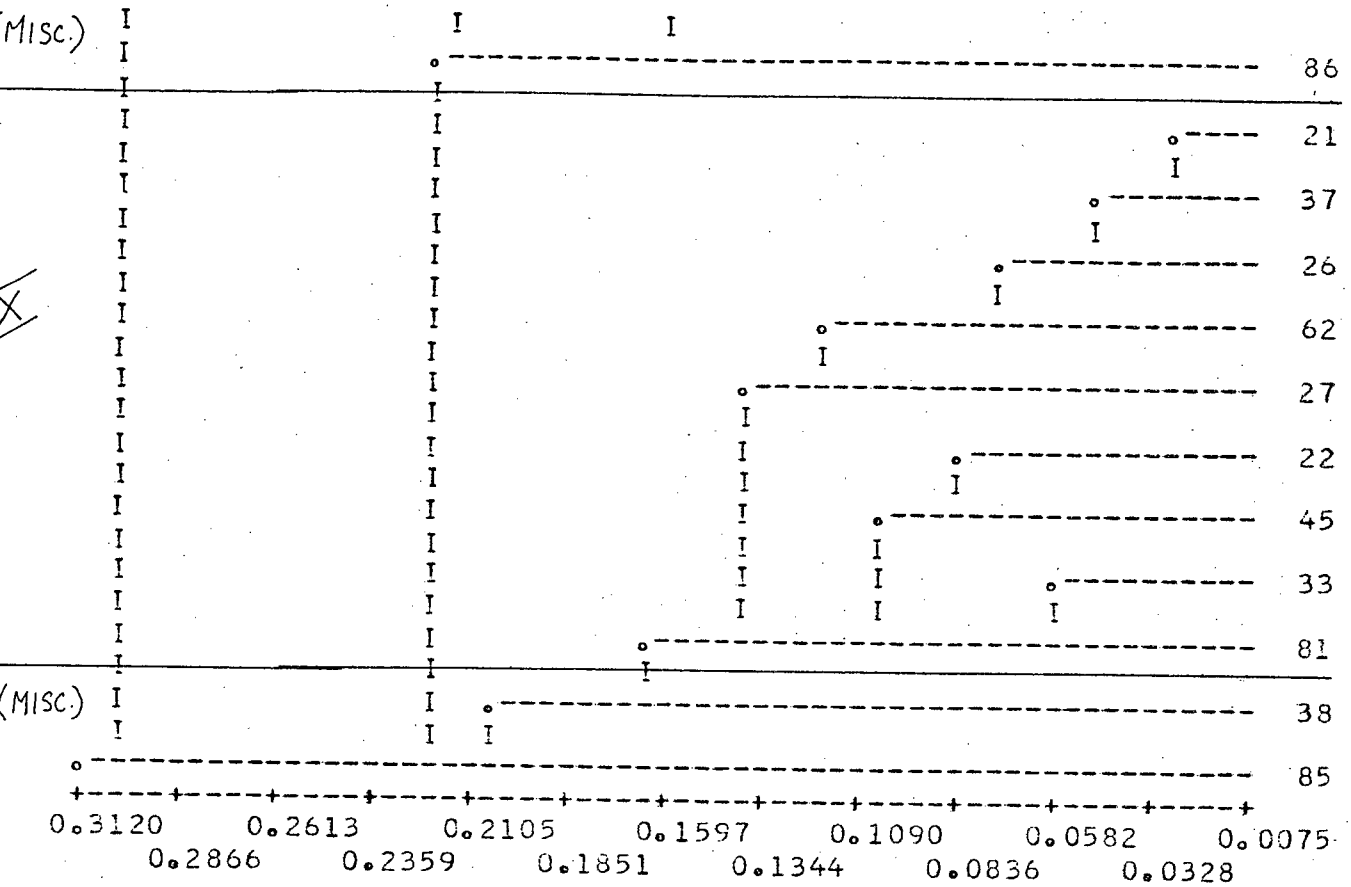
70% trace

99 KERFED CONTAINERS, MINUS "BB" BOXES, ALL TRAITS. 24/6/75
ETHOD 4




31
19
IV
9
18
59
90
58
70
40
47
V
34
63
66
50
61
65
69
92
75
VI
57
93
88
98
91
96
73
87
76
83
89


VII
VIII
IX
(MISC.)
77
51
68
95
74
52
55
56
60
79
82
2
23
41
5
30
32
78
43
67
29
39
12
44
42
25
24
84
20
28



DENDROGRAM: VALUES ALONG X-AXIS ARE SCALED COEFFICIENTS

VALUES ALONG Y-AXIS ARE MERGE LEVELS

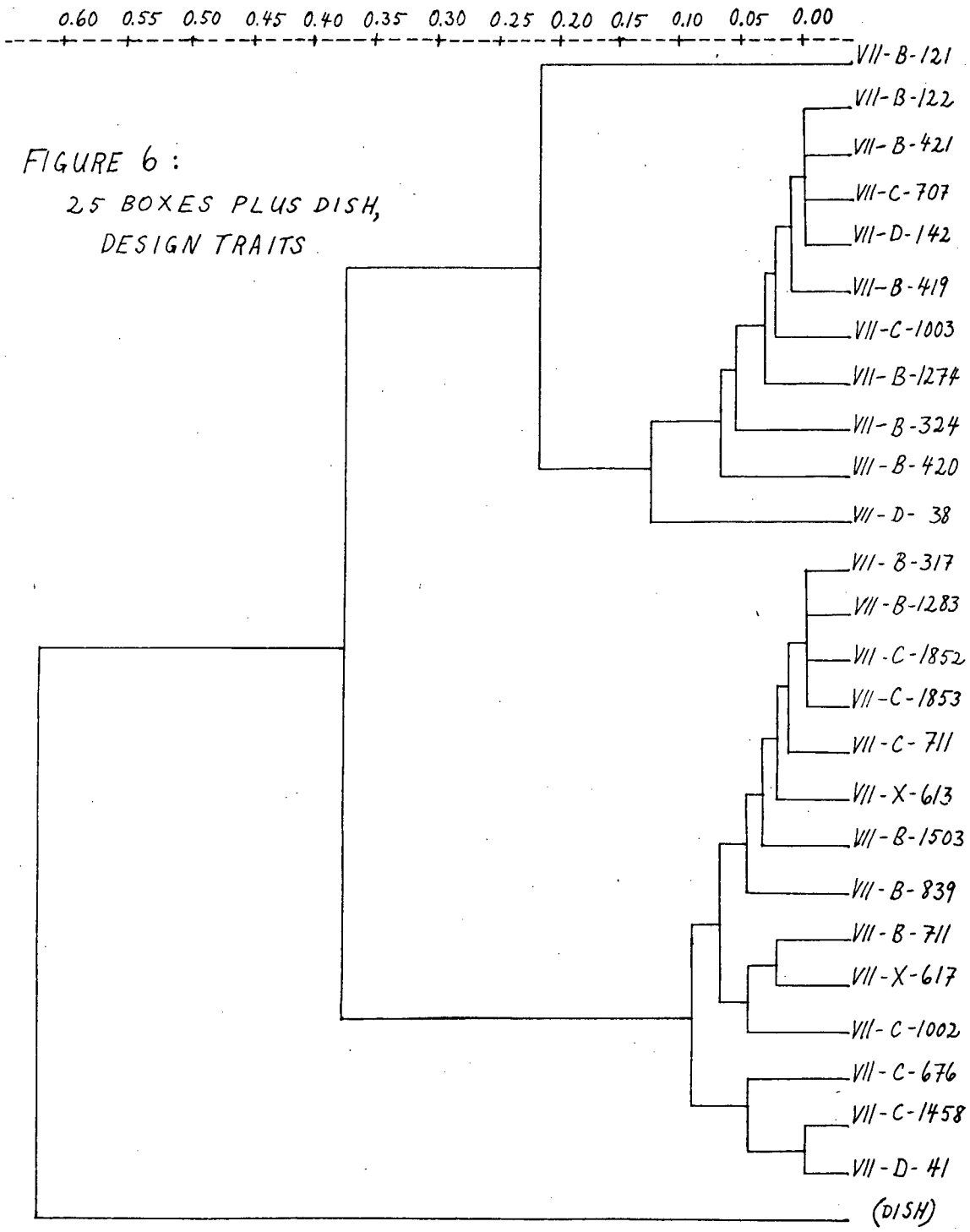


FIGURE 6 :
25 BOXES PLUS DISH,
DESIGN TRAITS

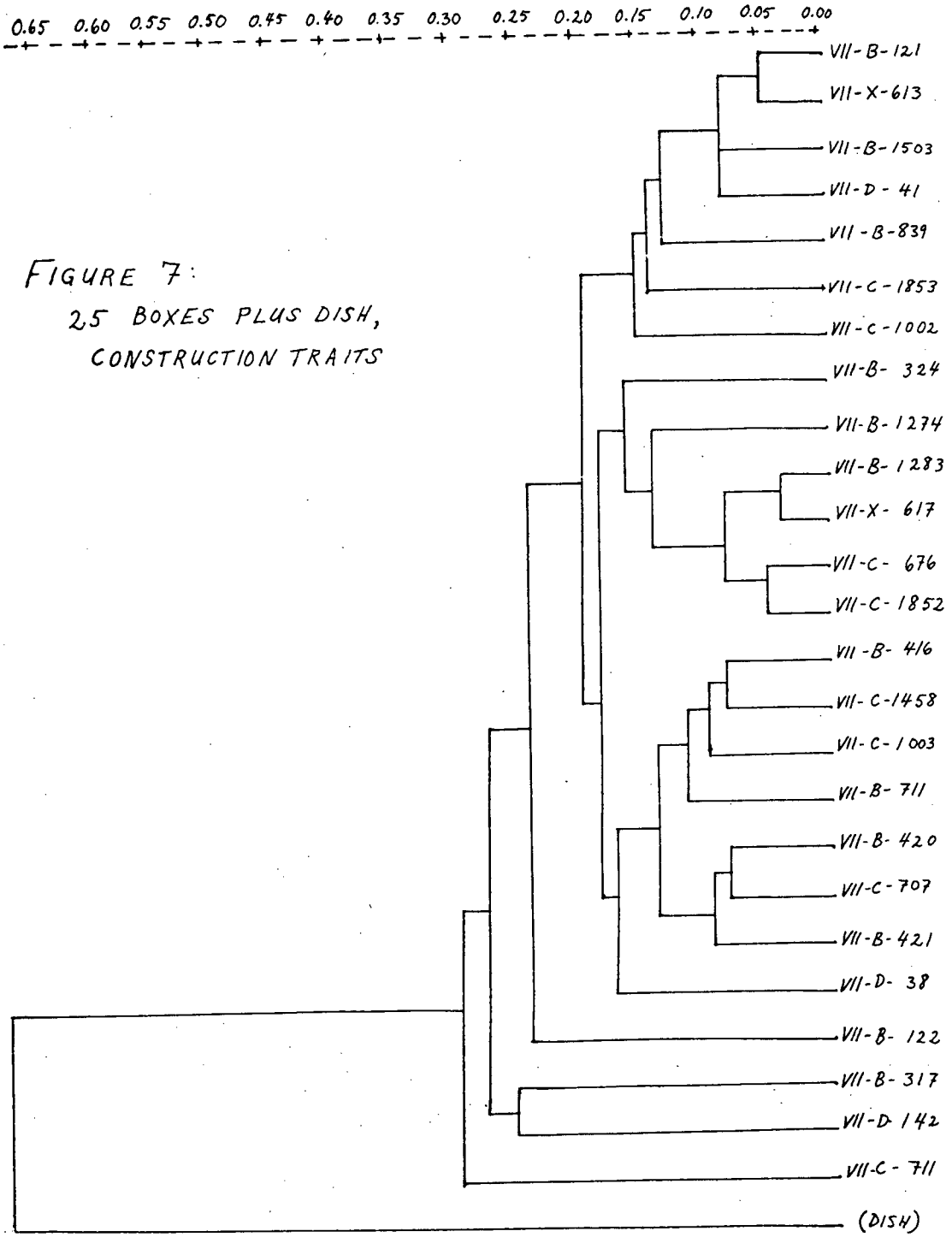


FIGURE 7:
25 BOXES PLUS DISH,
CONSTRUCTION TRAITS

APPENDIX 3

List of plates

Plates 2-70, with interfaced documentation.

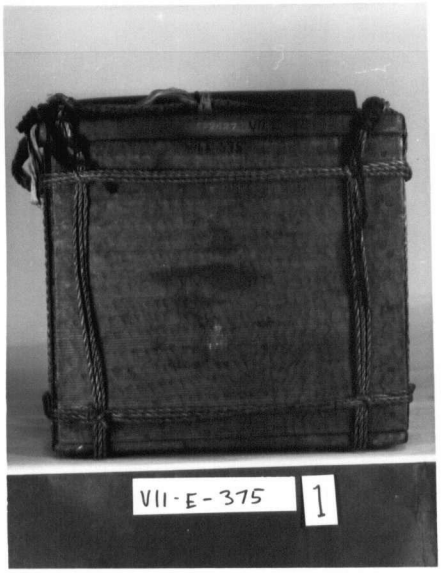
PLATES

Plate	Catalogue Number	Side
1. **(Frontispiece)**	VII-A-289	3
2,3	VII-E-375	1
4,5	VII-D-136	1,2
6	VII-EE-28	
7	VII-F-193	1
8.	VII-C-103	2
9.	VII-B-547	
10	VII-C-1132	1
11	VII-E-50	1
12,13	VII-C-1872	1,3
14,15,16,17	VII-B-321	1-4
18	VII-C-657	3
19	VII-B-324	3
20,21,22	VII-B-1274	1-3
23,24,25,26	VII-C-1852	1-4
27,28,29,30	VII-C-128	1-4
31,32,33,34	VII-A-127	1,2,4,inner
35,36,37,38	VII-B-1158	1-4
39,40,41,42	VII-B-334	1-4
43,44,45,46	VII-B-737	1-4
47,48,49,50	VII-B-97	4-1

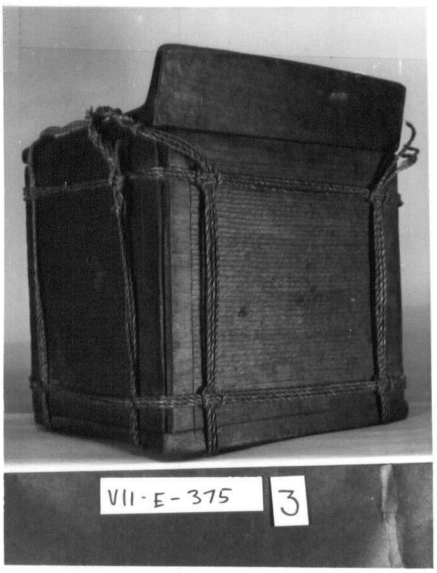
Plate	Catalogue Number	Side
51,52,53,54	VII-B-736	1-4
55,56,57,58	VII-A-126	1-4
59,60,61,62	VII-B-739	1-4
63,64,65,66	VII-C-99	1-4
67,68,69,70	VII-A-289	1,2,3,inner

Plates 2,3.	VII-E-375	Kwakiutl. Collected at Koskimo Village by M. Dawson, summer, 1885.

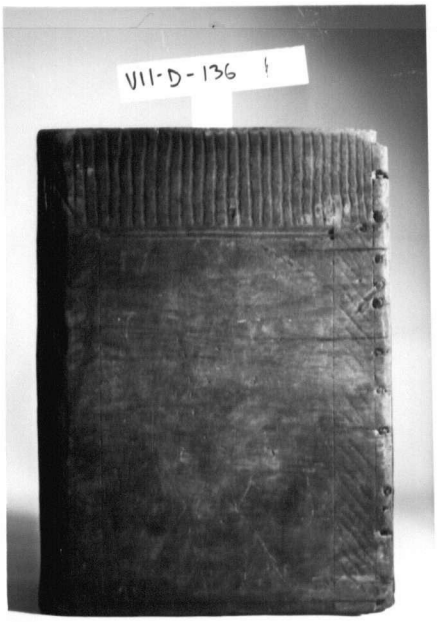
Plates, 4,5.	VII-D-136	Bella Coola. Collected at Bella Coola by Harlan I. Smith from Captain Schooner, August 17, 1920.



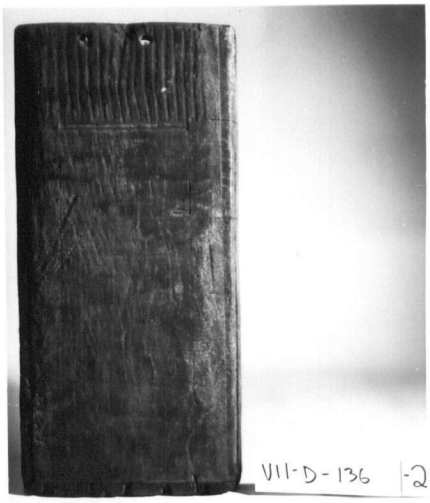
2



3

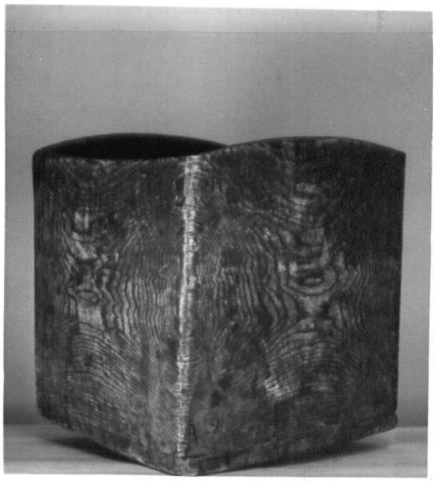


4

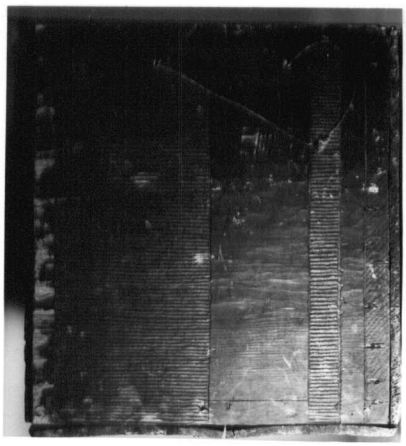


5

Plate 6	VII-EE-28	Bella Bella. Collected at Port Simpson, by C. M. Barbeau in March, 1915. (Barbeau) "Water bucket (,u·mt) made by a wudstE (Bella Bella) man long ago; over 70 years ago; of red cedar. Purchased from same woman 'mə·s.
Plate 7	VII-F-183	Nootka. Collected from Clayoquot by C. F. Newcombe, 1895-1901.
Plate 8	VII-C-103	Tsimsian. Collected at Fort Simpson by I. W. Powell. Sent to Ottawa December, 1897.
Plate 9	VII-B-547	Haida. Collected at Cha-atl by C. F. Newcombe, 1895-1901. (Newcombe) "Represents the Raven Crest. Coffin board."



6



7

8

9

Plate 10	VII-C-1132	Tsimsian. Collected at Kitwanga by C. M. Barbeau in 1924. (Barbeau) "Raven Drum - qaqum'anut; of wood made in connection with the qaqum'anut song of the crest of Kwinu. On the one side is painted gEdəmgana': person of frogs; and tkuwElksəgəmqaq: The Prince of Ravens. The drum was said to have been made at the same time the pole, short with frogs, was made at kitwunkul. The paintings were done by Johnny Lagaxnitz. From Mrs. Johnny Lagaxnitz (gwinu) of gitwunkul, now living at gitwəngE."
Plate 11	VII-E-50	Kwakiutl. Collected by C. F. Newcombe in 1900. Drum.
Plate 12,13	VII-C-1872	Tsimsian, Gitksan. Collected in 1972. Made by Earl Muldoe, 'Ksan. Drum.

10

11

12

13

Plates 14-17	VII-B-321	Haida. Collected at Massett by C. F. Newcombe in 1895-1901.

15

14

17

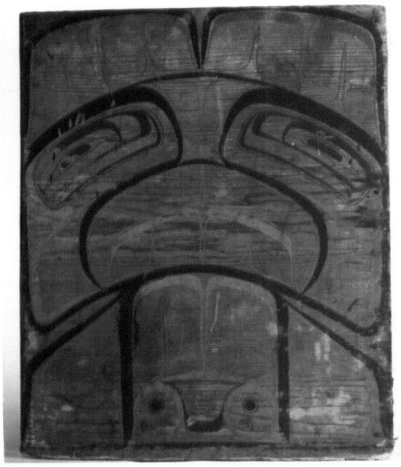
16

Plate 18	VII-C-657	Tsimsian. Collected at Port Simpson by C. M. Barbeau, February-March, 1915. (Barbeau) "The mɣdiɣk (grizzly bear), on one side split, and on the other whole. On the opposite sides biyEls (stars). This box belonged to ntŝi·ˈtslE̱·mɣ̨n (gispuwud. gitxaɬa), being of the family of ce·ks (gitxaɬa, gispuwud·), her crests were those of the t̂ɣmlax'ą́m gispuwud. Made by ni·ˈswá'mak (laxakk̓ik̓, gispaxɬɔ'ts); being of the family of ce·ks (gitxala, gispuwud), her crests were those of the (sic). Used for general storage purposes. Pegs were sometimes of yew or yellow cedar. Purchased from Mathilda Kelley, who inherited it from her maternal grandmother.
Plate 19	VII-B-324	Haida. Collected at Masset by C. F. Newcombe, 1895-1901.

18

19

Plates 20-22	VII-B-1274	Haida. Collected at Masset by Harlan I. Smith in 1919. (Note: side 4 is similar to side 2.)



VII B-1-2-74 -1

20

VII B-1-2-74 -2

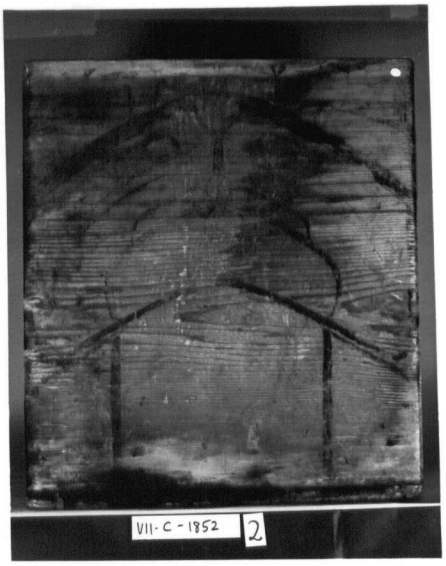
21

VII B-1-2-74 -3

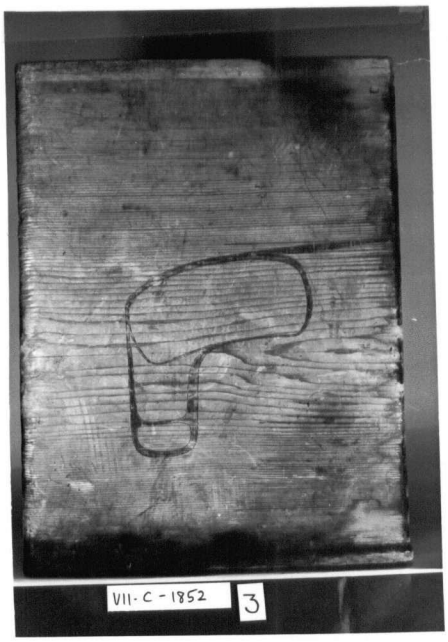
22

Plates 23-26	VII-C-1852	Tsimsian. Collected at Kitsegukla by W. H. Birmingham between 1950 and 1971.

23



24



25

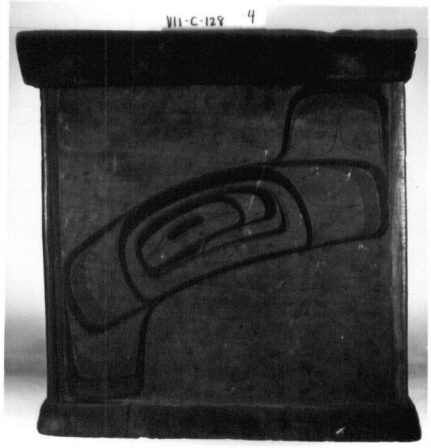
26

Plates 27-30	VII-C-128	Tsimsian. Collected at Angidah Village by W. A. Newcombe in 1905.

27

28

29



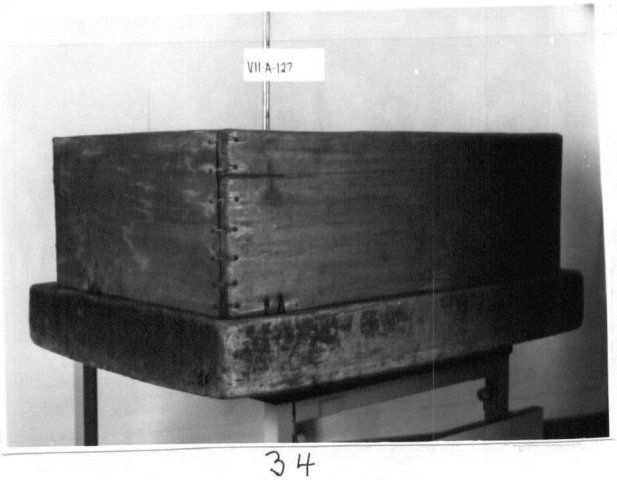
30

Plates 30-34	VII-A-127	Tlingit. Collected in Southern Alaska by F. M. Chapman in April, 1914. (Note: side 3 is identical to side 1.)

31

32

33

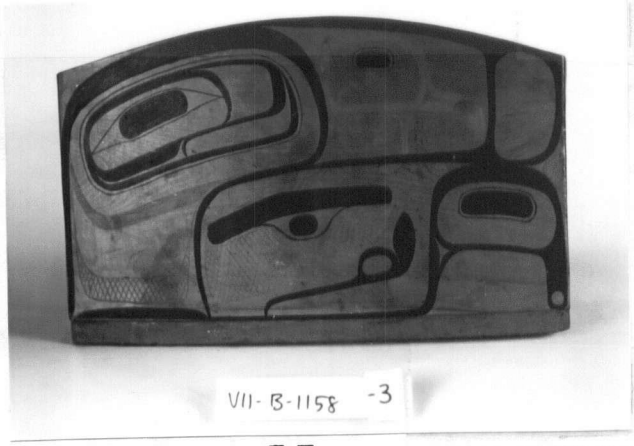


34

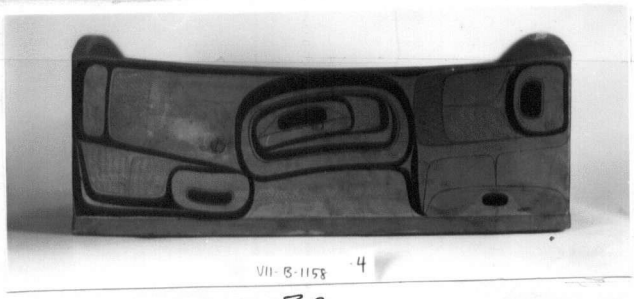
Plates 35-38	VII-B-1158	Haida. Collected from the Masset Band by Thomas Deasy, before July 1914. (Deasy) "a large box, painted with Indian paint, was used for cooking seaweed and other food.... It was made by Chief Richard Russ, who is now dead." (Note: This dish is not a perfect example of this type of motif. As described in Chapter 3, pages 41-42, there is not usually an explicit facial profile on the ends of these dishes. This is the only one of the Cluster X containers which shows this variation.)

35

36



37



38

Plates 39-42 VII-B-334 Haida. Collected at Masset by C. F. Newcombe in 1902.

VII-B-334 -1

39

VII-B-334 -2

40

VII-B-334 -3

41

VII-B-334 -4

42

Plates 43-46	VII-B-737	Haida. Collected on the Queen Charlotte Islands by C. F. Newcombe in 1897.

VII-B-737 -1

43

VII-B-737 -2

44

VII-B-737 -3

45

VII-B-737 -4

46

Plates 47-50 VII-B-97 Haida. Collected by Rev. Crosby in Skidegate, 1886.

VII-B-97 4

47

VII-B-97 3

48

VII-B-97 2

49

VII-B-97 1

50

Plates 51-54 VII-B-736 Haida. Collected by A. Aaronson before 1899.

52

51

54

53

Plates 55-58	VII-A-126	Tlingit. Collected in Southern Alaska by K. M. Chapman, 1914.

VII-A-126 1

55

VII-A-126 2

56

VII-A-126 3

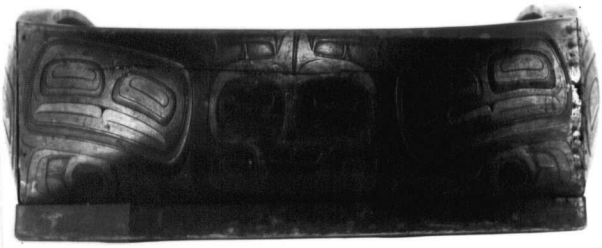
57

VII-A-126 4

58

Plates 59-62 VII-B-739 Haida. Collected by C. F. Newcombe in 1897.

59

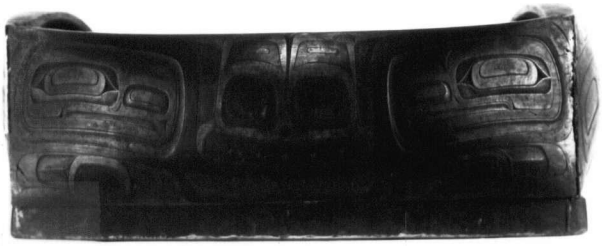


VII-B-739 1

60

VII-B-739 2

61



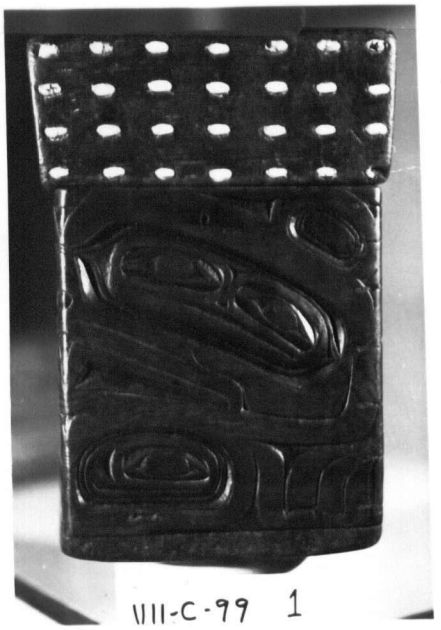
VII-B-739 3

62

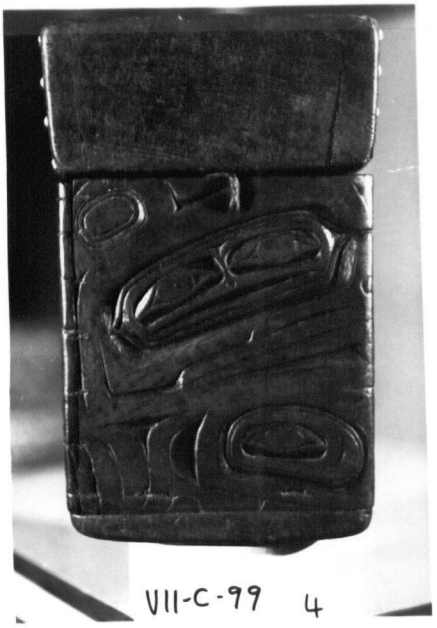
VII-B-739 4

Plates 63-66	VII-C-99	Tsimsian. Collected at Fort Simpson by I. W. Powell in 1897.

64



63



66

65

Plates 1, 67-70	VII-A-289	Tlingit. Collected by or for Lord Bossom before 1900. (Bossom) "Reportedly procured from Tehl cock(sic) (Raven Fragrance), chief of the 'Con-nuh-ta-kee' family of Southeastern Alaska. Originally from the Queen Charlotte Islands." (Note: side 4 is identical to side 2.)

67

68

69

70

APPENDIX 4

Data matrix, 99 containers, all traits, in final dendrogram order (as Figure 5)

Ordering of characters in data matrix (refer to figure 3):

- General data

  α(3x1); β(6x1)

- Construction

  G(10x1); H(11x4); I(8x2: sides 1&2, 3&4); A(3x1)

- Wall

  A(3x1); B(5x1); C(3x2: sides 1&3, 2&4); D(8x2: sides 1&3, 2&4);

  E(3x2:sides 1&3, 2&4); F(6x1); Q(2x1)

- Lid

  M(4x1); N(11x1); O(5x1); Q(2x1)

- Base

  G(10x1); J(12x1); K(4x1); L(6x1); Q(2x1)

- Finish and Decoration (including Lid)

  R(4x5); S(8x5); T(3x2: sides 1&3, 2&4); U(15x4)

The total is 308 characters, with the following meanings:

0 = no comparison

1 = absence

2 = presence

ORDER ON DIMENSION 1

		1	11111	11112	22222	22223	33333	33334	44444	44445	55555	55556	66666	66667	77777	77778	88888	88889
		12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890
1	001	21112	11112	21111	11111	21111	12111	11111	21211	11111	12121	11111	11212	11112	11111	11211	11112	11211	21111
2	187	21121	11112	11112	11110	00000	00000	11111	21111	11111	12121	11000	00000	00011	11111	21111	11122	11211	21111
3	030	11212	11112	11211	11111	21111	12111	11211	11211	11121	11121	11112	11111	11112	11111	11211	11112	11121	11211
4	031	11212	11112	12111	11111	11111	22111	11111	12211	11111	11221	11111	11122	11112	11111	11211	11112	11211	11112
5	190	21112	11112	11111	21111	21111	12111	11111	21111	11111	12111	11111	11211	11112	11111	11211	11112	11211	21111
6	026	11221	11112	11112	11111	11111	21111	11211	11211	11121	11121	11112	11112	11112	11111	11211	11112	11121	11211
7	002	11210	00112	11121	11111	21111	12111	12111	11211	11211	11121	11121	11112	11112	11111	11211	11112	11121	11211
8	006	21111	12112	11112	11111	21111	11111	12111	11111	11211	11111	11121	11111	11112	11111	11211	11112	11211	21111
9	038	11212	11112	12111	11111	21111	11111	21111	11111	12111	11111	11211	11111	11112	11111	11211	11112	11121	11211
10	014	11212	11112	12112	11110	00000	00000	00000	00000	00000	00000	00000	00000	00012	11111	11211	11112	11121	11211
11	033	11212	11112	11112	11111	21111	12111	11211	11111	11111	21121	11112	11111	11112	11111	11211	11112	11121	11211
12	199	21121	11112	11112	11111	21111	12111	11112	11211	11111	21121	11111	12112	11122	11111	11211	11112	11211	21111
13	005	11221	11112	11112	11112	11111	11111	21111	11111	12111	11111	11211	11111	11112	11111	11211	11112	11121	11211
14	009	21111	11122	11112	11111	21111	11111	11211	11211	11121	11111	11112	11112	11111	11111	21111	11122	11211	21111
15	003	12112	11112	12111	11111	21111	11111	11112	11111	11111	22111	11111	12211	11112	11111	11211	11112	11211	21111
16	032	11221	11112	11112	11111	21111	12111	11211	11111	11121	11121	11112	11111	11112	11111	11211	11112	11121	11211
17	004	12112	12112	12111	11111	21111	12111	11111	21211	11111	12111	11111	11212	11112	11111	11211	11112	11221	21211
18	039	21221	11112	11111	21111	21111	12111	11211	11211	11121	11121	11112	11112	11112	11111	11211	11112	11211	21111
19	035	11221	11112	11111	21111	21111	12111	21111	11111	12111	11111	11211	11111	11112	11121	11111	12112	11121	11211
20	208	11221	11112	11112	11111	21111	11111	11211	11211	11121	21111	11112	12112	11112	11111	11211	11112	11121	11211
21	212	12121	11112	11112	11111	21111	12111	21111	11111	12111	11111	11211	11111	11111	22111	11112	11112	11211	21111
22	220	21112	11112	11111	12111	21111	12111	11112	11111	11111	12111	11111	12111	11121	12111	11112	11112	11211	21111
23	188	21111	11122	11112	11111	21111	11111	11211	11211	11121	11111	11112	11112	11111	11111	21111	11122	11211	21111
24	203	11221	11112	11111	21111	21111	12111	12111	11111	11211	11121	11121	11111	11112	11111	11211	11112	11121	11211
25	202	21111	11222	11112	11111	21111	12111	21111	11111	12111	11111	11211	11111	11111	22111	11112	11112	11211	21111
26	214	21121	11112	11112	11111	21111	12111	21111	11111	12111	11111	11121	11112	11111	21111	11121	11112	11211	21111
27	216	12121	11112	11112	11111	21111	12111	21111	11111	12111	11111	11211	11111	11111	21111	11121	11112	11211	21111

28	210	12121	11112	11112	11110	00000	00000	21111	11111	12111	11111	11211	11111	11121	12111	11112	11112	11211	21111
29	197	11212	11112	12111	11112	11111	11111	21111	11111	12111	11111	11211	11111	11112	11111	11211	11112	11121	11211
30	191	21111	11212	11111	21111	21111	12111	21111	11111	12111	11111	11211	11111	11121	12111	21112	11112	11211	21111
31	034	11221	11112	11112	11111	21111	12111	11111	21111	11111	12121	11111	12111	11112	11211	11111	21112	11121	11211
32	193	11212	11112	11112	11111	21111	12111	11112	11111	11111	21121	11111	12211	11122	11211	11211	21112	11211	21111
33	223	12111	11122	11112	11111	21111	11111	11111	11111	21111	11111	21111	11111	12212	21111	11121	11112	11211	21111
34	062	11221	11112	11112	11111	21111	11111	12111	11211	11211	11111	11121	11112	11111	11111	21111	11122	11121	11211
35	020	21111	11212	11112	11111	21111	11111	11111	21211	11111	22111	11111	11212	11121	11111	11211	11112	11211	21111
36	017	21121	11112	11112	11111	21111	12111	11111	21111	11111	12121	11111	11211	11112	11111	11211	11112	11211	21111
37	213	12121	11112	11111	21111	21111	10111	11111	11111	21111	12121	12111	11211	11222	11111	11211	11112	11211	21111
38	225	21112	11122	11121	11111	21111	11111	11111	11111	21111	11111	12111	11111	11221	12111	11112	11112	11211	21111
39	198	21111	11122	11112	21110	00000	00000	00000	00000	00000	00000	00000	00000	00012	12111	21112	11122	11211	00000
40	055	21121	11112	11112	11111	21111	11111	11111	21211	11111	12111	11111	11212	11111	11111	21111	11122	11211	21111
41	189	21111	11122	11112	11111	21111	12111	11111	21111	11121	21121	11111	11211	11112	11111	11211	11112	11211	21111
42	201	21111	11122	11112	11111	11121	11112	12111	11111	11111	11111	12111	12112	11111	11111	21111	11121	12112	21111
43	195	21111	11122	11112	11111	21111	11111	21111	11111	12111	11111	11211	11111	11111	21111	11112	11112	11211	21111
44	200	21121	11112	11112	11111	21111	11111	12111	11211	11211	11111	11121	11112	11111	11121	11111	12112	11121	11211
45	222	21112	11112	11111	21111	21111	12111	21111	11111	12111	11111	11211	11111	11121	11111	12111	11112	11211	21111
46	019	21112	21112	12111	11111	21111	12111	11112	11211	11111	21121	11111	12112	11112	11111	11211	11112	11211	21111
47	058	11221	11112	11112	11111	21111	12111	12111	11111	11211	11121	11121	11111	11112	11111	11211	11112	11121	11211
48	024	21121	11112	11112	11111	21111	12111	11112	11211	11111	21121	11111	12112	11111	11111	21111	11122	11211	21111
49	025	11221	11112	11111	21111	21111	11111	11211	11111	11121	11111	11112	12111	11112	11111	11211	11112	11121	11212
50	066	11200	11112	12111	21111	21111	11111	11212	11211	11121	21111	11112	12112	11112	11111	11211	11112	11121	11211
51	171	21121	11112	11112	11111	21111	11111	11112	11211	21111	12111	11111	11211	11121	12111	21112	11112	11211	21111
52	181	21121	11112	11111	21111	21111	11111	11112	11211	11111	21111	11111	12112	11122	11111	11211	11112	11211	21111
53	012	21121	11112	11112	11111	21111	11111	11112	11111	11111	21111	11111	12111	11111	11111	21111	11122	11211	21111
54	015	21111	11212	11112	21111	21111	11111	11112	21211	11111	12121	11111	11211	11121	11111	11211	11112	11211	21111
55	182	21111	11122	11112	21111	21111	11111	11111	21211	11121	12111	11112	11112	11122	11111	11211	11112	11211	21111
56	183	21121	11112	11111	21111	21111	12111	11212	11111	11111	12121	11111	11211	11111	11111	21111	11122	11211	21111
57	114	21112	12122	21111	11111	21111	11111	11111	21111	11111	12111	11111	11211	11112	11111	11211	11112	11211	21111

58	052	21111	11122	11111	21111	21111	12111	11112	21211	11121	21121	11111	12112	11112	11111	11211	11112	11211	21111
59	044	11212	11112	12111	11111	21111	11111	21111	11111	12111	11111	11211	11111	11112	11111	11211	11112	11121	11211
60	184	21121	11112	11112	21111	21111	12111	11111	21111	11111	12121	11111	12111	11122	11111	11211	11112	11211	21111
61	067	11211	00112	12111	11112	11111	11111	21111	11111	12111	11111	11211	11111	11112	11111	11211	11112	21121	11211
62	215	21111	11122	11112	11111	21111	12111	00000	00000	00000	00000	00000	00000	00011	11111	21111	11122	11211	21111
63	063	11212	11122	12111	11111	21111	12111	21111	11111	12111	11111	11211	11111	11111	11121	11111	12112	21122	11211
64	008	21111	11212	11112	11111	21111	11111	11211	11211	11111	21111	11112	11112	11121	11111	11211	11112	11211	21111
65	068	11211	12112	12111	11112	11111	11111	21111	11111	12111	11111	11211	11111	11112	11121	11211	12112	11121	11211
66	065	21111	21112	11112	11111	21111	11111	11111	21211	11111	12111	11111	11211	11112	11111	11211	11112	11211	21111
67	196	21111	11212	11112	11111	21111	12111	21111	11111	12111	11111	11211	11111	11111	21111	11112	11112	11211	21111
68	176	21121	11112	11111	21111	21111	11111	11111	21211	11111	12111	11111	11212	11112	11111	11211	11112	11211	01110
69	071	11211	21122	12111	11112	11111	11111	21111	11111	12111	11111	11211	11111	11112	11111	11211	11112	11121	11211
70	053	21121	11112	11112	11111	21111	12111	11111	21211	11111	12121	11111	11212	11111	11111	21111	11122	11211	21111
71	029	21110	01112	12111	11111	21111	11111	12111	11211	11111	21121	11111	12111	11111	11211	11111	21112	11121	11211
72	013	21121	11112	11111	21111	21111	12111	11211	21111	11121	12121	11112	11211	11112	11111	11211	11112	11211	21111
73	157	21121	11112	11112	11111	21111	12111	11111	21211	11111	12121	11111	11212	11112	11111	11211	11112	11211	21111
74	178	11221	11112	11112	21111	21111	12111	11121	11111	11112	11121	11111	21111	11112	11111	11211	11112	11121	11211
75	113	21112	12112	11112	11111	21111	11111	11111	21211	11111	12111	11111	11212	11111	11111	21111	11122	11211	21111
76	159	21121	11112	11112	21111	21111	11111	11112	21211	11111	12111	11111	11211	11112	11111	11211	11112	11211	21111
77	169	21111	12122	11112	21111	21111	12111	11111	21111	11111	21121	11112	11211	11122	11111	11211	11112	11211	21111
78	194	11221	11112	11112	11111	21111	11111	11211	11211	11121	11111	11112	11111	11111	11111	21111	11122	11211	21111
79	185	11212	11112	12111	11111	21111	11111	11111	11112	11211	11111	11121	11111	11111	11211	11111	21112	11121	11211
80	007	21121	11112	11112	11111	21111	11111	11112	11111	11111	21111	11111	12111	11112	11111	11211	11112	11211	21111
81	224	21112	11112	11112	11111	21111	11111	11112	11211	11111	21121	11111	12112	11111	11111	21111	11122	11211	21111
82	186	21121	11112	11111	21111	21111	12111	11112	11111	11121	21121	11111	12111	11122	11111	11211	11112	11211	21111
83	160	21121	11112	11112	21111	21111	11111	11111	21211	11111	12111	11111	11212	11121	11111	11211	11112	11211	21111
84	207	11221	11112	11111	21111	11111	21111	11111	12111	11111	11221	11111	11121	11111	11221	11111	22112	11121	11211
85	226	21112	11122	11211	11111	21111	12111	11112	11111	11111	21121	11111	12112	11121	11111	21111	11122	11211	21111
86	211	21111	11122	11112	11111	21111	11111	21111	11111	12111	11111	11211	11111	11121	11111	11112	11112	11211	21111
87	158	21121	11112	11112	11111	21111	11111	11112	11111	11111	21111	11111	12111	11111	11111	21111	11122	11211	21111

88	119	21121	11112	11112	11111	21111	12111	11112	11211	11111	21121	11111	12112	11111	11111	21111	11122	11211	21111
89	167	21112	11112	11112	21111	21111	12111	21111	11111	12111	11111	12211	11111	11111	21111	21121	11112	11211	21111
90	048	11211	11222	11112	11111	21111	11111	12111	11211	11211	11111	11121	11112	11111	11121	11111	12112	11121	11211
91	142	21121	11112	11111	21111	21111	12111	11112	11211	11111	21111	11111	12112	11122	11111	11211	11112	11211	21111
92	078	11221	11112	11111	21111	21111	11111	11112	11211	11111	21111	11112	12112	11112	11111	11211	11111	21121	11211
93	115	21121	11112	11112	11111	21111	12111	11111	21211	11111	21111	11111	12112	11111	11111	21111	11122	11211	21111
94	027	11221	11112	11112	11111	21111	12111	12111	11111	11211	11121	11121	11111	11112	11111	11211	11112	11121	11211
95	177	21121	11112	11111	21111	21111	12111	11111	21111	11111	22121	11111	11211	11111	11111	21111	11122	11211	21111
96	143	21121	11112	11112	11111	21111	11111	11112	21211	11111	12111	11111	12112	11122	11111	11211	11112	11211	21111
97	018	21121	11112	11112	11111	21111	11111	11211	11211	11121	12111	11112	11112	11112	11111	11211	11112	11211	21111
98	127	21121	11112	11121	11112	11111	11110	00000	00000	00000	00000	00000	00000	00111	01111	21111	11122	11211	21111
99	028	11221	11112	11112	11111	21111	11111	11112	11211	11111	21111	11111	12112	11112	11111	11211	11112	11121	11211

ORDER ON DIMENSION 1

			1	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111	11111
		99999	99990	00000	00001	11111	11112	22222	22223	33333	33334	44444	44445	55555	55556	66666	66667	77777	77778
		12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	66890
1	001	21121	12111	11112	11111	11211	21112	11111	20000	00000	00000	00000	00011	12111	11111	21111	11111	11212	11112
2	187	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11100	00000	00000	00000	00000
3	030	12111	21121	11112	11111	11122	12211	21111	20000	00000	00000	00000	00011	12121	11111	11211	11111	21112	11121
4	031	12111	21121	11111	21111	11122	12221	11111	20000	00000	00000	00000	00011	12111	11111	21111	11111	21112	11121
5	190	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11112	11111	11111	21112	11121
6	026	12111	21121	11111	12111	11121	12111	21111	20000	00000	00000	00000	00011	12111	11111	11111	11211	21112	11112
7	002	12111	21121	11111	12111	11121	12111	21111	20000	00000	00000	00000	00011	11211	11111	00111	11111	10001	11212
8	006	21121	12111	11112	11111	11211	21121	11112	11112	11111	11121	11121	11211	11121	11112	11111	11111	21111	12112
9	038	11212	12111	11112	11111	11122	12211	11122	10000	00000	00000	00000	00011	12111	11111	21111	11111	11212	11121
10	014	12111	21121	11112	12111	11121	12111	21111	20000	00000	00000	00000	00011	12111	11111	21111	11111	21112	11112
11	033	12111	21121	11111	12111	11122	12211	11121	20000	00000	00000	00000	00011	11112	21111	21211	11111	21112	11112
12	199	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11112	11111	11111	21112	11121
13	005	12111	21111	21111	11112	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	11111	11211	21112	11112
14	009	21121	12111	11112	11111	11211	21121	11112	11121	11111	11211	11112	12111	11121	11112	11111	11111	21112	11121
15	003	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	11221	11111	11111	11121	11111	21112	11112
16	032	12111	21121	11112	12111	11122	12211	21111	20000	00000	00000	00000	00011	11121	11100	00000	00000	00001	11212
17	004	21121	12111	11112	11111	11211	21121	11112	22111	11121	21111	11211	12112	11111	11111	11211	11111	21112	11112
18	039	21121	12111	11112	11111	11121	12111	11121	20000	00000	00000	00000	00011	11112	11111	21111	11111	21112	11121
19	035	21121	12111	11112	11111	11121	12111	21111	20000	00000	00000	00000	00011	11112	11111	21111	11111	21111	11212
20	208	12111	22111	11112	11111	11112	11211	21111	20000	00000	00000	00000	00011	11121	11111	21111	11111	21112	11121
21	212	21121	12111	11112	11111	11211	21121	11112	11112	21111	11111	12111	12111	11121	11121	11111	11111	11122	11121
22	220	21121	12111	11112	11111	11211	21121	11112	12111	11111	11121	11111	22111	11111	12111	11112	11111	21111	12112
23	188	21121	12111	11112	11111	11211	21121	11112	12111	11111	11111	22121	12111	11121	11121	11111	11111	21112	11121
24	203	12111	21121	11112	11111	11122	12211	21111	20000	00000	00000	00000	00011	11121	11111	11211	11111	21112	11212
25	202	21121	12111	11112	11111	11211	21121	11112	11112	11111	11112	12211	12111	11121	11121	11111	11111	11122	11121
26	214	21121	12111	11112	11111	11211	21121	11112	11112	11111	11111	22211	12100	00000	00000	00000	00000	11121	11212
27	216	21121	12111	11112	11111	11211	21121	11112	11112	21111	11111	12111	12111	11121	11121	11111	11111	21112	11112

28	210	21121	12111	11112	11111	11211	21121	11112	11112	21111	11111	12111	12111	11121	11121	11111	11111	21112	11100
29	197	11212	12111	11112	11111	11121	12111	21111	20000	00000	00000	00000	00011	12111	11111	11111	12111	11212	11112
30	191	21121	12111	11112	11111	11211	21121	11112	11112	12111	11111	12211	12111	11112	11121	11111	11111	21112	11121
31	034	12111	21121	11112	11111	11112	11211	11121	20000	00000	00000	00000	00011	11121	11111	00111	00111	00002	11121
32	193	11212	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11112	11111	11111	21112	11121
33	223	21121	12111	11112	11111	11211	21121	11112	11112	11111	11111	22111	12111	11121	11121	11111	11111	21112	11112
34	062	11212	12111	11111	21111	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	21111	11111	21112	11112
35	020	21121	12111	11112	11111	11211	21121	11112	12111	11121	11111	11211	11211	11121	11112	11111	11111	21112	11121
36	017	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	12111	11121	11112	11111	11111	21112	11121
37	213	21121	12111	11112	11111	11211	21121	11112	11112	21111	11111	12111	12111	11121	11121	11111	11111	21112	11121
38	225	21121	12111	11112	11111	11211	21121	11112	11112	12111	11111	12111	12111	11211	11112	11111	11111	21112	11121
39	198	21121	12111	11112	11111	11000	00000	00002	12111	00000	00000	01121	11211	11122	11100	00000	00000	21111	12112
40	055	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	12111	11121	11111	21111	11111	21112	11112
41	189	11212	12111	11112	11111	11211	21121	11111	20000	00000	00000	00000	00011	11121	11112	11111	11111	21112	11121
42	201	21121	12111	11112	11111	11211	21121	11112	11121	11111	11211	11112	11211	11112	11112	11111	11111	11121	12121
43	195	21121	12111	11112	11111	11211	21121	11112	11112	11111	11112	12211	12111	11121	11121	11111	11111	11122	11121
44	200	11212	11112	11111	12111	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	21111	11111	21111	11212
45	222	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11121	11111	11111	21112	11121
46	019	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	12111	11111	21112	11111	11111	21112	11112
47	058	12111	21121	11112	11111	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	21111	11111	21112	11112
48	024	21121	12111	11112	11111	11211	21121	11112	12111	11211	11111	11111	22111	11121	11112	11111	11111	21111	21112
49	025	11212	12111	11111	21111	11121	12111	21121	20000	00000	00000	00000	00011	11112	11111	21111	11111	21112	11112
50	066	11212	12111	11112	11111	11122	12211	21111	20000	00000	00000	00000	00011	11121	11111	21211	11111	21112	11112
51	171	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11111	11111	11121	21112	11121
52	181	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00000	00000	00000	00000	00000	21112	11121
53	012	21121	12111	11112	11111	11211	21121	11112	12111	11121	11111	11211	12111	11121	11111	11121	11111	21112	11112
54	015	21121	12111	11112	11111	11211	21121	11112	12111	11121	11111	11211	12111	11122	11111	21111	11111	21112	11112
55	182	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11112	11111	11111	21112	11121
56	183	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11112	11111	11111	21112	11121
57	114	21121	12111	11112	11111	11211	21121	11112	12111	11121	12111	12211	12111	11121	21111	11121	11111	21112	11121

58	052	21121	12111	11112	11111	11211	21121	11112	11121	11111	11211	11211	11211	11112	11111	21111	11111	21112	11112
59	044	11212	12121	11111	12111	11122	12211	21111	20000	00000	00000	00000	00011	11121	11111	11111	12111	21112	21112
60	184	21121	12111	11112	11111	11112	11211	11122	10000	00000	00000	00000	00011	11122	11111	21111	11111	21112	11121
61	067	12111	21121	11112	12111	11122	12211	21111	20000	00000	00000	00000	00011	12111	11111	21111	11111	21212	11121
62	215	21121	12111	11112	11111	11211	21121	11112	11211	00000	00000	02111	12111	11121	11100	00000	00000	21112	11121
63	063	21121	12111	11112	11111	11121	12111	21111	22111	11111	21111	11121	11211	11121	11111	11211	11111	21111	21112
64	008	21121	12111	11112	11111	11211	21121	11112	12111	11121	11111	11211	12111	11121	11112	11111	11111	21112	11121
65	068	11212	11111	11121	11111	12121	12111	21111	20000	00000	00000	00000	00011	11211	11111	21211	11111	11212	11112
66	065	21121	12111	11112	11111	11211	21121	11112	12111	11121	11111	11211	11211	12112	11112	11111	11111	21112	11122
67	196	21121	12111	11112	11111	11211	21121	11112	11112	11111	11112	12111	12111	12111	11100	00000	00000	11122	11121
68	176	21121	12111	11112	11111	11000	00000	00002	10000	00000	00000	00000	00000	00000	00000	00000	00000	00000	00000
69	071	12111	21111	21112	11111	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	11211	11111	21112	11112
70	053	21121	12111	11112	11111	11211	21121	11112	11121	11111	11211	11121	12111	11112	11100	00000	00000	00001	11212
71	029	11212	12111	11112	11111	11122	12211	21111	20000	00000	00000	00000	00011	11121	21100	00000	00000	00001	11212
72	013	21121	12111	11112	11111	11121	12111	11122	12111	11112	11111	11211	12111	11121	11111	21111	11111	21112	11112
73	157	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	12111	11121	11112	11111	11111	21112	11112
74	178	12111	21121	11112	11111	11122	12211	21111	20000	00000	00000	00000	00011	11122	11111	21111	11111	21112	11112
75	113	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	11212	11111	11111	11121	11111	21112	11212
76	159	21121	12111	11112	11111	11112	11221	11112	10000	00000	00000	00000	00011	11122	11111	21111	11111	21112	11121
77	169	21121	12111	11112	11111	11211	21121	11112	12111	12111	11111	12121	12111	11121	11111	21111	11111	21112	11121
78	194	22111	21121	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11111	11111	11121	21112	11121
79	185	11212	12111	11111	12111	11122	12211	21111	20000	00000	00000	00000	00011	11121	11111	21111	11111	21112	11112
80	007	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11112	11111	11111	21112	11121
81	224	21121	12111	11112	11111	11211	21121	11112	11121	11112	11111	11211	12111	11121	11111	21111	11111	21111	21112
82	186	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11121	11111	11111	21112	11121
83	160	21121	12111	11212	11111	21122	11221	11112	10000	00000	00000	00000	00011	11121	11112	11111	11111	21112	11121
84	207	11212	12111	11111	12111	11121	12111	21111	20000	00000	00000	00000	00011	11112	11111	21111	11111	11212	11122
85	226	21121	12111	11112	11111	11211	21121	11112	12111	11211	11111	11121	12112	11112	11111	11112	11111	21111	12112
86	211	21121	12111	11112	11111	11211	21121	11112	11112	12111	11111	12112	12111	11121	11112	11111	11111	21112	11121
87	158	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11121	11100	00000	00000	21111	11212

88	119	21121	12111	11112	11111	11211	21121	11112	12111	11111	21111	11211	12111	11121	11111	11221	11111	21111	21112
89	167	21121	12111	11112	11111	11211	21121	11112	10000	21111	11111	12111	12111	11122	11121	11111	11111	21112	11121
90	048	11212	12111	11111	12111	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	21111	11111	21112	11112
91	142	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11112	11111	11111	21112	11121
92	078	11212	12111	11111	12111	11121	12111	11121	20000	00000	00000	00000	00011	11112	11111	11111	12111	21112	11112
93	115	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	12111	11121	11112	11111	11111	21112	11122
94	027	12111	21121	11111	12111	11121	12111	11121	20000	00000	00000	00000	00011	11121	11111	21111	11111	21111	11212
95	177	21121	12111	11112	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11112	11111	11111	21112	11121
96	143	21121	12111	11121	11111	11211	21121	11112	10000	00000	00000	00000	00011	11112	11112	11111	11111	21112	11121
97	018	21121	12111	11112	11111	11211	21121	11112	12111	11112	11111	11211	12111	11121	11112	11111	11111	21112	11121
98	127	21121	12111	11112	11111	11211	21121	11112	11121	00000	00000	02111	12111	11122	11100	00000	00000	21112	11121
99	028	11212	12111	11112	11111	11121	12111	21111	20000	00000	00000	00000	00011	11121	11111	00111	11111	21111	11212

		11111	11111	11111	11112	22222	22222	22222	22222	22222	22222	22222	22222	22222	22222	22222	22222	22222	22222
		88888	88889	99999	99990	00000	00001	11111	11112	22222	22223	33333	33334	44444	44445	55555	55556	66666	66667
		12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890	12345	67890
1	001	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	21111	11121	12111	21111
2	187	00121	11212	12110	00000	00121	11111	12111	11112	11111	10000	00000	00000	00211	21112	11211	11111	11112	11211
3	030	12112	11121	11211	12100	00121	11212	12111	21212	11121	21211	12120	00000	00211	21111	11111	11111	22212	11111
4	031	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21111	11111	11111	22212	11111
5	190	21112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	21111	12111	11111
6	026	12112	11121	11211	12100	00121	21222	12121	21212	12122	21212	12220	00000	00112	11211	11111	11111	22212	11111
7	002	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21112	11111	11112	11112	11111
8	006	21112	11122	11211	12212	11111	21111	11121	11111	12111	11112	11111	12111	11121	11211	11121	11111	11112	11111
9	038	21112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21112	12111	11112	11111	12111
10	014	12112	11121	11211	12100	00111	11211	11111	21111	11121	11111	12110	00000	00211	21111	11111	11111	22212	11111
11	033	12112	11121	11211	12100	00111	21211	11121	21111	12121	11112	12210	00000	00112	11211	11111	11111	22212	11111
12	199	21112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11112	11212	11111
13	005	12112	11121	11211	12100	00121	11221	12111	21112	11122	11211	12110	00000	00211	21112	11111	11112	11111	11111
14	009	21112	11122	11211	12211	21122	11111	12211	11112	21111	11221	11111	22111	11121	12112	12111	11111	11112	12111
15	003	12112	11122	11211	12211	21121	21211	12121	21112	12121	11212	12111	12111	11112	11212	11111	11121	11112	11111
16	032	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11111	22211	11111
17	004	21112	21121	11211	12111	21121	11211	12111	21112	11122	11211	12111	11111	12000	00012	11111	11121	11112	11111
18	039	12112	11122	11211	12200	00111	21111	21111	11111	12111	12111	11110	00000	00112	21112	11111	21111	11121	11111
19	035	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21111	11111	11112	11212	11111
20	208	12112	11121	11211	12100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
21	212	21121	11211	12111	21112	11122	11111	12211	11112	21111	11221	11111	12111	11121	12112	11211	11111	11112	11211
22	220	21122	21121	12221	12112	21111	21111	11121	11111	12111	11112	11111	12111	11112	11200	00000	00000	00011	11112
23	188	21112	11121	11211	12112	12112	11111	11211	11111	21111	11121	11112	12111	11121	12121	11111	11111	11121	11111
24	203	12112	11121	11211	12100	00121	11212	12111	22212	11121	21211	12220	00000	00211	21111	11111	11112	22212	11111
25	202	21121	11212	12111	21212	11112	11111	12211	11112	21111	11221	11111	12111	11121	12121	11111	11111	11112	11211
26	214	21121	21211	12121	21111	21122	11111	12211	11112	21111	11121	11111	12111	11121	12112	11211	11111	11112	11211
27	216	21121	11211	12111	21112	11112	11111	11211	11111	21111	11121	11111	12111	11121	12121	11111	11111	11121	11111

28	210	21121	11211	12111	21112	11211	11111	12111	11112	11111	11211	11112	11111	11121	12121	11111	11111	11111	11211
29	197	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21112	11111	11112	11111	11111
30	191	21121	11211	12111	21112	11211	11111	12111	11112	11111	11211	11112	11111	11211	21121	11111	11111	11112	11211
31	034	12112	11121	11211	12100	00121	11111	12111	11112	11111	11211	11110	00000	00211	21112	12111	11111	11112	12111
32	193	12121	11211	12111	21100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
33	223	21121	11211	12111	21112	11122	11111	12211	11112	21111	11221	11111	22111	11121	12112	11211	11111	11112	11211
34	062	12112	11121	11211	12100	00121	11212	12111	21212	11121	21211	12120	00000	00112	11211	11111	11112	22211	11111
35	020	21112	11121	11211	12112	11111	21111	11121	11111	12111	11112	11112	12111	12112	11211	21111	11121	12111	21111
36	017	21112	11121	11211	12112	11111	21111	11121	11111	12111	11112	11111	12111	12112	12112	11111	11121	11111	12121
37	213	21112	11121	11211	12112	11122	11111	12211	11112	21111	11021	11111	12111	11121	12112	12111	11111	11112	12111
38	225	21121	21211	12121	21112	21122	11111	12211	11112	21111	12121	11112	12111	12121	12112	11211	11111	11112	11211
39	198	12112	11121	11211	12111	22211	11111	21111	11121	11111	12111	11112	11111	11211	21121	11111	11111	11121	11111
40	055	21112	11121	11211	12111	21111	21111	11121	21111	12111	11112	12111	12111	11112	11211	11112	11111	11112	11111
41	189	21112	21121	11221	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11212	11111	11112	11111	11111
42	201	21121	21211	12121	21112	11211	11111	21111	11121	11111	12111	11112	11111	11211	21121	11111	11111	11121	11111
43	195	21121	21212	12121	21212	11121	11111	12111	11112	11111	11211	11112	11111	11211	21112	11211	11111	11112	11211
44	200	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11112	22211	11111
45	222	21121	11211	12111	21100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
46	019	12112	21122	11221	12211	21121	11211	12111	21112	11121	11211	12112	11111	11211	21111	21111	11121	12111	21111
47	058	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11111	22211	11111
48	024	21112	11121	11211	12111	21112	11111	11211	11112	11111	11121	11111	12111	11121	12112	12111	11111	11112	12111
49	025	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11212	11111	11112	11112	11111
50	066	12112	11121	11211	12100	00121	12211	12112	21112	11221	11211	22110	00000	00211	21112	11111	11112	11112	11111
51	171	21112	11121	11211	12100	00122	11111	12211	11112	21111	11221	11110	00000	00121	12111	11211	11111	11111	11211
52	181	21112	11121	11211	12100	00121	11111	12111	11112	11111	11211	11110	00000	00211	21111	11211	11111	11112	11211
53	012	21112	11121	11211	12112	11112	21111	11221	21111	22111	11122	12111	12111	11112	11211	11112	11111	11112	11111
54	015	12112	11121	11211	12111	21111	21111	11121	11111	12111	11112	11111	12111	11112	11211	21111	11121	12111	21111
55	182	21112	21121	11211	12100	00211	11111	11121	11121	11111	11112	11110	00000	00211	11221	11111	11111	11112	11111
56	183	21121	11211	12111	21100	00121	11111	12111	11112	11111	11211	11110	00000	00211	21112	11211	11111	11112	11211
57	114	21112	21121	11221	12112	21112	11111	12111	21111	21111	11211	12111	12111	11121	12100	00000	00000	00012	11111

58	052	21112	11121	11211	12111	21111	12111	12111	21111	11211	11211	12111	22111	11211	21112	11211	11111	11112	11211
59	044	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21112	11111	11112	11111	11111
60	184	21112	11121	11211	12100	00121	11111	12111	11112	11111	11211	11110	00000	00211	21112	11211	11111	11112	11211
61	067	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21111	11111	11111	22212	11111
62	215	21121	11211	12111	21111	22121	11111	12111	11112	11111	11211	11112	11111	11211	21112	11211	11111	11112	11211
63	063	12112	11122	11211	12211	22121	11211	12111	21112	11122	11211	12112	11111	11211	21111	11111	11112	22211	11111
64	008	21112	11121	11211	12112	21111	21111	11121	11111	12111	11112	11111	12111	11112	11211	11111	21111	11112	11111
65	068	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21112	11111	11112	11111	11111
66	065	12112	11122	11211	12211	21211	11111	11112	21121	11111	11111	22111	12111	11121	12121	11111	11111	11112	11121
67	196	21112	21122	11211	12212	21212	11111	12111	11112	11111	11211	11111	12111	11211	21121	11111	11111	11112	11211
68	176	00211	12111	21112	11100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
69	071	12112	11121	11211	12100	00111	11211	11111	22111	11121	11111	12110	00000	00211	21111	11111	11111	22212	11111
70	053	21112	21121	11221	12111	21111	21211	11121	21111	12121	11112	12111	22111	11112	11212	11111	11121	11111	11112
71	029	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00211	21112	11111	11112	11112	11111
72	013	21112	21122	11221	12211	21111	21111	11121	11111	12111	11112	11112	11111	11112	11212	11111	11121	11112	11121
73	157	21112	11121	11211	12111	21111	21111	11121	11111	12111	11112	11111	12111	12112	11212	11111	11121	11111	11121
74	178	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11112	22211	11111
75	113	21112	11122	11211	12212	21111	21111	11121	21211	12111	11112	12122	12111	12112	11212	11111	11121	11112	11111
76	159	21112	21122	11221	12200	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
77	169	21112	21121	11221	12112	11112	11111	11211	11111	21111	11121	11111	12111	11121	12121	11111	11111	11121	11111
78	194	21121	11211	12111	21100	00121	11111	12111	11112	11111	11211	11110	00000	00211	21112	11211	11111	11112	11211
79	185	12112	11121	11211	12100	00121	11211	12111	21112	11121	11211	12110	00000	00000	00012	11111	11112	11111	11111
80	007	21112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	21111	11121	12111	21111
81	224	21112	11121	11211	12112	21111	21111	12121	21111	12111	11212	12112	12111	11112	11211	11112	11111	12112	11111
82	186	21121	11211	12111	21100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
83	160	21121	11211	12111	21100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
84	207	12112	11121	11211	12100	00111	21112	11121	11212	12122	21112	11120	00000	00112	11212	11111	11112	11111	11111
85	226	21112	21121	11221	12112	11112	21111	11221	11111	22111	11122	11111	12111	11112	11212	11111	11121	11100	00000
86	211	21121	21211	12121	21112	21122	11111	12211	11112	21111	11121	11111	12111	11121	12111	11211	11111	11112	11211
87	158	21112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11212	11112	11111	11112	11111

88	119	21112	11121	11211	12112	21121	21211	11121	11112	12121	21112	11112	12111	11112	11212	11111	11121	11111	11112
89	167	21121	11211	12111	21112	21112	11111	11211	11111	21111	11121	11111	12111	11121	12121	11111	11111	11121	11111
90	048	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11111	22211	11111
91	142	21121	11211	12111	21100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
92	078	12112	11112	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11111	22211	11111
93	115	21112	21121	11221	12112	21121	21211	11121	11112	12121	11112	11112	12111	11112	11212	11111	11121	11111	11112
94	027	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11111	22211	11111
95	177	21121	11211	12111	21100	00121	11111	12111	11112	11111	11211	11110	00000	00121	12111	11211	11111	11111	11211
96	143	21112	11121	11211	12100	00211	11111	21111	11121	11111	12111	11110	00000	00211	21121	11111	11111	11121	11111
97	018	21112	11121	11211	12111	21111	21111	11121	11111	12111	11112	11112	12111	11112	11211	21111	11121	12111	21111
98	127	21112	11121	11211	12112	12121	11111	12111	11112	11111	12111	11121	11111	12112	11012	11211	11111	11112	11211
99	028	12112	11121	11211	12100	00111	21111	11121	11111	12111	11112	11110	00000	00112	11211	11111	11112	12211	11111

		22222	22222	22222	22222	22222	22223	33333	333
		77777	77778	88888	88889	99999	99990	00000	000
		12345	67890	12345	67890	12345	67890	12345	678
1	001	11121	11211	21111	11121	12111	21111	11121	112
2	187	11111	11112	11211	11111	11100	00000	00000	000
3	030	11112	11111	11111	11111	22212	11111	11112	111
4	031	11112	11111	11111	11111	22212	11111	11112	111
5	190	21111	11111	11111	21111	12111	11111	21111	111
6	026	11112	11111	11111	11111	22212	11111	11112	111
7	002	11112	11112	11111	11112	11112	11111	11112	111
8	006	11121	11111	11121	11111	11112	11111	11121	111
9	038	11111	22212	12111	11112	11111	12111	11111	222
10	014	11112	11111	11111	11111	22212	11111	11112	111
11	033	11112	11111	11111	11111	22212	11111	11112	111
12	199	11112	11111	11111	11112	12112	11111	11112	111
13	005	11111	22212	11111	11112	11111	11111	11111	222
14	009	11111	11112	12111	11111	11112	12111	11111	111
15	003	11211	11112	11111	11121	11112	11111	11211	111
16	032	11112	12211	11111	11111	22211	11111	11112	122
17	004	11121	11112	11111	11211	11112	11111	11121	111
18	039	11111	11112	11111	21111	11121	11111	11111	111
19	035	11112	11111	11111	11112	12112	11111	11112	111
20	208	11111	11121	11111	11111	11121	11111	11111	111
21	212	11111	11112	11211	11111	11112	11211	11111	111
22	220	11111	11112	11111	11112	11111	11112	11111	111
23	188	11111	11121	11111	11111	11121	11111	11111	111
24	203	11112	11111	11111	11112	22212	11111	11112	111
25	202	11111	11112	11211	11111	11112	11211	11111	111
26	214	11111	11112	11211	11111	11121	11111	11111	111
27	216	11111	11121	11111	11111	11121	11111	11111	111

28	210	11111	11111	11211	11111	11111	11211	11111	111
29	197	11111	22212	11111	11112	11111	11111	11111	222
30	191	11111	11112	11211	11111	11112	11211	11111	111
31	034	11111	11112	12111	11111	11112	12111	11111	111
32	193	11111	11121	11111	11111	11121	11111	11111	111
33	223	11111	11112	11211	11111	11112	11211	11111	111
34	062	11112	22211	11111	11112	22211	11111	11112	222
35	020	11121	11211	21111	11121	12111	21111	11121	112
36	017	11111	11112	11111	11121	11111	12121	11111	111
37	213	11111	11112	12111	11111	11112	12111	11111	111
38	225	11111	11112	11211	11111	11121	11111	11111	111
39	198	11111	11121	11111	11111	11121	11111	11111	111
40	055	11211	11111	11112	11111	11112	11111	11121	111
41	189	11111	22212	11111	11112	11111	11111	11111	222
42	201	11111	11121	11111	11111	11121	11111	11111	111
43	195	11111	11112	11211	11111	11121	11111	11111	111
44	200	11112	22211	11111	11112	22211	11111	11112	222
45	222	11111	11121	11111	11111	11121	11111	11111	111
46	019	11121	11211	21111	11121	12111	21111	11121	112
47	058	11112	12211	11111	11111	22211	11111	11112	122
48	024	11111	11112	12111	11111	11112	12111	11111	111
49	025	11112	11112	11111	11112	11112	11111	11112	111
50	066	11112	11112	11111	11112	11112	11111	11111	111
51	171	11111	11111	11211	11111	11121	11111	11111	111
52	181	11111	11111	11211	11111	11112	11211	11111	111
53	012	11211	11111	11112	11111	11112	11111	11121	111
54	015	11121	11211	21111	11121	12111	21111	11111	112
55	182	21111	11121	11111	11111	11112	11111	21111	111
56	183	11111	11112	11211	11111	11112	11211	11111	111
57	114	11211	11100	00000	00000	00012	11111	11211	111

58	052	11111	11112	11211	11111	11112	11211	11111	111
59	044	11111	22212	11111	11112	11111	11111	11111	222
60	184	11111	11112	11211	11111	11112	11211	11111	111
61	067	11112	11111	11111	11111	22212	11111	11112	111
62	215	11111	11112	11211	11111	11112	11211	11111	111
63	063	11112	22212	11111	11112	11111	11111	11112	222
64	008	11121	11111	11111	21111	11112	11111	11211	111
65	068	11111	22212	11111	11112	11111	11111	11111	222
66	065	11111	11121	11111	11111	11112	11121	11111	111
67	196	11111	11112	11211	11111	11112	11211	11111	111
68	176	11111	11121	11111	11111	11121	11111	11111	111
69	071	11112	11111	11111	11111	22212	11111	11112	111
70	053	11111	11112	11111	11121	11111	11112	11111	111
71	029	11112	11112	11111	11112	11112	11111	11112	111
72	013	11111	11112	11111	11121	11112	11121	11111	111
73	157	11111	11112	11111	11121	11111	11121	11111	111
74	178	11112	22211	11111	11112	22211	11111	11112	222
75	113	11211	11112	11111	11121	11112	11111	11121	111
76	159	11111	11121	11111	11111	11121	11111	11111	111
77	169	11111	11121	11111	11111	11121	11111	11111	111
78	194	11111	11112	11211	11111	11112	11211	11111	111
79	185	11111	22212	11111	11112	11111	11111	11111	222
80	007	11121	11211	21111	11121	12111	21111	11121	112
81	224	11211	11111	11112	11111	11212	11111	11121	111
82	186	11111	11121	11111	11111	11121	11111	11111	111
83	160	11111	11121	11111	11111	11121	11111	11111	111
84	207	11111	22212	11111	11112	11111	11111	11111	222
85	226	00000	00000	00000	00000	00000	00000	00000	000
86	211	11111	11111	11211	11111	11121	11111	11111	111
87	158	11211	11111	11112	11111	11112	11111	11121	111

```
 88   119 11111 11112 11111 11211 11111 11112 11111 111
 89   167 11111 11121 11111 11111 11121 11111 11111 111
 90   048 11111 22211 11111 11111 22211 11111 11111 222
 91   142 11111 11121 11111 11111 11121 11111 11111 111
 92   078 11111 22211 11111 11111 22211 11111 11111 222
 93   115 11111 11112 11111 11211 11111 11112 11111 111
 94   027 11112 12211 11111 11111 22211 11111 11112 122
 95   177 11111 11111 11211 11111 11111 11211 11111 111
 96   143 11111 11121 11111 11111 11121 11111 11111 111
 97   018 11121 11211 21111 11121 12111 21111 11121 112
 98   127 11111 11112 11211 11111 11112 11211 11111 111
 99   028 11111 22211 11111 11112 12211 11111 11111 222
EXECUTION TERMINATED


$SIGNOFF
```