INTRODUCTION

1. Purpose

In Databook II we continue the presentation of detailed descriptions of quipus. Prior to the first Databook, at least seventy-one quipus were published, including nine done by us (Ascher and Ascher 1972). These appear in sixteen separate sources, written in Spanish, English, German, French, or Italian. The first Databook increased the publicly available corpus to two hundred and sixty-two; Databook II increases it to two hundred and seventy-seven. Our overall interpretation appears in Code of the Quipu: A Study in Media, Mathematics and Culture. The detailed quipu descriptions are presented in these Databooks so that interested persons can search for their own interpretations or seek to formulate and answer new questions.

2. When and Where the Work was Done

The activity that resulted in the original Databook took place between 1970 and 1978. The compilation of this Databook II continued from 1978 until the present. In all, these involved travel to three continents. Table 1 shows the location and number of quipus we have personally examined and, of them, the number and identifying tags for those published in these Databooks. The identifying tags (e.g., AS10), appearing on the far right of Table 1, are explained in section 3 below.

From our search, we know the whereabouts of quipus that we have not yet been able to examine. Table 2 shows where these quipus are and how many remain to be studied and published.

3. Tag System and Published Quipus

Our first paper on quipus (1969) introduced a system to refer to published descriptions of specimens. The aim of the system is clarity and brevity. The system was used in the Databook and is continued here.

In the system, each published quipu is tagged with a letter (or letters) and a number. The letter is derived from the last name of the person or people who first published a specimen. The number follows and refers to the order of publication. For example, AS1 is the first quipu we published; AS2 is the second quipu published in the same paper, and so on through AS9, all nine appearing in the same publication. In the Databook and in the present publication, we continue the series; note that the first quipu in this volume is AS201. In the few cases where we described a quipu that previously appeared elsewhere in a form not entirely adequate for our purposes, the tag follows the AS series, but attaches a notation to indicate prior publication. For example, AS87/N3 is our quipu 87 and Nordenskiöld's quipu 3. We do not tag quipus that are merely mentioned in passing; nor do we tag those specimens that are described in such a way as to be inadequate for purposes of interpretation. In many cases, authors of quipu descriptions assigned numbers to the specimens they studied. In these cases, we do not change the numbers they used; indeed, they fit neatly with the tag system. Table 3 lists all the literature known to us where adequate quipu descriptions are published, along with the number of specimens and their tags. This is followed by a bibliography of published quipus.

TABLE 1

QUIPU LOCATIONS AND NUMBERS

Collection	Location	Number Examined	Number Described in Databooks	Tags
Europe:				
Musée d' L'Homme	Paris, France	15	11	AS74-AS84
Musée d'Ethnographie	Geneva, Switzerland	2	1	AS85
Museum Voor Landen Volkerkunde	Rotterdam, Netherlands	1	1	AS29
British Museum	London, England	1	1	AS14
Niedersächsisches Landesmuseum	Hannover, W. Germany	4	4	AS10-AS13
Museum Für Völkerkunde	Basel, Switzerland	4	1	AS86
Museum Für Völkerkunde	Munich, W. Germany	21	10	AS87/N3, AS88/N6, AS89, AS90/N2, AS91-AS94, AS95/N4, AS96
Museum Für Völkerkunde	Berlin, W. Germany	253	93	AS97-AS102, AS103/N12, AS104/N11, AS105/N16, AS106-AS139, AS140/N9, AS141-AS145, AS146/N10, AS147-AS166, AS167/N15, AS168-AS189
Museum Für Völkerkunde	Vienna, Austria	1	1	AS208
Náprstkova Muzeum	Prague, Czechoslovakia	1	1	AS211

TABLE 1 (continued)

Collection	Location	Number Examined	Number Described in Databooks	Tags
North America:				
American Museum of Natural History	New York, N.Y.	48	8	AS190-200
Brooklyn Museum	New York, N.Y.	3	1	AS35
Field Museum of Natural History	Chicago, Ill.	1	1	AS210
Leo J. Harris	St. Paul, Minn.	1	1	AS213
Hood Museum of Art, Dartmouth College	Hanover, N.H.	2	2	AS214-AS215
Joslyn Art Museum	Omaha, Neb.	1	1	AS212
Lowie Museum, University of California	Berkeley, Calif.	5	5	AS201-AS205
Museum of Culture History, University of California	Los Angeles, Calif.	1	1	AS206
Museum of Science	Buffalo, N.Y.	1	1	AS207
National Museum -- Smithsonian	Washington, D.C.	1	1	AS34
Peabody Museum, Harvard University	Cambridge, Mass.	4	4	AS30-AS33
Royal Ontario Museum	Toronto, Ontario	1	1	AS209
The University Museum, University of Pennsylvania	Philadelphia, Penn.	14	14	AS15-AS28
South America:				
Museo "Jijon y Caamaño," Universidad Catolica del Ecuador	Quito, Ecuador	2	2	AS36-AS37
Museo Nacional de Anthropología y Arqueología	Lima, Peru	35	10	AS38-AS47

TABLE 1 (continued)

Collection	Location	Number Examined	Number Described in Databooks	Tags
Ana Maria Soldi	Lima, Peru	1	1	AS50
Museo Amano	Lima, Peru	4	2	AS48-AS49
Oscar Núnez del Prado	Cuzco, Peru	9	9	AS59-AS60, AS61/MA36, AS62-AS66, AS67/MA29
Museo de Ica	Ica, Peru	22	8	AS51-AS58
Rancho San Juan	Ica Valley, Peru	2	2	AS72-AS73
Percy Dauelsberg	Arica, Chile	4	3	AS69-AS71

TABLE 2

UNEXAMINED QUIPUS

Collection	Location	Number
Europe:		
Museum Für Völkerkunde	Leipzig, E. Germany	10
Museum Für Völkerkunde	Hamburg, W. Germany	2
Deutsche Museum	Munich, W. Germany	1
Linden Museum	Stuttgart, W. Germany	1
Museum Für Völkerkunde	Freiburg-Im-Breisgau, W. Germany	1
Ethnografiska Museum	Göteborgs, Sweden	15
Ethnografiska Museum	Stockholm, Sweden	1
National Museum	Copenhagen, Denmark	1
Rijksmuseum voor Volkenkunde	Leiden, Netherlands	1
Tropen Museum	Amsterdam, Netherlands	1
Amerika Museum	Cuijk, Netherlands	1
North America:		
Royal Ontario Museum	Toronto, Ontario	1
Textile Museum	Washington, D.C.	2
Newark Museum	Newark, N.J.	1
Charles Llewellyn	Durham, North Carolina	1
Milwaukee Public Museum	Milwaukee, Wisconsin	3
Peabody Museum, Yale University	New Haven, Connecticut	1
Haffenreffer Museum, Brown University	Bristol, Rhode Island	1
Furman University	Greeenville, South Carolina	1

TABLE 2 (continued)

South America:		
Universidad Nacional de La Plata	La Plata, Argentina	2
Museo de Puruchuco	Lima, Peru	20

TABLE 3

PUBLISHED QUIPU DESCRIPTIONS

Author and Date	Number	Tag
Altieri, 1939	1	AL12
Altieri, 1941	11	AL1-11
Ascher and Ascher, 1972	9	AS1-AS9
Ascher and Ascher, 1978	191	AS10-AS200
Ascher and Ascher, 1988	15	AS201-AS215
Barthel, 1951	1	B1
Cipriani, 1928	2	C1,2
Locke, 1912	1	L1
Locke, 1923	1	L2
Locke, 1927	1	L46
Locke, 1928	15	L3-10, 27-29, 47-50
Muntó, 1966	1	M1
Mackey, 1970	7	MA2,3,9,14, 29,36,44
Nordenskiöld, 1925a	7	N1-4,6-8
Nordenskiöld, 1925b	7	N9-12,14-16
Nordenskiöld, 1931	1	N17
Radicati, 1949-1950	2	R1,2
Radicati, 1965	4	R3-6

The complete citation for all tagged quipus is given below:

Altieri, Radamés A.

1939 Sobre un Kipu Peruano. Universidad Nacional de Tucumán, Publication No. 248, Pp. 7-12.

1941 Sobre 11 Antiquos Kipu Peruanos. Revista del Instituto de Anthropologia, Vol. 2, Tucamán, Pp. 177-211.

Ascher, Marcia, and Robert Ascher

1972 Numbers and Relations from Ancient Andean Quipus. Archive for History of Exact Sciences, Vol. 8, Pp. 288-320.

1978 Code of the Quipu: Databook. University of Michigan Press (available on microfiche from Cornell University Library Archives, Ithaca, N.Y.).

1988 Code of the Quipu: Databook II.

Barthel, Thomas S.

1951 Bemerkungen zu einem Astronomischen Quipu aus Südperu. Ethnos, Vol. 16, Pp. 153-170.

Cipriani, Lidio

1928 Su due "quipu" del Museo Nazionale de Anthropoligia e Etnologia di Firenze. Congresso Internacional de Americanistas, 22, Rome. Pp. 471-480.

Locke, L. Leland

1912 The Ancient Quipu, A Peruvian Knot Record. American Anthropologist, Vol. 14, Pp. 325-332.

1923 The Ancient Quipu or Peruvian Knot Record. The American Museum of Natural History, New York.

1927 A Peruvian Quipu. Contributions from the Museum of the American Indian, Heye Foundation, Vol. 7, Pp. 3-6.

1928 Supplementary Notes on the Quipus of the American Museum of Natural History. Anthropological Papers, The American Museum of Natural History, Vol. 30, Pp. 39-73.

Mackey, C.J.

1970 Knot Records in Ancient and Modern Peru. Ph.D. Dissertation. University Microfilms, Ann Arbor, Michigan.

Muntó, Antonia Molina

1966 El Quipu de Madrid. Actas y Memorias, Congreso Internacional de Americanistas, 36, Sevilla, Pp. 521-527.

Nordenskiöld, Erland

1925a The Secret of the Peruvian Quipus. Comparative Ethnographical Studies, 6, Pt. 1, Pp. 1-37.

1925b Calculations with Years and Months in the Peruvian Quipus. Comparative Ethnographical Studies, 6, Pt. 2, Pp. 1-35.

1931 Le Quipu Péruvien du Musée du Trocadéro. Bulletin du Musée d'Ethnographie du Trocadéro, No. 1, Paris, Pp. 16-20.

Radicati di Primeglio, Carlos

1949-50 Introduccion al Estudio de los Quipus. Documenta: Revista de la Sociedad Peruana de Historia, Vol. 2, Pp. 244-339.

1965 La "Seriación" como posible Clave para Descifrar los Quipus Extanumerales. Documenta: Revista de La Sociedad Peruana de Historia, Vol. 4, Pp. 112-215.

4. Definitions and Symbols

This section is presented in three parts: cord usages, knots and knot clusters, and color.

Cord Usages

A quipu is made up of cords that vary in length and color. In preparing a single quipu cord, one or more strands were doubled, then twisted together, and finished with an end knot. Thus, the two ends differ; one has a twisted end and the other a knotted end which usually tapers off.

Fig. 1

We identify five basic cord usages. There is a horizontal main cord; cords suspended from the main cord are referred to as pendant cords; cords attached to the main cord but which fall in the direction opposite to pendant cords are called top cords; and cords attached to pendant or top cords are called subsidiary cords. Markers also are attached to the main cord.

Main Cord. Usually the main cord has both ends free and the ends are finished differently. All our measurements begin at the twisted end and proceed to the knotted end. The twisted end is identified by $, and the knotted end by ¢. (See Fig. 2).

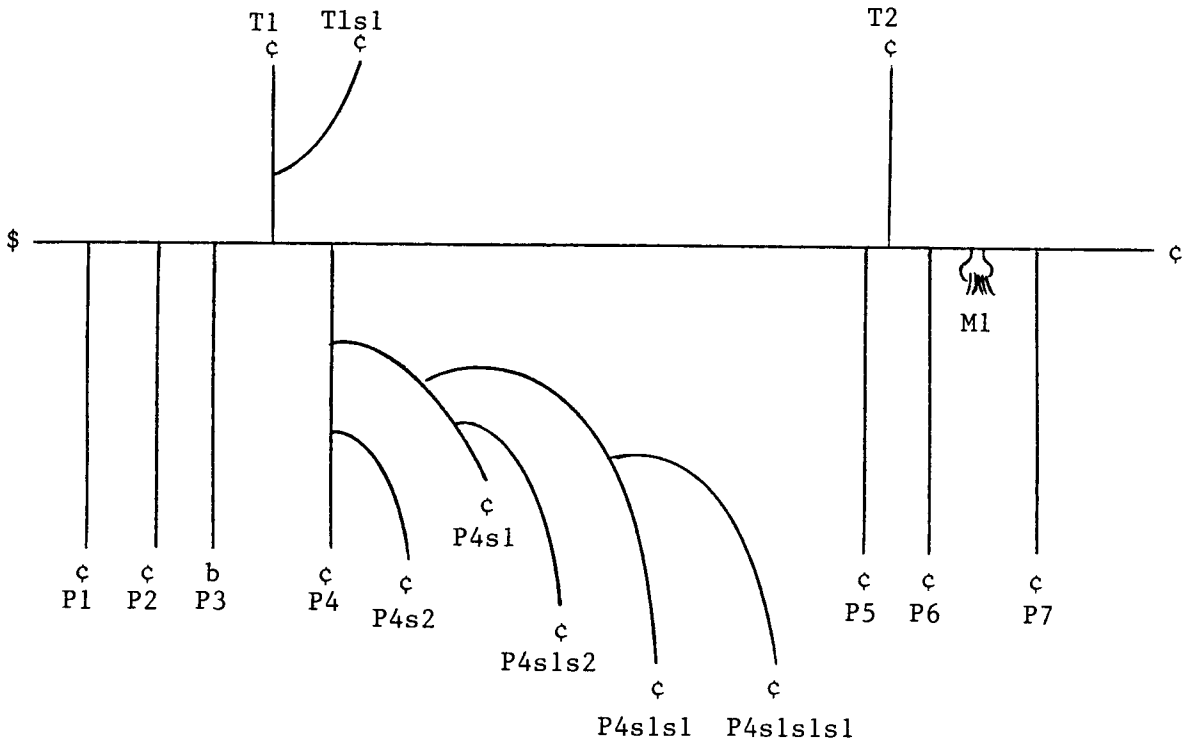

Fig. 2

On some quipus, the twisted end of the main cord is also knotted. This is identified by ¢$, but it still remains the starting point. On some, the end of the main cord is formed

into a loop. Where this or any other peculiar main cord construction occurs, it is specially noted and diagrammed in the Observations section following each quipu description.

Pendant Cord. A pendant cord is usually attached to the main cord by having been passed over the main cord, and then passed through its own twisted end. After being positioned, it was pulled taut so that it is fixed in place. Unless otherwise noted, this is the means of pendant attachment. The free end of the pendant is marked ¢ when the finishing knot is present.

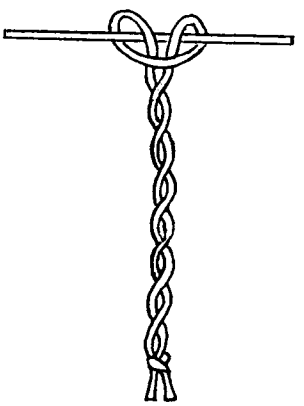

Fig. 3

If the pendant has been broken, it is marked b to indicate that it is not complete. When neither ¢ nor b appears, the pendant end is tapered but it has no end knot, and no obvious break in the cord. In our descriptions, the pendant cords are numbered consecutively along the main cord (see Fig. 2). All measurements on a pendant cord begin at its attachment to the main cord and proceed to its free end.

On some quipus, a cord is linked to the end of a main cord through its twisted end. When this or other special forms of attachment occur, they are described individually.

Top Cord. There are two common forms of top cord attachment. The first is exactly the same as the pendant attachment described above, but due to the way the cord was fixed in place, it is directed upward as compared to a pendant which is directed downward (see Fig. 4A). In the second form, the top cord is attached through the pendant cords rather than directly to the main cord. Here the free end of the top cord was passed through the twisted ends of several pendant cords and then through its own twisted end before the cords were pulled taut (see Fig. 4B). Both arrangements are referred to as top cords (T) and numbered consecutively along the main cord (see Fig. 2); in the latter arrangement, the pendants it unites are also indicated. All measurements on a top cord begin at its attached end and proceed to its free end.

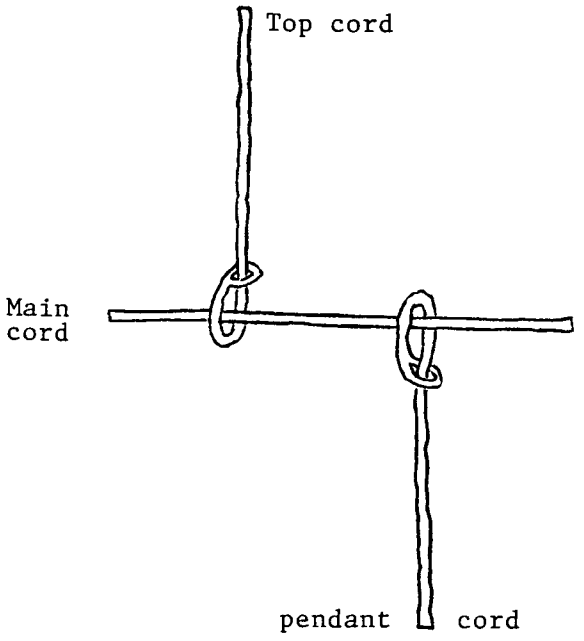

Fig. 4A

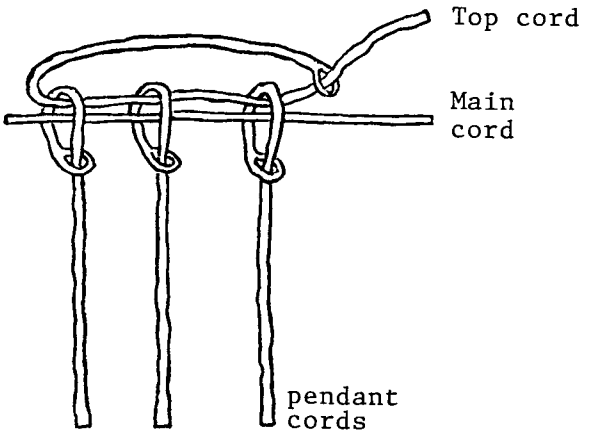

Fig. 4B

Subsidiary Cord. Subsidiary cords are cords attached to pendant cords, top cords, or other subsidiary cords. They are usually attached in the same manner as described above for pendants attached to the main cord (see Fig. 5A). Another less usual form is where the subsidiary is attached through the host cord (see Fig. 5B). The first method is considered usual and carries no special indication; the latter is distinguished by the symbol +.

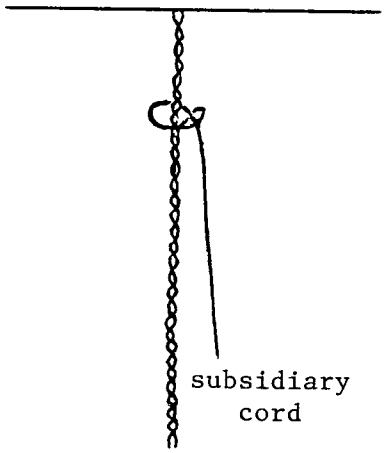

Fig. 5A

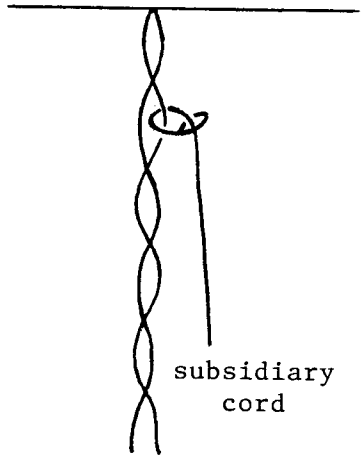

Fig. 5B

Subsidiaries are numbered consecutively along a pendant or top cord (see P4s1 and P4s2, in Fig. 2). Subsidiaries attached to another subsidiary are numbered consecutively along that host (see P4s1s1 and P4s1s2 in Fig. 2), and so on (see P4s1s1s1 in Fig. 2). All measurements on a subsidiary begin at its attached end and proceed to its free end.

Markers. Markers are attachments to the main cord that are noticeably different from pendants or top cords. They are distinctive either by length, color, or elaborate construction.

They are identified by M, numbered consecutively along the main cord, and described in detail with the quipu on which they appear. (See Fig. 2).

Knots and Knot Clusters

Most of the cords of the quipus have knots spaced along them. We identify three basic knot types on the cords: single knots; long knots; and figure eight knots. When other knots occur they are specially described.

Single Knots. A single knot is an overhand knot formed as in Fig. 6A. Several single knots are considered a cluster when they are close together and, if other single knots are on the cord, they are sufficiently far away to be distinct from them. The cluster of single knots is identified by s preceded by the number of knots (see Fig. 6B).

Fig. 6A

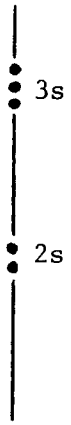

Fig. 6B

Long Knots. Long knots vary in the number of turns used in their construction. Fig. 7 shows a long knot with four turns. When pulled taut, the turns can still be counted and so each is symbolized by an L preceded by the number of turns. A long knot of one turn (1L) is not possible.

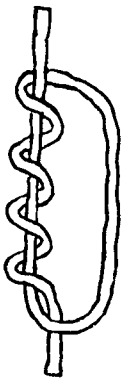

Fig. 7

Figure Eight Knots. A figure eight knot is constructed as shown in Fig. 8A and is designated by E. In some few cases, a similar knot with an extra turn appears (see Fig. 8B). This is

Fig. 8A

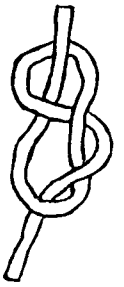

Fig. 8B

Color

In quipu descriptions other than our own (and in our earliest work), colors were described by statements such as "light brown" or "bluish green." Although these descriptors may have been consistent on a given quipu, they are inadequate when discussing quipus that are now located in different places or for conveying colors to others. Since color is an important physical property of the cords, we have standardized the method of description.

We note, however, that the color that we now see is only an approximation of the original color. There is no way of determining the original color although, theoretically, there are ways of determining the original colorants. Two similar but different techniques have been applied to early textiles. Both methods depend on the availability of assumed or hypothesized colorants, are expensive, time-consuming, and most important, destructive. The original colorants cannot, therefore, be obtained in general, and so the color that we now see is described.

Single Color. The Inter-Society Color Council-National Bureau of Standards method of designating colors is used (ISCC-NBS Color-Name Charts Illustrated with Centroid Colors--Supplement to NBS Circular 533). As discussed in Kelly (1965), this is the third level of accuracy of a six-level system. It has two hundred and sixty-seven color-name blocks. Each has a specific number as well as a descriptive name. We use, instead, single or double letter mneumonics for simplicity and to avoid confusion with the other numbers associated with each cord. A complete list, relating our mneumonics to the ISCC-NBS numbers,

is given in Table 5; Table 6 contains the numbers and their complete descriptive names. Single colored cords, therefore, are designated in the Databooks by one or two letters.

Multicolor. Many cords are multicolored. They were made by combining strands or cords of two or more colors. Three types of multicolor combinations are clearly distinguishable from each other because of their distinctly different appearances. In order to have unique descriptors that retain the standard designation of the individual colors involved and yet record these differences in appearance, three symbols -, :, / are used as follows: (1) Two colors, say B and G, twisted together resulting in a peppermint stick or barber pole appearance, are designated B-G. (2) When two colors are interspersed so that they give a mottled effect, they are designated B:G. (The color with the lower valued ISCC-NBS number is always listed first in these multicolor designations.) (3) In some cases, colors have been joined such that one begins where the other ends; this is designated by B/G followed by the position on the cord where each color ends.

The same manner of combination is extendable to several colors. For example, B:G:LC means that B and G and LC are interspersed to give a mottled effect; B/LC/G (4.5/8.5/22.0) means that the first 4.5 cm of the cord is color B, the next 4.0 cm (ending at 8.5 cm) is color LC, and the last part of the cord (ending at 22.0 cm) is color G; and (B-G)/LC (8.5/22.0) means that the first 8.5 cm of the cord is B and G twisted to give a "barber-pole" appearance and that the rest of the cord is color LC.

TABLE 4

SYMBOLS

$	Twisted end of cord - see discussion under Main Cord.
¢	Knotted end of cord - see discussion under Main Cord.
b	Broken end of cord - see discussion under Pendant Cord.
+	Subsidiary attachment - see discussion under Subsidiary Cord.
P2	Pendant cord - see discussion under Pendant Cord.
T2	Top cord - see discussion under Top Cord.
P2s3	Subsidiary cord - see discussion under Subsidiary Cord.
T2s3	Subsidiary cord - see discussion under Subsidiary Cord.
M2	Marker - see discussion under Markers.
3s	Three single knots - see discussion under Single Knots.
4L	Long knot of 4 - see discussion under Long Knots.
1E	Figure-eight knot - see discussion under Figure-eight Knot.
1EE	Figure-eight knot - see discussion under Figure-eight Knot.
X	Color mneumonic - see discussion under Single Color.
XY	Color mneumonic - see discussion under Single Color.
X:Y	Color mneumonic - see discussion under Multicolor.
X-Y	Color mneumonic - see discussion under Multicolor.
X/Y	Color mneumonic - see discussion under Multicolor.

TABLE 5

CORRESPONDENCE OF SINGLE COLOR MNEUMONICS TO ISCC-NBS NUMBERS--ALPHABETICAL LISTING

A	AB	57	H	HB	61	R	R	38
B	B	77	K	KB	59		RB	43
	BB	78		KG	156		RD	46
	BD	81	L	LA	191		RG	155
	BG	186		LB	75		RL	42
	BL	185		LC	187		RM	15
	BS	55		LD	192		RO	39
	BY	79		LG	154	S	SB	54
C	CB	62		LK	267		SR	12
D	DB	56	M	MB	58		SY	84
	DG	126		MG	265	T	TG	165
	DO	108	N	NB	74	V	VB	175
E	EB	80	O	OB	95		VG	147
F	FB	65		OD	128		VR	14
	FR	40		OG	109	W	W	Neutral-uncolored
G	G	127		OK	114			
	GA	64		OL	111	Y	YB	76
	GB	45		OR	51		YG	151
	GG	150		OY	72		YY	89
	GL	173	P	PB	179			
	GO	110		PG	149			
	GR	266		PR	41			
	GY	113						

TABLE 6

CORRESPONDENCE OF SINGLE COLOR MNEUMONICS TO

ISCC-NBS NUMBERS AND DESCRIPTIVE NAMES--NUMERICAL LISTING

12	(SR)	strong Red
14	(VR)	vivid deep Red
15	(RM)	moderate Red
38	(R)	dark reddish Orange
39	(RO)	gray reddish Orange
40	(FR)	strong reddish Brown
41	(PR)	deep reddish Brown
42	(RL)	light reddish Brown
43	(RB)	moderate reddish Brown
45	(GB)	light grayish reddish Brown
46	(RD)	grayish reddish Brown
51	(OR)	deep Orange
54	(SB)	brownish Orange
55	(BS)	strong Brown
56	(DB)	deep Brown
57	(AB)	light Brown
58	(MB)	moderate Brown
59	(KB)	dark Brown
61	(HB)	grayish Brown
62	(CB)	dark grayish Brown
64	(GA)	brownish Gray
65	(FB)	brownish Black
72	(OY)	dark Orange Yellow

TABLE 6 (continued)

74	(NB)	strong yellowish Brown
75	(LB)	deep yellowish Brown
76	(YB)	light yellowish Brown
77	(B)	moderate yellowish Brown
78	(BB)	dark yellowish Brown
79	(BY)	light grayish yellowish Brown
80	(EB)	grayish yellowish Brown
81	(BD)	dark grayish yellowish Brown
84	(SY)	strong Yellow
89	(YY)	pale Yellow
95	(OB)	moderate Olive Brown
108	(DO)	dark Olive
109	(OG)	light grayish Olive
110	(GO)	grayish Olive
111	(OL)	dark grayish Olive
113	(GY)	Olive Gray
114	(OK)	Olive Black
126	(DG)	dark Olive Green
127	(G)	grayish Olive Green
128	(OD)	dark grayish Olive Green
147	(VG)	vivid dark Green
149	(PG)	pale Green
150	(GG)	grayish Green

TABLE 6 (continued)

151	(YG)	dark grayish Green
154	(LG)	light greenish Gray
155	(RG)	greenish Gray
156	(KG)	dark greenish Gray
165	(TG)	dark bluish Green
173	(GL)	moderate greenish Blue
175	(VB)	vivid dark greenish Blue
179	(PB)	deep Blue
185	(BL)	pale Blue
186	(BG)	grayish Blue
187	(LC)	dark grayish Blue
191	(LA)	bluish Gray
192	(LD)	dark bluish Gray
265	(MG)	medium Gray
266	(GR)	dark Green
267	(LK)	Black

5. Format of Descriptions

The description of each quipu is in four parts.

First, the heading identifies the quipu. This has the tag, the present location (museum or private collection), and the identification number that the owner uses within the collection.

The next part is a description of the main cord. Starting at one end, the finishing of the end is described (e.g., twisted, knotted, broken, etc.). Then there is a measurement of the distance along the main cord until the first attached cord is encountered. A cord or cord group is noted and named, then any space until the next cord or cord group is given. Thus, each line in the main cord description begins with a position and describes what occurs until the next position is noted. For example, the quipu in Fig. 9 would have the following main cord description:

$ 3.5 cm: group of 4 pendant cords (1-4), then space of 2.0 cm.
6.5 cm: group of 3 pendant cords united by top cord (5-7,T1), then space of 3.0 cm
10.5 cm: end ¢

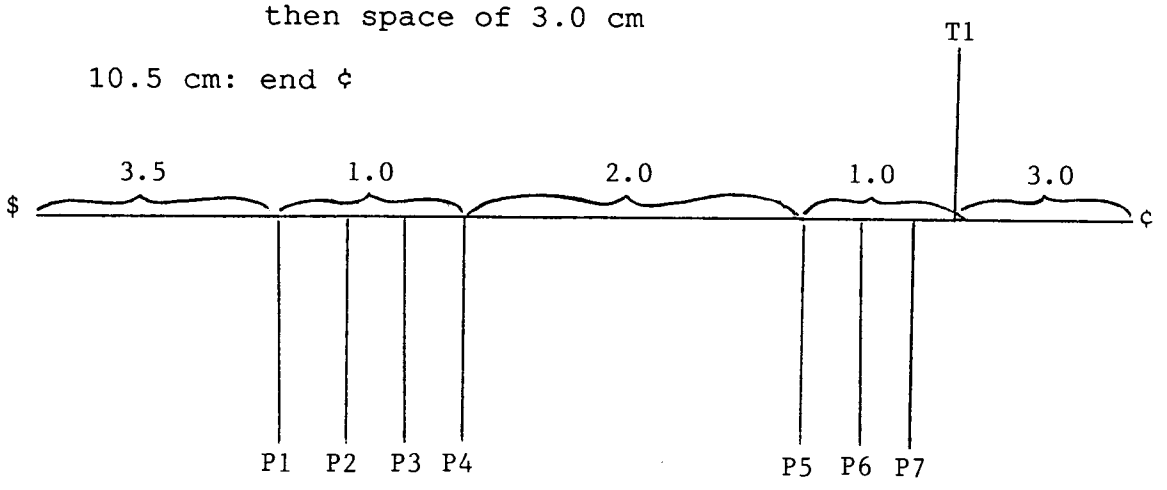

Fig. 9

All measurements are to 0.5 cm and so no spaces less than that are recorded. Pendants are identified as a group when they are united by a top cord or when they are sufficiently close together and separated from other cords to be a visual unit. Such a case is seen in the illustration (Fig. 9) where the space of 1.0 cm for four pendants is followed by a space with no cords for 2.0 cm. When visualizing cords and spaces between them, it is important to keep in mind that cords have width. The accuracy of 0.5 cm thus suffices and, in the illustration above, corroborates that the four pendants are a group as the space between them is unmeasurable.

The third part of the description focuses on the individual cords in the order that they are encountered along the main cord. Thus, the first column headed Cord designates the cord (i.e., P3, T1, M2). As you read across the row, this cord is described: the knots (number, type, position on cord); overall length and type of end finish; color; value; subsidiaries (number and position on cord). The subsidiaries are described individually on the lines following the host cord. For example, if pendant P4 has three subsidiaries as shown in Fig. 10, the entries are:

Cord	. . .	Subsidiaries (no., position)
P4		2:2.5-3.0;1:5.5
P4s1		1:3.5
P4s1s1		
P4s2		
P4s3		

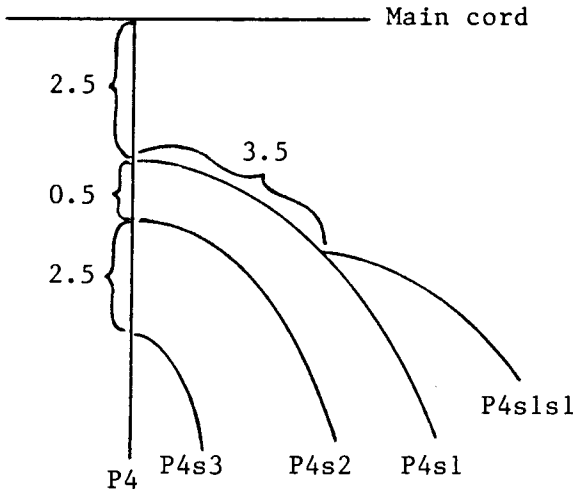

Fig. 10

The column headed Value carries our numerical interpretation of the knots. The interpretation assumes that the knot clusters represent digits in a base ten positional system. A complete discussion of this is found in earlier works (Ascher and Ascher 1975, 1981). In the interpretation of knots as numbers, the relative position of clusters along the cord is of paramount importance. The positions are recorded with the knot types so that others can make their own interpretations. However, assigned values have also been included as it is frequently easier to identify relative position along a cord, and from cord to cord, when actually seeing the knot clusters in context of the entire quipu. Some symbols are used that are special to this column and related to the problems of interpretation. Sometimes, when a cord is broken, no value can be assigned. In this case, the value is designated by the symbol ?. If some part of the cord remains, partial interpretation is often possible. If, for example, the cord is

broken between the first and second digits of a three digit number and the first digit is 5, the value assigned would be 5?? meaning that the value is at least 500 and at most 599. If the same cord were broken higher so that 4 knots in the first cluster remained, but it is not clear if originally there were additional knots, the value assigned would be (4+)?? meaning that the value is at least 400 and at most 999. Finally, where the assignment of a value is dubious due to inconsistent knot placement or some other peculiarity, the value is followed by (?). In some cases, the type of knot associated with the units position appears both in the units position and then again just after that. This is designated by, for example, 4 & 2, in order to relate both knot clusters to the same position without merging the values. Hence,

Entire Value Unknown	?
Specific Digits Unknown	X??
Digit Possibly Incomplete	(X+)
Value Assigned is Dubious	XX(?)
Double Units Position	XX&X

The last section of each quipu description contains Observations about the quipu. These are of several types: (i) Any information that the owner gave on provenance, associated artifacts, and any other helpful references about the quipu are noted. (ii) Any particular construction features of the quipu that are not amenable to inclusion in the standard format are noted and described in detail. (iii.) If two or more quipus

were associated with each other--for example, if they were found in a basket or a bag--that is noted and observations about the quipus as a collection are included with the first specimen encountered in the listings. (iv) Finally, there are observations about regularities and relations found on the quipu. They include, for example, color patterning, subsidiary placement, and relative order of magnitude of cord values. They also include numerical relationships between values such as some being sums or products of others. These observations are of the type discussed in (Ascher and Ascher 1972, 1975). The observations are not exhaustive, but are included as a step toward the accumulation of ideas that make up the logical-numerical system expressed on quipus. Our interpretation of the logical-numerical system can be found in our general treatment of quipus Code of the Quipu: A Study in Media, Mathematics and Culture.

6. Bibliograpy

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