

QUIPU AS156

Museum identification: No. VA42535 (Museum für Völkerkunde, Berlin)

Main cord: color B

- § 5.0 cm: group of 4 pendant cords (1-4), then space of 0.5 cm.
- 6.5 cm: group of 2 pendant cords (5-6), then space of 0.5 cm.
- 7.5 cm: group of 2 pendant cords (7-8), then space of 1.0 cm.
- 9.0 cm: group of 2 pendant cords (9-10), then space of 0.5 cm.
- 10.0 cm: group of 2 pendant cords (11-12), then space of 0.5 cm.
- 11.0 cm: group of 2 pendant cords (13-14), then space of 0.5 cm.
- 12.0 cm: group of 2 pendant cords (15-16), then space of 0.5 cm.
- 13.0 cm: group of 2 pendant cords (17-18), then space of 0.5 cm.
- 14.0 cm: group of 2 pendant cords (19-20), then space of 0.5 cm.
- 15.0 cm: group of 2 pendant cords (21-22), then space of 0.5 cm.
- 16.0 cm: group of 2 pendant cords (23-24), then space of 0.5 cm.
- 17.0 cm: group of 2 pendant cords (25-26), then space of 0.5 cm.
- 18.0 cm: group of 2 pendant cords (27-28), then space of 0.5 cm.
- 19.0 cm: group of 2 pendant cords (29-30), then space of 0.5 cm.
- 20.0 cm: group of 2 pendant cords (31-32), then space of 0.5 cm.
- 21.0 cm: group of 2 pendant cords (33-34), then space of 0.5 cm.
- 22.0 cm: group of 2 pendant cords (35-36), then space of 1.5 cm. including
marker (M1)
- 24.0 cm: group of 2 pendant cords (37-38), then space of 0.5 cm.
- 25.0 cm: group of 2 pendant cords (39-40), then space of 0.5 cm.
- 26.0 cm: group of 2 pendant cords (41-42), then space of 0.5 cm.
- 27.0 cm: group of 2 pendant cords (43-44), then space of 0.5 cm.
- 28.0 cm: group of 2 pendant cords (45-46), then space of 0.5 cm.
- 29.0 cm: group of 2 pendant cords (47-48), then space of 0.5 cm.
- 30.0 cm: group of 2 pendant cords (49-50), then space of 0.5 cm.
- 31.0 cm: group of 2 pendant cords (51-52), then space of 0.5 cm.

32.0 cm: group of 2 pendant cords (53-54), then space of 0.5 cm.
 33.0 cm: group of 2 pendant cords (55-56), then space of 0.5 cm.
 34.0 cm: group of 2 pendant cords (57-58), then space of 0.5 cm.
 35.0 cm: group of 2 pendant cords (59-60), then space of 0.5 cm.
 36.0 cm: group of 2 pendant cords (61-62), then space of 0.5 cm.
 37.0 cm: group of 2 pendant cords (63-64), then space of 43.0 cm.
 80.5 cm: end ç

Cord	Knots (no., type, position)	Length	Color	Value	Subsidiaries (no., position)
1	1s(9.0);6s(15.0)	55.5ç	B:BB:GG	160	
2	3s(9.0);5s(14.5)	58.5ç	W	350	
3	1s(9.0);6s(14.5)	63.0ç	B	160	
4	3s(9.0);3s(14.0)	65.5ç	B	330	
5	1s(10.0);4s(16.5)	73.0ç	B:BB:GG	140	
6	3s(9.5);6s(15.5)	53.0ç	W	360	
7	1s(10.5);4s(16.5)	68.5ç	B	140	
8	3s(10.5);6s(17.0)	61.5ç	B	360	
9	2s(15.0)	45.0ç	B:BB:GG	20	
10	5s(17.0)	43.5ç	W	50	
11	2s(15.5)	45.5ç	B	20	
12	5s(16.0);	41.5ç	B	50	
13*	2s(16.0)	45.0	B:BB:GG	20	
14	4s(17.0)	37.5ç	W	40	
15	2s(17.0)	44.0ç	B	20	
16	4s(17.5)	42.0ç	B	40	
17	2s(17.0)	42.5ç	B:BB:GG	20	

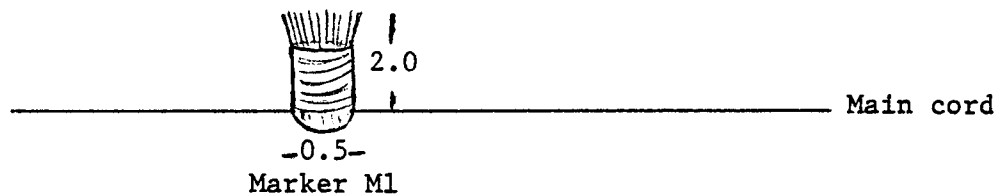
Cord	Knots (no., type, position)	Length	Color	Value	Subsidiaries (no., position)
18	—	5.5b	W	?	
19	2s(17.5)	47.5¢	B	20	
20	5s(19.0)	40.5¢	B	50	
21	4s(18.0)	41.5¢	B:BB:GG	40	
22	6s(18.5)	37.0¢	W	60	
23	4s(17.0)	41.0¢	B	40	
24	6s(18.0)	42.0¢	B	60	
25	2s(16.5)	35.5¢	B:BB:GG	20	
26	5s(18.0)	42.5¢	W	50	
27	2s(17.0)	44.0¢	B	20	
28	5s(17.0)	40.5¢	B	50	
29	2s(16.5)	43.5¢	B:BB:GG	20	
30	5s(17.5)	41.5¢	W	50	
31	2s(16.5)	43.5¢	B	20	
32	4s(17.0)	38.0¢	B	40	
33	2s(17.0)	43.5¢	B:BB:GG	20	
34*	5s(17.0)	38.5¢	W	50	
35	2s(17.5)	45.0¢	B	20	
36	4s(17.0)	42.5¢	B	40	
M1			GG		
37	2s(15.0)	45.0¢	B:BB:GG	20	
38	5s(16.5);2L(23.0)	34.5¢	W	52	
39	2s(15.5)	47.5¢	B	20	

Cord	Knots (no., type, position)	Length	Color	Value	Subsidiaries (no., position)
40	5s(17.5);1E(23.5)	36.0¢	B	51	
41	2s(16.0)	35.0¢	B:BB:GG	20	
42	5s(16.5);2L(23.0)	38.5¢	W	52	
43	2s(16.0)	43.5¢	B	20	
44	5s(16.5);1E(22.0)	36.0¢	B	51	
45	2s(16.5)	48.0¢	B:BB:GG	20	
46	5s(16.5);2L(22.5)	27.0	W	52	
47	2s(17.0)	42.5¢	B	20	
48	5s(18.0);1E(24.0)	39.5¢	B	51	
49	2s(17.5)	45.0¢	B:BB:GG	20	
50	--	2.5b	W	?	
51	2s(17.0)	50.5¢	B	20	
52	5s(17.5);2L(24.5)	39.0¢	B	52	
53	2s(17.0)	45.5¢	B:BB:GG	20	
54	--	3.0b	W	?	
55	2s(17.0)	47.0¢	B	20	
56	5s(17.5);1E(24.5)	39.5¢	B	51	
57	2s(17.0)	45.5¢	B:BB:GG	20	
58	5s(18.0)	36.5¢	W	50	
59	2s(18.0)	50.5¢	B	20	
60	5s(19.5);2L(25.5)	39.0¢	B	52	
61	2s(18.5)	46.0¢	B:BB:GG	20	
62	5s(19.0)	42.0¢	W	50	

Cord	Knots (no., type, position)	Length	Color	Value	Subsidiaries (no., position)
63	2s(18.5)	44.5¢	B	20	
64	5s(19.0); 2L(25.5)	39.0¢	B	52	

Observations

- *1. Construction note: Pendant cords 13 and 34 were broken but could be matched with 2 broken pendants stored with the quipu. The breaks were at 5.5 cm. and 4.0 cm. respectively.
- **2. Construction note: The marker was made of numerous short cords tied around the main cord, directed upward, and bound together.



3. This is one of several quipus acquired by the Museum in 1907 with provenance Pachacamac. For others included in this group, see AS97.
4. By color patterning, there are 16 groups of 4 pendants each. The repeated pattern is B:BB:GG, W, B, B. The first 2 groups are set off by spacing and the remaining 14 groups are separated by the marker into two sets of 7 groups each. With the exception of the first group, each group of 4 pendants is subdivided by spacing into 2 subgroups of 2 pendants each. Hence the quipu can be described as:
- Part I: Groups 1 and 2 (Group 2 contains subgroups 1 and 2).
- Part II: Groups 1-7 (Each group contains subgroups 1 and 2).

Part III: Groups 1-7 (Each group contains subgroups 1 and 2).

5. Part I

- a) The sum of the pendants in group 1 equals the sum of the pendants in group 2. Each sum equals 1000.
- b) The sum of the pendants in subgroup 1 of group 2 equals the sum of the pendants in subgroup 2 of group 2. Each sum equals 500. (Group 1 is not separated into subgroups by space and the even division of values by pendant pairs is not present.)
- c) Group 1 is the sum group for the 7 groups in Part II: i.e., the value on the first pendant in group 1 is the sum of values on the first pendants in the 7 groups; the value on the second pendant in group 2 is the sum of values on the second pendants in the 7 groups; etc. Similarly, group 2 is the sum group for the 7 groups in Part III. (It is being assumed that the values on the broken pendants P50 and P54 are both 52. This assumption consistently fits with all observations.)

6. Part II

- a) The sum of all the values is 1000.
- b) The pendants carry only values of 20, 40, 50, 60 arranged such that the subgroups sum to 60, 70, or 100.
- c) The sums of the groups and subgroups can be summarized as follows:

Groups 1-3 sum to 400 with 5 subgroups summing to 70 and 1 to 60

Group 4 sums to 200 with 2 subgroups summing to 100

Groups 5-6 sum to 400 with 3 subgroups summing to 70 and 3 to 60.

Thus, $1000 = 1(200) + 2(400) = 2(100) + 4(60) + 8(70)$.

7. Part III

- a) The sum of all the values is 1000.

- b) The sum of the 7 first subgroups equals the sum of the 7 second subgroups.
Each sum is 500.
- c) Individually the subgroups sum to 70, 71, or 72 such that, in all, there are 2 subgroups summing to 70, 4 subgroups summing to 71, and 8 subgroups summing to 72. The 14 subgroups are paired into 7 groups such that there are 4 groups summing to 143, 2 groups summing to 142, and 1 group sums to 144.
Thus, $1000 = 2(500) = 2(70) + 4(71) + 8(72) = 1(144) + 2(142) + 4(143)$.
- d) It should be noted that 1000 cannot be evenly divided into 14 or 7 parts ($1000/14 = 71\frac{6}{7}$; $1000/7 = 142\frac{6}{7}$). Hence, when only integers are available, if even division were intended, some "best" representation must be used. A possible "best" division of 1000 into 14 parts could be eight 71's and six 72's. A comparable "best" division of 1000 into 7 parts could be six 143's and one 142. Here we find that the 14 parts of 1000 involve three consecutive integers (70, 71, 72) and the numbers of each are consecutive powers of 2 (2, 4, 8). Similarly, the 7 parts of 1000 are three consecutive integers (142, 143, 144) and the numbers of each are consecutive powers of 2 (1, 2, 4).
- e) Note also that when combining 14 values into 7 pairs, many different pairings are possible. The pairing used here has some interesting properties and can be described as follows: pair the smallest value with the largest value; pair the next smallest with the next largest, etc. As a result, there is the smallest scatter of sums and starting with consecutive powers of 2 leads to consecutive powers of 2. Described symbolically:

$$\text{Given } \underbrace{x, x, x, \dots}_{2^n}, \underbrace{x+1, x+1, x+1, \dots}_{2^{n+1}}, \underbrace{x+2, x+2, \dots}_{2^{n+2}} \quad n \geq 1$$

Add x to x+2 until the x's are exhausted. Add x+1 to x+2 until the x+1's are exhausted. Add x+2 to x+2 until the x+2's are exhausted.

Result

$$\underbrace{2x+2, 2x+2, \dots,}_{2^n}$$

$$\underbrace{2x+3, 2x+3, \dots,}_{2^{n+1}}$$

$$\underbrace{2x+4, 2x+4, \dots,}_{2^{n-1}}$$