Chapter 36

Economic and Technological Change during the Middle and Late Holocene in the Lamoncong Highlands, South Sulawesi, Indonesia,

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Abstract

This study reviews the archaeological and ethnographic collections made by Paul and Fritz Sarasin in Lamoncong, Sulawesi, over 100 years ago. The archaeological collection comes from four rock shelters dated to between the middle Holocene and the ethnographic present. The ethnographic collection includes items from the local To Ala' ('forest people'), who still occupied rockshelters at the time of the Sarasins' visit, as well as from Bugis immigrants. Combined study of these two collections allows the reconstruction of a layered culture history for the To Ala' and their ancestors. Few of their middle Holocene practices apparently survived till ethnographic times, apart from inserting barbs (originally backed stone blades, later metal) in their clubs. Early Austronesian influences are suggested by the introduction of blowpipes (inferred archaeologically) along with the thigh xylophone and death masks (inferred ethnographically). Historical Bugis influences are reflected in terms of language and in the pottery, betel nuts, iron tools, and other goods that the To Ala' evidently obtained through trading forest produce. These observations suggest that, in Lamoncong, the interaction between pre-Austronesian indigenes and Austronesian immigrants was a complex, dialectical process that cannot be boiled down to a simplistic contrast between foraging and agricultural populations.

Introduction

The Lamoncong highlands offer excellent prospects for studying the transition from foraging to agricultural economies in Indonesia. Two Swiss cousins, Paul and Fritz Sarasin, visited Lamoncong in Sulawesi's upper Walanae valley (Figure 36.1) at the start of the twentieth century. They recorded a local population called the To Ala' (forest people) who erected dwellings of timber and bamboo in rock shelters. The Sarasins collected objects of material culture from the To Ala' as well as the local Bugis (the dominant ethnic group), and measured the To Ala' subjects whom they encountered (Sarasin and Sarasin 1905a: 264–96; Sarasin 1906: 107–12). They also excavated four rock shelters, one of them, Leang Balisao, named after the Balisao (the To Ala' representative to the Bugis) who dwelt there (Sarasin and Sarasin 1905a: 282–7, 292–3; 1905b). The excavated assemblages, which include a human burial, are available for study at Basel in Switzerland, where the Lamoncong ethnographic collection is also located.

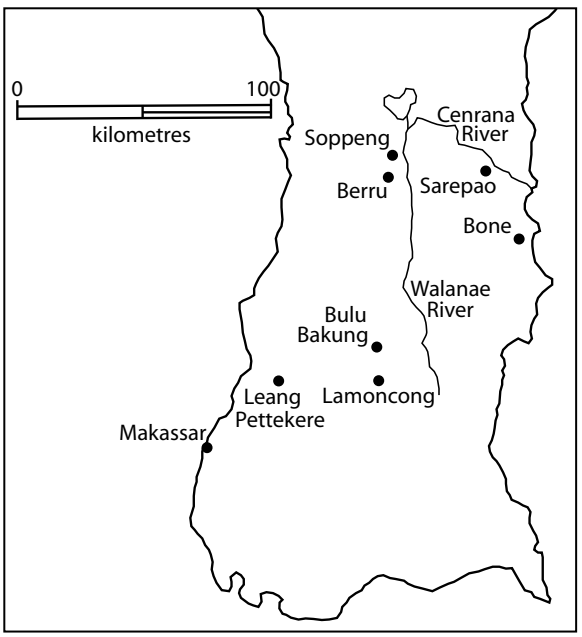

Fig. 36.1 South Sulawesi peninsula with places mentioned in the text

The Sarasins' observations on the To Ala' have been overshadowed by the archaeological importance of the assemblages they excavated, which the Sarasins named the Toalean (after the To Ala'). Winged projectile points

of stone (Maros points), stone blades, bone points (all observed by the Sarasins), and backed microliths (first noted by Van Heekeren 1972: 106) engaged the attention of prehistorians during the twentieth century as they wrestled with the variety of industries related to hunter-gatherer occupation in Australasia. At the same time, the distinctiveness of the To Ala' and local Bugis came under question. Mijsberg (1941) compared the measurements of the To Ala' and their Bugis neighbours taken by P. V. Van Stein Callenfels in 1934, and failed to find any statistically significant differences. Pelras (1996: 37) mentions documentary claims that the To Ala' were actually Bugis exiles banished to destitution for breaches of customary law, and dismisses any relationship between the To Ala' and Sulawesi's pre-Austronesian inhabitants. The Sarasins themselves (1905a: 272, 278, 286) had noted that the To Ala' spoke Bugis and practised swidden agriculture, but had no knowledge of flaking stone. Considering also that the To Ala' ceased to exist as a distinct group at some stage after 1934, we might be tempted to assign the To Ala' to the ragbag of uncertified ethnic entities recognised by early European ethnographers.

Yet the material culture of the To Ala' collected by the Sarasins shows they cannot be simply swept aside as a Bugis variant. Blench (n.d.) refers to their thigh xylophone, paralleled elsewhere in the island only in North Sulawesi, which supports his reconstruction of thigh xylophones as a proto-Austronesian musical instrument. Should we then change the status of the To Ala' to early Austronesian descendants who had remained untouched by the socio-political changes that swept South Sulawesi with the rise of centralised kingdoms (cf. Caldwell 1995)? However, the To Ala' also had a type of club, unique in Sulawesi, that reflects flaked-stone technology (Sarasin and Sarasin 1905a: 274); and, as I shall demonstrate, the materials excavated by the Sarasins reveal the application of flaked-stone technology to iron and polished stone artefacts. Bellwood and Glover (2004: 16–7) refer to a 'halo of interaction' and an 'exchange-based mutualism' that would have connected farming and foraging groups as the former spread across the territory that the latter had hitherto occupied. Therefore, to expect the To Ala' to represent either the early Austronesian adaptation or the pre-Austronesian lifestyle in South Sulawesi would be to impose a false dichotomy upon the societies of mixed tradition that would have come into existence as soon as Austronesian colonisation affected the region. The value of the Lamoncong evidence lies in its illustration of how these different cultural attributes blended over time.

Some attention to the physical anthropology of the To Ala' is appropriate in view of the claim by Pelras (1996: 37–9) that the pre-Austronesian inhabitants of South Sulawesi would have been of 'Australo-Melanesian' affinity. The Sarasins had recorded higher frequencies of facial hair and wavy head hair amongst the To Ala' than the Bugis. Callenfels saw no evidence for this but did not record any data relevant to the point (Mijsberg 1941: 1282). The data he took consist of 22 body and head measurements, which Mijsberg (1941: 1284–5) analysed, including 14 indices based on the original measurements. For all 36 variables, Mijsberg used a statistic recommended by Karl Pearson to infer a lack of statistical difference. However, when we apply the more standard *t*-test to Mijsberg's data (Keller and Warrack 2003: 414, B-9), we find that Callenfels's samples of To Ala' and Bugis are significantly different on 18 of the 22 measurements and 11 of the 14 indices (using the *t*-test formula that assumes equality of variance between the two samples, one-tailed *t*-tests with the *p*-value for significant difference set at the conventional 0.05 benchmark). Indeed, we would expect reliable samples of the To Ala' (n = 23) and Bugis (n = 53) to produce statistically significant differences, because they were different populations, and Callenfels had screened his To Ala' subjects to remove those who could remember having any Bugis ancestry. Specifically, the To Ala' were on average taller than the Bugis and had relatively longer arms and broader shoulders, as well as a broad forehead compared to maximum head breadth.

Human remains provide some evidence to link the To Ala' with the Toaleans. The partial skeleton of a late teenager of uncertain sex was retrieved from the Upper Cakondo shelter by the Sarasins. My observations on the remains indicate a gracile, long-limbed individual of middling size with smaller teeth and a simpler molar morphology than would be expected of Bugis or their immediate ancestors (Bulbeck 2004a: 229–32). Simple molar morphology and remarkably small teeth are characteristic of the small available sample of Toalean human remains, as is a broad frontal bone (Bulbeck 2004a: 240–7), here providing a documented similarity to the To Ala'. While we know nothing about the hair characteristics (or skin colour) of the Toaleans or the Upper Cakondo fossil, the available evidence from physical anthropology would certainly not disqualify the Toaleans from having an ancestral relationship to the To Ala'.

Materials and Methods

The Lamoncong ethnographic collection and excavated assemblages are stored in the Asian Section of Basel's Culture History Museum (Museum der Kulturen Basel). The ethnographic collection includes 32 items representing To Ala' material culture and six local Bugis items (Table 36.1). To document the items, I translated

the descriptions on the accompanying catalogue cards, measured the objects' dimensions, recorded the material used in their manufacture, noted any evidence of fire hardening and metal blades used in carpentry, and observed any decorations. Most of the To Ala' clubs had metal pieces set in grooves, and I recorded the dimensions, edge morphology and other physical attributes of the metal pieces. The Bugis strike-a-light set included an iron hammer and two chert cores, and I recorded the edge damage on the iron hammer as well as the cores' technological attributes and edge damage.

The excavated artefacts from the rock shelters include polished stone, bone points, polished suid teeth, earthenware pottery, imported ceramic sherds, iron artefacts, wood and nuts, and bast knots (Table 36.2). Measurements and macroscopic observations were made on all of these, except for the bast fragments, already described by the Sarasins (1905b: 21–2). The only control over the age of the rock-shelter assemblages is the contents themselves, because the Sarasins excavated the contents holus-bolus (whilst taking some notes on stratigraphic relationships), and no attempt has yet been made to obtain radiocarbon dates from the sites.

For reasons explained in due course, the artefact classes suggest the chronological order shown in Table 36.2, from Leang Ululeba (oldest) to the Upper Cakondo shelter (youngest). The faunal remains would however qualify that framework. Leang Balisao, still inhabited at the time of excavation, has deer (introduced to Sulawesi in the late Holocene) and water buffalo, convincing Simons and Bulbeck (2004: 183) that it is the youngest assemblage excavated by the Sarasins. The presence of dog, which the To Ala' used in hunting (Sarasin and Sarasin 1905a: 278), and chicken at Lower Cakondo might also suggest a younger date than the Upper Cakondo site, whose faunal assemblage does not include deer or domesticates (Simons and Bulbeck 2004: 183–4). However, all sites except Ululeba have traces of habitation in the second millennium AD (see below), indicating the following chronology (cf. Simons and Bulbeck 2004: 184). Leang Ululeba had been occupied from around the middle Holocene till about 2,000 years ago, consistent with a high proportion of the endemic dwarf water buffalo (anoa) in its faunal refuse. Initial use of Lower Cakondo and Leang Balisao also dates to the mid-Holocene (hence, high proportions of anoa in the fauna), but sporadic occupation continued till historical times. The period of occupation in the Upper Cakondo shelter was more discrete, entirely confined to the late Holocene, but essentially preceded modern times when iron, domesticated animals, and imported ceramics were commonly available in Lamoncong.

Flaked stone artefacts make up most of the material from the Sarasins' excavations. Owing to time limitations, only the flaked stone artefacts that conform to the well-known Toalean types were recorded from every site. Flakes with signs of retouch or use, and cores, were studied in detail from both Cakondo shelters. Retouch and use-wear evidence had to be entirely convincing — based on regularity and invasiveness of the edge scarring, and lack of random blunting damage in the same section of the edge — to be accepted, as the specimens had been stored together in boxes for a century and their edges are not in pristine condition. Fortunately, regular indentations are a common form of recognisable retouch on Toalean elongated pieces. Gloss polish, the result of working plant material (Sinha and Glover 1983/4: 147), is a distinctive signature of use, but the artefacts' curation circumstances do not facilitate the microscopic examination and activity analysis described by Sinha and Glover. Time constraints restricted my debitage analysis to the Upper Cakondo lithics. I employed the system previously applied by Pasqua (1995: 21–9; Pasqua and Bulbeck 1998: 219–21) to debitage from lowland Toalean sites, and also recorded the orientation of the scars on the dorsal surface of the flakes, so as to track evidence of core rotation during knapping. Maximum length, maximum breadth (at right angles to maximum length), and maximum thickness (at right angles to the preceding two measurements) were recorded for all studied lithics, to allow comparisons between the different classes.

My description of the Lamoncong artefacts will proceed more or less in descending order of perishability of the material used. This approach recognises the archaeological truism that the most perishable components of material culture also tend to be the most informative on adaptation and cultural relationships.

Timber

Wood is the most common material in the ethnographic collection, occurring on five of the six Bugis items and 23 of the 32 To Ala' items. All carpentry had evidently been performed with metal (presumably iron) blades, including the To Ala' items made of softwood: the three 'Bugis-style' ladles, a covered jar for lime to be taken with betel nuts, and a small club. The To Ala' wooden items convey the general impression of a settled population (household chattels, and a large nail) with components of agriculture (digging sticks) and hunting (snare and clubs) in their subsistence economy.

Table 36.1 Summary of contents of the Sarasins' Lamoncong ethnographic collection (some numbers refer to more than one item, according to my notes).

Item description	Museum accession numbers	To Ala'	Bugis
Digging sticks	IIc Nos 861-862, 878-879	3	1
Spears	IIc Nos 874-875, 888	2	1
Large clubs	IIc Nos 868-872	5	0
Small paddle-shaped club	IIc No. 884	1	0
Snare	IIc No. 866	1	0
Large wooden nail	IIc No. 887	1	0
Strike-a-light set	IIc No. 877	0	1
Spark friction set	IIc No. 865	1	0
Paddle	IIc No. 886	0	1
Scraper	IIc No. 873	1	0
Mortar and pestle set	IIc No. 880	1	0
Bowl	IIc No. 885	1	0
Bugis-style ladles	IIc Nos 881-883	3	0
Betel-nut paraphernalia	IIc Nos 855-857	3	0
Bark-cloth strap	IIc No. 860	1	0
Bast knot	IIc No. 854	1	0
Ornaments	IIc Nos 858-859, 867	3	0
Hats	IIc Nos 853, 857-858	3	0
Xylophone	IIc No. 876	1	0
Mask	IIc Nos 863-864	0	2
Total		32	6

Table 36.2 Main artefact classes useful for dating purposes from the Lamoncong rock shelters.

Artefact class	Ululeba	Balisao	Lower Cakondo	Upper Cakondo
Maros points	5	2	2	0
Bone awls	2	0	0	0
Babirusa canines	1	0	0	4
Boar tooth points	2	2	2	11
Thin bone points	0	0	0	6
Backed flaked stone	2	1	5	16
Marine shell pieces	0	0	0	2
Polished stone	1	2	0	2
Earthenware sherds	0	11	11	8
Iron pieces	0	1	1	0
Imported pot sherds	0	5	3	1
Wood fragments	1	0	3	1
Nuts and nut fragments	0	2	4	1
Bast fragments	0	1	6	3

The three smallest items of wood are a three-piece ear pendant, the clasp on the more complex of the bags for carrying betel nuts, and a bauble attached to a decorative band of plaited rattan. The largest timber items are the digging sticks, including a one-piece stick with a pointed end (2.25 m long) and the three digging stick handles, 1.10–1.31 cm long, with a cleft end (presumably to take an iron blade, as still shown by the Bugis example). These handles betray their origins as long, relatively straight branches. The other wooden pieces that retain their natural form are the snare and the xylophone sticks, which are modified twigs, and the three large clubs which are fire-hardened roots attached to handles. Fire hardening is evident on many of the wooden objects, but not the snare twigs, the smallest wooden items, the softwood artefacts, and a To Ala' digging-stick handle which is still largely covered in bark.

To Ala' iconography is represented by the decorations on the five large clubs, which are unique to the To Ala', and the thigh xylophone, which must also be a To Ala' product. The large clubs are richly decorated with a variety of materials, including locks of wavy human hair. In particular, the bark covering the handle of the longest club (69 cm) has been finely chiselled to produce 31 encircling translations of pentagonal, rectangular and semi-circular motifs. Different decorations — a cross in a box, a semi-lunate incision, and an oval with a row of five small triangles — occur on the bars of the thigh xylophone. All of these To Ala' motifs are also found on decorated local pottery from fourteenth to twentieth century sites near Makassar, the capital of South Sulawesi (Bulbeck and Clune 2003: 84–6). The cross in a box also occurs on the Lamoncong Bugis-style ladle that is shaped like a kris. Also, the handle of the wooden mortar finishes in an undulating, six-waved knob that strongly resembles the carved wave form on many Islamic grave markers near Makassar (see Bulbeck 1992: 746–97). These last two items may well be Bugis or Makassar products purchased by the To Ala' at the Lamoncong market (cf. Sarasin and Sarasin 1905a: 277), as a three-lobed wooden bowl may also be.

In summary, at least some of the To Ala' household items were obtained through trade or are direct imitations of local Bugis chattels. The To Ala' clearly used metal blades in their carpentry even if the tools they used are not represented in the ethnographic collection. Other technological parallels between the To Ala' wooden items and their Bugis counterparts include hardening with fire, and the digging stick handles made of a branch with a cleft end to haft the blade. Finally, as a possible indicator of more deep-seated influences, To Ala' iconography includes geometric decorations which parallel motifs on historical pottery made nearby in South Sulawesi.

The Sarasins' rock-shelter excavations yielded six items of wood. One, from Leang Ululeba, is a frail, pointed fragment with some signs of fire hardening. It could be from a root, as there are no other suggestions of recent habitation at Ululeba. The 'small' Upper Cakondo shelter (not included in Table 36.2) yielded a pointed wooden piece, 62 mm long, covered with bark externally and fire-hardened inside, which may have come from a spear or digging stick. The three fragments from Lower Cakondo include a tiny pointed object, a burnt fragment shaped like a human phalanx, and a very smooth fragment evidently planed with metal. Metal finishing is also evident on the pointed end of a wooden pole (of up to 80 mm circumference) recovered from the Upper Cakondo shelter, presumably used to build a structure. This may be the most informative of the excavated fragments of wood, as it indicates a dwelling construction within Upper Cakondo at a time when metal tools had reached Lamoncong.

Bamboo

The Bugis spear has a shaft of nine bamboo segments, 1.87 metres long, with an iron spearhead secured in place by an iron wedge and a rattan strap. The two To Ala' spears are made of even longer bamboo pieces, 2.41 m long (four segments) and 2.66 m long (five segments). They have lethal points created by cutting the bamboo at an angle, evidently with a metal blade. As befits the reputation of the To Ala' as forest people, the greater length of their spears may suggest access to superior bamboo than that used by the Lamoncong Bugis.

Smaller pieces of bamboo have been employed in three other items. One is a To Ala' spark friction set with a stick of bamboo and a fluted bamboo segment that ends in a ramp. To generate a spark, the stick would have been pushed towards the ramp, where traces of burning are visible. The spark would have set alight a large wad of cotton placed in the flute (according to the catalogue card). Both bamboo pieces in the set had evidently been worked with metal. The other examples of bamboo are a small stick holding the To Ala' bast knot, and two bamboo stubs used as teeth in one of the Bugis masks. No bamboo, however, is present in the materials recovered from the excavations. Its absence accords with the slighter occurrence of bamboo in relation to wood in the ethnographic collection.

Other Plant Matter

The To Ala' strap of beaten bark cloth is very long, being folded over several times, and 5 cm wide. Two of the three To Ala' hats are bowl-shaped gourd shells. The third is flatter on top, and made of plaited rattan which had been coated with resin and packed with a mud-like substance. Along with the three ornamental items (Table 36.1), these artefacts reflect attention by the To Ala' to their social persona.

Most of rattan in the ethnographic collection has a binding function, as already observed for the Bugis spear. All five large To Ala' clubs have bands of rattan encircling the handle, and, in two cases, the lower section of the club end. The bands would have prevented the wooden frame from splitting and splintering during use, as is especially the case with the four clubs that are composite tools bound together with the bands. A rattan band also binds a cut fragment of water buffalo rib to the wooden shaft of the To Ala' scraper. Presumably, most or all of the Lamoncong rattan had been collected by the To Ala' during their forays into the forest.

Cotton, which would have been obtained through trade, occurs as a minor element on one Bugis item and two To Ala' clubs. The largest, most decorated club has two black cotton bands used for attaching locks of human hair and flaps of black cotton to the upper handle. A smaller composite club has a strand of red cotton encircling the upper handle. One Bugis mask has a broken cotton strap coloured gold and decorated with rows of small rectangles.

Miscellaneous twine and cord occur on six To Ala' and two Bugis items. The To Ala' examples include carry straps of twine on four of the five large clubs, a cord used with the wooden snare, and a string used to tie shut one of the betel-nut bags. One of the Bugis masks has a strap, and the Bugis wooden paddle, used in pottery manufacture (according to the catalogue card), has two longitudinal strings at right angles to 15 cross strings.

Bast knots provide a link between To Ala' ethnography and recent habitation in the rock shelters. Both of the betel-nut carry bags are made of plaited bast, and the ethnographic collection includes a To Ala' bast knot. The Sarasins recovered ten bast fragments, slightly carbonised, from their excavations (Table 36.2). The Lower Cakondo bast fibres are arranged in two sets of parallel strands plaited perpendicular to each other, probably to make a sack, using a pretzel-shaped knot similar to that on the smaller of the betel-nut carry bags (No. 855). The bast fibres from Upper Cakondo and Leang Balisao, however, are single knotted strands without plaiting (Sarasin and Sarasin 1905b: 21–2).

The only other plant remains in the excavated assemblage are seven nuts and fragments, and a cuticle that looks like a wing to a seedpod. However, twine or cord is also implied by the 11 bone pieces with drilled holes, presumably for suspension (see below). The nuts include three carbonised candlenuts (from Upper Cakondo, Lower Cakondo and Balisao), a carbonised betel nut from Balisao, and three uncarbonised betel nuts from Lower Cakondo. The betel nuts link recent habitation of the shelters with the To Ala' ethnographic collection.

Animal Material

Polished and fire-hardened canines of Sulawesi's unique babirusa (pig deer), probably worn as ornaments (Sarasin and Sarasin 1905b: 18–9), occur in the Upper Cakondo and Ululeba assemblages (Table 36.3). Babirusa no longer frequented the Lamoncong region by the time of the Sarasins' visit. The presence of these canine ornaments, as well as babirusa bone fragments in the faunal assemblages, reflects the greater expanses of forest in Lamoncong before its clearance for farming (Simons and Bulbeck 2004: 185–6). Other Toalean sites do not have reported cases of polished or fire-hardened babirusa canines (Simons 1997: 31), so these may have been a distinctive feature of the Lamoncong Toaleans.

As another specialty of the Lamoncong assemblages, more points were manufactured from fire-hardened, lower incisors and canines of the Celebes boar (*Sus celebensis*) than from polished bone. The 'small' Upper Cakondo assemblage has one boar tooth point and the other assemblages have two to eleven examples (Table 36.2), totalling 19 specimens of an artefact class not reported from any other Toalean site. Provenanced bone points on the other hand are restricted to two specimens with a broad base from Leang Ululeba, and six bone points which taper towards both ends, including two clear bipoints, from the main Upper Cakondo assemblage. In lowland Toalean assemblages, by contrast, bone points commonly occur (Bulbeck et al. 2000: 73; Olsen and Glover 2004: 280).

The Lamoncong tooth points resemble the Ululeba bone points in that their maximum circumference is typically located towards the base. However, they differ in being smaller and thinner, so that 46 percent have a maximum circumference less than half of the complete length. The thinnest points are the Upper Cakondo bone points, all of which are more than twice as long as their maximum circumference, i.e. 'thin' (Table 36.4). These data support the distinction between awls and bipoints made by Olsen and Glover (2004: 291). Awls tend

Table 36.3 Babirusa canine ornaments in the Lamoncong assemblages; measurements in mm.

Site	Accession No.	Straight length	Maximum circumference	Remarks
Upper Cakondo	8051	102	45	
Upper Cakondo	8052	55	?	Broken in two
Upper Cakondo	8052	31	33	
Upper Cakondo	8052	52	28	Fragment
Ululeba	8099	60	42	Broken in four

Table 36.4 Dimensions in mm of the Lamoncong bone and tooth points. One fragment of a tooth point from Leang Ululeba was not measured. Data include measurements from a tooth point and a bone point not provenanced to a particular site. The serrated bone fragment is from Leang Balisao. Note that the average length and maximum circumference of the ten complete tooth points from Upper Cakondo (32.8 and 16.4 mm respectively) barely differ from the overall averages.

Classes of points	Length			Maximum circumference			'Thin' points
	Mean	S.D.	Range	Mean	S.D.	Range	(percent)
6 Upper Cakondo bone points	34.0	4.1	30–40	12.3	3.8	5–15	100%
3 other complete bone points	42.0	4.0	38–46	23.0	2.6	20–26	0%
13 complete tooth points	32.1	5.6	21–44	16.2	4.5	12–25	46%
5 tooth point fragments	21.5	4.6	16.5–26.5	15.8	3.9	12–21	N/A
Serrated bone fragment	24			16			N/A

to have a broadened base, and this feature characterises the Leang Ululeba and unprovenanced bone points, and most of the tooth points. The bipoints (and other thin bone points) would have served well as projectile points, notably as blowpipe darts. One fragment of a tooth point from Leang Ululeba was not measured. Data include measurements from a tooth point and a bone point not provenanced to a particular site. The serrated bone fragment is from Leang Balisao. Note that the average length and maximum circumference of the ten complete tooth points from Upper Cakondo (32.8 and 16.4 mm respectively) barely differ from the overall averages.

The Lamoncong bone points seem to have changed their function from awls in pre-ceramic times (Ululeba) to projectile points (blowpipe darts?) in later prehistory (Upper Cakondo). Tooth points may have taken over the awl function from bone points, although several Upper Cakondo examples are polished bipoints (Sarasin and Sarasin 1905a: 284). Both bone and tooth points had fallen into disuse by modern times, for they do not appear to have been observed amongst the To Ala' (or any other group in Sulawesi, to my knowledge).

Worked bone and (presumably) horn from the water buffalo are present in the To Ala' ethnographic collection, but the only clear similarity with the Lamoncong Toalean assemblages is the artefactual use of osteological elements. The To Ala' collection includes a piece of water-buffalo rib flaked and polished smooth at the working end of the scraper (IIc 783), and two items of horn — a highly polished ear plug (IIc 859) and a clasp on the larger of the two betel-nut bags (IIc 856). In the rock-shelter assemblages (see Sarasin and Sarasin 1905b: Tafel 3) we find a tabular fragment of human cranium with a drilled hole (Upper Cakondo), a possible human fragment with a drilled hole (Lower Cakondo), an ungulate fragment with a large hole bored through it (Lower Cakondo), and eight fragments of ungulate extremity bones with drilled holes of 1 to 3 mm diameter (two from Leang Ululeba, six from Upper Cakondo). Interestingly, the possible human fragment from Lower Cakondo has a zigzag design, which is matched in the decorated pottery of the early to middle second millennium AD at Soppeng, in the lower Walanae valley, as well as Makassar (Bulbeck and Clune 2003: 84–5, 97). The practice of drilling holes into bone fragments, possibly

for use as suspended ornaments and as small pipes (Sarasin and Sarasin 1905a: 284–5), is represented in three of the Lamoncong Toalean assemblages but not in the To Ala' ethnographic collection.

Artefacts of marine shell are also present in the Toalean assemblage, indicative of contact with the coast. The two from Upper Cakondo are a fragment from the mouth of a clam, and a tiny cowry shell (*Cypraea moneta*) with the top cut off. Another 11 bivalve fragments, which sport ragged edges (rejuvenating retouch?) that are flattened and abraded (cutting and scraping use?), are unfortunately not provenanced to any particular site (No. 8118). A further 55 fragments of freshwater snail shell, also provenanced simply to the Toalean caves (No. 8119), have battered edges but these could reflect taphonomic damage.

Finally, phalanger fur has been used for both To Ala' and Bugis items in the ethnographic collection. One of the To Ala' gourd hats (IIc 858) is covered with cuscus felt, and the head and facial hair on the two Bugis masks has been created by laying on strips of furry cuscus pelt. One of the masks has especially abundant facial hair including full beard and moustache, bushy eyebrows, and a huge growth of nasal hair. The masks are described as very similar to the masks of the deceased made for mortuary practices in the central highlands of Sulawesi, even though there was no particular suggestion that the Lamoncong masks had any ritual role (Sarasin and Sarasin 1905a: 291–2).

Ceramics

Sherds of pottery were recovered from all of the Lamoncong rock shelters except Leang Ululeba (Table 36.2). None of pottery has to be very old as the three assemblages with earthenware pottery also have imported ceramics. Most of the imported ceramics would be classified as coarse stoneware, with body inclusions, surface-treatment effects, colour and porosity that recall Sawankhalok (or other Thai), Guangdong, Brittleware, and Coarse Red martavans (cf. Harrisson 1990: 33–43). The modal age for these coarse stonewares in South Sulawesi would be fifteenth to sixteenth centuries, with a range between the thirteenth and nineteenth centuries (Bulbeck 1992: 537–9; Bulbeck and Caldwell 2000: 110–23). Only Leang Balisao, which was occupied at the time of excavation, yielded any fine imported ware. I identified one of the three fragments as eighteenth century Chinese blue-and-white, one as nineteenth century Chinese blue-and-white ('Kitchen Ch'ing'), and one as nineteenth century European underglaze painted. Imported ceramic sherds are also present in the Lamoncong ethnographic collection; they had been used as eye insets, after varying amounts of reshaping of their perimeter, in the Bugis masks. Originally there had been four sherds but only three are still extant, which I classified as sixteenth-century 'Ming Swatow' (Bulbeck 1992: 559–72, 605), Ch'ing yellow monochrome, and white-glazed Ch'ing (all basal sherds).

The earthenware sherds predominantly come from plain jars with traces of turntable production or paddle-and-anvil finishing, fired in a generally oxidising environment. Twenty-six of the 30 sherds come from jars, including nine rims, five sherds from the neck and shoulder region, and 12 body sherds. The other four sherds include two bases to bowls, one with a foot-ring, and two body sherds probably from bowls. Four of the 12 jar body sherds have carbonised residues, consistent with my impression that most of the jars were cooking pots (*periuk* in Indonesian), although thicker body sherds, probably from storage jars, are also present. Ten sherds have traces of paddle-and-anvil finishing. Thirteen have horizontal lines, usually of sufficient regularity to suggest production on a hand-turned wheel, rather than a simple turntable support such as the broken vessel recorded by Soejono (1984: 128) at a potter's workshop in Berru, Soppeng. Surface finish was recorded on 20 sherds and a red slip was noticed on six cases, while seven were smoothed and self-slipped, and one shallow bowl had a black burnished base (internally and externally). Eleven of these 20 sherds have fully oxidised bodies and the other nine are partly reduced (for instance, reduced core or reduced interior wall).

Sarasin and Sarasin (1905b: 22–3) infer that the earthenware is modern Bugis pottery obtained by the To Ala' through trade. Certainly the sherds' attributes would be consistent with dating them to the second millennium AD. The nine jar rims are all similar in cross-section to examples from fourteenth to eighteenth century Bugis sites in Soppeng (Bulbeck 1989: 101). The most common Munsell colour readings of the sherds' fabric are 5YR 6/4 and 5YR 5/4 (light reddish brown to reddish brown), as also recorded for the Soppeng sherds. A Leang Balisao sherd from the shoulder of a jar has a notched appliqué band (Figure 36.2b), as does one of the Soppeng sherds (Bulbeck 1989: 102). Another jar sherd from Leang Balisao has sets of vertical incisions on its neck (Figure 36.2a). The closest parallels I know of in the South Sulawesi peninsula have sets of slanting incisions on the neck, being an Early Metal Phase jar from Leang Pettekere in the Maros karsts (Flavel 1997: Fig. 4.12), and a jar recorded from Allangkanangnge ri Latanete, a Bugis palace site in the

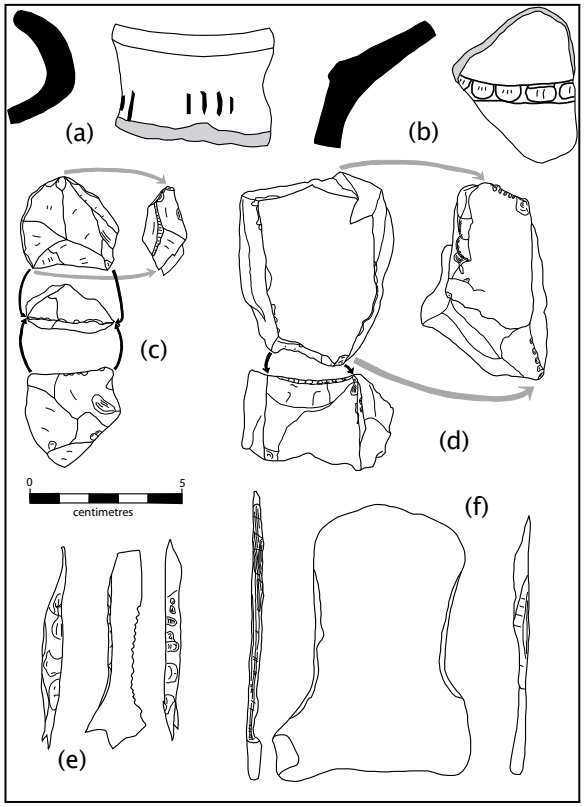

Fig. 36.2 More recent Lamoncong artefacts. (a) Decorated jar rim from Leang Balisao. (b) Decorated jar shoulder from Leang Balisao. (c) Smaller Bugis strike-a-light chert core. (d) Large Bugis strike-a-light chert core. (e) Possible strike-a-light hammer from Leang Balisao. (f) Bugis strike-a-light iron hammer.

Cenrana valley occupied between the thirteenth and seventeenth centuries (Bulbeck and Hakim 2005). The Lamoncong ethnographic collection unfortunately does not include any earthenware pottery, but it does include the Bugis paddle mentioned previously.

Metal

Ironware, including spearheads, krisses and knives, was sold in the Lamoncong market to To Ala' as well as Bugis customers (Sarasin and Sarasin 1905a: 277). Iron is present in four Bugis items in the Lamoncong ethnographic collection. One of the masks has a modern iron nail. The Bugis spear has a head, 21 cm long and shaped like a harpoon, of very hard, sharp iron. The Bugis digging stick has an iron blade of rectangular cross-section, 157 by 38 by 15 mm, in its socket. The strike-a-light set includes an iron hammer, shaped like a flat shoehorn, which had been hit against the two chert cores in the set (Figure 36.2c–d) to generate sparks. The hammer's bevelled margins bear the traces of this impact in the form of a flattened facet along the longer edge, a chain of rectangular facets along the other edge, and a silvery sheen to both edges (Figure 36.2f). Interestingly, the iron piece from Leang Balisao (tentatively identified as a knife blade on the catalogue card, No. 8108) could conceivably have also been a strike-a-light hammer (Figure 36.2e). Both of its margins are concave and pocked with shallow, quadrilateral indents. Although these indents look like steep scars, propagated from one face along one margin and the other face along the other margin, this effect could have been obtained if the edge of the hammer had hit the surface of a chert flint at an oblique angle.

Brass occurs on more items in the To Ala' ethnographic collection than iron does, even though no brass was recovered from the rock-shelter excavations. The fastening mechanism on the larger betel-nut carry bag has a brass ring, and four of the five To Ala' clubs have brass insets (compared to only three clubs with iron insets). Whether of brass or iron, the metal insets in the clubs were wedged into longitudinal grooves, accompanied in one case by two insets that slant across the club's long axis, and in another case by the placement of most of the insets at the end of the club. The metal insets show evidence of having been shaped for the task, especially (i) serration or bevelling of the edge protruding from the club, (ii) bevelling of the basal segment stuck into the groove, and (iii) sides that have been cut to shape or, in one case, trimmed through bipolar retouch (Table 36.5). Only brass or iron had been used for the clubs with two to five insets but both metals are present in the clubs with seven to twelve insets. This observation, along with the minimal standardisation in the dimensions of the insets, suggests that pieces of scrap metal at hand had been opportunistically used by the club maker to give the weapon additional 'bite'. Sarasin and Sarasin (1905a: 274) opined that these clubs used to take insets of flaked stone. They could have bolstered this opinion had they been able to recognise the backed microliths in the assemblages they excavated, and had they foreknowledge of research by twentieth century Australian archaeologists into the use of backed microliths as hafted tool insets (e.g. McCarthy 1943: 149).

Backing retouch on flaked stone artefacts is defined by the presence of steep scars that converge along the blunted edge from both faces, by dint of bipolar retouch (McBryde 1985: 232). Precisely this form of retouch is present along both margins of the second artefact of iron from the Lamoncong excavations, a rusted blade fragment from Lower Cakondo (No. 8073; Figure 36.3h). The retouch imparts a distinctly serrated morphology to the margins of the blade. Combined with the evidence that backed microliths were the longest practised Toalean 'type', a topic to which we now turn, this artefact indicates retention of bipolar blunting until the Iron Age at Lamoncong.

Table 36.5 Dimensions in mm and other attributes of the metal insets in the To Ala' clubs.

Club	Metal	Length	Width	Thickness	Other observations
No. 868	Iron	48	27	8	Inset longways
" "	Iron	44	~22	3	Inset longways
" "	Iron	22	13	4	Wedge (holding piece)
" "	Iron	22	7	1	Wedge (holding piece)
" "	Iron	21	10	2	Inset longways; blade bent over
" "	Iron	20	~20	1	Split edge
" "	Iron	20	~5	2	Inset longways; bevelled edge
" "	Iron	~17	7.5	2.5	Standing inset; guttered edge
" "	Brass	16	~15	1	Serrated edge
" "	Iron	~13	7	2.5	Standing inset; serrated edge
" "	Iron	10	10	7	
" "	Brass	10	~5	1.5	Vessel rim fragment
No. 869	Brass	44	25-30	1	Inset longways; corroded
" "	Brass	40	14	6	Rim fragment; jagged upturned sides
" "	Iron	39	25	3	Inset longways; pentagonal shape
" "	Brass	37	13-17	3	Inset longways; bevelled edge
" "	Brass	34	18-24	3	Inset longways; bevelled edge
" "	Iron	34	22	3	Inset longways; triangular shape
" "	Iron	15	22	2	Standing inset
No. 870	Iron	53	~22	1.5	Long inset; bevelled base, serrated edge
" "	Iron	52	~37	4	Inset longways
" "	Iron	35	26	3	Inset longways
" "	Iron	31	23	1	Long inset; bevelled base, serrated edge
" "	Iron	31	8	4	Wedge (holding piece)
No. 871	Brass	25	~12	1	Inset longways; serrated edge
" "	Brass	24	~14	1.5	Inset longways; serrated edge and sides
" "	Brass	19	11	1.5	Inset longways; serrated sides
" "	Brass	14	?	1.5	Inset longways; serrated edge
No. 872	Brass	27	10-12	1.5	Inset longways; serrated twisted edge
" "	Brass	14	15.5	2	Bevelled base; bipolar trimmed sides

Stone

Backed artefacts of flaked stone, most of which are microlithic, occur in greater number in the Upper Cakondo assemblage than the other three assemblages combined, yet Upper Cakondo lacks the Maros points found at the other sites (Table 36.2). Based on study of lowland assemblages, I have argued that Maros points disappeared from the Toalean after pottery appeared, whereas backed microliths — present in South Sulawesi by the early Holocene — then enjoyed a resurgence (Bulbeck 2004b: 141; Bulbeck et al. 2000:90; Pasqua and Bulbeck 1998:229). This chronology accords with the changeover from Leang Ululeba, whose pre-ceramic assemblage has yielded the majority of Maros points, to Upper Cakondo with no Maros points and most of the backed artefacts. The appearance in the Upper Cakondo assemblage of thin bone points, which may have been blowpipe darts (cf. Olsen and Glover 2004: 295), additionally supports the argument by Bulbeck et al. (2000: 103) that the introduction of the blowpipe led to the demise of archery (and Maros points) in South Sulawesi.

Application of the direct historic approach in ethnographic analogy (Hayden 1993: 129) to the Lamoncong backed flaked lithics would suggest they had been used as stone barbs set in clubs. Their maximum length, which is usually parallel to the backed edge, approximates 30 mm on average, while maximum width approximates half the maximum length, and the flakes tend to be thin (Table 36.6). The corresponding average dimensions of the metal insets in the To Ala' clubs are 27.7 ± 12.5 mm for length, 16.7 ± 8.2 mm for width, and 2.6 ± 1.8 mm for thickness (see Table 36.5). Apart from the thinner blade allowed by the use of metal scrap, the club insets and backed lithics have very similar average dimensions and similarly wide standard deviations, despite the very different production technologies employed. As another point of similarity, the flaking sequence used in making the backed lithics appears to have been more opportunistic than standardised. Half of them have had their point of impact removed through retouch, and the assemblages contain few if any pieces that resemble the ridge-straightening flakes described for standardised backed blade industries (Hiscock 1993: 67–9). To complete the description of the backed lithics (Figure 36.3e–g), they often have a backed length (measured with a cloth tape) longer than the maximum length, as the margin with backing is usually convex and typically backed along its full length. Steepness of the retouch is reflected in the retouch angle, which is close to perpendicular (Table 36.6). All pieces were made on chert except one example, from Upper Cakondo, made from fine-grained volcanic stone.

Maros points (Figure 36.3a–b) are recognised in this study by having a distinct, measurable hollow at the base flanked bilaterally by wings, as well as symmetric margins coming to a point, and at least some denticulate retouch along the margins. This definition excluded several points with features suggestive of Maros point blanks, including two from the Upper Cakondo assemblage. Specimens that fitted the definition are small — indeed, the second smallest class of Lamoncong lithics (see Table 36.8) — and considerably more standardised in their major dimensions (Table 36.7) than the backed lithics are.

Table 36.6 Main metrical features of the Lamoncong backed, flaked stone artefacts.

Measurement	Number of observations	Mean	Standard deviation	Range
Maximum length (mm)	24	29.5	7.7	17.5-45
Maximum breadth (mm)	24	16.1	4.3	10-24
Maximum thickness (mm)	24	4.3	1.7	2-9.5
Backing length (mm)	24	33.1	10.6	15-59
Retouch angle of backing (degrees)	15	81.3	6.5	70-90

Table 36.7 Main metrical features of the Lamoncong Maros points (all chert).

Measurement	Number of observations	Mean	Standard deviation	Range
Maximum length (mm)	9	21.8	3.2	16-27
Maximum breadth (mm)	9	12.7	2.3	9-16.5
Maximum thickness (mm)	9	3.0	0.9	1.5-4.5
Depth of hollowed base (mm)	9	3.1	1.4	1-5

Three of the five polished stone artefacts (Table 36.2) are chert pieces, evidently Toalean artefacts whose surface polishing shows transfer of this technology from bone (and suid teeth) to stone. One polished artefact from Leang Balisao is a Maros point whose dorsum, which is cortex, has clearly been polished smooth (No. 8102; Figure 36.3a). The second example from Leang Balisao is a polished point of soft stone, identified by its catalogue card as gypsum. The Ululeba polished artefact is a piece from a large chert (jasper) flake whose dorsum has been polished flat, and whose entire margin has been trimmed with bipolar retouch (No. 8094; Figure 36.3d). One of the two Upper Cakondo polished artefacts is a pointed blade, of chert, whose ventrum and two dorsal scars have been polished smooth, particularly the smaller scar which is flawlessly smooth (No. 8039 Box II). With maximum length, breadth and thickness of 34, 16 and 7 mm respectively, its dimensions resemble those of other chert points from Upper Cakondo (Table 36.8). Only one of the five artefacts is at all suggestive of 'Neolithic' technology. This

is a bipolar flake (41 x 30 x 14 mm) of coarse volcanic rock from Upper Cakondo, with one of its three dorsal facets bevelled and smoothly polished, suggesting that the flake had been detached from a large polished artefact (No. 8039 Box I; Figure 36.3c).

The classes of lithics, other than those discussed above, were recorded in less detail owing to time constraints. In particular, debitage was classified only for the Upper and Lower Cakondo shelters, and (apart from blades and cores) recorded in terms of its attributes only for the Upper Cakondo assemblage. The recognised debitage classes are complete flakes, transversely and longitudinally broken flakes, flake fragments, and debris (see definitions in Pasqua and Bulbeck 1998: 219–21). Some specimens in the assemblages do not appear to be flaked artefacts but instead are pot-lids or other examples of heat shatter. I recognised blades in cases of those flakes whose maximum length and flake length (distance from point of impact to termination) are both at least twice the maximum breadth, and whose dorsal arrises run parallel to the flake length. I recognised points in the case of flakes whose termination ends in a point. Hence a point, blade or pointed blade is also a flake, and the metrical data are presented (Table 36.8) so that the reader can, if s/he so wishes, aggregate the data and calculate the values for the more general classes (such as complete flakes).

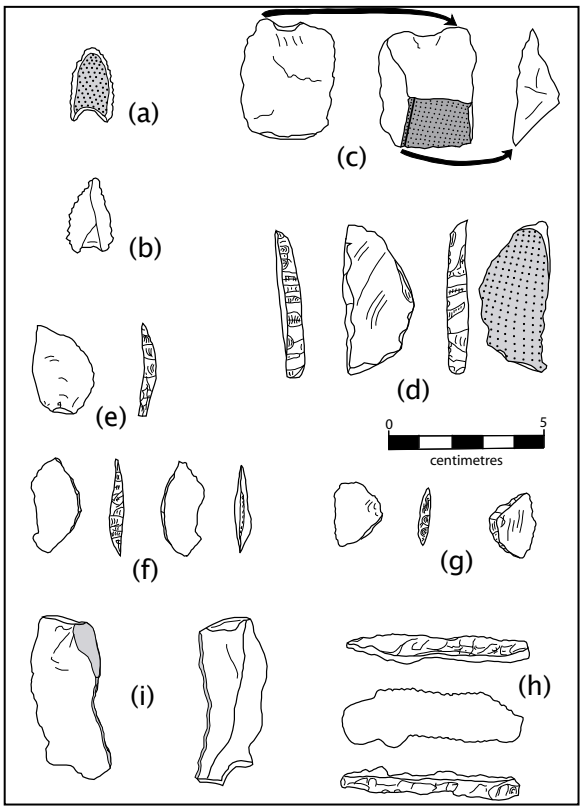

Fig. 36.3 Lamoncong artefacts illustrating Toalean flaking technology. (a)-(b) Maros points from Leang Balisao; (a) has dorsum of polished cortex. (c) Bipolar flake detached from polished volcanic implement, Upper Cakondo shelter. (d) Polished chert artefact with bipolar blunting along its margins, from Leang Ululeba. (e)-(g) Backed microliths from Upper Cakondo shelter; (e) would be classified as a point. (h) Iron piece with bipolar blunting along its margins, Lower Cakondo shelter. (i) Elongated flake from Leang Ululeba with gloss (shaded grey).

Larger artefact size appears to be associated with both retouch and utilisation (including gloss). This would make behavioural sense as larger pieces would be easier to handle and more likely to include a useful edge, and more promising candidates for edge maintenance through rejuvenating retouch. Accordingly, elongated pieces (blades and points) with both utilisation and retouch tend to be the longest of all the artefacts, while the chert flakes with both retouch and gloss/utilisation are the largest of the chert flake classes. The retouched points that lack utilisation traces from Upper Cakondo also tend to be quite large, but this is not true of those from Lower Cakondo, especially the two specimens that are also blades, which have the smallest average dimensions of any recorded artefact class (Table 36.8). This distinction between the Upper and Lower Cakondo retouched points is statistically significant on all three dimensions (maximum length, $t = 3.4$, d.f. 28, $p < 0.005$; maximum breadth, $t = 3.0$, d.f. 28, $p < 0.005$; maximum thickness, $t = 2.4$, d.f. 28, $p < 0.025$). The larger size of the Upper Cakondo retouched points suggests their production as spearheads while the much smaller size of the Lower Cakondo retouched points suggests an arrowhead function.

The proportion of Cakondo points that show retouch or utilisation traces is very high (44/57 = 77 percent) compared to other Cakondo flakes, whether the latter are blades (7/25 = 28 percent) or non-blade flakes (54/219 = 25 percent, excluding broken debitage). This focus of use and retouch on points, and the high frequency of points in the Cakondo assemblages (57/433 = 13 percent, or 61/457 = 13 percent if we include Maros points and backed and polished pieces), suggests that the reduction sequences practised at the Cakondo shelters were largely geared to the production of points. Elongated flakes, including a small proportion that cannot be distinguished from blades, are a common feature of the Cakondo lithics, but the non-pointed examples may have been largely incidental to the focus on making points. These comments are made in the context of the available specimens, which were recovered without sieving, with the result that the debitage and even the pieces of heat shatter rarely drop below 20 mm in terms of their maximum length (Table 36.8).

Volcanic artefacts tend to be slightly larger than their chert counterparts, and were mainly made from river pebbles rather than outcrop nodules, but technological differences are few. The larger size of the volcanic artefacts

Table 36.8 Dimensions in mm of lithic classes recorded from the Cakondo shelters. Sample sizes are shown by the sum of the 'UC No.' (Upper Cakondo number of instances) and 'LC No.' (Lower Cakondo number of instances) values in bold face.

Lithic class	UC No.	LC No.	Maximum length	Maximum width	Maximum thickness
Volcanic utilised retouched pointed blade	1	0	46.5	19	7
Volcanic utilised retouched point	1	0	55	23	5
Chert utilised retouched points	1	**1**	55.0 (53, 57)	22.8 (17.5, 28)	10.0 (8, 12)
Chert glossed pointed blade	0	1	53	12.5	4
Chert retouched glossed flakes	1	**2**	41.3 ± 9.8 (30–47.5)	14.5 ± 3.5 (12–18.5)	5.2 ±1.6 (4–7)
Chert utilised retouched flakes	6	**4**	35.6 ± 12.8 (16–58)	21.7 ± 5.8 (13–26.5)	8.5 ± 5.6 (1–21)
Chert retouched glossed blade	1	0	24	11	7
Chert glossed blades	3	0	45.7 ± 3.2 (42.5–50)	17.2 ± 4.2 (13–23)	6.7 ± 1.0 (5.5–8)
Chert utilised blade	1	0	39	14.5	5.5
Chert glossed points	0	2	45.5 (38, 53)	18.8 (12.5, 25)	6.0 (4, 8)
Chert utilised points	4	**2**	37.3 ± 4.4 (30.5–43.5)	19.8 ± 4.7 (12.5–27)	5.7 ± 1.1 (4.5–7.5)
Chert retouched pointed blades	0	2	16.5 (19, 24)	8.75 (7, 10.5)	2.75 (1.5, 4)
Chert retouched blades	2	0	39.8 (30.5, 49)	18.0 (13.5, 22.5)	8.8 (6.5, 11)
Volcanic retouched points	2	0	32.0 (31, 33)	19.0 (17.5, 20.5)	6.5 (6, 7)
Chert retouched points (Upper Cakondo)	14	0	36.1 ± 10.9 (27–68)	18.0 ± 3.5 (13–26)	4.9 ± 2.2 (2–10)
Chert retouched points (Lower Cakondo)	0	16	25.5 ± 5.8 (17–36.5)	13.9 ± 4.0 (9–20)	3.3 ± 1.4 (1.5–6)
Chert glossed flakes	2	**5**	31.0 ± 9.4 (20–43.5)	19.4 ± 4.1 (15–27)	6.4 ± 4.1 (3.5–15)
Chert utilised flakes	8	**7**	35.1 ± 8.0 (26–50.5)	20.0 ± 6.2 (12–34)	6.4 ± 1.7 (3–9.5)
Chert retouched flakes	19	**13**	29.9 ± 11.5 (16–62)	17.3 ± 5.0 (10–31)	5.1 ± 3.0 (1.6–14)
Chert blade points	2	**2**	36.0 ± 8.8 (27–48)	14.3 ± 4.7 (9–20.5)	3.8 ± 1.7 (2–6)
Volcanic blade	1	0	53.5	17	6
Chert blades	11	**6**	41.5 ± 11.5 (20–61.5)	13.9 ± 3.6 (8.5–20.5)	5.3 ± 2.5 (2–11)
Volcanic points	2	0	36.3 (34, 38.5)	23.5 (19, 28)	8.0 (6.5, 9.5)

Chert points	7	0	34.6 ± 4.6 (29.5–43)	16.7 ± 4.2 (10–22.5)	5.4 ± 3.6 (2–13)
Volcanic complete flakes	17	2	37.2 ± 7.6 (25–53.5)	22.4 ± 6.3 (10–33)	7.3 ± 2.6 (4–13)
Chert complete flakes	88	58	33.3 ± 8.9 (14–61.5)	19.6 ± 5.4 (10–37)	6.1 ± 2.6 (2–14)
Volcanic transversely broken flakes	2	0	39.0 (26, 52)	23.5 (17, 30)	6.0 (3, 9)
Chert transversely broken flakes	10	18	30.3 ± 4.7 (21–36)	21.9 ± 4.8 (16–30.5)	5.8 ± 2.9 (1.5–11.5)
Chert longitudinally broken flake	1	1	61.5	18	7.5
Volcanic flake fragments	4	0	31.4 ± 8.6 (25–44)	21.0 ± 5.4 (17.5–29)	8.3 ± 7.4 (3–19)
Chert flake fragments	16	12	30.0 ± 5.4 (19–39)	18.7 ± 5.0 (10.5–24)	6.7 ± 2.0 (4–10)
Volcanic debris	2	1	25.5 (24, 27)	14.8 (14, 15.5)	5.8 (5.5, 6)
Chert debris	24	2	29.1 ± 6.4 (21–48)	15.3 ± 4.0 (8.5–23)	7.0 ± 2.8 (2–13.5)
Volcanic heat shatter	1	0	30	16.5	6
Chert heat shatter	6	5	25.8 ± 5.5 (16.5–31.5)	20.8 ± 5.6 (13.5–30)	6.8 ± 4.2 (3–12)
Chert cores	9	**2**	37.0 ± 7.4 (26–51)	20.4 ± 5.5 (10.5–28)	11.2 ± 2.7 (8–17)

is shown by the maximum dimensions in Table 36.8, by the flake lengths, breadths and thicknesses in cases of Upper Cakondo specimens that have all these dimensions, and by the Upper Cakondo platform dimensions (Table 36.9). Cortex is usually absent on both volcanic and chert artefacts (Table 36.9) and hardly ever dominant (only four chert pieces and one volcanic piece from Upper Cakondo have 50 percent or more of their surface made up by cortex). However, when present, cortex is usually waterworn on volcanic specimens (71.4 percent) and almost always geological on chert artefacts (the only two exceptions have secondary weathering). Technologically, the volcanic pieces may show a higher ratio of bipolar production than the chert specimens, the dorsum is more often flat/convex or irregular in shape, and scars occur on the bulb of percussion less frequently, but other attributes show little or no difference (Table 36.9). In both the chert and volcanic pieces, core rotation is evident from the orientation of the dorsal scars which are typically perpendicular to the direction of detachment, or converge on each other, or simply irregular in their direction. In summary, the Lamoncong Toaleans evidently shaped their volcanic river pebbles and their chert and volcanic nodules into cores that allowed similar reduction strategies on both types of raw material.

Evidence from the cores themselves is available only for chert as I could not find any volcanic cores in the Lamoncong assemblages. The Cakondo cores were heavily reduced, to the point where only their maximum thickness was large by the standards of other artefact classes (see last line of Table 36.8). In all but three cases, reduction of the Cakondo cores had stopped short of bipolar flaking, but their small size would suggest the detachment of small flakes, late in the reduction sequence, that were missed by the Sarasins' excavation strategy. Interestingly, one of the cores in the Bugis ethnographic strike-a-light sets has similar dimensions (36 x 30 x 17 mm for maximum length, breadth and thickness respectively) to the larger Cakondo cores, although the other Bugis core is much larger (72 x 61 x 41 mm). None of the Cakondo cores displays the pattern of battered and scarred edges enveloping the core, which the Bugis strike-a-light cores show (Figure 36.2c–d), but one of the Lower Cakondo cores — the only single-platform core I observed — is distinctly battered along one edge of the platform. While this could have resulted from pounding or scraping use, it could also reflect use of the core for producing

Table 36.9 Technological attributes of the Upper Cakondo stone artefacts.

Technological attribute	Chert		Volcanic	
	n	Statistic	n	Statistic
Flake length	117	29.4 ± 10.5	21	32.0 ± 9.9
Flake breadth	117	19.3 ± 6.2	21	25.1 ± 9.4
Flake thickness	117	4.6 ± 2.2	21	5.3 ± 2.5
Platform width	140	11.9 ± 4.8	24	14.6 ± 7.0
Platform thickness	146	3.8 ± 2.0	24	4.5 ± 2.4
Platform angle	147	86.0 ± 17.2	24	85.7 ± 20.0
Bulbar angle	148	100.1 ± 14.9	24	99.8 ± 14.7
Specimens lacking any cortex	242	66.9%	35	80.0%
Geological cortex (if cortex)	80	97.5%	7	28.6%
High dorsal angle present	148	23.6%	25	12.0%
Strong dorsal ridging present	147	63.3%	25	52.0%
Concave dorsal shape present	146	69.2%	26	26.9%
Feather terminations on flakes	128	67.2%	23	73.9%
Parallel/sub-parallel dorsal scars	157	29.3%	26	23.1%
Flat or faceted platform surface	145	83.4%	25	76.0%
Wide-area platform type	143	69.2%	25	68.0%
Overhang removal present	147	48.3%	25	40.0%
Bulbar scar present	144	27.8%	24	12.5%
Bipolar flake production	165	4.2%	27	11.1%

sparks, as also suggested by the possible iron hammer from Leang Balisao. Certainly, it would not be permissible to infer lack of evidence for the use of chert strike-a-lights in the Lamoncong shelters, even if ethnographically this practice was restricted to the Bugis.

Discussion

The Leang Ululeba assemblage can be taken to represent the Lamoncong Toaleans in pre-ceramic times. Maros points (arrowheads?) are well represented along with a low presence of points from swine teeth (projectile points?) and backed lithics (club barbs?). The associated faunal refuse is limited to forest species, fully 25 percent from the dwarf water buffalo (Simons and Bulbeck 2004: 183). Babirusa canines and drilled bone pieces suggest attention to personal decoration, and awls of polished bone would have been used either in drilling holes in pendants or in textiles and basketry. The practice of polishing chert, probably a technological transfer from polishing bone, is indicated by a piece which also has bipolar trimming along its entire margin. Use of plant resources is indicated by at least one flake with abundant gloss (No. 8093; Figure 36.3i) but not by any definite plant macrofossils, whose absence probably reflects the prehistoric antiquity of the habitation deposit at the site.

The Upper Cakondo assemblage resembles Ululeba in the presence of polished babirusa canines and drilled bone fragments, and the lack of iron and remains of deer or domesticated animals. It differs from Leang Ululeba in lacking Maros points and bone awls, and in having pottery, polished volcanic stone, thin bone points, marine shell, plant macrofossils, and abundant backed microliths and swine tooth points. Chert points larger than Maros points (the ranges for maximum length do not overlap — Tables 7 and 8) are also common. The loss of Maros points and proliferation of 'miscellaneous' points and backed microliths are changes observed to accompany the transition from pre-ceramic to ceramic Toalean assemblages along the south coastal lowlands (Bulbeck et al. 2000: 84). The explanation for this change would appear to be the replacement of archery with blowpipes, whose introduction is reflected in the appearance of thin bone points, at a time when clubs and spears (both found in the To Ala'

ethnographic collection) retained or even increased their importance in hunting. The establishment of wider contacts as far as the seaboard, probably by dint of the arrival of newcomers from the coastal lowlands, is witnessed by the appearance of marine shell and pottery. By and large the assemblage would appear to be prehistoric late Holocene, although habitation into the second millennium AD is indicated by an imported stoneware sherd and the preservation of fragile bast knots. The chronology may match that at the 'Neolithic' site of Bulu Bakung, a factory for axe and adze blanks in the upper Walanae, dated to between c. 2500 and 500 years ago (Bulbeck 2004b: 144–5; Hasyim 2001: 156).

The Lower Cakondo and Leang Balisao assemblages would appear to include a middle Holocene component, as witnessed by the presence of Maros points and, at least at Lower Cakondo, other retouched points of the same small size. However, these assemblages are on balance the most recent (certainly true of Leang Balisao, inhabited at the time of excavation) and also produce the closest parallels with the To Ala' ethnographic collection. Remains of deer, dog, chicken and water buffalo occur in the faunal refuse, along with a larger quantity of pottery than at Upper Cakondo, including eighteenth to nineteenth century tableware at Balisao. Also, babirusa canines and polished bone implements are absent, and Leang Balisao lacks drilled bone pieces. Specific parallels with To Ala' ethnography include iron and betel nuts, found at both sites. Lower Cakondo and Leang Balisao would appear to have still been inhabited after the establishment of the Lamoncong market, a development which, itself, would have probably stimulated the To Ala' to intensify their collection of forest produce for trade (cf. Sarasin and Sarasin 1905a: 275). The traditional practice of silent trade, recalled by Bugis informants, would have been a less efficient vehicle for commerce.

The recent intensification of relationships between the Bugis and To Ala' was very likely responsible for the epidemic that had wiped out all but 100 of the Lamoncong To Ala' in the late 1890s (Sarasin and Sarasin 1905a: 277). This disaster must have seriously eroded the traditional knowledge base of the To Ala', thus explaining certain discrepancies between the excavated assemblages and the ethnographic collection, such as evidence of strike-a-light sets in the former but not the latter. Other differences, such as brass in the ethnographic collection but not the rock shelters, may be attributed to an increased availability of manufactured goods. Given the circumstances, the evidence for direct continuity of the same population from Toalean times to the ethnographically recorded To Ala' is remarkably good.

Relations between the To Ala' and the Bugis, however, probably went back centuries before the arrival of the Sarasins. The Sarasins reported that the mortuary custom of the To Ala' formerly involved cremation of the corpse, a practice then unknown in Sulawesi (Sarasin and Sarasin 1905a: 291). Later research demonstrated cremation of the corpse by the Bugis in the centuries leading up to their seventeenth century conversion to Islam (Pelras 1996: 106, 133–8; van Vuuren 1914: 1–2), and an Early Metal Phase custom, recorded archaeologically in the Maros lowlands, of burning the defleshed bones of the deceased before interring them (Bulbeck 2004a: 234–7). Possibly, the To Ala' account recorded by the Sarasins was actually the garbled memory of a former Bugis practice, whereas the To Ala' had always inhumed their deceased, as the Upper Cakondo burial might suggest. However, it would be more parsimonious to infer that the To Ala' had adopted cremation — probably from their Bugis neighbours in late pre-Islamic times — and continued it long enough to recall it as a former practice up to a time when the local Bugis had forgotten this old custom. The To Ala' betel nuts and paraphernalia point to a similar inference — betel nuts have no apparent role in Bugis ethnography (they are not discussed by Pelras 1996) except for being peremptorily chewed in certain Bugis ceremonies, suggestive of a significant role in times gone by (Sirtjo Koolhof, pers. comm., September 1996).

The external influences evidenced by the Upper Cakondo assemblage may date back to proto-Bugis or even proto-South Sulawesi times (cf. Bulbeck 1992: 512–5). The likely use of the bipoints as blowgun points, a technology that probably originated in Borneo, would betray an early Austronesian connection (Olsen and Glover 2004: 295; Oppenheimer 1998: 74–75). This is also the case for the To Ala' thigh xylophone, and perhaps the masks too. The latter had intriguingly emerged from a Bugis house in the context of the Sarasins' (1905a: 291) discussions with the Balisao on the former To Ala' practice of cremations. Similar masks may have formerly been widespread at funerals in Sulawesi, and thus reached the To Ala' who continued to make them after the Bugis had dropped them from their cultural repertoire (at least, until occupying Lamoncong). Thus, early Austronesian influence on the ancestors of the To Ala' would appear to have had a significant influence in Lamoncong, though there is no evidence that this influence then extended to agriculture or the husbandry of domesticated animals.

Conclusion

The To Ala' ethnographic collection and the Toalean excavated assemblages, obtained by the Sarasins from the Lamoncong highlands, complement each other as sources on a layered culture history of the district. The oldest layer, best represented by the Leang Ululeba assemblage, refers to forest hunter-gatherers whose armoury included spears and archery, who had babirusa canines and drilled bone pieces as personal ornaments, and who occasionally blunted the margins of their stone artefacts including pieces of polished chert. The second layer may have involved the introduction of some pottery but not, on the available evidence, any shift to farming. Early Austronesian influences are suggested by the replacement of archery with blowpipes, and the likely introduction of thigh xylophones and death masks at this stage. However, the rising importance of stone-tipped spears and hafted stone barbs is paralleled in ceramic-period Toalean assemblages in the South Sulawesi lowlands. This observation suggests that the direct channel for external influences was the peninsula's Toalean network.

The third layer reflects early historical Bugis influence, including pottery, betel nuts and other exotic goods obtained through silent trade, perhaps also iron strike-a-light hammers as part of this package. More intimate relationships are also suggested by the former To Ala' practice of cremations and the dominance of geometric motifs, similar to those in early historical Bugis and Makasar assemblages, in To Ala' iconography. Traditional Toalean forms of body decoration seem to have been lost during this stage, and archery may have disappeared. This period of early Bugis historical influence grades into Lamoncong's 'Modern Period' or ethnographic present. A market was established at Lamoncong, local Bugis declared the To Ala' the subjects of the raja of Bone (the most powerful of the Bugis kingdoms), and an epidemic devastated the Lamoncong To Ala' (not necessarily in that order). The To Ala' became known as specialists in the collection of forest produce for trade and skilled hunters accompanied by dogs, though they cultivated gardens by this time. Clubs barbed with metal scrap rather than stone flakes, and bamboo spears no longer tipped with bone or stone points, were perhaps the most prominent elements of the To Ala' material culture connecting them with their past.

At some point during the twentieth century the To Ala' ceased to be viable as a separate ethnic group. The Sarasins were not trained ethnographers, so many details of To Ala' ethnography remain elusive. Nonetheless the archaeological record gives us a long-term perspective on the To Ala' that not even the most professional ethnographic account could, of itself, provide.

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