THE POTTERY FROM GILIMANUK, BALI

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INTRODUCTION

The site of Gilimanuk lies 5 metres above sea level on the southern shoreline of Gilimanuk Bay in western Bali. Excavations conducted in 1963-4, 1973, 1977, 1979, and most recently in 1984 have produced evidence for a coastal settlement with burials (Soejono 1979). These burials are believed to date to around the beginning of the Christian era, and have parallels in other Indonesian sites such as Melolo in Sumba (van Heekeren 1956a), Anyer in West Java (van Heekeren 1956b), and Plawangan in Central Java (Sukendar 1981).

The excavations at Gilimanuk cover a total area of 224 m^2, and go down to an average depth of 2 metres. Thirty-seven pits have been excavated, each measuring 2.5 x 2.5 metres. The stratigraphy shows four layers:

1. Black humus disturbed by recent human activities, average thickness 20 cm;
2. Yellow-grey fine grained soil, average thickness 15 cm;
3. A composition of clay and sand with a light to dark brown color, between 40 and 115 cm thick;
4. Light grey sand, with an average thickness of about 75 cm.

The first layer contained only modern rubbish. The second contained potsherds and shells in its lower part, indicating a gradual transition downwards into layer 3, which was filled with the remains of human activity, mostly fragmentary, except for a number of beads and complete pottery vessels.

Potsherds, bones and shells occurred in large quantities, together with fragments of ornaments and metal objects. Human skeletons occurred in the fourth layer, with funerary goods including pottery, beads, and items of bronze, gold and iron. All are well preserved. Most of the human burials were provided with gifts (Soejono 1979:192).

THE POTTERY TYPOLOGY (Figures 1-4).

Normally, most Indonesian prehistoric pottery finds consist only of sherds, and complete vessels are very rare. In Gilimanuk, however, we found a number of complete vessels as well as several tens of thousands of sherds. The complete vessels comprise jars, dishes, lids, incense burners, plates and water pitchers in several shapes and sizes (Figure 1 & Table 1).

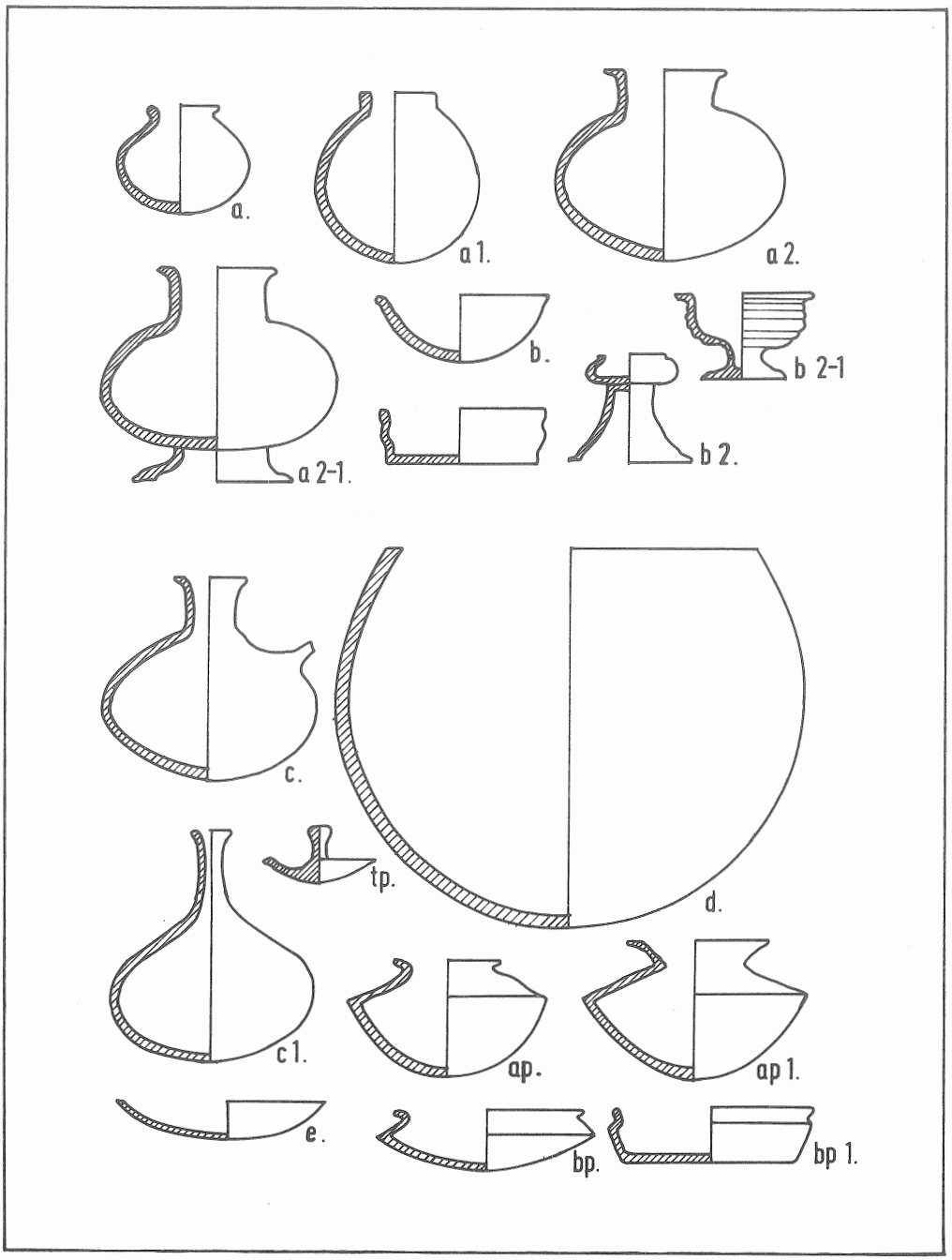

Figure 1. Gilimanuk vessel shapes.

The thicknesses of vessel walls vary, with jar thicknesses averaging 5-10 mm and dishes 4-8 mm. Some of the jars have thicknesses between 10 and 20 mm. The sizes of the vessels also vary, and three categories were separated: small (maximum diameter around 10-15 cm); medium (16-30 cm); and large (over 31 cm). Some pots were weathered and a few had their original surfaces destroyed. Most, however, had well-preserved surfaces. The Gilimanuk pottery decoration (Figures 2,3) includes net impression, incision, applique, and scalloped or finger-tip impressed lips. The incised patterns include wavy and geometric designs, and there is also an applied wavy band pattern. Net impression is the most common form of decoration. Otherwise, undecorated pots often have their surfaces slipped in red and burnished. Among the unslipped and burnished pottery, brown is the dominant color, although red and black also occur.

VESSEL TYPE	SUB-TYPE	VARIANT
globular jar (a)	straight neck (a1)	
	concave neck (a2)	footed(a2-1)
dish (b)	flat bottom (b1)	
	footed (b2)	horizontally ribbed (b2-1)
spouted pitcher (kendi)(c)	unspouted (c1)	
large globular jar (d)		
plate (e)		
lid (tp)		
carinated jar (ap)		
carinated dish (bp)	flat bottom (bp1)	

Table 1: Gilimanuk vessel shapes (see Figure 1).

PHYSICAL ANALYSIS

Recent research has provided data on the physical properties of the Gilimanuk pottery. Laboratory tests on samples of sherds were undertaken for porosity, specific gravity and hardness.

Porosity is one of the basic properties of pottery (Shepard 1965:126); it refers to the ability of a fired body to absorb water by capillary action (Hamer 1975:230). The porosity of pottery is defined as the ratio of the volume of pore space to the total volume of the piece. In a plastic clay, the interstitial spaces between the

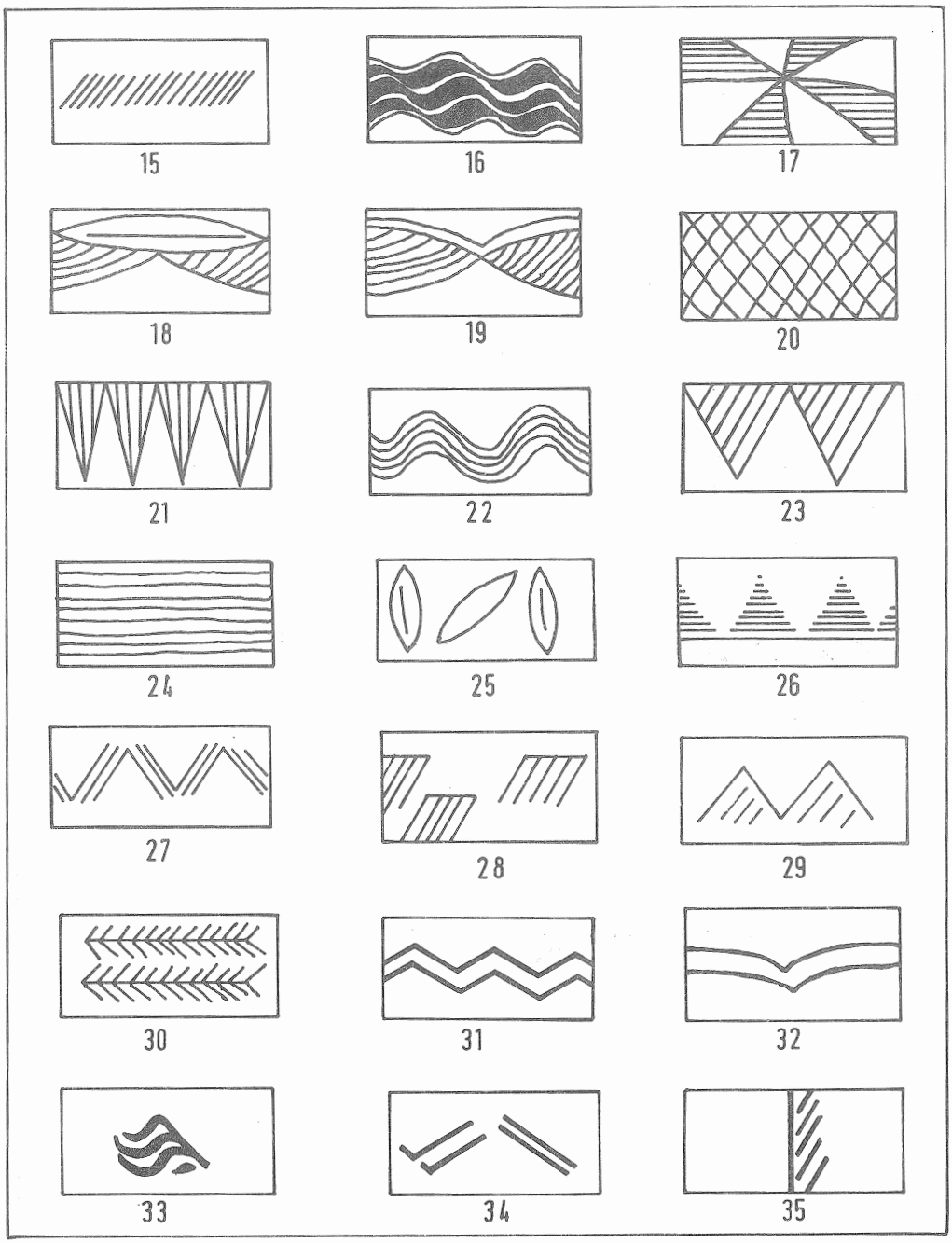

Figure 2. Gilimanuk decoration: incised patterns

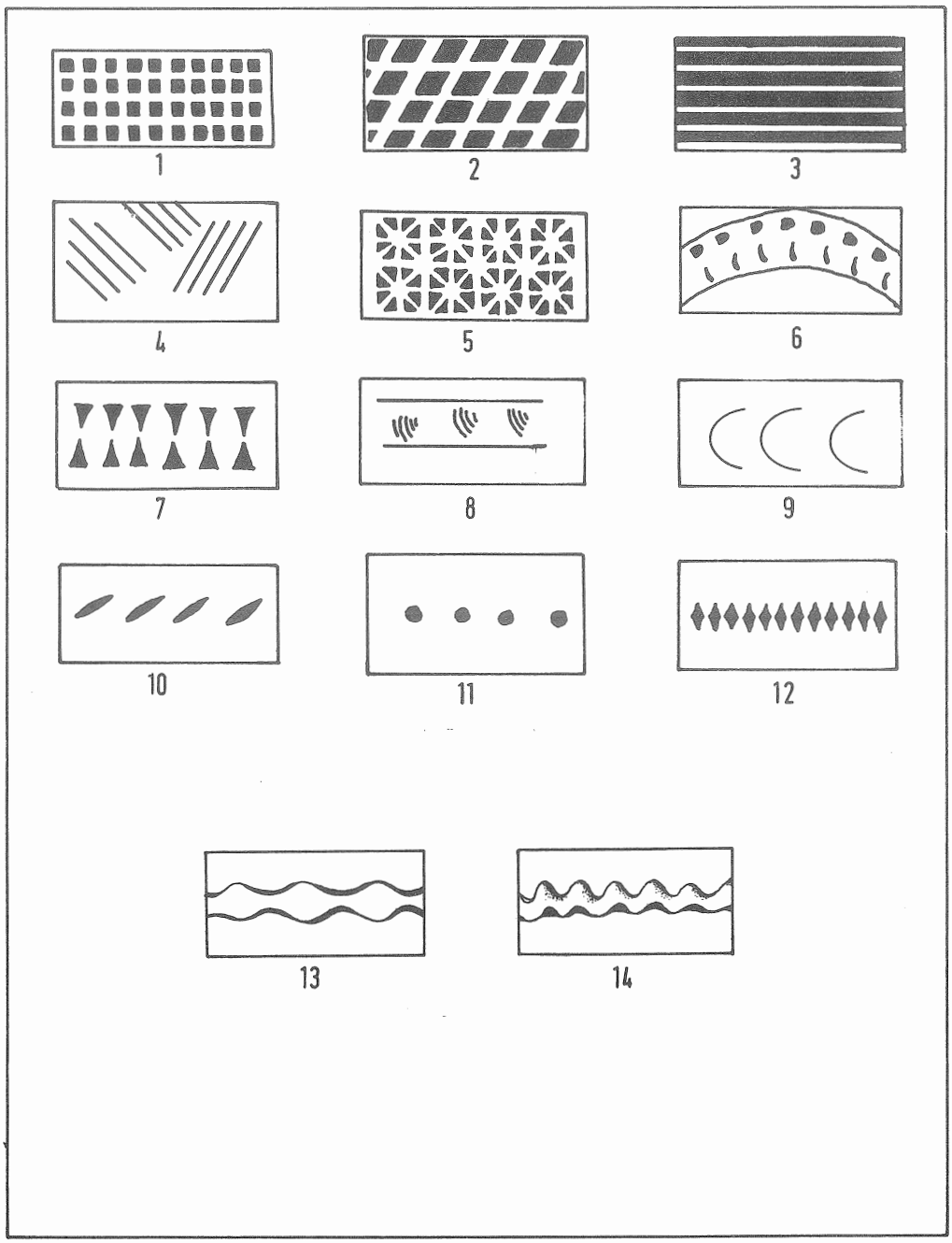

Figure 3. Gilimanuk decoration: impressed and applied patterns.

clay and other mineral particles are filled with water. Above a firing temperature of 600 degrees Centigrade this water is expelled. Therefore, clay fired at or just above this temperature becomes an extremely porous body. As the temperature increases above 600 degrees, however, the feldspathoids and free silica are fluxed by the alkalis which are present. The resulting molten silicates begin to fill the spaces and the whole mass shrinks as a result. Thus, there is less space left and the body becomes less porous.

The specific gravity (the ratio between the weight of equal volumes of a material and water) of pottery varies with porosity. The clay minerals themselves also vary in specific gravity (kaolinite 2.67, montmorillonite 2.35), as do the impurities in common clays (gypsum 2.3, hematite and magnetite 5.2). Iron oxides increase the specific gravity of clay, but carbonaceous matter reduces it (Shepard 1965:137). Firing also changes the true specific gravity of pottery.

Hardness is one of the specifications by which people judge the serviceability of pottery and the likelihood of its being broken or damaged. In ceramic description hardness is usually recorded by reference to a simple scratch test (Shepard 1965:114). Wares that are 2.5 to 3 in the Mohs' scale (i.e. soft) often have a high lustre and a bright color, but pottery that is 5 to 6 hardness will be a better service ware (Shepard 1965:114). If pottery is hard, it may have been made from a low-fusing, dense-firing clay, or it may have been fired at a relatively high temperature that promoted vitrification.

Forty-six Gilimanuk potsherds have been tested for their physical properties (Table 2). They come from excavation sectors VIII, XII, XVII, XXII and XXVII, excavated in 1964, 1973, 1977 and 1979. The sherds were from several layers; layer 1 in sector XXII, layer 2 in sector XII, and layers 3 and 4 in sectors VII, XVII, XXII, and XXVII.

Specific gravities range from 1.79 to 2.70, and average 2.40. Only two samples were less than 2, and only one reached 2.70. Percentage porosity ranges between 4.5 and 33.3%, and hardness averages 4 in the Mohs' scale. Twelve sherds have a hardness of 3, nineteen of 4, and fifteen of 5.

OBSERVATIONS

The use of pottery for grave goods is a characteristic of Indonesian burial traditions during prehistoric times. Some Gilimanuk vessels were even used mouth to mouth as containers for secondary burials. This custom seems to have been connected with the tradition of burial in stone sarcophagi which developed in the inland regions of Bali (Soejono 1965). Double jars were probably used by the Gilimanuk people owing to the lack of volcanic stone in the area (Soejono 1979: 200).

SAMPLE NUMBER	SPECIFIC GRAVITY	POROSITY	HARDNESS
1	2.49	22.9	3
2	2.41	24.1	4
3	2.39	25.1	4
4	2.70	33.0	3
5	2.62	28.6	5
6	2.35	23.0	5
7	2.40	23.8	4
8	2.53	21.7	3
9	2.30	22.2	5
10	2.40	22.5	5
11	1.79	4.5	3
12	2.36	24.5	3
13	2.36	24.5	3
14	2.10	12.4	3
15	2.46	21.5	4
16	2.42	27.7	4
17	2.64	24.6	5
18	2.42	23.1	3
19	1.91	8.4	4
20	2.50	23.2	5
21	2.53	27.7	4
22	2.33	24.9	5
23	2.56	22.7	5
24	2.61	25.7	3
25	2.35	19.6	5
26	2.37	24.5	4
27	2.45	24.7	4
28	2.43	33.3	3
29	2.42	22.3	4
30	2.52	26.2	3
31	2.06	9.2	4
32	2.57	26.8	4
33	2.41	25.3	4
34	2.42	33.1	5
35	2.34	18.8	5
36	2.46	26.0	4
37	2.48	24.6	4
38	2.41	21.2	5
39	2.33	25.3	5
40	2.37	30.8	4
41	2.45	24.9	5
42	2.33	19.7	5
43	2.48	24.2	3
44	2.51	29.5	4
45	2.18	18.8	4
46	2.56	23.4	4

Table 2: Physical tests on Gilimanuk pottery

Many complete vessels were used as funerary gifts, together with beads, bronzes, and iron and gold objects. The pottery, to judge from the great quantity of sherds in the site, was also used for daily utensils. Varying wall thicknesses and vessel sizes indicate that it was made by several techniques, including the paddle and anvil and the potter's wheel.

Visually, there appear to be two different types of pottery in the site which are different in function and manufacturing techniques. Most of the pottery used for burial purposes has net-impressed decoration and is of poor quality. On the other hand, the habitation sherdage is characterised by incised decoration and finer surfaces.

Despite these observations, however, the pottery could only be classified as one type from the viewpoint of physical properties. Specific gravities average 2.40 grams; a little lower than kaolinite, but higher than montmorillonite and gypsum. Porosity averages between 18 and 29 per cent, lower than ordinary clay which has 20-40 per cent porosity after firing at 945 degrees centigrade, and much lower than the refractory clays (kaolin, flint clay) which have 45-50 per cent at 945 degrees (Shepard 1965:126). The sherds average 4 in the Mohs' scale of hardness; not too hard to withstand all abrasion, but not as hard as quartz and not as brittle as gypsum.

Considering physical properties, only one class of Gilimanuk pottery can therefore be recognised.

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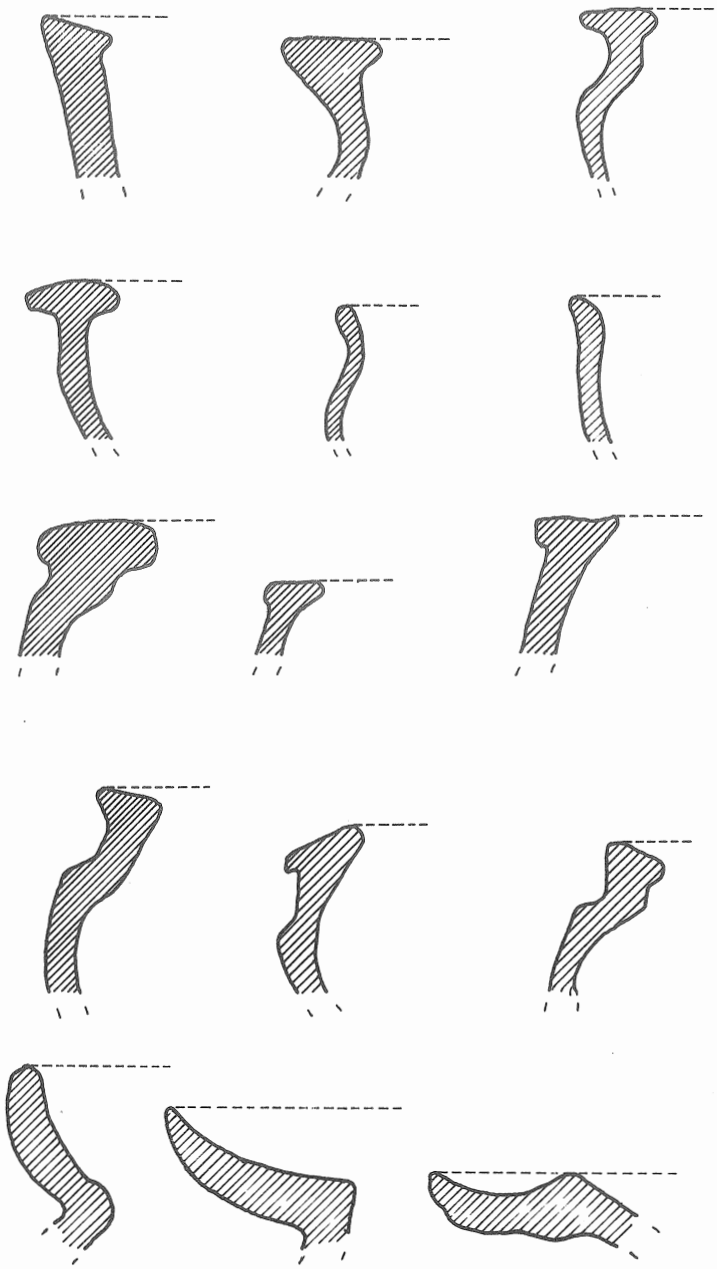

Figure 4. Rim cross-sections from Gilimanuk.