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THE BRONZE-IRON AGE OF SOUTH SULAWESI, INDONESIA: MORTUARY TRADITIONS, METALLURGY AND TRADE

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Introduction

The province of South Sulawesi comprises the southwest peninsula and southern central highlands of the island of Sulawesi, formerly called the Celebes (Figure 1). Given the dates elsewhere in the Indo-Malaysian Archipelago (Glover and Syme 1993:63), bronze and iron would have appeared more or less concurrently in South Sulawesi perhaps more than two millennia ago. Recognizing the contemporaneity of these two metals in Indonesia, van Heekeren (1958) coined the term Bronze-Iron Age, which he drew to a close in the 16th-17th centuries with the arrival of the Europeans. Later archaeologists have preferred the terms Early Metal Phase, referring to the time until the early centuries of our millennium (Bellwood 1985), Iron Age (Bronson 1992) and Bronze Age (Glover and Syme 1993). For two reasons, this paper will retain van Heekeren's term, firstly to emphasize that we are discussing the time before brass and wootz steel reached Island Southeast Asia in significant quantities (cf. Bronson 1992), and secondly because European manipulation of social developments in South Sulawesi was slight until the late 17th century, when the Dutch won control over the entrepôt of Macassar.

Defined thus, the Bronze-Iron Age also witnessed the evolution of politically centralized societies in the South Sulawesi lowlands, culminating in the Bugis and Makasar[1] kingdoms which embraced Islam at the start of the 17th century (Caldwell 1995). Muslims right across South Sulawesi have incorporated deepseated pre-Islamic traditions within their religious beliefs, and to this day rural Muslims revere ancestral sites, rehearse stories from the past, and perpetuate time-honoured ceremonies (Pelras 1985). Local ethnohistory is thus a vital resource complementing the bounteous corpus of historical texts and archaeological remains relevant to the Bronze-Iron Age of South Sulawesi (Kallupa *et al.* 1989; Bulbeck 1992; Bougas 1996).

The ancient history of the Indo-Malaysian Archipelago, specifically its western region, extends back two thousand years, yet South Sulawesi

[1] Note the spelling conventions used in this paper: Makasar for the ethnic group and language, Macassar for the capital city of South Sulawesi (now Ujung Pandang). In addition, the letter "a" at the end of a word indicates a glottal stop, even though these are not used in the official spellings for place names; hence, for example, Luwuk for the kingdom but Luwu for the presentday county.

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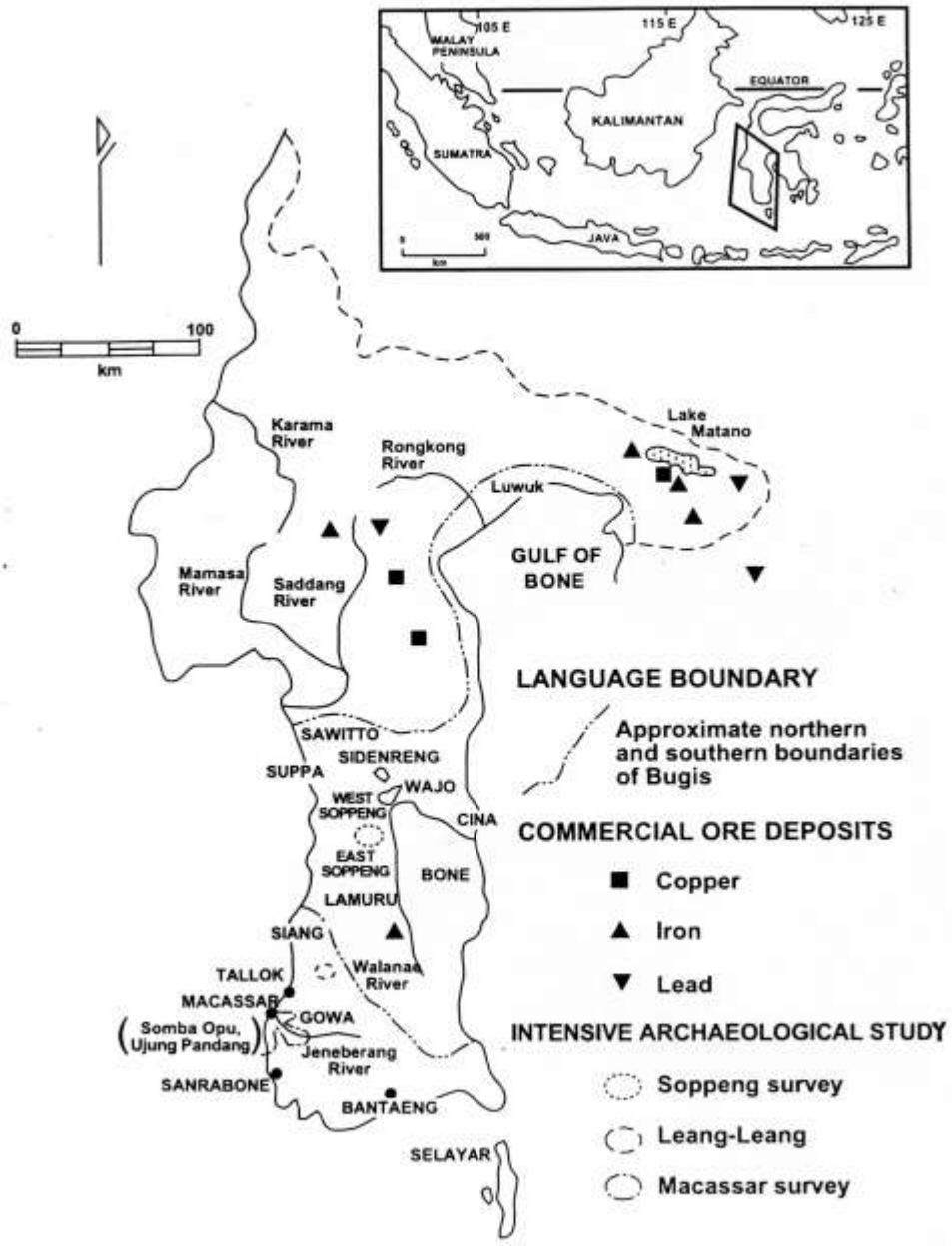


Figure 1 South Sulawesi: major natural features, commercial ore deposits, historical kingdoms, and archaeological field work.

remained under the wraps of prehistory throughout the first millennium AD. Javanese and Malay literature of the early second millennium includes occasional references to South Sulawesi places (Reid 1983), contemporary with the earliest local oral traditions that became incorporated within Bugis and Makasar historical writings. After c. 1400, when the Bugis commenced writing with an adapted Indic script, South Sulawesi texts diversified into aristocratic genealogies, accounts of rulers' accomplishments, and vassal lists, some of which were synthesized into the "chronicles" of the major 17th century royal houses (Caldwell 1988; Macknight 1993). European accounts open with Tomé Pires' notes on South Sulawesi, which he collected from traders in Melaka after it was taken by the Portuguese in 1511, and continue with eye-witness records from the mid-16th century onwards (Pelras 1981). 17th century European records focus on Macassar which the Dutch East India Company (or VOC), in alliance with the Bone and Soppeng Bugis, occupied in 1667 at the conclusion of the Macassar War (Bulbeck 1990).[2]

South Sulawesi has been the subject of archaeological research for more than a century, ever since the early forays by Engelhard (1884) and the Sarasins (1905). Dutch archaeologists and administrators continued an active programme of survey, excavation, and the restoration of monuments until the early 1950s, as summarized by van Heekeren (1958, 1972). After the trials of Indonesian independence, the 1969 Australian-Indonesian Archaeological Expedition to South Sulawesi (Mulvaney and Soejono 1970a, 1970b), followed by the work of Ian Glover (1976, 1978, 1981) in Leang-Leang (Figure 1), introduced modern standards of archaeological research. In more recent times, Indonesians have taken over the main initiative in developing the province's abundant archaeological resources (e.g. Muttalib 1978; Subagus 1986; Ramli *et al.* 1992). My own project, code-named the "South Sulawesi Prehistoric and Historical Archaeological Project" (SSPHAP), coordinated two surveys, of which the Soppeng survey focused on sites associated with major historical toponyms (Kallupa *et al.* 1989), while the Macassar survey targeted 12th-17th century burial sites (Bulbeck 1992). In all, there probably has been more archaeological research in South Sulawesi than in any other Indonesian province outside of Java. Accordingly the time is due to gather the scattered evidence on the Bronze-Iron Age in South Sulawesi, so as to develop a provisional profile of indigenous metallurgy, the transformations in mortuary tradition, and the trade connections with the wider archipelago.

Of all the trade goods which have moved through the archipelago, spices from the islands east of Sulawesi may have had the greatest influence on the pattern of events. Cloves were apparently imported into Syria by 1000 BC (Frank 1993:408) and China by 300 BC, while both cloves and nutmeg were known to the ancient Greeks and Romans (Miller 1969). The major trade route would appear to have run along the Sunda chain between the "spice islands" in the east and south Sumatra in the west, as

[2] The VOC also claimed Selayar and the whole south coast of the peninsula as their conquests during the Macassar War (Andaya 1981), and this point is significant when we later consider the distribution of axes in South Sulawesi.

marked by the trail of Heger Type I Dong Son drums whose date of manufacture can be assigned to the initial centuries AD (Spriggs and Miller 1989). The battle to control cloves and nutmeg originally drew the Portuguese to Melaka, and later drove Macassar and the VOC to establish rival trading empires, until the VOC affirmed its monopoly over the spices by occupying Macassar (Andaya 1981). So it is important to be aware of the trade in cloves and nutmeg as a backdrop to our documentation of South Sulawesi's Bronze-Iron Age.

Background to the Bugis and Makasar

Bugis and Makasar belong to the South Sulawesi language group which covers a large, continuous area from Selayar Island in the south, to Sulawesi's central highlands in the north (Figure 1).[3] Bugis is the most widespread language, with ten dialects spoken by several million people in the main body of the peninsula and along the Gulf of Bone, not to mention further millions of Bugis in colonies throughout the Indo-Malaysian Archipelago. The Makasar languages, which include Konjo and Selayar, are spoken by approximately two million people who occupy the land south of the Bugis (Grimes and Grimes 1987).

South Sulawesi has abundant fertile soils along the lowlands either side of, and in between, the two volcanic cordilleras running north-south along the peninsula. The main body of these fertile lowlands corresponds to the heartlands of the historical "agrarian" Bugis kingdoms of Sawitto, Sidenreng, Wajok, Soppeng and Bone (Figure 1). Two monsoons inundate the coastal lowlands, in a pattern whereby the west coast is hit by the December-February monsoon, and the east coast receives a weaker monsoon approximately six months later. Both monsoons are trapped in the peninsular cordilleras and central Sulawesi highlands, resulting in biennial inundation along the main rivers that drain the mountains. The combination of geology, topography and climate has provided ideal conditions for wet-rice agriculture, with one reliable crop a year over most of the peninsula, and two crops a year along stretches of the Walanae and Saddang valleys (Oldeman and Darmiyati 1977).

Of all places in eastern Indonesia, the South Sulawesi lowlands most clearly present a pattern of dense populations living in a peasant economy, and this agrarian formation can be traced back to at least the 15th century (Macknight 1983). The total population of the Bugis and Makasar by the 17th century can be conservatively estimated at a million.[4] Seafoods have also played an important part in the subsistence economy,

[3] The Tamanic languages of central Kalimantan appear to be a geographic outlier of the group, possibly possessing a specific relationship with Bugis (Adelaar 1994).

[4] Both the historical and the archaeological evidence on the mid-17th century population of Macassar city and its surrounds suggests 300-400,000 (Bulbeck 1992:458-60). It would be surprising if this figure represented more than 25% of the peninsula's inhabitants although, admittedly, comparable studies have not been pursued for other, contemporary South Sulawesi kingdoms. The first estimate to be made of the population of Sulawesi is Forrest's figure of two to three million in the late 18th century (Forrest 1792:72). Whilst in Sulawesi, Forrest spent most of his time among the Bugis and Makasar who accordingly would have constituted the basis for his estimate.

owing to the narrowness of the peninsula and its long coastline. South Sulawesi is also strategically located on the sea routes between eastern and western Indonesia, and both the Bugis and Makasar are renowned seafarers and traders.

Mainland East Asian tradewares in Island Southeast Asia

The dating of historical sites in South Sulawesi benefits enormously from the typical presence of ceramics imported from the mainland, especially China. We can appreciate how advanced ceramic technology was among the Chinese by noting their invention of stonewares with an ash glaze by the Shang period, porcellanous wares carrying transparent glazes by the mid-first millennium AD, and translucent porcelains by 1000 years ago. The Chinese potters also continued to produce earthenwares, as the lower firing temperatures were suitable for the application of lead glazes with their striking monochrome and polychrome effects. By the T'ang Dynasty two major technological innovations had emerged: the production of stonewares carrying polychrome glazes, and the painting of green and brown pigments beneath (and sometimes on) transparent-glazed wares (Satō 1981). By the beginning of the second millennium AD, Chinese potters had widened their decorative repertory to include decorations painted in iron black under the glaze, and overglaze enamel decorations. Underglaze cobalt-blue decorations rapidly came to dominate China's production after adoption of the technique from the Middle East in the late 14th century (Medley 1974; Guy 1986).

There is no evidence of an international trade of any significance in pre-T'ang ceramics, which reflects the dominance of silk among China's exports during the first millennium AD (Guy 1986; Liu 1988:64), but during the T'ang Dynasty a wide range of Chinese tradewares reached the major ports across the Old World. These date back to the eighth century at the Middle Eastern site of Siraf, and included Yüeh-type 越 grey stonewares, whitewares, coarse stoneware jars,[5] and Ch'ang-sha 長沙 painted wares (Tampoe 1989). Similar T'ang wares have been recovered from coastal sites in Egypt, then along South Asia's coast and the Malay Peninsula, and as far north as Korea and Japan (Mikami 1980-81; Feng 1981; Guy 1986; Nik Hassan and Kamaruddin 1993). Within Island Southeast Asia, T'ang wares have been found only in south Sumatra and Java, complemented by small amounts from Bali, Borneo (Adhyatman 1983; Ridho 1990) and possibly South Sulawesi,[6] followed by rare Five Dynasties pieces from Butuan in the southern Philippines (Ronquillo 1987). During the Northern Sung Dynasty, the Chinese court promoted the shipbuilding industry and exportation of manufactured goods. China's

[5] Probably produced in North Vietnam as well as South China (Harrisson 1986).

[6] As noted by Hadimuljono and Macknight (1983:67), Orsoy de Flines recognized two T'ang pieces from South Sulawesi, a complete phoenix-headed ewer reportedly from Maros, and a broken bowl collected in Bone (discussed in a later section of this paper). On the other hand, Adhyatman (1983:9) challenged de Flines' identification of these pieces as Yüeh olive-green wares, as no examples have been documented among the enormous quantity of tradewares recovered from pre-Islamic cemeteries in South Sulawesi. Of course, Adhyatman's objection could reflect extreme rarity of T'ang pieces rather than complete absence.

ceramic trade expanded dramatically during the Sung and Yüan dynasties, both in terms of export volume and the number of foreign markets reached, especially within Southeast Asia (Lo 1969; Feng 1981; Guy 1986).

China would appear to be the ultimate source of the tradition of manufacturing glazed ceramics as practised by every major ethnic group during historical times in Mainland Southeast Asia. As early as the Han Dynasty, after the Chinese occupation of North Vietnam, the local ceramic industry turned out white-bodied stonewares, mainly in Chinese-inspired shapes, for the sinicized elite (Brown 1988). The Vietnamese and Khmers produced glazed stonewares during both millennia AD, the P'iao and Mons made glazed earthenwares during the first millennium AD, and the Chams, Burmese, Thais, and Laos manufactured glazed stonewares during the present millennium (Brown 1988; di Crocco 1992; Richards 1995). Examples of even the small traditions, e.g. Burmese (Adhyatman 1990) and Cham wares (Burns and Ronquillo n.d.), are beginning to be identified at sites within the Indo-Malaysian Archipelago. However, only the Thai and Vietnamese wares occur at all frequently. Even then, Chinese wares dominate the assemblages, apart from special cases such as the high occurrence of Vietnamese wares at Majapahit sites in Java (Satari 1981; Ridho 1983). Ceramic experts used to believe in a 15th century "Ming gap" in China's ceramic exports, which let the Thais and Vietnamese secure a niche in the trade of glazed ceramics to Island Southeast Asia (Guy 1986), but this idea has given way to the realization that the ever-growing demand provided room for new players, even while Chinese exports continued to burgeon throughout the Ming Dynasty (Richards 1995:3).

The 42,980 tradeware pieces identified at SSPHAP's sites have been classified according to the 29 classes described elsewhere in detail (Bulbeck 1992:App. B). Seriation of these classes (Appendix A) allows them to be dated in close agreement with the chronologies proposed by East Asian ceramic experts (Guy 1986; Brown 1988; Richards 1995). The important point to note here is the transition from 12th-14th century assemblages dominated by whitewares and monochromes, accompanied by occasional wares with iron decorations under the glaze or enamelled overglaze decorations, to the enormous variety of Ming-period ceramics with a focus on blue-and-white wares. Note also that with the very limited trade in pre-Sung wares, Chinese ceramics are an insensitive indicator of the degree to which South Sulawesi communities may have been engaged in long-distance trade during the first millennium AD.

General Chronology of South Sulawesi's Archaeology

A brief survey of the early prehistory of South Sulawesi is required to contextualize the Bronze-Iron Age, for two main reasons. Firstly, as will be explained, ancient traditions such as the knowledge of stone knapping apparently persisted in an adapted form throughout the Bronze-Iron Age. This is important evidence of cultural continuity over the very long term. Secondly, many of the excavated rock shelters combine premetallic and metallic remains. To understand either, we need to understand both.

Note also the scope for an ethnoarchaeology of metal remains in South Sulawesi, given the circumstances of cultural continuity and long-term utilization of the same sites, including 20th century accounts of the continued use of rockshelters near Lamoncong (van Heekeren 1972:108), in Bone (van Heekeren 1949:97) and at Batu Ejaya (van Stein Callenfels 1938:581). That is, by linking modern metallic remains to the patterns of cultural activities which produced them, the archaeologist stands in a better position to interpret finds from Bronze-Iron Age layers.

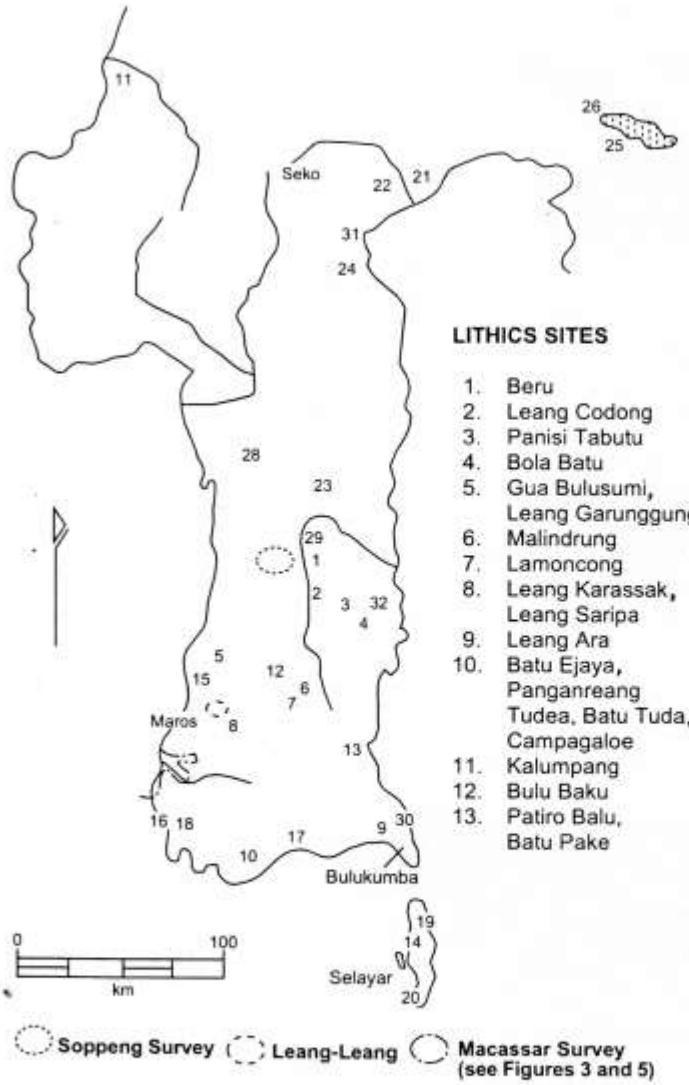
Prehistory and its legacy

The oldest recorded artifacts may be the heavily water-rolled lithics embedded within the higher terraces of the Walanae River at Beru (for site locations, see Figure 2). These flaked gravels and flakes, which are assigned to the Cabenge industry, appear to date to the Late Pleistocene, possibly in excess of 31,000 years ago. They are morphologically different from the less patinated lithics, embedded in the lower terraces at Beru, which resemble the 31-19,000 year old stone artifacts excavated by Ian Glover at Leang Burung 2, Leang-Leang (Bartstra *et al.* 1991; Keates and Bartstra 1991/92; see also Glover 1981).

Archaeological research on Holocene prehistory has focused on the Toalean, first identified through excavations by the Sarasin cousins (1905) at rockshelters near Lamoncong in the upper Walanae Valley. They coined this term with reference to the local enclave of *Toala* or "forest people" who would still occasionally use the shelters as dwellings, although they no longer had any knowledge of the manufacture or use of knapped stone. The Toalean is recognized by the appearance of microliths (small stone tools) including backed blades and geometric microliths between 7000 and 6000 BP, and serrated points, such as the hollow-based Maros points, by 5500 BP (Glover 1976; Glover and Presland 1980:36-39). The majority of identified Toalean sites are rockshelters (Table 1), but site surveys have recorded geometric microliths at Campagaloe (Mulvaney and Soejono 1970a:168), Maros points at Malindrung (Iwan Sumantri pers. comm.), and backed blades, geometric microliths or Maros points at ten sites within the Macassar survey area (Figures 3-4).

An earlier, aceramic phase of the Toalean is represented at Leang Saripa, Ulu Leang 1 spits 4-11, Leang Burung 1 Trench A spits 17-23, and Leang Burung 1 Trench B (Table 1). Three of the open sites in the Macassar survey area, Bukit Bikulung, Gentung (Bulbeck 1992:243, 317) and Pammangkulang Batua (Pasqua 1995), are best interpreted as aceramic Toalean sites which were subsequently used for other purposes, involving activities that left a small quantity of potsherds.

Polished and ground stone artifacts, which correctly speaking should define the "New Stone Age", are usually sparse in late Holocene assemblages of the Indo-Malaysian Archipelago (Bellwood 1985:226), whose Neolithic is therefore generally identified by the appearance of earthenware pottery. Radiocarbon dates from Leang-Leang currently place the arrival of pottery at around 1500 BC (Bulbeck 1992:23; Bulbeck 1995:6; Bulbeck and Pasqua in prep.). Projectile points continued to be



LITHICS SITES

1. Beru
2. Leang Codong
3. Panisi Tabutu
4. Bola Batu
5. Gua Bulusumi, Leang Garunggung
6. Malindrung
7. Lamoncong
8. Leang Karassak, Leang Saripa
9. Leang Ara
10. Batu Ejaya, Panganreang Tudea, Batu Tuda, Campagaloe
11. Kalumpang
12. Bulu Baku
13. Patiro Balu, Batu Pake

METAL SITES

9. Leang Tattara
11. Kalumpang
14. Papanlohea, Tile - Tile
15. Ujungloe, Malewang, Palambeang
16. Sanrabone
17. Bantaeng
18. Sompu
19. Batang Mata Sapo
20. Nipotokka
21. Patimang
22. Baebunta, Sabbang
23. Tosora
24. Kakarangan
25. Soroako
26. Mantano
27. Cerekang
28. Massepe

BURIAL SITES

4. Lampokko
14. Parangeang
29. Sompoh
30. Sapohatu
31. Palopo
32. Watampone

Figure 2 General South Sulawesi sites referred to in the text.

made of stone, but without the hollowed base, as recorded at ceramic-rich deposits at Leang Karassak (Pasqua 1995) and Batu Ejaya (Chapman 1981, 1986). A very late example of a serrated projectile point, collected at Pabundukang Tua ("16" in Figure 3), can be dated to the 13th-15th centuries, based on the class of stoneware from which it was made (Appendix B). Backed microliths also continued to be made during the ceramic phase of the Toalean as demonstrated at Leang Burung 1 Trench A spits 1-16 (Table 1), Leang Karassak (Pasqua 1995), and the ceramic-rich open

Table 1. Summary of Contents from Toalean Rockshelters

SITE	Maros points	Backed microliths	Pot-sherds	Polished stone	Bronze	Iron	Glass	Human bone
Leang-Leang								
Ulu Leang 1:								
spits 1-3	xx	x	x	-	-	x	EM	B
spits 4-11	x	xx	-	-	-	-	-	-
Leang Burung 1:								
Trench B	xx	x	x-	-	-	-	-	B
A spits 1-16	x	xx	xx	-	-	x	M	FF
A spits 17-23	x	x	-	-	-	-	-	F
Leang Pattae	x	x	x	-	-	-	-	-
Leang Paja	x	x	xx	-	-			FF
Other Maros								
Leang Lampoa	-	?	xx	-	-	-	-	FF
Leang Karassak	x	x	xx	-	-	x	-	F
Leang Saripa	xx	x	x-	x	-	-	-	-
South Coast								
Batu Ejaya 1	-	-	xx	x	x	x	M	T
Batu Ejaya 2	-	x	x	-	x	-	-	T
Panganreang Tudea	x	xx	x	-	x	-	E?	BF
Leang Batu Tuda	-	x						
Leang Ara	x	x	x	-	-	-	E	F
Pangkajene								
Gua Bulusumi	x	x	x	x	-	-	-	-
Lamoncong								
Leang Cakondo 1	x	x?	x	-	-			FF
Leang Cakondo 2	x	x?	x	-	-			FF
Leang Ulebaba	-	-	x	-	-			F
Leang Balisao	-	-	x	-	-			T
Tomatoa Kacicang	-	x?	x	x	-	x	E	-
Bone and Soppeng								
Bola Batu	-	x?	x-	x	-	x	-	FT
Panusi Tabatu	-	-?	-	-	-	-	-	-
Leang Codong	-	-	x-	-	x	x	E	TF

Note re Table 1: Data from Bulbeck and Pasqua (in prep.) and this paper. XX = abundant, X = present, X- = negligible quantity (potsherds), - = absent, E = early glass, M = modern glass, B = primary burial, FF = abundant human fragments, F = human fragments, T = human teeth.

sites of Balang Sari, Bonto Ramba Tua, and Pakka Mukang within the area of the Macassar survey (Bulbeck and Pasqua in prep.).

The only rich assemblages of polished lithics recorded in the whole of South Sulawesi come from the three sites of Sempaga, Kamassi and Minanga Sipakko, near Kalumpang at the far northwest of the province (Figure 2). All three sites contained polished stone axes, either oval or rectangular in shape, plus evidence of on-site manufacture at Kamassi and Minanga Sipakko in the form of unfinished axes (van Heekeren 1972:184-90). In addition Kamassi contained projectile points and knives of polished slate and schist, which are unmatched in any assemblage from the peninsula.

From the peninsula itself we have no more than 30 provenanced items of polished stone, despite decades of survey and excavation. The most frequent class is axes, represented by 16 complete axes and fragments from ubiquitously distributed sites,[7] not to mention 26+ unprovenanced axes collected or purchased at various places in the southern reaches of the peninsula.[8] The rarer classes include three stone bracelets; several stone tablets, including the Bukit Manggarupi example which has a furrow on one face (Figure 4); a disc with a hole, two rim fragments from a stone box, two barkcloth beaters;[9] and some polished stone balls with a shiny dark-brown surface, from Leang Saripa (van Heekeren 1939). The stone balls were excavated in what appear to be preceramic deposits; the axes, bracelets and barkcloth beater from Batu Ejaya 1 may be no more than 1000 years old, based on the site's single radiocarbon date (Chapman 1986:81-83); while the hollowed disc and stone box were presumably part of Sero's complement of 13th to 17th century grave goods (Bulbeck 1992: 224).[10] Thus, the "New Stone Age" of the South Sulawesi peninsula appears to have been chronologically extensive, having lasted at least three millennia,[11] yet it is extremely sparse, represented by an average of less

[7] Three axes from each of Batu Ejaya 1 (van Heekeren 1949:93) and Patiro Balu (van Heekeren 1951:509-10), two axes from Gua Bulusumi (Subagus 1986:253), and one axe from each of Tomatoa Kacicang (van Stein Callenfels 1938:580), Batu Pake (Kallupa 1984:6), Leang Paja (Glover 1978:72), and Balang Sari, Katangka Toa and Bonto Jalling in the Macassar survey area (Bulbeck 1992:App. G). Single axe fragments have also been collected from Bola Batu (van Heekeren 1949:99, 101) and Ganrang Jawa (Bulbeck 1992:App. G).

[8] The 26 unprovenanced (or poorly provenanced) axes listed by van der Hoop (1941) appear to have been handed over to Dutch officials as a continuation of the tradition under which axes, once discovered, were handed over to the ruler (cf. van Heekeren 1958:3). I have also noticed, but not recorded, polished stone axes embellishing showcases in the various regional museums.

[9] All the stone bracelets are from Batu Ejaya 1, two excavated by van Stein Callenfels (van Heekeren 1949:93) and one by Mulvaney and Soejono (1970a:167). The stone tablets, apart from the Bukit Manggarupi example, are from Batu Pake (Kallupa 1984:6). The stone disc and box fragments come from Sero (Bulbeck 1992:224) while the barkcloth beaters are from Tomatoa Kacicang (van Heekeren 1972:109) and Batu Ejaya 1 (van Heekeren 1949:94). See Figures 2 and 3 for site locations.

[10] One of the Sero box fragments appears to have been secondarily worked to produce a notched stone point. Previously I had interpreted this as evidence of an age greater than 1000 BP for the box (Bulbeck 1992:242), but now I would be more inclined to see this as yet another example of the very late survival of stone-knapping technology among the Makasar.

[11] In a sense the "Neolithic" continues till today, given that SSPHAP's survey recorded stone mortars and pestles in use at Bangkala (Bulbeck 1992:336) and Soppeng (Kallupa *et al.* 1989:

than ten provenanced items per millennium, and highly variable with at least seven artifact classes.

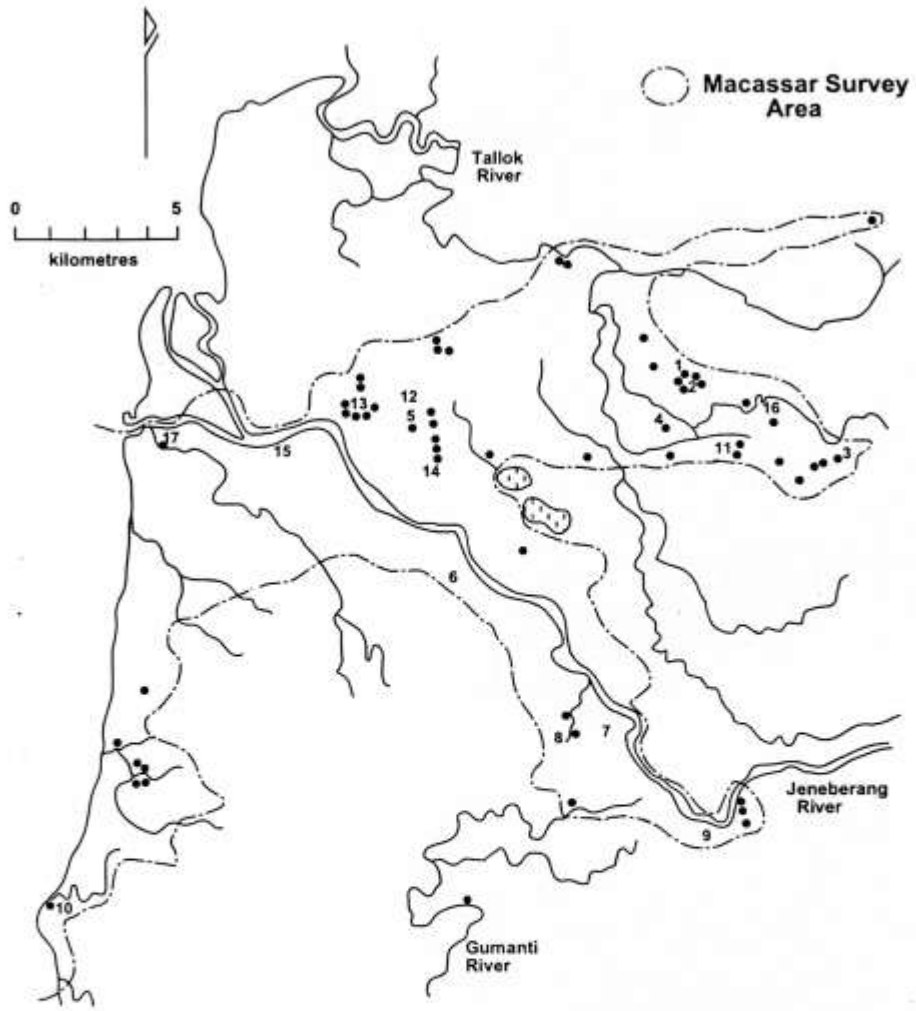
The sparse profile of the peninsula's "Neolithic" could largely reflect the prehistorians' focus on rockshelters.[12] Fortunately, the recently discovered site of Bulu Baku in the Upper Walanae Valley ("12" in Figure 2) would appear to provide the first recorded case of a large, open-air Neolithic or early Bronze-Iron Age site in the South Sulawesi peninsula. The surface contents included an abundance of low-fired earthenware sherds; volcanic cobbles hammer-dressed into a range of forms resembling axes, tablets and picks, of which less than two per cent appeared to have any polishing; and large amounts of flaked chert and chalcedony (Bulbeck 1995:8). Systematic survey and excavation are required to investigate whether Bulu Baku had been a workshop where cobbles were merely hammer-dressed before being carried elsewhere for final polishing, and whether the site contains any of the projectile points and knives of polished stone as previously recorded at Kamassi.

In any case, there can be little doubt that knapping persisted as the dominant technology for producing stone tools until at least the early second millennium AD. In addition to the dating of around AD 1000 for the rich assemblage from Batu Ejaya 1, flaked stone is present in the Leang Karassak *in situ* deposits up to the layer dated to between the 15th and 17th centuries AD (Pasqua 1995). The flaked siliceous stone at Bulu Baku can be compared to the 32 flakes of obsidian at Kamassi (van Heekeren 1972:185). The 1811 flaked lithics recorded across 72 locations within the Macassar survey area (Figure 3) include numerous examples from recent alluvial surfaces. Farther south, excavations recovered two stone flakes inside the fortress built on the estuary of the Sanrabone River (Ramli *et al.* 1992:32). Finally, the Soppeng survey recovered a core knapped from the base of a 13th-14th century celadon (Appendix B).

One area where the persistence of stone knapping has been of demonstrable importance to industrial technology is the production of gunflints. In Europe, when the transition from matchlock to flintlock muskets began in the 1680s, flint strike-a-lights of a convenient size and shape were simply fitted into the flintlocks. It was only in the early 18th century that knappers developed typologically specialized gunflints (Clarke 1935:39-40, 53-55). Three chert lithics from Garassik exhibit the dimensions and edge battering to be expected of gunflints (Figure 4), and are similar in shape and dimensions to the certain gunflint, and four suspected gunflints, reported by Spoehr (1973:248, 250) from the Cotta Daan historical site in the Sulu Archipelago. However, the Garassik lithics could not be gunflints from either the 1667 Macassar War or the 1669 sack-

73). Van Heekeren (1972:187) noted that the stone barkcloth beater which he excavated at Kamassi is the same type which was still in use in the Kalumpang area.

[12] Of the rockshelters, only Batu Ejaya 1 has produced a fair range of artifacts of polished stone, which may reflect its ceremonial use as recorded ethnographically by van Stein Callenfels (1938). The other rockshelters have usually produced no polished lithics, and two at the most. One explanation could be that even after the local inhabitants settled down into farming villages, hunting parties would have still used the rockshelters as temporary campsites, in which case their debris would mimic the refuse left by hunter-gatherers (cf. Gorecki 1991).



TOALEAN SITES

1. Moncong-Moncong Baru
2. Balang Sari
3. Gentung
4. Bonto Sunggu Asli
5. Bukit Bikulung
6. Saukang Boe
7. Pammangkulang Batua
8. Bonto Ramba Tua
9. Solokoa Na Lassang
10. Pakka Mukang

Polished Stone Artifacts

2. Balang Sari
11. Ganrang Jawa
12. Sero (3 pieces)
13. Katangka Toa
14. Bukit Manggarupi
15. Bonto Jalling

Miscellaneous

16. Pabundukang
17. Garassik

• Other sites with flaked lithics

Figure 3 Sites with lithics inside the Macassar survey area.

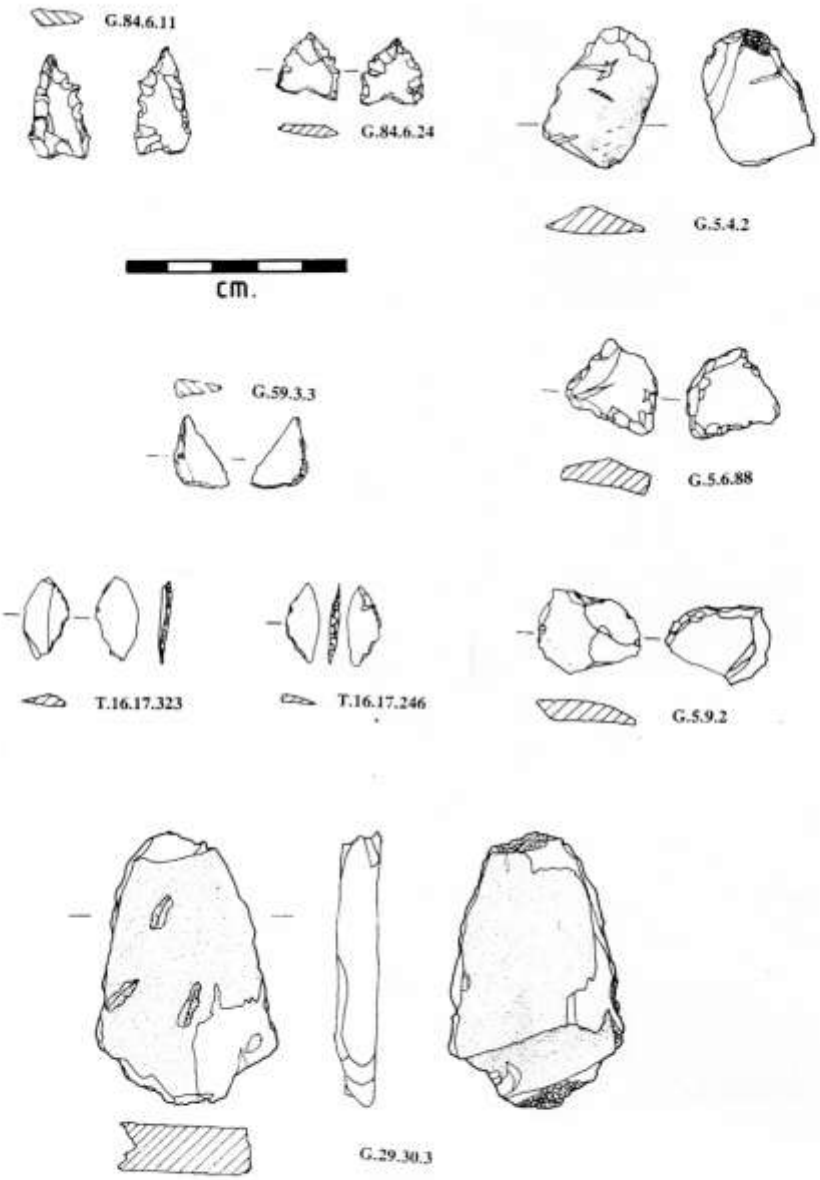


Figure 4 Lithics from the Macassar survey. Maros points: G.84.6.11 and G.84.6.24 (Pammangkulang Batua). Geometric microliths: G.59.3.3 (Gentung), T.16.17.323 and T.16.17.246 (Pakka Mukang). Suspected gunflints: G.5.4.2, G.5.6.88 and G.5.9.2 (Garassik). Polished tablet: G.29.30.3 (Bukit Manggarupi).

ing of Somba Opu by the VOC, because flintlock muskets had not yet come into use. Unless they are simple strike-a-lights, the Garassik lithics would actually be too recent for the Bronze-Iron Age.

In sum, it may be reasonable to associate the appearance of pottery in South Sulawesi with the establishment of horticultural communities, notwithstanding the lack of direct evidence. However, the lithics indicate major cultural continuity between preceramic and ceramic times. Geometric microliths continued to be made for at least a millennium, and while Maros points quickly dropped out, serrated projectile points continued to be flaked until at least the 13th-14th century. The technology of polishing stone, evinced at Leang Saripa in a preceramic context, later expanded in scope but remained subservient to stone knapping. Technological change thus appears to have been gradual, which is at odds with the widespread belief that the Island Southeast Asian "Neolithic" involved the immigration of Austronesian farmers who replaced the indigenous hunter-gatherers (see, for example, the papers in Bellwood *et al.* 1995).

Some inward movement of people must have been associated with the introduction of ceramics and polished stone axes to South Sulawesi, but the ensuing cultural change seems to have been gradual. Further, early farming communities in the peninsula would have been advantaged through inheriting the information on natural resources and transport routes which local hunter-gatherers had accumulated over the previous millennia. Thus, the spread of a farming economy in South Sulawesi seems to have been achieved by a process of integration more than immigration.

In a previous attempt to harmonize the archaeological and linguistic evidence, I suggested that the highly idiosyncratic nature of the Makasar languages may reflect a major substratum from the language(s) spoken by the middle Holocene people who had produced the Toalean microliths (Bulbeck 1992:513). The recorded distributions of the microliths give some substance to this suggestion. Maros points appear to be restricted to the southwest corner of the peninsula, more or less below the line drawn from Gua Bulusumi to Malindrung and Leang Ara ("5" to "9" in Figure 2), and the only recorded backed microliths northeast of this area are a few possible geometric microliths from Bola Batu. Thus there is a tantalizing correspondence between the area of definitely documented Toalean microlithic types, and the ethnographic distribution of the Makasar languages to the southwest of the southern boundary of the Bugis (Figure 1). So unless this matchup is due to coincidence, it may reflect a distant ancestry of the Makasar cultural identity established as early as 7000 years ago.

Historical archaeology

Virtually all the major kingdoms of South Sulawesi, and some of its minor kingdoms, have origins which can be traced back to the 13th-14th centuries. Examples include East and West Soppeng (Kallupa *et al.* 1989), Cina,[13]

[13] The traditional understanding of Cina is that it was made up of West Cina, with its palace

Bone, Wajok, Sawitto, Gowa (Bulbeck 1992:474), Luwuk (Caldwell 1995) and Bantaeng (Bougas 1996). Equally early kingdoms may have been established at Siang (Pelras 1981) and Selayar (Naniek 1983), but chronicles recording their foundation have not yet been documented.

According to both the written texts and local oral accounts, heavenly beings or *tomanurung*, usually male but occasionally female or a married couple, descended to earth to inaugurate the early Bugis and Makasar royal lines. These *tomanurung* myths may not sound very promising for scientific research, but in the four cases where the supposed *tomanurung* event can be spatially located, and systematic archaeological research has been undertaken at the site, the inferred dating of the *tomanurung* event has been confirmed archaeologically.[14] Hence the *tomanurung* stories should be interpreted as archetypal renditions of the more prosaic origin stories recorded for those kingdoms which originated after the introduction of writing in 1400. For instance, the origins of Sanrabone are ascribed to a 15th century immigrant from north Java, Tallok was founded at around 1500 by a younger prince from Gowa (Bulbeck 1992:138, 401), and the Sidenreng line was inaugurated in the late 15th century by a descendant of the royal Suppa line (Caldwell 1988:147-49).

A "megalithic tradition" of masonry characterizes the Bugis pre-Islamic palace centres. Large mortars called *lesung batu*, which are stone slabs with between one and five circular holes, dot the landscape at Cina's palace centre of Allangkanangnge and West Soppeng's palace centre of Tinco Tua. Other megaliths at these sites include royal installation stones, pre-Islamic grave markers and, at Tinco Tua, a scratched slab (Kallupa *et al.* 1989; Kaharuddin 1994). Batu Pake, a masonry maze associated with tradewares dating mainly to the 16th and 17th centuries, was the palace centre of the small Bugis kingdom of Bulo-Bulo (Kallupa 1984:7-8; Darmawan *et al.* 1992). The megalithic tradition was less pronounced among the Makasar but includes a *dakon* stone gaming board, and two stones with chiselled holes at pre-Islamic palace centres near Bantaeng (Bougas 1996: 15, 31), and a sculpted menhir at Gowa's hinterland palace centre of Kale Gowa (Bulbeck 1992:221). Right across the peninsula, the royal Islamic cemeteries are dominated by exquisitely ornate sepulchres and tombs which are a direct continuation of the pre-Islamic megalithic tradition (Ambary 1985).

By at least the 16th century, defenses were regularly erected around major sites. Bougas (1996:14, 44-45) describes defensive walls built with field stones at two *circa* 16th century palace centres near Bantaeng. The

centre located directly south of Wajo where the Walanae bends eastwards (and changes its name to the Cenrana) and East Cina, with its palace centre located near the mouth of the Cenrana (Figure 1). In Caldwell's view (1988:207-11), "East Cina" corresponds to Cina's original location, and "West Cina" relates to where Cina moved to after 1400.

[14] The four cases are East Soppeng and West Soppeng (Caldwell 1988:200-01; Kallupa *et al.* 1989), Gowa (Bulbeck 1992:231) and Bantaeng (Bougas 1996). West Cina may be a fifth example, because if Cina was divided into west and east from its inception (*pace* Caldwell 1988), then its apparent 13th century origins (Bulbeck 1992:474-75) would match up with the earliest tradewares recorded at West Cina's palace centre of Allangkanangnge (Kaharuddin 1994).

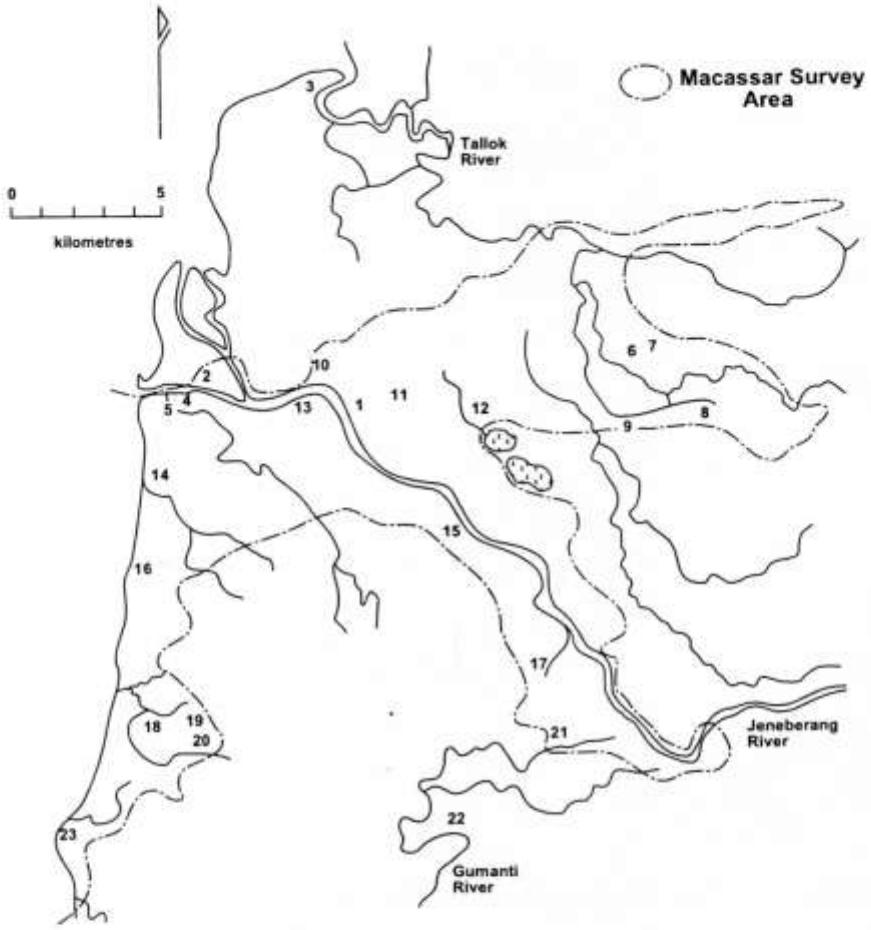
old earthen walls surrounding Kale Gowa were replaced by brick walls in the mid-16th century, and these were extended to a total length of four km in the 17th century (Bulbeck 1992). The 17th century defence works at Macassar included masonry at Somba Opu (Anon. 1990) and Tallok (Bulbeck 1992), plus approximately ten km of brick wall along the city's foreshore (Bulbeck 1990). Watampone was surrounded by a wall by the late 16th century (Macknight 1993:22), and Bone's late 17th century stronghold at the mouth of the Cenrana River was a heavily fortified citadel (Andaya 1981:Map 8). The early Islamic palace of Luwuk at Malangke is marked by a remnant earthen wall (Bulbeck 1995:12). To date, the defended palace centres which have been subjected to scientific excavations include Wajok's 15th to 18th century capital of Tosora (Darmawan, Kallupa, Ramli and Albertinus 1993), Gowa's coastal palace centre at Somba Opu (Anon. 1990, 1992), and Sanrabone Fort (Ramli *et al.* 1992).

One main source of information on the historical archaeology of the Bugis and the Makasar is their pre-Islamic burial grounds and the goods interred therein. Quite a few of these attracted the attention of Dutch colonial administrators, who produced scattered reports as summarized by van Heekeren (1958). In 1936 Japanese ceramic collectors began ransacking the Makasar cemeteries (Ito and Yoshitaro 1941), and these became the target of clandestine looting from the 1960s onwards. Only a tiny proportion has been spared the looter's spade through salvage excavation by professional archaeologists (e.g. Tjandrasasmita 1970). One solution to this problem, initiated on Selayar by Naniek (1983) and Wibisono (1985), treated the looting epidemic as a site-survey technique, and combined local reports on the recovered antiques with the evidence of sherdage left at the looted sites. SSPHAP's subsequent Macassar (Figure 5) and Soppeng surveys, and most recently Bougas' (1996) Bantaeng survey, deployed the Selayar survey methodology explicitly to address anthropological issues arising from critical study of the Bugis and Makasar texts.

Pre-Islamic Mortuary Practices in South Sulawesi

Before discussing variation in pre-Islamic burial practices, we should consider the taphonomic factors likely to influence the preservation of human bone, so as to identify the expected archaeological signature of any particular mortuary practice within the preservational circumstances of the available sites. For instance, limestone shelters have alkaline deposits that are typically protected from the elements or excessive microbiological attack, and so are ideal for preserving bone (Straus 1990). Therefore the common occurrence of human remains in the widespread limestone shelters of South Sulawesi (Table 1) does not imply any cultural preference, in the past, to bury the dead in these sites. On the contrary, the number of individuals represented at these shelters must be a miniscule proportion of the total number of people who have lived in the vicinity of these sites over the millennia, suggesting that most of the deceased were disposed of in other places.

Primary burials in acidic or microbiologically active soils can be ex-



FORTRESSES — **OTHER SITES**

1. Kale Gowa
2. Somba Opu
3. Tallok
4. Garassik
5. Bayoa 1
6. Bangkala
7. Moncong-Moncong Lama
8. Ganrang Jawa
9. Lamuru
10. Bontomanaik
11. Tombolok
12. Saumata
13. Bonto Jalling
14. Aengtoa
15. Saukang Boe
16. Jamarang
17. Bonto Ramba
18. Matoanging
19. Manjalling Lompoe
20. Talaborong
21. Galogorro
22. Kalukuang
23. Galesong

Figure 5 Bronze-Iron Age sites within the Macassar survey area.

pected to suffer rapid and total decay (cf. Renfrew and Bahn 1991:246-47). So it is that in hinterland locations across the Macassar survey area, where pH tests consistently registered acidic soils, informants reported the absence of human bone at looted cemeteries, even in cases where the layout of burial goods allowed them to divine the original disposition of the corpse. Inhumed remains were recorded at only one hinterland site, where indeed the soils were neutral. But along the coastal strip human skeletons were frequently reported, just as alkaline soils became the rule.[15] Thus, local differences in soil pH at the pre-Islamic cemeteries excavated by Tjandrasasmita (1970:21-24) may partly explain why Sompu yielded bountiful human remains (Figure 7), whereas the Malewang skeletons had been reduced to badly decomposed teeth (which are more resistant than bone), and Palambeang produced no human remains at all.

One practice that enhances the preservation of bone is to burn it at temperatures between 360° and 525° and so reduce most, if not all, of the organic component which comprises around 50% of fresh bone (Burns 1987:50-53). The so-called radical carbon fraction which results is physically resilient, chemically inert, and unsuitable for ingestion by microorganisms (cf. Renfrew and Bahn 1991:58, 213-14, 245-46). Here the enemy of preservation is the heat treatment itself. Fresh bone tends to warp and split deeply along transverse fractures and longitudinal cracks, as it chars and blackens at temperatures under 500°. Previously defleshed bone, after drying, is more stable when it is burned, apart from a surficial crackle and some longitudinal splits. Within the temperature range of cremations, i.e. above 500°, the bone calcines to white, the inorganic crystals begin to expand, and finally fusion (melting) sets in above 700°. Teeth are merely coloured grey during burning but respond particularly badly to cremation as the enamel cracks off and leaves cone-shaped stubs (Burns 1987:3-4, 8, 41, 53; Ubelaker 1984:35-36).

To summarize, once deposited in limestone shelters human bone should preserve well, and any fragmentation not due to later disturbance can be attributed to prior heat treatment and defleshing processes. Open burial sites can be expected to preserve unburnt bone only if the deposits are neutral to alkaline, whereas some quantity of any bone exposed to temperatures in excess of 360° should be recoverable. Hence suspected burial sites where no bone was recovered, such as Sabbang ("22" in Figure 2), probably involved little heat treatment of the human remains (Bulbeck 1992:448). As regards burials in acidic soils, the best-preserved remains should come from corpses which had been carefully defleshed and dried before the bones were collected and burnt. Except for some warping and fracturing, preservation should also be good for corpses heated to the stage where the bones and teeth were merely burnt. Cremated remains buried in any deposits should leave white, misshapen fragments of bone,

[15] See Bulbeck (1992:201, 249, 261, 277, 284-85, 297-99, 303, 306-07, 321-22, 325, 328, 332, 343, 366, 372-74, 377, 383, 413, 433-35) for the data justifying these generalizations. Kassik Tengah is the site where SSPHAP's informant had noted how the grave goods would have been placed in relation to the corpse, and Dampang is the hinterland site with the neutral soils and reported human remains.

accompanied by a conspicuous absence of teeth.

The radiocarbon dates referred to below enjoy a secure provenance, coming from either the bone itself or the wooden coffins containing the skeletal remains. Dates on bone have not always been successful (see especially Bayard this volume) but seem to make sense in South Sulawesi, especially the dates on "collagen" which is more reliable than the apatite fraction (Taylor 1992). Following Spriggs (this volume), all dates are expressed within the one-sigma error range of the Stuiver and Reimer (1993) calibrated dates. This provides adequate liberty to slot the dated burial practices into a consistent scenario, without needing the further room for interpretation which would come from extending the error range to two sigma.

Burials in rockshelters until AD 1000-1200

The oldest human remains in South Sulawesi may be the fossilized cranium found by villagers in a limestone sinkhole at Parangeang, Selayar. This old man has several archaic features usually interpreted as "Australomelanesian" such as a massive cheek region, keeling along the midline of the cranial vault, and a quite large palate (field notes, 13/7/86). It invites comparison with the fossilized skull excavated at the virtually aceramic site of Bola Batu (van Heekeren 1949). Nonetheless there are some differences, in that the Bola Batu skull has suffered fragmentation, possibly before burial, and it would appear to be a female as indicated by its gracility and small teeth (Hooijer 1950:60-63, 67).

The earliest date on human remains, 2930-3640 BC, comes from the apatite fraction of semi-fossilized bones from an adult male skeleton in Trench B, Leang Burung 1, Leang-Leang (Bulbeck 1992:440). The dating is consistent with the middle Holocene charcoal dates and lack of potsherds from this trench, while the disposition of the excavated bones suggests a disturbed inhumation with the head oriented to the east (Pasqua 1995:33, 41). This is the only certain burial of a "Toalean", i.e. a person associated with the culture that produced Maros points and backed microliths.

Leang Burung 1 also contains evidence of a totally different mortuary practice in spits 1-16 of Trench A, located beneath the overhang (see Table 1). The deposits in these spits, which stratigraphically overlie the Trench B deposits, are rich in potsherds and human fragments, all associated with a suite of radiocarbon dates all later than the Trench B determinations (Pasqua 1995:33-39). The dates from the collagen fraction of the bones themselves are 200-400 BC and AD 130-600 from two charred femur fragments, and AD 660-1020 from a combined sample of the small proportion of bone that shows no evidence of burning. Proportional representation of the skeleton is very uneven, suggesting secondary burial of bones following their pretreatment elsewhere (Bulbeck 1992:440-45). The bone dates may suggest that the heat treatment of the human remains at Leang Burung 1 was discontinued after AD 600, although the deposits are too disturbed to provide any stratified contextual information. In any case, use of the interior of Leang Burung 1 as a site for secondary burials appears to have spanned the first millennium AD, even though the only

metal recovered during the excavation was a piece of corroded iron from spit 4 (Bulbeck 1995:7).

Very few cranial fragments and tooth crowns are present despite an abundance of charred mandible fragments. One practice that could have resulted in the observed pattern would be cremation of the corpse with its head nestled in a fire that reached temperatures in the order of 700°, but with the rest of the body exposed to lower temperatures. This way the mandibles would have been farther than the cranium from the coals and, in conjunction with their robust structure, they would have preserved quite well, even though any teeth in the sockets would have become loosened, fallen into the fire and so been destroyed. The postcranial skeleton would have been mainly charred, possibly as a result of the corpse catching alight. A similar practice may account for the charred bone fragments, lacking any teeth, which Glover (1978:74) collected near the entrance of Leang Pette Kere, another site in Leang-Leang. Boedhisampurno (1982a) concluded that the bones represent six male and female adults cremated at 700-800°, either as corpses or as freshly defleshed bone, which could be a less detailed version of the scenario I suggest for Leang Burung 1. Boedhisampurno also reported Glover's estimated dating of 500 BC to AD 1000 for the associated incised sherds, an estimate which brackets the dates obtained on the charred Leang Burung femora.[16]

However, another process which could plausibly explain this lack of teeth would be their extraction from the jaws at an early stage during the mortuary ritual. Family members might have noticed how cremation bursts the teeth, and so decided to remove them before subjecting the deceased to heat treatment. Subsequent disposal of the teeth at designated places would then have led to a pattern of human remains dominated by isolated teeth, as recorded at four South Sulawesi rockshelters with metal associations (Table 1). The clearest case is Leang Codong where over 2500 human teeth, but no more than a few scraps of bone, were excavated (Jacob 1967). The iron spearhead (Plate 1) and rolled-over bronze leaf in the deposits, along with 15 beads of red carnelian, white stone and pink or blue glass, all suggest a dating in the first millennium AD (Bulbeck 1992:445).[17] Bola Batu has, in addition to the fossilized skull mentioned above, 11 loose teeth representing three to six individuals (Hooijer 1950:63, 68). These teeth may have fallen out of the mouths of people whilst taking shelter within the site, perhaps as a result of periodontal disease.[18] However, with equal plausibility the Bola Batu teeth

[16] Glover (1978:74) described the Leang Pette Kere sherds as dark-surfaced, which would seem to reflect their incorporation within the crematory fire, as the dark surfacing has a greasy feel and also covers some of the broken walls of the sherds (personal observation).

[17] Jacob (1967:116) accepted a "Toalean" association for the teeth and thus a middle Holocene dating, but one point I am establishing is that the Leang Codong teeth conform far better with Bronze-Iron Age mortuary patterns, and so are probably associated with the bronze and beads. The excavators noted that the deposits were completely unstratified, which did not stop them from removing the site's entire contents (Bulbeck 1992:445-46), so there is no possibility of using stratigraphic information to determine the true associations of the teeth.

[18] As would appear to be the case for the Leang Balisao lower premolars which even retained the dried traces of blood (Sarasin and Sarasin 1905:62).

may have been deliberately buried, possibly in association with the two fragments of iron recovered during the excavation (cf. van Heekeren 1949:101). A similarly ambivalent interpretation applies to the four loose teeth excavated from Batu Ejaya 1, and the 20 teeth and a finger bone from Batu Ejaya 2 (personal observation). A late prehistoric dating is suggested by the two bronze bracelet fragments (van Stein Callenfels 1938:582) and by the AD 850-1280 radiocarbon date from Batu Ejaya 1, and by the Kalumpang-like decorated pottery from both Batu Ejaya 1 and 2 (Mulvaney and Soejono 1970b:30-31; Clune 1996:110).[19] The indicated practice of extracting teeth during the mortuary ritual and burying them separately from the other remains is also evidenced at Tabon Cave in the Philippines, where Fox (1970:70-74) excavated a pottery box with nothing but the teeth from several individuals.

At Leang-Leang, at least, the most frequently encountered mortuary practice during the early Bronze-Iron Age involved defleshing the corpse and later collecting the skeletal remains for disposal in the limestone shelters. This is the procedure inferred from the 79 kg of unburnt bone and 795 teeth, from at least 50 different individuals, which were collected at Ulu Leang 2 (Andrews and Glover 1986; Boedhisampurno 1982b). Andrews and Glover further infer that the human remains were placed inside earthenware pots, represented by 98 kg of sherdage, and date the assemblage to the first millennium AD from its inclusion of 171 glass beads, a copper bead, and four fragments of iron knives.[20] Other Leang-Leang assemblages that would represent the same practice include the unburnt human bone from Trench A at Leang Burung 1, referred to above; the unburnt bones, and incised earthenwares with a light-coloured surface, collected from the interior of Leang Pette Kere (Glover 1978:74); and the bones and teeth collected by Glover (1978:72) from Leang Paja (Ulu Wae), in association with Lapitoid pottery (Mulvaney and Soejono 1970a; Clune 1996:119-20). This practice may have continued until around AD 1200, given the occasional tradeware such as the three monochrome glazed sherds from the top spits of Trench A, Leang Burung 1 (Chapman 1981:103).

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[19] Five coins have been excavated at Batu Ejaya, two Dutch East India Company (1602-1799) coins at Batu Ejaya 1 (van Stein Callenfels 1938:582), and three coins dating between 1796 and 1816 in the mixed, shallow deposits of Batu Ejaya 2 (Chapman 1981:114). Coins have not been excavated in any other rockshelter in South Sulawesi, so it is tempting to link this unique association with the practice of sacrificial offerings which van Stein Callenfels (1938:581) recorded at Batu Ejaya. The other recent items at these shelters – an iron nail in spit 5 of the 1960 excavation of Batu Ejaya 1, which also produced bottle glass, along with Ch'ing and European tradewares (personal observation), and the basal charcoal sample from Batu Ejaya 2 which dated as modern (Mulvaney and Soejono 1970b:31) – may also be associated with the same ceremonial use. While the archaeology and ethnography combined suggest that Batu Ejaya has served as an important religious site for at least the last millennium, it would also follow that the human teeth in these deposits may be recent, possibly buried as offerings.

[20] Andrews and Glover specify c. AD 0-300, but the Ulu Leang 2 assemblage could date to anywhere in the first millennium AD. For instance glass beads of the "Indo-Pacific" variety continued to be manufactured in Southeast Asia from the second to the 12th century (Francis 1991). The absence of tradewares, however, would rule out a later date, as noted by Andrews and Glover.

Fragmentary human bone has also been recovered from numerous Toalean rockshelters distributed across the southern third of the peninsula (Table 1). Van Heekeren (1972:123) inferred a mortuary tradition among the "Toaleans" similar to the practice I have just described, but as the associated assemblages include pottery in every case, and bronze or early glass in several cases, the secondary burials represented by the bone fragments are probably late prehistoric. For example Leang Ara produced pottery and a light-blue glass bead as well as a human mandible with its molars (van Heekeren 1972:110); van Heekeren's (1972:111) excavation at Leang Karassak recovered potsherds and a mandible, this time edentulous;[21] while Panganreang Tudea, where van Stein Callenfels excavated some potsherds, a bronze fish hook and a stone bead (van Heekeren 1949:93),[22] contained fragments from secondary burials in its lower layers (van Stein Callenfels 1938:583-84).

The upper layers of Panganreang Tudea produced extended skeletons (van Stein Callenfels 1938:583), which presumably were immediately pre-Islamic Makasar inhumations of the variety to be described below. Two other sites, Leang Cakondo 1 and Leang Lampoa, each contained a disturbed primary inhumation as represented by the broken bones of an almost complete skeleton, as well as the sparse remnants of at least one secondary burial (Sarasin and Sarasin 1905:57-60; Hooijer 1950). Whether these two primary inhumations represent preceramic "Toaleans" or immediately pre-Islamic inhumations cannot be determined from the bare description of these sites' contents. For instance, Sarasin and Sarasin (1905:23, 61) recovered iron and Chinese ceramics from their Lamoncong sites, as well as the earthenwares, but unfortunately they did not specify at which sites. By analogy with the evidence from Leang-Leang, I predict that the secondary burials at Leang Uleleba (represented by some human teeth, a partial fibula and some foot bones) and at Leang Cakondo 1 would date to approximately the first millennium AD, a prediction that could be tested by radiocarbon dates from the bones themselves.

Let us summarize the evidence from the rockshelters on mortuary practices in South Sulawesi during the early Bronze-Iron Age. The deceased were submitted to at least one preliminary treatment before their remains were disposed of alongside a modest retinue of grave goods. Cremation was one of the treatments employed in what appears to have been the intentional reduction of the corpse to the barest scraps. By analogy with Tillotson's (1989) analysis of ethnographic mortuary practices in Island Southeast Asia, social organization would have been competitive and ranked. Wealth would have been seen not as an accumulable asset but in terms of producing and redistributing agricultural

[21] Van der Hoop (1941:271) catalogued the light-blue glass bead with Accession No. 3548 as donated by van Heekeren from his excavation at Leang Karassak. This must actually be the Leang Ara bead (otherwise absent from van der Hoop's catalogue), with the confusion having arisen from the fact that van Heekeren excavated both Leang Karassak and Leang Ara during the same field trip.

[22] The bead is registered in the Batavia museum catalogue as being glass (van der Hoop 1941: 271; Hooijer 1950:8).

surplus, notably at the deliberately elaborated mortuary feasts. There would also have been intense pressures on individuals to build up their status, at least within the confines of an economy mainly based on slash-and-burn agriculture, in which land was owned by politically autonomous communities.

Burials at open sites until AD 1200-1300

A few open sites have evidence of urn burials dating to the first millennium AD. At Takbuncini in Galesong (Figure 5), Nusriat and Siahrawi (1994) excavated ten egg-shaped earthenware urns between 29 and 86 cm tall, and 27 to 58 cm at their maximum diameter where the cover rested on the base (Plate 3). They reportedly contained the bones of tightly flexed corpses of children, as well as adult males and females, interred in jars of various sizes to enclose the body of the deceased.[23] The only identified funerary goods, one bead of copper and 59 beads of polished stone, were found in a separate urn that lacked human remains (Figure 6).

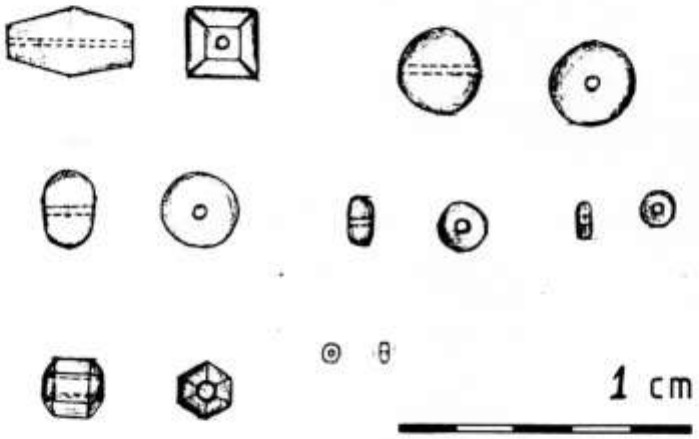

Figure 6 Beads from jar 4, Takbuncini jar-burial field. Copper bead at lower left, other beads are semi-precious stone. From Nusriat and Siahrawi (1994).

Interestingly at Manjalling, also in Galesong, six stone beads were excavated in association with two clusters of potsherds, as well as a clay feature interpreted as a hearth with two juxtaposed basins (Darmawan, Kallupa, Albertinus and Rasyid 1993:28-29). By analogy with Takbuncini, the sherdage concentrations may represent two disturbed burial urns, with stone beads as grave goods, which had originally been placed in the clay feature. Under this scenario, any human remains could have been pulverized beyond recognition, explaining their absence from the excavated materials.

A comparable site is Tile-Tile, Selayar, where one of three earthenware urns was found to contain broken human bones (no further

[23] Nusriat supplied me with 52 gm of the human bone to submit for radiocarbon dating, but unfortunately the sample contained too little carbon for a conventional date (ANU-9785).

described), beads of semi-precious stone and gold leaves, as well as a ring, an earring and three bracelets of bronze (van Heekeren 1958:85). The villagers at Galogorro (Figure 5) also dug up four urns containing fragmented human bone, one including a spearhead (field notes).

The massive earthenware jars excavated by Willems (1938) at Sabbang in Luwu ("22" in Figure 2) had probably contained human burials too. The absence of human remains in these jars – if the burial environment were acidic – could be due to lack of burning or cremating the deceased prior to interment. The dating is problematical because the iron spearheads and (unidentified) "Chinese wares" at the site were found above the level of the jars. Supporting evidence for late prehistoric burials at Sabbang, which may have included Willems' jars, comes from four green, black, and azure glass beads reportedly collected from the same general burial ground (Bulbeck 1995:11).

Another cluster of early burial jars, in this case containing burnt bone, was reportedly discovered at Bonto Ramba ("17" in Figure 5) when the villagers dug a footpath through the river bank. The walls of the path retained a band of earthenware sherds which I collected and which, according to Peter Bellwood (pers. comm.), are low-fired and should be prehistoric. The jars had reportedly formed a line as far as the spot where the villagers also found a bronze kettle drum. The drum was described as about one metre in height and circumference, decorated with frog-shaped handles, and buried upside down with bountiful necklace beads and other gold jewelry inside it (field notes). It would appear to have been a Heger IA kettle drum, as is the famous Papanlohea drum in Selayar, which was also originally discovered in a site that had reportedly yielded other antiques and human bones (Kempers 1988:17, 411). These Heger IA drums, made in North Vietnam during the early centuries AD (Kempers 1988), could of course have had a long and varied use-life before being buried at Bonta Ramba and Papanlohea, possibly in the order of a millennium ago. Other antiques looted at Bonto Ramba include a bronze cup (Plate 4) and iron swords and knives.

The Macassar survey recorded four other sites where the villagers reported finding cremated remains buried in jars, all of them associated with iron weapons or gold. At Matoanging the grave goods comprised an abundance of gold jewellery, while at Saukang Boe an earthenware urn contained the bones from a single cremated corpse, along with two gold rings and an iron kris. The absence of looted tradewares at Matoanging would suggest a date earlier than AD 1200, whereas the burnt human bone collected at the Saukang Boe urn-burial spot produced a calibrated radiocarbon determination of AD 1280-1650 (Bulbeck 1992:301-03, 437-41). The cremated human remains collected from the surface of Talaborong are dated to AD 970-1270 (Bulbeck 1992:436), associated with fat-lipped whiteware porcelains (Figure 8e-f) of a type which Lam (1985) dates to the 11th-14th centuries,[24] an iron tablet,[25] and gold (to judge from local

[24] The remainder of the Talaborong tradeware assemblage consists of apparently early stoneware jars, and a range of poorly documented early whitewares and monochromes (Figures 8 and 9), plus one solitary fragment with blue decorations beneath the glaze (Bulbeck 1992:436-37).

reports). Finally, the area of Saumata Lama with 13th-14th century tradewares and carbonized human remains also produced the rusted blades of a sword, a spear and a harpoon (Bulbeck 1992:277, Photo 9-4).

The Macassar survey thus discovered a crematory tradition which can be dated to c. 1000-1300, associated with grave goods of a luxuriance not recorded at earlier sites – bronze, iron, gold and early tradewares. The lower layers at Sompu (Figure 2) may reflect the same tradition. Once the excavated squares are aligned northwest to southeast, it is possible to draw a line which separates the complex of extended articulated burials associated with 15th-17th century tradewares, from the lower levels which contain disarticulated human remains lacking teeth (strongly suggesting cremation), 13th-14th century tradewares, and most of the fine earthenwares (Figure 7).[26]

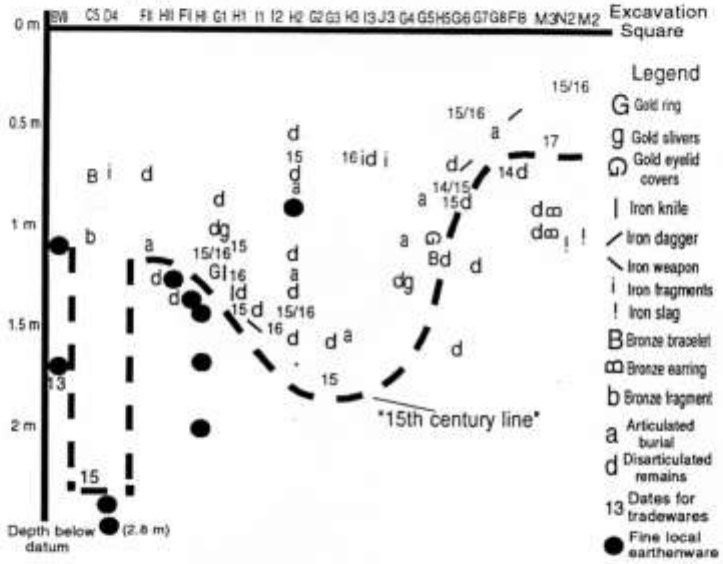

Figure 7 Schematic representation of the excavation at Sompu, Takalar, with the dashed line separating the pre- and post-15th century levels.

Another relevant Makasar site along the coastal plain is Lembang Gantarang Keke, near Bantaeng, where looters have reported bones buried in earthenware containers, associated with early (possibly Sung)

[25] The tablet is 30 mm long by 10 mm wide, slightly corroded, and has a tiny notch on one of the longer margins (field notes). Teeth were, of course, absent from the Talaborong and Saukang Boe bone collections.

[26] The lack of articulated burials at Sompu beneath the "15th century line" contrasts with seven articulated burials among 25 instances of human bone above the line. The immediately pre-Islamic disarticulated human remains probably reflect postdepositional disturbance, especially by looters (cf. Tjandrasasmita 1970). As looting was less prone to penetrate the site's deeper layers, it cannot be held responsible for the dominance of scrappy remains deep down, which seems to reflect a real difference even if it is not statistically significant (Fisher Exact test, $p = 0.24$). The description of the human remains is inadequate to divine whether or not they had been heat-treated.

whiteware and monochromes (Bougas 1996:16). According to Bougas (1996) Lembang Gantarang Keke indicates intensive contact with classical Java. This may suggest that the Makasar adopted the practice of cremations from classical Java, where cremations were the preferred mortuary ceremony (Stutterheim 1939), rather than its having been a revival or continuation of earlier Bugis/Makasar traditions, even though these had also involved cremating the corpse.

East-west inhumations on the eve of Islamization

Confirming the 16th century European records that the Makasar inhumed their dead (Hadimuljono and Macknight 1983:69-70), excavations of immediately pre-Islamic Makasar skeletons show they were extended in a supine position with the head directed eastwards. Examples are the Ulu Leang 1 burial, Leang-Leang, found with a Vietnamese monochrome bowl (Glover, 1976);[27] the Sompu articulated burials (Tjandrasasmita 1970:26) which occur in the same levels as 15th-16th century tradewares (Figure 7); the Batang Mata Sapo burials on Selayar, excavated with Ming-period tradewares (Naniek 1983:87-88); and the disturbed burial at Manjalling, Galesong, associated with 17th century sherds (Darmawan, Kallupa, Albertinus and Rasyid 1993).[28] Cemeteries with east-west inhumations are responsible for the vast majority of the enormous body of tradewares looted in Makasar areas (Hadimuljono and Macknight 1983:71), including some which may date to as early as 1250-1350 (Bougas 1996:18).[29] The head may have been directed eastwards for religious reasons that were in vogue before the transition from cremations to inhumations.[30]

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[27] The bowl was dated to the 15th century by Glover's colleagues, but my seriation of Vietnamese monochromes would suggest a 13th-14th century dating (Appendix A).

[28] The burial (in square 2) had been looted prior to the excavation, leaving only a skullcap, long bones and teeth in association with a concentration of earthenware sherds. The stratigraphic sections and plan show the looter's pit in the western wall, 50 cm from where the bones were found. All but one of the sherds in the square were classified as Swatow, i.e. 17th century (Table 8).

[29] Many of the pre-Islamic cemeteries in the Macassar survey area combined a small proportion of early tradewares among a much larger component of Ming-period wares (Bulbeck 1992). Given the exponential increase in the availability of tradewares after c. 1300, when the shift to extended inhumations commenced, looters' reports are too imprecise to tell how many of these cemeteries may have had an initial stage when cremated remains were interred, and how many received primary inhumations from their inception.

[30] At two sites near Lembang Gantarang Keke, Bantaeng, looters chanced upon unique terracotta figurines which may be local imitations of classical Javanese models. The apparently female figurines (with feet rather than pegged bases) were reportedly interred in terracotta boxes, unassociated with tradewares, head directed eastward. Although the figurines do not seem to have been buried in graves, they may well represent the spirits of the deceased (Bougas 1996:18-19). Elsewhere Bougas (1996:16) suggests that the eastward direction of the head of the inhumed burials reflects an association with the rising sun and life, contrasting with the direction of the feet towards the setting sun, traditionally associated with death. Thus the orientation of the corpse would have reflected the passage of the sun through the heavens. The spirit would have left through the mouth, travelling vertically (as assisted by the corpses' supine position) before following the sun's course to the realm whither the feet pointed. Ian Caldwell (pers. comm.) elaborates this interpretation by suggesting that only the spirits of the commoners would have travelled westward, whereas the aristocrats' spirits would have returned east toward the realm of life and the rising sun.

An elaboration on the usual practice of primary inhumations is found with the boat-shaped coffins, or *duni*, which had a hole in the base to drain the decomposing body fluids. The Macassar survey encountered reports of these occasionally at hinterland sites and commonly along the coastal strip. Radiocarbon dates on the *duni* themselves are 1260-1360 at Bayoa in Sanrabone, 1400-1640 at Lamuru, and a 17th century dating at Bayoa 1 (Bulbeck 1992).[31] Three *duni* (two broken) were recovered from Bayoa in Galesong, associated with the bones of two or three individuals, and 15th-17th century tradewares (Bulbeck 1992:434).

Tjandrasasmita (1970:23-24) excavated a *duni*, in this case probably a secondary rather than a primary burial, and 15th-16th century tradewares at Palambeang. The Palambeang site falls within the chiefdom of Siang (Figure 1), visited by Antonio de Paiva in 1544, who recorded the following mortuary rite (Jacobs 1966:299-300). The corpse was placed inside a coffin along with expensive cloth and gold, and the coffin was stored for three months in a large house erected on stilts. A tube inserted into the coffin drained the body fluids until all the flesh and skin had decomposed. After this period the coffin was lowered into the ground, accompanied by more silk and a water-buffalo's head with gilded horns. Now, Paiva's account clearly refers to elite burials, but more modest enactments of the ceremony could account for the distinctive features of Tjandrasasmita's (1970:20-24) sites within Siang's former area – relatively few tradewares compared to gold and iron goods, and poorly preserved human remains (though still following an east-west orientation).

The Bulukumba coastline (Figure 2) is another location along the traditional Bugis-Makasar border where coffins were used for secondary disposals. At Leang Tattara, Engelhard (1884:377-79) collected a *duni* base with a hole in its centre, a human mandible, a ring and a small bell of bronze, beads of glass and stone, a knife blade and fine earthenwares, plus three early Ming Chinese coins (Yung-lo 永樂, 1403-1424). Muttalib (1983) recorded further limestone shelters containing boat-shaped coffins, packed with bones, on their floors. At the site I inspected, Gua Sapohatu, there were three wooden coffins with the bones of at least 13 individuals aged 15 years or older at death.[32] The two tradeware sherds collected from the rockshelter were Ming, probably 16th century (field notes 1/8/86). The Bulukumba sites may represent a synergistic blending between the late prehistoric tendency for the secondary disposal of the dead in rockshelters, and the new preference for boat-shaped coffins.

The "ship of the dead" symbolism is not accidental; the three complete *duni* recorded during SSPHAP's field work were all found at a place called Bayoa, Makasar for Bajau, located at a major river-mouth port. The

[31] The two radiocarbon dates from the same coffin at Bayoa 1 are modern and 270±120 BP (Bulbeck 1992:442), i.e. overlapping between the 17th and 20th centuries AD at one sigma. The 17th century is the most likely date from the tradewares found in this pre-Islamic cemetery, although the 18th century is also feasible.

[32] The jaws, skullcaps, pelves and long bones were equally represented and well-preserved, but small bones and mid-facial fragments were conspicuously rare, suggesting prior defleshing of the corpse elsewhere, followed by their recovery for disposal in the coffins.

toponym Bayoa also occurs at the fourth major port of Tallok, where no *duni* had been found (Bulbeck 1992:452), that is until 1991, when Suaka excavated **five** ***duni*** there (Bulbeck 1995:9). Further, the Sanrabone *duni* (dated 1260-1360) was found adjacent to the burial marker of Karaeng Lolo Bayo, "king of the Bajaus who left the sea to live on the land". As no other burial place attributed to Karaeng Bayo is known, it is tempting to link this Lolo Bayo with the mythical Karaeng Bayo who supposedly inaugurated the Gowa dynasty by marrying a heavenly nymph at Kale Gowa in c. 1300 (Bulbeck 1992:434-36).

The archaeological evidence suggests that a maritime network, which would seem to have been linked with the Bajau, shifted from the western to the eastern archipelago at around AD 1000. Prior to that date burials in boat-shaped coffins occurred fairly commonly in Sumatra, Java, Bali, the Malay Peninsula and northwest Borneo, but then they seemingly vanished (Bulbeck 1992:450; cf. Stutterheim 1939). Their disappearance in the west marks their appearance in the east, firstly at Sabah, northeast Borneo, dated to between 1000 and 1200 (Bellwood 1988:252-53),[33] then in the Philippine lowlands where cemeteries containing tradewares and occasional log burials proliferated between the 12th and 16th centuries (Bulbeck 1992:451), and finally in Makasar coastal areas after c. 1300. These places mark the western boundary of the ethnographic Bajau network, which extended from Maluku through Sulawesi and northeast Borneo to the southern Philippines (Reid 1983:125). Very significantly, in this context, the early 16th century seafarers from South Sulawesi ("Macassar") were known as Bajaus in Java and the Malay states (Reid 1983:126-28).

All of this points to a Bajau network, associated with boat burials, which linked the Macassar harbour and other coastal Makasar areas to the rest of the archipelago, including the southern Philippines (cf. Macknight 1993:40). It overlapped in time with the earlier established network of Javanese traders, most clearly registered at Bantaeng (but also at Macassar and right along South Sulawesi's south coast) through toponyms derived from the north Javanese ports attached to Majapahit (Reid 1983; Bougas 1996), as well as the pre-1300 mortuary tradition of cremations. Thus, the switch to primary inhumations among Makasar speakers would appear to have been a statement of cultural affiliation with the Bajau network as opposed to the Javanese network and, more relevantly, to the Bugis.

Bugis cremations on the eve of Islamization

In the centuries immediately preceding Islamization, cremation of the corpse and disposal of the ashes in stoneware jars became standard practice among the Bugis. Kallupa *et al.* (1989) mapped the reported crematory places, and the stone monuments containing ossuary jars of pre-Islamic aristocrats or their more mythological ancestors, at nine historical

[33] Based on the almost identical radiocarbon dates from two burial coffins, both calibrated to one sigma. Bellwood (1988:252) also mentions a possible 14th-15th century identification for the stoneware jar that had been placed beneath one of these coffins to collect the decomposing body fluids, but the jar appears to date to the 10th-13th century (Bulbeck 1992:450).

sites in Soppeng. Hadimuljono and Macknight (1983:69-71) summarize the historical and archaeological evidence for the Bugis agrarian chiefdoms of Lamuru, Sawitto, Wajok, Sidenreng and Bone (see Figure 1). The cremations of known Wajok and Bone royalty can be dated to the 14th century, the 15th century, 1584 and 1607.[34] Burial urns associated with calcined human remains are known from five sites in Wajo and Bone (van Heekeren 1958:84-85) and, of these, Sompoh and Lampokko (see Figure 2) can be dated between the 15th and 17th centuries based on the recovered tradeware sherds.[35]

Formerly the status of the Luwu Bugis was unclear, as the area's huge hauls of antiques seemed out of step with the pattern of limited looting in the Bugis agrarian areas (e.g. Reid 1983:122; Macknight 1993: 38). However, local reports indicate that the Luwu Bugis placed the cremated bones along with smaller grave goods in stoneware jars, around which the larger grave goods were arranged. Despite reports of early monochromes, the ceramics would appear to date mainly between the 15th and 17th centuries (Bulbeck 1995:12). The large jars are called *balubu*, so the posthumous title "Datu ri Balubu" for one late 16th century queen near Patimang (Caldwell 1993:7) would probably refer to her burial urn.

The practice of cremations among the immediately pre-Islamic Luwuk Bugis may be critical to understanding the spread of the tradition to the agrarian Bugis. An accumulating body of evidence indicates that Bugis high culture, which includes the *I La Galigo* epic literature and the rituals carried out by *bissu* male transvestite priests, was developed in Luwuk, and brought to other Bugis areas as Luwuk dominated the political landscape of South Sulawesi between c. 1300 and 1500 (see Caldwell 1995 for a preliminary account of this evidence). Unlike the other Bugis kingdoms, Luwuk clearly had a direct diplomatic relationship with Majapahit Java, as indicated by the frequent use of Sanskrit names for the Luwuk rulers, and Luwuk's inclusion among Majapahit's 14th century list of tributary kingdoms (Caldwell 1988). Thus, as previously argued for the coastal Makasar, the tradition of cremation amongst the immediately pre-Islamic Bugis would appear to have been adopted from classical Java (cf. Hadimuljono and Macknight 1983:70). On current evidence, the Bugis seem to have begun cremating at the same time as the coastal Makasar started switching to inhumations, but further historical archaeological work in Bugis areas, especially Luwu, is required to confirm any such scenario.

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[34] We Linro died giving birth to the child of the nephew of the first "Batara Wajo", La Tenriba, who would have been born at around 1320 (Noorduyn 1955:158, Figs, as analyzed by Bulbeck 1992:473-76). The reported period of the reign of Bone's third ruler, Kerrampeluak, in Macknight and Mukhlis (n.d.) is 1424-1496, very similar to my estimate of 1410-1482. The 1584 and 1607 dates refer respectively to very late pre-Islamic kings of Bone and Wajok (Hadimuljono and Macknight 1983:70).

[35] The National Museum's identifications of the ceramics collected by van Heekeren (Acc. Nos 4728 and 4733) are as follows. Sompoh: Chinese - two 14th-15th century, four 15th and/or 16th century, six 17th century; one Vietnamese, one Thai. Lampokko, 116 sherds - 15th-16th century Chinese pieces; Vietnamese; Sawankhalok.

Metals and Metallurgy

The present review will summarize the South Sulawesi metal artifacts that have come to my attention, with a focus on provenanced finds, but also including antiques as reported by looters or which have passed through collectors' hands. Together these sources demonstrate the breadth and sheer quantity of metal within the Bronze-Iron Age material culture of the Bugis and Makasar, in an order of frequency starting with iron, then copper-based metals, gold and, very rarely, silver.

An accurate archaeological context may be critical for understanding the significance of any find, but regrettably the record is subject to complex biases. For instance, no bronze axes have been professionally excavated in South Sulawesi nor, to my knowledge, reported as looted grave goods. This would seem to be because they were guarded as lucky charms against enemy attack, as recorded ethnographically in Luwu, and testified by the numerous axes that the Macassar army surrendered upon its defeat to the VOC on Buton, southeast Sulawesi, in the leadup to the Macassar War (van Heekeren 1958:3-4). Hence relatively few axes would have been carelessly lost or deliberately disposed of, and relatively many of those would have been recovered by other parties. Any axes which commoners found had to be handed over to the local ruler (van Heekeren 1958:3), and a colonial version of the same pattern may account for the seven bronze axes collected or purchased by Dutch officials in Selayar or along the south coast of the peninsula (van der Hoop 1941).[36]

Belinda Syme (in Glover and Syme 1993:65) suggests that many of the peninsula's supposedly prehistoric bronzes may actually relate to the historical kingdoms. As regards the "Macassar flask", a unique axe purchased in Macassar during the 1930s (van der Hoop 1941:200), with a facial mask and other decorations relating it to the Pejeng drums cast in Java and Bali during the first millennium (Bellwood 1985:284-87), Syme has informed me of a smaller version recently sold by a local antique dealer, who reported that both axes had been found near Gowa's old city wall, i.e. Somba Opu. In my view, this unique pair of axes may have constituted the antique regalia of Garassik, which used to rule over the Macassar foreshore before being absorbed by Gowa in the 16th century, and whose name is derived from Gresik, one of Majapahit's principal ports (Bulbeck 1992:378-81). The case of the Selayar Heger-type bronze drum, which was "recycled" amongst the regalia of the local sultanate of Balambangung after its unearthing (van Heekeren 1958:33-34), should alert us to the complex histories which may attend South Sulawesi's ceremonial bronzes. Only the bronze Buddha statue from Sikendeng, near Kalumpang at the far north of the province (Figure 2), would appear to have been deposited relatively quickly in its archaeological findspot. As with similar examples elsewhere in the archipelago, it was apparently manufactured at Amaravati in India (Oey-Blom 1985), the southeast

[36] National Museum Accession Nos 1549 (Pangkajene), 1839 (the "Macassar flask"), 3510 (Gantarang, Bulukumba), 3511 and 3512 (Bira, Bulukumba), 3515 (also Bulukumba), and 1547 (Bontobangung, Selayar).

capital of Satavahana during the second and third centuries AD (Wolpert 1989:76); such a dating would be fully commensurate with the rich "Neolithic" assemblages excavated at Sikendeng and the two other Kalumpang sites (discussed above).

Despite the complexities of interpretation, the available archaeological record permits us to reconstruct, provisionally, the evolution of local metallurgy and utilization of metal wares. It also contextualizes the pattern, which emerges from the texts, whereby metallurgy and control over the products' distribution were major pre-occupations of the historical kingdoms, as will be reviewed at the end of this section.

Metal finds from rockshelters

Metal items have been recovered fairly regularly from South Sulawesi rockshelters, but always in small quantities (Tables 1 and 2). Apart from the modern nails at Ulu Leang 1 (Glover 1976:125) and Batu Ejaya 1, all the reported iron artifacts are badly fragmented and corroded, and may be reduced to formless fragments (as at Leang Burung 1 and Bola Batu). Far more ironwares must have been deposited in these sites than even the most careful excavation can detect. Copper-based alloys would also be under-represented, albeit to a lesser degree. However, the absence of the noble metals, gold and silver, cannot be attributed to poor preservation.

All of the finds listed in Table 2 could be grave goods, except for the knife fragments from Tomatoa Kacicang (Plate 2) whose deposits apparently lacked human remains (Table 1). However, the bronze fishhook from Panganreang Tudea, whose name means "place of sacrifice", and the bronze armband from Batu Ejaya, where van Stein Callenfels (1938:581) observed a continuing tradition of sacrifice, may be associated with non-mortuary rituals. Batu Ejaya is unique amongst South Sulawesi rockshelters in that its deposits include European coins, in additon to 19th-20th century tradewares and glass (see footnote 19). Rather than dismiss these modern elements as noise (e.g. Mulvaney and Soejono 1979a:168), we should accept them as the ethnoarchaeological corollary of the site's sacrificial practices, as may strengthen the case for viewing the Batu Ejaya and Panganreang Tudea bronzes in an analogous light.

The grave goods from the mortuary sites of Ulu Leang 2, Leang Codong and Leang Tattara run the gamut from copper beads, to bronze leaf, jewelry and a bell, and ironwares such as spears and knives (Table 2). The best-certified metal grave good is the blade of a possible iron digging stick which had been interred with the east-west extended inhumation at Ulu Leang 1 (Glover 1976:124). The restriction of these grave goods to small, ceremonial and decorative bronzes, and to iron weapons and tools, indicates a long-term pattern of limited access to luxuries on the part of the individuals interred in rockshelters.

Metal finds from open burial sites

Three open jar-burial sites, Takbuncini, Sabbang and Galogorro, seem to be associated with early metal grave goods, such as those from the mortuary rockshelters which I date to the first millennium AD. Use of the

Heger-type bronze drum at Bonto Ramba as a substitute ossuary jar would appear to date to the very end of the first or the early second millennium, given that most of the metalwork at Bonto Ramba is similar to that recorded at crematory sites with early whitewares and monochromes (Table 3). This appearance of iron swords and gold reflects the general trend towards a greater diversity of grave goods over time, which peaked at around 1500-1600.

Metallic goods reported from cemeteries with Ming-period trade ceramics are so numerous that they can be conveniently listed according to the four main areas of documentation: the southeast coast, especially Macassar and its environs (Table 4); the south coast, especially Bantaeng (Table 5); Selayar (Table 6); and Luwu (Table 7). Interestingly enough, these four areas correspond to the South Sulawesi toponyms which can be identified with tributary kingdoms of Majapahit as recorded in the 14th century *Nagarakertagamana* poem – "Macassar, Bantaeng, Selayar and Luwuk" – which implies they were "on the map" as the major Makasar and Bugis trading centres by the 14th century, and remained so until the coming of Islam. There are some further reports of metallic grave goods from South Sulawesi, but they are scattered: bronze fragments found with cremated human remains and 14th-17th century datable items at Gowarie, Soppeng (Kallupa *et al.* 1989:28-29); and a piece of patinated bronze with relief decorations associated with 14th century and earlier tradewares at Watampone (van Heekeren 1950:12).[37] Of course, metal goods were interred with the dead in other places too, probably across the entire peninsula, but presumably in smaller amounts.

The empty cells in Tables 4 to 7 do not imply absence of the valuable, nominated in the column, at the site listed in the row; rather they should be read as lack of evidence, which largely reflects degree of investigation. For instance, SSPHAP's team devoted nine working days to recording Kale Gowa, but spent little time enquiring about antiques, and my sole datum of the metal grave goods is Bougas' (1996:14) report of seven gold death masks' having been discovered in the pre-Islamic royal graveyard (Table 4). No doubt, discussions with antique dealers familiar with Kale Gowa would reveal a variety of grave goods equivalent to that at Lembang Cina, Bantaeng (Table 5), which can be regarded as the "type site" of a looted Ming-period Makasar cemetery thanks to Bougas' lengthy discussions with local looters and dealers. Bougas (1996:32-34) details the variety of bronze, iron and gold artifacts, and goes so far as to document the usual disposition of these goods, and the tradewares, around the skeleton. The "type site" of a professionally excavated pre-Islamic Makasar cemetery would be Sompu (Figure 7) as a much larger area was exposed here than at Malewang, Palambeang (Tjandrasasmita 1970) or Batang Mata Sapo (Naniek 1983).

Bronzes appear to be the main metallic grave good, as Bougas (1996: 33) notes for Bantaeng, and are certainly the richest in variety (Tables 4-7).

[37] However, in this case the lack of collected human remains means that the assemblage may have derived from an occupation rather than a burial site

Jewelry is common, apparently restricted to bracelets, earrings and ankle bands (e.g. Plate 5).[38] Vessels include the plates, dishes and bowls occasionally used at Lembang Cina in place of their ceramic equivalents to cover the corpse (Bougas 1996:33); a betel-nut box from Batang Mata Sapo (Naniek 1983:88) and a beaker from Nipotokka (Engelhardt 1884:373); an incense burner at Baebunta (Table 7); and the covered bowls and a kettle held at the Museum I La Galigo, Ujung Pandang (Accession Nos 89, 2278 and 177). Occasional gongs and a rice ladle are reported from Lembang Cina (Bougas 1996:33), two mirrors were recovered from Nipotokka (Engelhard 1884:373), while the Museum I La Galigo holds three bells looted from Gowa and Pangkajene (Accession Nos 150, 151 and 256). Finally, the small finds include five fragments of leaf at Bayoa 1 (Bulbeck 1992:382-83), wire at Baebunta (Bulbeck 1995:11) and undiagnostic fragments at Sompu (Figure 7).

Table 2. Main Metal Finds from South Sulawesi Rockshelters

SITE	Copper bead	Bronze leaf	Bronze fishhook	Bronze jewellry	Bronze bell	Iron spear	Iron knife	Iron stick
First millennium								
Ulu Leang 2	x	-	-	-	-	-	x	-
Leang Codong	-	x	-	-	-	x	-	-
Panganreang Tudea	-	-	x	-	-	-	-	-
Batu Ejaya 1	-	-	-	x	-	-	-	-
Second millenium								
Leang Tattara	-	-	-	x	x	-	x	-
Ulu Leang 1	-	-	-	-	-	-	-	x
Tomatoa Kacicang	-	-	-	-	-	-	x	-

Table 3. Metals, South Sulawesi Pre-Ming Open Burial Sites

SITE	Copper bead	Bronze jewellry	Bronze drum	Bronze cup	Iron spear	Iron sword	Iron misc.	Gold jewellry	Gold misc.
Takbuncini	x	-	-	-	-	-	-	-	-
Sabbang	-	-	-	-	x	-	-	-	-
Galogorro	-	-	-	-	x	-	-	-	-
Tile-Tile	-	x	-	-	-	x	-	-	x
Bonto Ramba	-	-	x	x	-	x	x	x	-
Papanlohea	-	-	x	-	-	-	-	-	-
Matoanging	-	-	-	-	-	-	-	x	-
Saukang Boe	-	-	-	-	-	x	-	x	-
Talaborong	-	-	-	-	-	-	x	-	x
Saumata Lama	-	-	-	-	x	x	x	-	-
Sompu (early)	-	x	-	-	-	-	x	-	-

Note re Table 3:

Data summarized from the previous section.

The grave goods of iron are primarily if not entirely weapons.

[38] Bracelets, earrings and ankle bands at Lembang Cina (Bougas 1996:33); bracelets and earrings at Sompu (Figure 7); a bracelet and set of ankle bands at Baebunta (Bulbeck 1995:11); earrings at Nipotokka (Engelhard 1884:373); and individual bracelets at Kaluku Bodo in Galesong (field notes), Batang Mata Sapo (Naniek 1983:88) and Mangkutuna (Table 7).

Bougas (1996:33) lists blunt-tipped choppers or *kelewang* used for hacking, swords with either straight or serpentine blades, and small *badik* daggers. My field notes on Kaluku Bodo, Galesong, mention the same range of weapons, plus spears. The Sompu excavations yielded knives, daggers and another unidentified weapon (Figure 7). The two excavated cemeteries in Pangkajene, Malewang and Palambeang, both produced knives,

Table 4. Metal Finds, Ming Period Open Burial Sites, Southeast Coast

SITE	Bronze foil	Bronze jewellry	Bronze misc.	Iron spear	Iron sword	Iron knife	Iron misc.	Gold ring	Gold mask	Gold misc.
Ujungloe	-	-	-	-	-	-	-	-	x	-
Malewang	-	-	-	-	-	x	x	-	-	x
Palambeang	-	-	-	-	-	x	-	-	-	-
Kale Gowa	-	-	-	-	-	-	-	-	x	-
Tallok	-	-	-	-	x	-	-	-	-	-
Bayoa 1	x	-	-	-	-	-	-	-	-	-
Bangkala	-	-	-	-	x	-	-	-	-	x
Moncong Lama	-	-	-	-	-	-	-	-	-	x
Ganrang Jawa	-	-	x	-	-	-	-	-	-	-
Lamuru	-	-	-	-	-	-	x	-	-	-
Bontomanaik	-	-	-	-	x	-	x	-	-	x
Tombolok	-	-	-	-	-	-	-	-	-	x
Bonto Jalling	-	-	-	-	x	-	-	-	-	x
Galesong	-	x	-	x	x	x	x	-	-	-
Sanrabone	-	-	-	-	-	-	-	-	x	-
Sompu (late)	-	x	x	-	x	x	x	x	-	x

Note re Table 4:

Data for the sites from Tallok to Bonto Jalling are from Bulbeck (1992); otherwise see text. Three more sites, not shown here, between Tombolok and Bonto Jalling also reportedly produced gold. The Lamuru miscellaneous iron consists of weapons (no further described). The Ganrang Jawa bronze is a rim fragment from a bowl.

Table 5. Metal Finds from Ming Period Open Burial Sites, South Coast

SITE	Bronze jewellry	Bronze vessel	Bronze gong	Bronze ladle	Iron sword	Iron dagger	Iron chopper	Gold jewellry	Gold mask	Gold misc.
Jeneponto	-	-	-	-	-	-	-	-	x	-
Lembang Cina	x	x	x	x	x	x	x	x	x	-
La Tenri Rua	-	-	-	-	-	-	-	x	x	x

Note re Table 5:

Data from Bougas (1996:32-34).

Table 6. Main Finds from Ming Period Open Burial Sites, Selayar

SITE	Bronze bracelet	Bronze ring	Bronze box	Bronze beaker	Bronze mirror	Iron sword	Iron knife	Gold coin
Batang Mata Sapo	x	-	x	-	-	x	x	x
Nipotokka	x	x	-	x	x	-	-	-

Note re Table 6:

Data from Naniek (1983:88) and Engelhard (1884:372-73). The gold coin was minted during Sultan Alauddin's reign, i.e. 1593-1639 (Bulbeck 1992:30).

plus a dagger at Malewang (Tjandrasmita 1970:21-24). I have photographs of daggers from Baebunta and Patimang in Luwu, and reports of the frequent recovery of swords and metre-long knives at Patimang (Bulbeck 1995:11-12). Further examples of spears, swords and knives are shown in Tables 4 and 6. While there might be a presumption that weapons would have been the possessions and hence the grave goods of men, some Bantaeng looters instead believe that weapons were also buried with women, in which case they were placed on the left side (Bougas 1996:33).

Table 7. Metal Finds from Ming Period Luwu Cremations

SITE	Bronze censer	Bronze vessel	Bronze jewelry	Bronze wire	Iron dagger	Iron sword	Iron knife	Gold ring	Gold misc.	Silver misc.
Baebunta	x	x	x	x	x	-	-	x	-	-
Mangkutuna	-	-	x	-	-	-	-	-	-	-
Patimang	-	-	-	-	x	x	x	-	x	x

Note re Table 7:

Baebunta data: June 1986 field notes, summarized in Bulbeck (1995:11). Mangkutuna and Patimang data: Bulbeck (1995:11) and January 1995 field notes.

Gold apparently accompanied the burials in three general forms: as items of jewelry which had presumably been the individual's personal possession whilst still alive, as body coverings designed for the interred corpse, and as coinage in at least one documented case (Batang Mata Sapo). The opulence of the royalty is no more graphically illustrated than with the burial of a man and a woman, near the royal Islamic La Tenri Rua cemetery in Bantaeng, where approximately 600 grams of gold were found in the guise of head ornamentation, necklaces, finger rings, genital covers and death masks (Bougas 1996:34). Gold seems to have filtered down to the local nobility quite often, too, its presence (but not its manufactured form) being recorded by SSPHAP's survey team at seven Ming-period burial sites within the Macassar survey area (Bulbeck 1992:244-55, 336, Fig. 10-25). In most cases the gold probably consisted of small items such as the ring, slivers (possibly from a necklace) and eyelid covers excavated at Sompu (Figure 7). Eyelid covers were also excavated at Malewang (Tjandrasasmita 1970:21), which may suggest that they were also present at many looted sites, but were not recognized as such owing to the looter's coarse excavating techniques. The other noble metal, silver, has to my knowledge been reported only from one site, Patimang in Luwu (Table 7), so obviously this isolated datum needs confirmation, although it can be pointed out that Patimang is probably the single richest source of looted Ming-period valuables in all of South Sulawesi (Bulbeck 1995:12).

Until very recently, the literature gave the impression that gold death masks were special, with examples reported only from the Maros region (Lombard 1972:204), Ujungloe in Pangkajene (Pelras 1975:26), Bantaeng (Reid 1983:152) and Sanrabone (Bulbeck 1992:Fig. E-3). As a result of his discussions with antique dealers, Bougas (1996:34) can report

one from Lembang Cina (in addition to the La Tenri Rua masks), seven at Kale Gowa, and five in the Jeneponto region directly west of Bantaeng. The Jeneponto masks were reportedly 10-12 cm across, and so would have barely covered the face, whereas the Kale Gowa masks were apparently larger and weighed between 40 and 70 grams each. The Ujungloe mask, the only example not to have fallen into the hands of private collectors, has an accompanying note which states its gold composition as 71.5% (Museum I La Galigo Acc. No. 2697). Pelras (1975:26) suggests a 14th-15th century dating for the Ujungloe mask, whereas the Vietnamese and Ming tradewares associated with the La Tenri Rua masks would date them to the 15th or 16th century (Bougas 1996:34). These masks have been reported at more or less the right frequency to suggest they were restricted to major pre-Islamic Makasar rulers and their chief wives, presumably to deify them in the afterlife (cf. Bougas 1996:34), possibly linked to solar symbolism.

Other metal finds from open sites

Metalwares from non-mortuary contexts in open sites date to no earlier than the closing centuries of South Sulawesi's Bronze-Iron Age. The quantity can be very large indeed, as with the 1036 iron fragments excavated at Somba Opu. In accord with the military status of the site, many of the excavated fragments are from such weapons as spears, knives, choppers or axes, and musket triggers (Anon. 1990, 1992). How much metallic weaponry was centralized at Somba Opu becomes even clearer when we consider the 44 cannons, 415 handguns, 23 arquebuses, two catapults and 8483 bullets which the VOC seized when it sacked Somba Opu (Andaya 1981:134). The frequent finds of artillery along the southeast coast reflect the intense battles which have beleagured it since the 16th century: Gowa's main 17th century cannon (Bulbeck 1992:370) and 16 excavated pieces of shot (Anon. 1990) at Somba Opu; an iron cannonball (Plate 6) and a bronze barrel fragment (Ramli *et al.* 1992:16) excavated at Sanrabone; further iron cannon balls collected at Kale Gowa and Jamarang (field notes); five balls of lead shot found near Kalukuang in Macassar's hinterland (Plate 7);[39] and cannon pieces collected at Tallok, Takalar and Maros (I La Galigo Museum Acc. Nos 2740, 2699 and 2544).

Coins occur quite commonly in South Sulawesi sites, such as the nine Malay coins and eight Chinese coins excavated at Wajok's palace of Tosora (Darmawan, Kallupa, Ramli and Albertinus 1993:41). Some would date to the Bronze-Iron Age, such as the Malay coin from Tosora with a 1560 date, and the four unidentified coins (presumably 16th-17th century) excavated at Somba Opu (Anon. 1990).[40] Most however are 19th century or later, such as the two identifiable coins excavated at Sanrabone, dated 1841 and 1976 (Rahman *et al.* 1993:43), the 21 coins dating between 1816

[39] The balls were collected by an archaeology student in South Sulawesi who let me record their visual traits. They are very dark grey where uncorroded, leave a grey streak, and have a specific gravity approaching 10.

[40] The list of holdings of the I La Galigo Museum also mentions an Indian coin from Takalar (Acc. No. 114)

and 1970 collected during the Macassar and Soppeng surveys (Bulbeck 1989:119, 1992:799-800), and the two VOC coins held at the Museum I La Galigo (Acc. Nos 113 and 2737). The apparent lack of identified coins minted earlier than 1560 does suggest that very little coinage was imported to South Sulawesi prior to the 16th century; the fact that Southeast Asia's pre-1400 AD coins were overwhelmingly made from gold and silver (Wicks 1992:312-13) rules out poor preservation as an explanation for the absence.

Corrosion would however be a plausible mechanism for the paucity of **utilitarian** metal goods from open sites. The only examples I know if which **might** date to the Bronze-Iron Age are the 14 nails excavated at Tosora, which are morphologically distinct from industrially produced 19th-20th century nails (Darmawan, Kallupa, Ramli and Albertinus 1993: 16), and the metal fishhook stratified beneath the 1841 coin at Sanrabone (Ramli *et al.* 1992). The fragment of an iron knife which I collected at Manjalling Lompoe, in the vicinity of pre-Islamic burials, is an example of modern puddled iron, based on Len Hogan's metallurgical analysis (Appendix C).

Iron slag, which would suggest local forging or even smelting, has been recovered from several sites. Within the Macassar survey area, SSPHAP collected iron slag at Aengtoa (Bulbeck 1992:799) and Saukang Boe (field notes), and an earthenware sherd from a ceramic crucible at Garassik (Sonny Wibisono pers. comm.). Sanrabone has produced another piece of iron slag (Bulbeck 1992:Fig. E-3) and five *bulat panjang* (oblong pieces), which may be slag, excavated by Ramli *et al.* (1992). Four iron objects resembling slag were excavated at Sompu (Tjandrasasmita 1970:4-5). As regards the Bugis area, SSPHAP's survey collected a pair of bellows, and sculpted stone objects tentatively interpreted as vessels for melting metals, at Tinco Tua, which was West Soppeng's capital prior to the 16th century (Kallupa *et al.* 1989:40, 48). Kakarangan, Luwu, would appear to be a clear case of a 17th century iron-smelting workshop, based on Willems' report of 25 mounds, of which the ten he excavated contained metal slag, fire-hardened earth, and ten 17th century tradeware sherds (van Heekeren 1940:12).[41]

Bronze-Iron Age metallurgy in South Sulawesi

Figure 1 plots South Sulawesi's commercial reserves of copper, iron and lead, as summarized from van Bemmelen (1970), Wolf (1981) and Bronson (1992). Intriguingly, Conto, writing in 1600, mentioned precisely these three metals as having been exported from South Sulawesi. The early Portuguese sources also refer to the exportation of South Sulawesi gold, in 1511 and 1534, and its extraction by mining and panning in 1569 (Pelras 1981:159). There is solid ethnohistorical evidence for exploitation of the iron deposits, especially those around Lake Matano which are associated with the world's largest nickel mine at Soroako. As we will see, the Matano nickeliferous iron was critical to the historical development of Luwuk, as apparently was the gold extracted in the central Sulawesi highlands

[41] The tradeware sherds are registered in Jakarta as National Museum Acc. No. 3779.

(Caldwell 1988:183-85). Bronze working has also been a traditional craft, quite possibly by the first millennium AD, although any mining of the island's copper and lead deposits appears to have ceased before European visitors could directly observe it.

As early as 1679, Dutch expeditions to the highlands north of Seko (see Figure 2) recorded *cire-perdue* bronze metallurgy, and this tradition continued, albeit in decline, until at least 1938. The workers melted old bronze objects together in a crucible, and then cast small bells, axes, spearheads, bracelets, and human and water-buffalo figures (van Heekeren 1958:5-6). Melting down old bronzes overcomes the lack of tin deposits in South Sulawesi (as everywhere else in Indonesia and the Philippines), but would have delayed the onset of bronze working until imported bronze scrap was fairly plentiful.

The variability of Sulawesi's bronze axes suggests that some of them were locally cast. Soejono (1972) located examples of four of his 15 Indonesian axe types in South Sulawesi, while Glover and Syme (1993) recognize 19 Southeast Asian axe types of which nine are known from Sulawesi, one of them from nowhere else.[42] Although no axe moulds have ever been reported from South Sulawesi, Bellwood (1985:307-09) excavated three axe moulds dating to the first millennium AD in the Talaud Islands in Sulawesi's north. A waste piece of cast glass found 60 cm beneath the soil near Palopo (van der Hoop 1941:319) offers some evidence of advanced pyrotechnology in Luwu by 1000 years ago.

The origins of the kingdom of Luwuk appear to be tied up with the exportation of iron from the surrounding highlands, especially the nickeliferous iron from Lake Matano. Several accounts dating to c. 1900 describe the simple smelting operation at Soroako which produced the iron-nickel alloy, and how similar operations north of Seko supplied Maluku with iron tools and western Indonesia with nickel-rich iron (Bronson 1992:73, 92). Preliminary field work by Caldwell (1993:7) has identified ethnohistorical evidence of an important ironworking industry at Matano, and two iron ore mines near Seko (see also Zerner 1981). By the early 16th century iron implements of all types were being exported from South Sulawesi to Maluku (Macknight 1993:40). The earliest direct reference to the exportation of iron from Luwu dates to 1670, but the famous *pamor luwu* iron-nickel inlay in the blades of certain classical Javanese krisses indicates a much earlier trade (Caldwell 1995:411). Perhaps most significantly, "mountains" of iron and gold are listed among the heirlooms of Luwuk's legendary founder by the *I La Galigo* (Kern 1988:21), a Bugis epic poem which seems to have originated in Luwuk's pre-Islamic court.

Metallurgy in Sulawesi was probably first established by the highland "Toraja" groups, and the Bugis may have learnt to work iron only after their expansion across the Luwu coastal plain. If so the technology soon spread rapidly across the peninsula. Bone's second ruler, who reigned at c. 1400, was nicknamed "the Ironsmith" (Macknight and Mukhlis n.d.). Taka Bassia, Makasar for "iron artisans", is a pre-Islamic ritual

[42] Or counting the unique "Macassar flask" and its smaller twin as a separate axe type, 5/10 in South Sulawesi under Soejono's typology, and 10/20 in Sulawesi according to Glover and Syme.

site near Bantaeng which local people identify as the original smithery for swords, choppers and other ironwares (Bougas 1996:28). By the mid-16th century Gowa had developed an apparatus of specialist technicians which included gold workers, ironsmiths, and manufacturers of metal weaponry (Bulbeck 1992:108). Finally, Macassar began issuing its own gold and silver coins during the reign of Tallok's Sultan Abdullah, 1593-1636 (Rahim and Ridwan 1975:18).[43]

Ironworking would have been critical to the economy of the Bugis and Makasar kingdoms, not only for the production of weaponry, but also in the manufacture of ploughs, digging sticks and other implements associated with the dramatic expansion of the agricultural sector after 1400 (cf. Macknight 1983). At this stage it is not permissible to speculate on the degree to which the scattered ironsmiths relied on iron imported from Luwu, iron scrap, or locally available ores (such as the source in the upper Walaneae Valley) for their raw material. Gold may have been shaped into ornaments widely, as the wide distribution of gold death masks in Makasar-speaking areas suggests, and there may also have been limited silver working, but as yet there is no textual or ethnohistorical evidence I know of to suggest **bronze** metallurgy. While it is entirely possible that small bronze-casting operations may have been established in the peninsula during the present millennium, most bronze would seem to have been imported from Java, which was famous for its bronzework (Bougas 1996:33), or from small-scale operations in the highlands to the north.

Imports of Early Monochromes and Whitewares to South Sulawesi

The first section of this paper observed that early monochromes and whitewares, including Vietnamese monochromes (Appendix A), were a major item of trade by the 13th century. Their identification in any particular area would imply goods traded back in exchange, even if we cannot yet specify what those goods were. Theoretically, three patterns of distribution might be expected. If the 13th-14th century political landscape consisted of only a small number of centralized societies, such as the kingdoms whose origins can be traced back that far, and there were merely weak trading links established more widely across the peninsula, then the early tradewares should be more or less restricted to the political heartlands of those kingdoms. If however a complex trading network had already been established, then early tradewares should be widespread, albeit with a focus on the areas of the early kingdoms. Finally, if political centralization had extended much farther than the textual records would suggest, early tradewares should show a fairly ubiquitous and even distribution.

[43] The chronicle specified gold and tin coins, but tin is very unlikely, for two reasons. Firstly, silver has traditionally been employed widely in Southeast Asia in making currency, but tin has never had that honour (see Wicks 1992). Secondly, the two Macassar coins in Jakarta's National Museum, both minted by mid-17th century sultans of Gowa, are respectively struck from silver (Acc. No. 2032) and gold (Acc. No. 2060), not tin.

The large sample of looted tradewares inspected by Suaka between 1973 and 1977 outlines the overall picture, even if most pieces are unprovenanced. The 14,611 wares include three as-yet unconfirmed T'ang identifications (Hadimuljono and Macknight 1983:67), and 1545 Sung and "Yüan" pieces (Hadimuljono and Macknight 1983:77). My 1986 transcription of the records of the 94 pieces provenanced to a district showed that 41 were traced to Selayar, 48 to the coastal strip between Jeneponto (immediately west of Bantaeng) and Siang, with only three cases from Pare-Pare (Suppa), and single examples from each of Bone, Wajo and Luwu.

During the Macassar survey, plus the surveys of Sanrabone and Kalukuang, SSPHAP recorded 55 Vietnamese monochromes, 104 early whitewares and 192 early monochromes at 43 of the 152 historical sites (Bulbeck 1992:608). An unknown proportion of the coarse stoneware pieces would also predate Ming (e.g. Bulbeck 1992:375, 436). Where these early wares occur as a miniscule component among predominanly Ming wares, as at the 16th-17th century palace centres of Tallok and especially Somba Opu (Bulbeck 1992:Figs 11-8 and 12-1), they are probably misidentifications or residual pieces (e.g. heirlooms).[44] In contrast Kale Gowa, which seems to have functioned as Gowa's primary or secondary palace between c. 1300 until at least 1694, shows a strong and very consistent signal of tradewares from the 13th right through to the 18th century (Bulbeck 1992:224, 231-37).

Selayar Island is the only other location where archaeological survey has attempted to record every pre-Islamic cemetery. Inspecting whole and broken ceramics from looted sites, Naniek (1983) and Wibisono (1985) have identified Sung or Yüan wares at 23 of the 42 sites with tradewares, from the far north to the far south of the island, along the coastal plain and up in the hills. The "strike rate" for early monochromes and whitewares is thus higher than in the Macassar survey, confirming Selayar's renown as a source of these antiques. However, Selayar's area (765 km^2) exceeds the Macassar survey area (167 km^2) nearly fivefold, so the concentration would appear to be less.

Another zone of early tradewares lies across the strait from Selayar, between Bantaeng and Jeneponto. Two sites here are noted for their pre-Ming tradewares, while earlier pieces as well as Ming ceramics have been looted at various locations within the enormous pre-Islamic cemetery complex of Lembang Cina (Bougas 1996). The La Tenri Rua royal Islamic cemetery in Bantaeng (Muttalib 1980) includes some early monochromes, resembling Che-chiang 浙江 celadons, on display at the site museum (pers. observation). Accordingly the three toponyms along the south coast of South Sulawesi cited in the 14th century *Nagarakertagamana* poem (Macassar, Selayar and Bantaeng) all contain a strong presence of early tradewares. As Luwuk is the fourth identified toponym, this raises the expectation that its pre-Islamic palace centres are also rich in pre-Ming ceramics. Some reports from antique dealers indicate this is so (Caldwell 1988:183; Caldwell 1993:8), but archaeological confirmation is still want-

[44] Suaka's excavations at Somba Opu recovered only Ming, Vietnamese, Sawankhalok, Ch'ing and later sherds (Anon. 1990:55).

ing (Bulbeck 1995).

The Soppeng survey recorded eight Vietnamese monochromes, 16 early whitewares and 97 early monochromes at eight of the 12 sites selected for survey (Kallupa *et al.* 1989).[45] The survey thus confirmed the local historical tradition of a 13th century origin for both East and West Soppeng, and shows that Bugis agrarian kingdoms which are not mentioned in the *Nagarakertagamana* were also importing early tradewares. The only other survey of an early hinterland kingdom is by Kaharuddin (1994:63) who found that approximately 30% of the 151 tradewares collected from Allangkanangnge, the purported palace centre of West Cina, were pre-Ming.[46] In addition, three collections made in the 1940s at Watampone, Bone's traditional capital, would appear to confirm Bone's 14th century origins as suggested by its kinglist. Orsoy de Flines identified them all as early Chinese celadons and whitewares, assigning 35 to the 13th-14th centuries, and three to around the tenth century.[47]

Early tradeware sherds have also been recorded from sites where we would not expect political centralization to have developed by the 13th-14th century. The Sompu excavation recovered two Sung and Yüan wares (Figure 7). Kalukuang, which is a fairly remote site in the Gowa foothills (Figure 5), is one of a very few sites with abundant early tradeware sherdage and nothing later (see the pieces in Figures 8-11 with labels commencing T.30). Palopo, even though it did not become Luwuk's capital until the 17th century (Caldwell 1993), contains a "tumulus area" where two 13th-14th century Che-chiang celadons were excavated, as identified by Orsoy de Flines.[48] The site museum at Lamuru's royal Islamic graveyard (Muttalib 1978) includes some early monochrome sherds which resemble Che-chiang celadons (pers. observation). Four similar pieces are included among the grave goods reportedly excavated with the bones of a "Karaeng Sapohatu" buried in a hole in the limestone in front of the rockshelter of the same name (field notes, 1/8/86). Finally, the top spits at Leang Burung 1, Trench A, produced three 13th-14th century monochromes (pers. observation; cf. Chapman 1981:103).[49]

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[45] Although the report recognized 15 Sung pieces, Ian Caldwell and I now agree that probably none of the sherds predates the 13th century, and many of the early monochromes are probably 15th century (cf. Appendix A).

[46] An earlier collection of 58 tradeware sherds made at "Cina ri Hau", Sengkang, which may be a garbled rendition of the same site, was inspected by Orsoy de Flines who dated them all to the 15th to 17th centuries (National Museum Acc. No. 4751).

[47] The Watampone sherds, under Acc. Nos 4734, 4736 and 4737, were collected by Bone's Assistant Resident (van Heekeren 1950:12). From my own inspection I am unable to confirm or negate de Flines' T'ang identifications, though the implied association of T'ang pieces with sherds dating to 200-300 years later looks suspicious. However, his identifying the pieces as pre-Ming is correct, as is clear from the virtual absence of underglaze-decorated sherds among the collections.

[48] No documentation appears to exist on the excavation of the tumuli which produced the Palopo pieces (under Acc. No. 3772 at Indonesia's National Museum).

[49] Tradewares are also identified from the excavations of eight other rockshelters – Batu Ejaya 1 and 2 (as discussed earlier), Bola Batu (van Heekeren 1949:101), Leang Ara, Panisi Tabutu (National Museum Acc. Nos 3491 and 3514 respectively), Leang Burung 1 (Glover 1981:36) and Leang Karassak (Pasqua 1995) – but none are pre-Ming. Additionally, the surface of Ulu

By all accounts, only a small proportion of South Sulawesi's tradewares dates back to the 13th-14th centuries. Early monochromes and whitewares (including Vietnamese examples) comprise only 5.5% of SSPHAP's pre-Ch'ing tradeware identifications (Bulbeck 1992:594), 6.4% of the 345 South Sulawesi sherds identified by Orsoy de Flines, and around 11% of Hadimuljono and Macknight's sample. Numerous Ming-period tradewares, but not a single earlier piece, have been excavated by Suaka at the open sites of Somba Opu, Manjalling and Pakka Mukang (Galesong), Sanrabone, Batu Pake and Tosora. Even in Selayar Ming-period wares outnumber earlier wares (Naniek 1983). Hence the thin presence of 13th-14th century tradewares, except at the early trading posts and embryonic centres of the early kingdoms, at least partly reflects these tradewares' general scarcity, as well as the archaeological focus on places of critical protohistorical interest.

This caveat notwithstanding, we can certainly identify a strong presence of early tradewares on Selayar and along the south coast, which together lay along one main route between Majapahit Java and the spice islands (Reid 1983). These tradewares were by no means restricted to the coast but were also traded into the foothills. They also reached the Bugis areas, but seemingly with a concentration at the political heartlands of the earlier kingdoms (Soppeng, Cina, Bone), and in merely miniscule amounts at the later political centres (Palopo, Lamuru). This may suggest that south of Palopo and north of the south coast, i.e. in the area of the Bugis agrarian kingdoms, trade during the 13th-14th centuries remained rather limited. The explanation might be that population densities were still very low beyond a few enclaves where intensive rice agriculture had been initiated (cf. Caldwell 1995).

Concluding Argument

This paper has recognized a Bronze-Iron Age in South Sulawesi to avoid prejudging the question of finer chronological divisions, but as a result of the evidence considered here, two periods are clearly distinguishable. The first can be equated with Bellwood's (1985) Early Metal Phase, and seems to have been a time of limited contact between communities in the peninsula and societies elsewhere in the archipelago. What evidence there is of local metallurgy is meagre and contradictory, and very few metal goods, mostly such small items as beads and foil, were introduced through exchange. A possible exception is the south coastal belt and Selayar Island, where a substantial array of bronze axes and two Dong Son drums are reported, but even these may date to no earlier than the end of the first millennium AD. Nonetheless this is our earliest evidence of the importation of truly valuable metalware, and it may well reflect a northern extension of the major trade route which ran from Java along the Lesser Sundas to Maluku during the Early Metal Phase (Bellwood 1985).

A flourishing tradition of metallurgy does appear to have been

Leang 1 contained sherds of celadon stoneware, which could be of any age, as well as blue-and-white porcelain (Glover 1976:124-25), while Sarasin and Sarasin (1905:23) excavated Chinese and European ceramics at Lamoncong.

established in Sulawesi by this time, but in the central highlands to the north. Van Heekeren (1958) has suggested linking the spectacular megalithic traditions of the central Sulawesi highlands with early metallurgy, and noted that the bronze Buddha statue at Kalumpang could identify the Karama River as a major trade route between central Sulawesi and the western archipelago. I cannot find evidence to contradict his view. Only with the expansion of the Bugis into the Luwu coastal plain does the latter area seem to have become the major interface between the central highlands and the outside world.

At around 1200, it would seem, several major transformations occurred concurrently. A much expanded repertoire of grave goods, including gold, tradewares and a smorgasbord of bronzes, can be dated to this interval. The wide variety of earlier practices, which usually involved complex secondary disposal of the human remains, gave way to one-step cremations (with burial of the "ashes" in a jar) and direct inhumations. Both changes appear to have been adopted from places with which South Sulawesi communities probably had direct contact, and for the first time South Sulawesi is referred to in the external sources. The oldest historical kingdoms apparently emerged, suggesting the origins of centralized societies. The changed burial practices may correlate with the transition from competitive ranked societies, whose economic basis lay in swidden agriculture, to stratified societies with an orientation towards surplus production and trade. By 1400 the Bugis had developed their script. Clune's (1996) analysis of the decorated earthenwares collected from Macassar historical sites emphasizes how clearly distinct they are from the peninsula's Early Metal Phase pottery. Unless these apparent re-orientations are the spurious result of some conspiracy of the visible evidence, we can infer a second, historical period within the Bronze-Iron Age.

The South Sulawesi peninsula then emerged as a natural link between the resource-rich highlands, with abundant dammar and other forest produce as well as minerals such as nickeliferous iron and gold, and the established trade route for spices which brushed against the south coast. As pointed out by Caldwell (1995:409-11), Luwuk appears to have been the first South Sulawesi kingdom to realize this locational advantage. Its list of tributary communities features 30 places located around the head of the Gulf of Bone, both along the coastal plain and within the abutting highlands, and 40 places along the south coast east and west of Bantaeng. The basis of Luwuk's economy lay in moving the highland resources to the trading route along the south coast, quite possibly assisted by the manufacture of superior iron weaponry and the persuasive powers it conferred. Although the list of tributaries dates to no earlier than 1500 (Bulbeck 1992:480), by this time Luwuk's glory was already in decline, so its hold over trade in the peninsula was presumably even greater beforehand. Certainly the spread of advanced iron metallurgy to the kingdoms in the peninsula, as suggested in this paper, would have removed what had been one of Luwuk's critical advantages in trade and warfare.

The second major natural advantage of the South Sulawesi peninsula is its rich agricultural land, bathed by a monsoonal climate ideally suited

to wet rice (Mackight 1983). The early Bugis agrarian kingdoms such as Soppeng appear to have relied on a rice surplus from the start. The extension and intensification of centrally planned rice production and exchange, after around 1400, led to the relative decline of Luwuk whose agrarian potential was always limited (Caldwell 1995). The peculiar distribution of Luwuk's tributaries at c. 1500, with one group to the far northeast of the peninsula and the other group to the far south, probably reflects Luwuk's loss of intervening strongholds to the expanding agrarian kingdoms, as would also have severed Luwuk's trade network.[50] Macassar's rising dominion over the south coast during the 16th century may have relied more on the population of warriors it could support through local rice production than on its access to new advanced weaponry through its emporium. Agricultural production buoys trade; an entrepôt will attract more traders when a substantial food surplus in the vicinity increases the available victuals and supports troops to protect the entrepôt (Bulbeck 1992:468-69, 481-83). Caldwell (pers. comm.) has recently added another dimension by suggesting that bulk shipping of rice may have been as important to Bantaeng's impressive prosperity as was its position along the spice route.[51]

The most critical factor would seem to have been the capacity to integrate trade and agrarian production. When Bone arose as the most powerful Bugis kingdom in the early 16th century, it pushed Luwuk back from the mouth of the Cenrana (Walanae) River, and so gained control over the trade into and out of the peninsular interior (Caldwell 1995:410). Its position immediately south of the Gulf of Bone would also have presented a potential stumbling block to Luwuk's trading aspirations, or at least convinced Luwuk of the wisdom of paying Bone the required "protection money". These strategic advantages, however, had to be defended by a large population, and here we see the crucial advantage of Bone's coastal alluvial plain, ideal for wet rice, and its commitment to increasing the rice harvest (Macknight 1983). Equally, Macassar's ascent was based on its strategic location at the junction of the trade routes along the south and west coasts, and its proximity to hugely productive rice fields (Bulbeck 1992). Political events during the 16th and 17th century essentially revolved around the contest between Macassar and Bone to integrate the entire peninsula beneath one overlordship (Bulbeck 1990:80). In one sense both polities achieved this – Macassar established direct rule over Bone in the mid-17th century, while Bone jointly occupied Macassar with the VOC directly after the Macassar War – but by this time the emergence of the European powers, and their machinery for economic integration on a hitherto unprecedented scale, spelled the closure of the

[50] Note, however, that the continuing prominence of Luwuk as an international trader until 1603 is clear from the fact that it adopted Islam before any other South Sulawesi kingdom did (cf. Caldwell 1993).

[51] Caldwell's main evidence is the incident in 1667 when the VOC captured Bantaeng from Macassar's troops, and set fire to approximately 100 boats in the harbour loaded with about 6000 tons of rice (Andaya 1981:76). By the early 16th century South Sulawesi was already exporting high-quality rice and many other foodstuffs to Melaka (Reid 1983:128).

Bronze-Iron Age in South Sulawesi.

APPENDIX A.

Dating SSPHAP's Tradeware Classes, With a Brief Description of the Early Whitewares and Monochromes

Early whitewares and monochromes are in general the most difficult of SSPHAP's tradeware pieces to identify and date, as they lack the compartmentalized, standardized decorations which allow trained observers to identify the later classes with straightforward confidence. Even with these latter, diagnostic classes, ideas on their precise dating have changed over time. Accordingly I seriated the 42,980 tradewares identified at SSPHAP's sites, based on the degree to which any pair of classes presented a similar profile of associations with the other 27 classes. **Five** seriation exercises were carried out in all, each employing different operational conditions to accommodate uncertainties in the data base (Bulbeck 1992: Figs B-1 to B-5). All the seriations agreed in producing four sequential clusters, which can be interpreted as "Early", "Ming", "Ch'ing" and "Recent"; however, they disagreed slightly on exactly which tradeware classes belong to which cluster.

Subsequently I have devised a method for averaging the results. In each seriation, the "Early" classes are assigned dates from 1200 to 1350 in stepped sequence, e.g. if there are four of them the class which is seriated as the earliest is dated 1200, the second is dated 1250, the third is dated 1300, and class which is seriated as the least early is dated 1350. The analogous procedure is carried out for the "Ming" classes, but with dates between 1400 and 1650, and for the "Ch'ing" (1700 to 1850) and "Recent" classes (1850 to 1950). Each tradeware class therefore has **five** dating estimates, which allows us to calculate its average dating, plus its likely chronological range from the degree to which it consistently groups with one or the other cluster (Table 8). A full explanation will be prepared in the near future.

One important result of this analysis is its clear chronological separation between the classes which SSPHAP's system labelled early whitewares, Ming whitewares, Wan-li 萬曆 whitewares and Ch'ing whitewares (Table 8). One type of Ming whiteware which can be easily confused with the early Ch'ing-pai 清白 whitewares, except for its distinguishing features of a more opaque glaze and a central stacking ring, is illustrated in Figure 8d. The celadons, however, proved to be more difficult to discriminate from each other. During field work Karaeng Demmanari (SSPHAP's ceramics expert) and I recognized a class of "Yüan-Ming celadons" (Figure 10e, h) to accommodate sherds with the thick celadon glaze typical of Che-chiang celadons, but whose decorations or details of manufacture evoked comparison with the usually thinner-glazed "Ming celadons". As Table 8 shows, Yüan-Ming and Ming celadons are essentially identical in age. Several sources indicate that the export period of the Che-chiang celadons continued well into the 15th century (Gompertz 1980:147, 188;

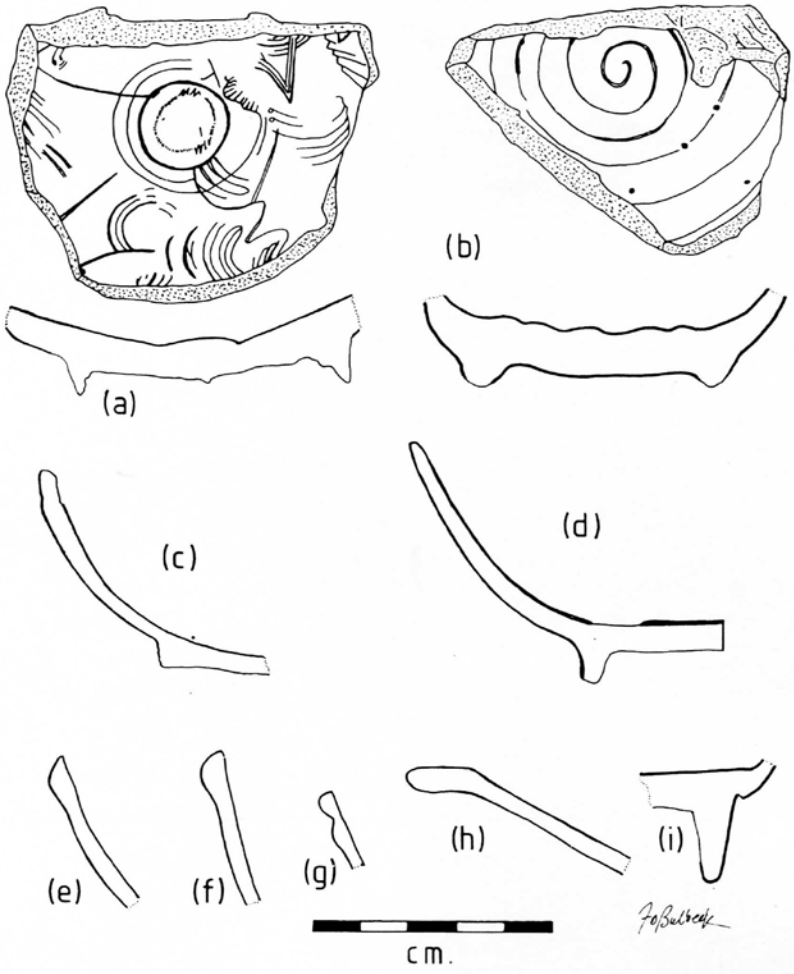


Figure 8 (a): G.12.1.1, rough porcellanous bowl with Ch'ing-pai glaze except for unglazed base and foot. (b): G.30.17.1, octagonal porcellanous bowl, milky white slip beneath Ch'ing-pai glaze, raised wheel spiral on obverse. (c): G.21.14.3, shallow porcellanous bowl, originally covered; thin Ch'ing-pai glaze, irregular at centre. (d): Ming whiteware distinguished by opaque glaze and central stacking ring (purchased in Ujung Pandang). (e)-(f): G.24.1.6, G.24.12.11, Ch'ing-pai porcelain bowls with thickened rims. (g): G.24.3.7: Ch'ing-pai porcelain bowl with corrugated rim. (h): T.30.9.2, rim of shallow porcelain plate with thin Ch'ing-pai glaze. (i): G.24.2.12, porcelain open vessel with Ch'ing-pai glaze except on the unglazed base and inner foot.

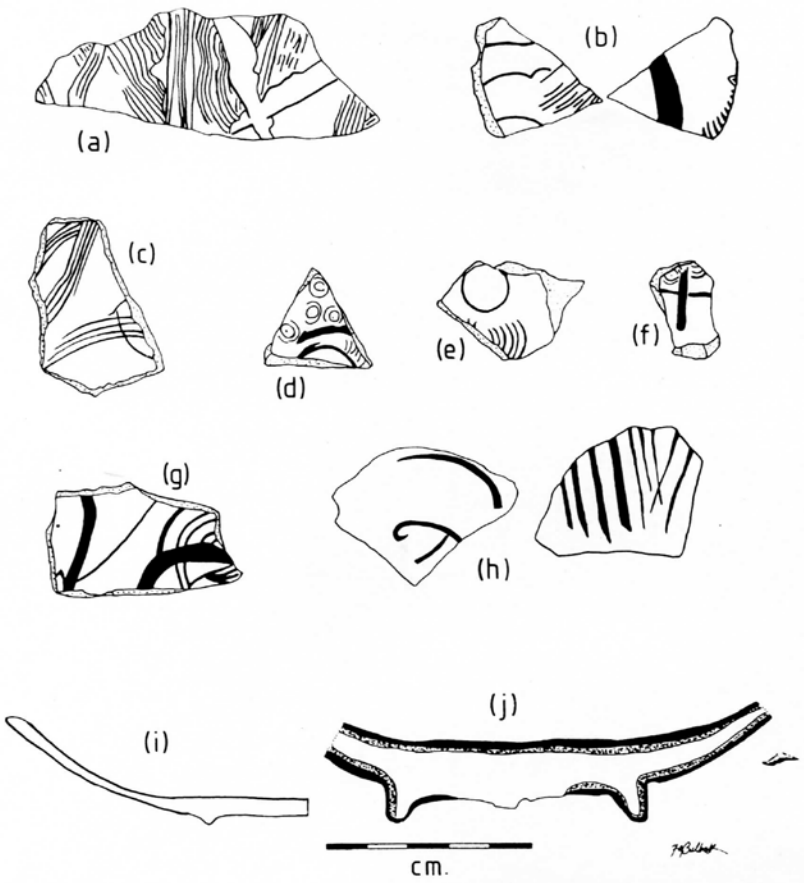


Figure 9 (a): G.24.1.7/8: exterior cavetto to porcelain bowl with transparent Ch'ing-pai glaze. (b): G.24.1.35, obverse (left) and reverse cavetto to porcelain bowl with transparent Ch'ing-pai glaze. (c): G.12.2.5, obverse lower cavetto to an open stoneware vessel with milky white slip beneath Ch'ing-pai glaze. (d)-(f): G.24.6.20, G.24.6.24, G.24.6.26, obverse basal sherds, grey stoneware body covered by thin olive-green glaze. (g): T.30.5.7, obverse lower cavetto to open porcellanous vessel with a thin olive-green glaze. (h): G.30.14.9, obverse (left) and reverse to an open stoneware vessel with an olive to olive-green glaze. (i): T.30.1.20, shallow stoneware bowl with unglazed rim, moulded design with fish and flower in centre, light- to olive-grey glaze. (j): T.30.9.1, stoneware vessel with pinkish grey body except where stippling shows dark-grey wall, milky white slip beneath olive-green glaze.

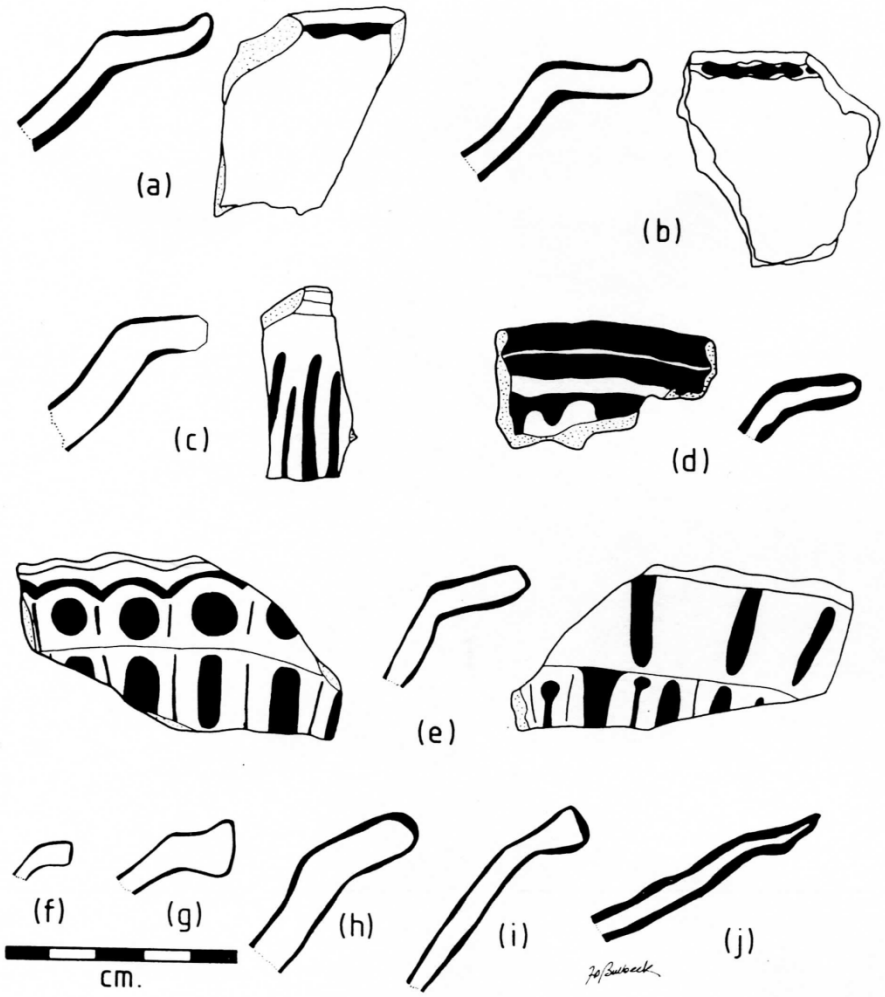


Figure 10 (a)-(b): T.30.1.26c, T.30.1.27, plate rims with greenish grey glaze, exteriorly notched rim. (c): S.15.1.7, plate rim with tip unglazed, greenish grey glaze. (d): T.30.1.29a/b, plate rim whose dark gleyish grey glaze turns to olive green at raised areas (shown in white). (e): G.5.4.29, Yüan-Ming celadon with moulded fluted decorations and Blue-Green A6 colour to the glaze. (f)-(g): S.3.1.2, S.10.2.5, plate rims with olive-green glaze. (h): G.3.3.4, Yüan-Ming celadon plate with scalloped reverse cavetto and rim, greenish grey glaze. (i): G.5.4.31/32, scalloped rim to a plate with two glaze applications, the lighter glaze on top obversely giving a brownish white colour, the darker glaze on top exteriorly giving an olive-green glaze. (j): T.6.11.55/56, plate with greenish grey glaze, four layers of glaze applied.

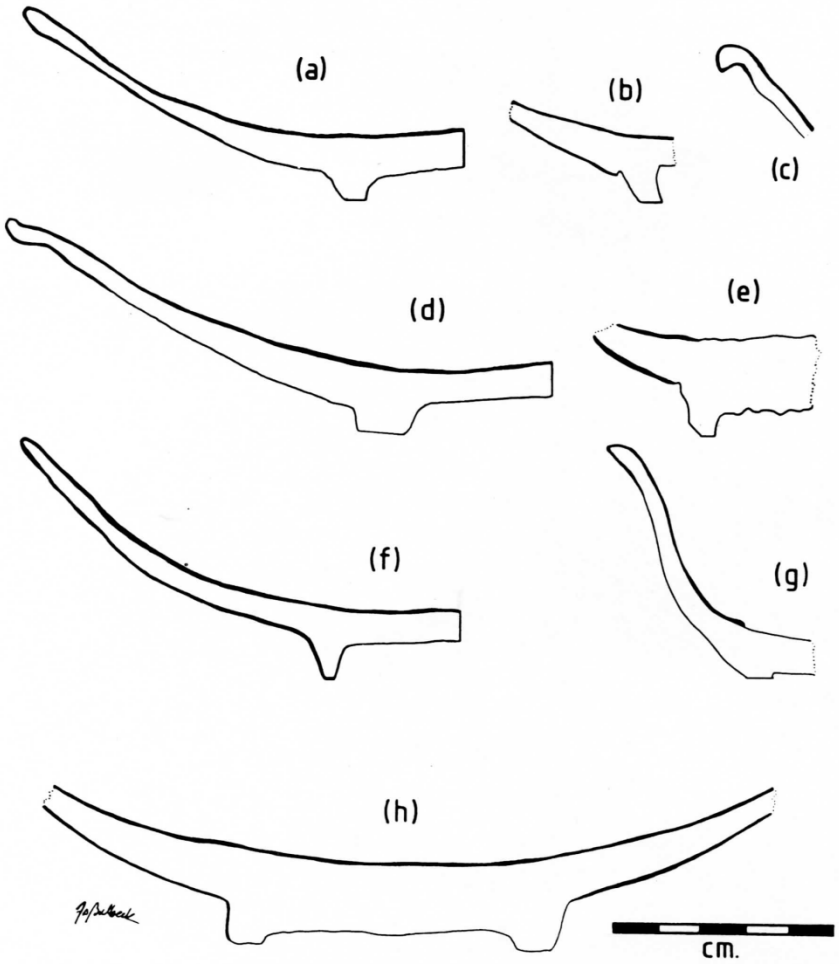


Figure 11 (a): T.30.1.1, stoneware conical bowl, rough finish, light greenish grey glaze. (b): S.10.6.35, foot to stoneware open vessel, greyish slip beneath light-greenish grey glaze. (c): G.30.35.3, stoneware bowl with thickened rolled-over rim, thin olive-green glaze. (d): chalky earthenware conical plate, with very thin pale-brown glaze, reverse largely unglazed. (e): S.10.18.2, heavily potted open vessel with turbid greenish grey glaze, but with centre, base and foot largely unglazed. (f): T.30.1.62, stoneware conical bowl, rough finish, grey-white slip irregularly present beneath olive-green glaze. (g): U.13.5.1, deep stoneware bowl, pale olive-green glaze, unglazed centre burned pink. (h): G.26.7.1, open vessel with white slip underneath an olive-green glaze, decorated with a moulded *chih* 制 mark.

Kwan and Martin 1985:77), if not the 16th century as suggested by the present analysis. Accordingly, it also seems likely that some proportion of the celadons and other monochromes which we classified as early would actually date to the 15th century, explaining why SSPHAP's class of early monochromes sometimes grouped with the "Ming cluster" (Bulbeck 1992: Figs B-2, B-5).

As yet there is no generally agreed system for classifying early whitewares and monochromes, despite concerted attempts since the 1960s to establish such a system (Zainie and Harrisson 1967; Addis 1968; Locsin 1968). Previously I have explained SSPHAP's criteria for recognizing these classes in terms of the variability of individual traits (Bulbeck 1992:525-32), including glaze colours as defined by the standards of the "Pottery Colour Chart" (Anon n.d.)[52] and the "Munsell Soil Color Charts" (Anon. 1975). The remainder of this appendix will summarize my description of these classes, along with illustrations of the vessels, and comparisons with other scholars' classificatory schemes.

Early whitewares

A Ch'ing-pai glaze is thin, greasy, and with a light bluish or greenish tinge (Addis 1968), usually corresponding to "light greenish grey" and "light bluish grey", or just whiter, of the Munsell Soil Color Charts. It occurred on around 63% of SSPHAP's sample of 120 early whitewares. Most of the other early whitewares, 26%, correspond to the "early Te-hua" 德化 category of Locsin (1968), differing from Ch'ing-pai glazes by being more opaque and less greasy (Figure 9i). SSPHAP's early whitewares consist mainly of bowls, sometimes covered (especially with the Te-hua wares), and small plates (Figure 8). Vigorous bas-relief decorations, sometimes incorporating the pronounced central nipple, characterize the small number of decorated Ch'ing-pai sherds (Figures 8a and 9a-c). Decorations on the Te-hua wares, if present, were almost invariably the result of moulding (cf. Locsin 1968:5).

The earliest of SSPHAP's Ch'ing-pai wares may be the bowls with fattened lips, which were popular between the 11th and 14th centuries (Lam 1985:2). The 13th and 14th centuries are usually considered the main export period of the early Te-hua whitewares, although there appears to have been some exportation beforehand (Locsin 1968:6; Medley 1974:133; Kwan and Martin 1985:75-76). Both of these whiteware classes were infrequently encountered during the Soppeng survey.

Early monochromes

Around 73% of SSPHAP's sample of 289 early monochromes had the rich greenish glazes usually associated with Che-chiang celadons (Gompertz 1980). Specimens with more than one application of glaze were rare. Plates were the most common form (Figure 10), supplemented by bowls and a small number of boxes and jars. Within SSPHAP's sample of rims, a

[52] As regards the glaze colours in Figures 9 to 11, "Pale olive green" matches Green/Brown A6 to A7 of the "Pottery Colour Chart", "olive green" matches Green/Brown A4 to A5, and "dark olive green" matches Green-Brown A2 to A3.

conventional rim shape was usually associated with a better quality of glaze (Figure 10d-h), while the more extravagant rims tended to have a thinner, greasier or more crazed glaze, sometimes slipped underneath (Figure 10a-c, i-j). Celadons with these Che-chiang attributes occurred more frequently in Soppeng than in the Macassar survey, and were a rather minor component of the sites dominated by early monochromes.

The remaining early monochromes, made up of subceladons, olive wares and olive-green wares, have in common a thin layer of glaze often desultorily applied, sometimes leaving the centre unglazed (Figure 11). Glaze colour is most often a light to dark olive green, varying to greenish grey shades or to olive and greyish colours. The body is highly variable in colour and quality, with a tendency for the use of slips over the darker or more brick-coloured bodies. Potting tends to be heavy, sometimes resulting in bizarre forms. Bowls are common, the rims rarely everted but flaring out into pronounced conical forms (Figure 11). Decorations may be incised, gouged, carved or combed (Figure 9d-h), or occasionally moulded. This class may include some of the oldest tradewares recovered by SSPHAP, as it overlaps in its range of visual attributes with the Yüeh stonewares of Sarawak (Zainie and Harrisson 1967) and Siraf (Tampoe 1989), the "northern celadons" of Gompertz (1980:31, 108), and the Butuan classes 3 to 9 which Evangelista *et al.* (1981) date to around the tenth century; however, the majority are likely to be Yüan in age.

Table 8. Dating scheme for SSPHAP's tradewares (derived from Bulbeck 1992:Figs B-1 to B-5).

	Tradeware class	Av. date	Likely range
Always Early	Vietnamese Monochromes	1239	13th-14th centuries
	Early Whitewares	1276	13th-14th centuries
Mainly Early	Vietnamese Black and White	1322	14th century
	Early Overglaze Enamels	1323	13th-15th centuries
	Early Monochromes	1347	13th-15th centuries
Mainly Ming – or else always early Ming	T'zu-chou Black and White	1418	14th-15th centuries
	Early Blue and White	1435	15th century
	Ming Whitewares	1474	14th-16th centuries
	San-cai	1477	15th century
Always Ming	Ming Swatow	1507	15th-16th centuries
	Sukothai	1509	15th-16th centuries
	Ming Blue and White	1519	15th-16th centuries
	Yüan-Ming Celadons	1521	15th-16th centuries
	Vietnamese Blue and White	1527	15th-16th centuries
	Ming Celadons	1535	15th-16th centuries
	Sawankhalok Monochromes	1544	15th century – c.1650
	Ming Overglaze Enamels	1550	15th century – c.1650
	Sawankhalok Black and White	1551	15th century – c.1650
	Wan-li Blue and White	1568	15th century – c.1650
	Bluewares	1569	15th century – c.1650
Always Late Ming	Swatow	1645	17th century
	Wan-li Whitewares	1658	17th century
	Late Ming Blue and White	1662	17th century
Always Ch'ing	Ch'ing Swatow	1770	c.1650-18th century
	Ch'ing Blue and White	1825	c.1650-19th century
Always Recent	Ch'ing Monochromes	1871	19th century-c.1950
	Japanese	1871	19th century-c.1950
	European	1911	c.1850-20th century
	Ch'ing Whitewares	1950	20th century

APPENDIX B.

Two Apparently Knapped High-Fired Ceramic Pieces

My claim for intentional flaking on the two ceramic sherds described here is not made lightly. In previous descriptions of the sites I have avoided mentioning these pieces. High-fired ceramics tend to flake with a conchoidal fracture, and a proportion of the nearly 42,980 tradeware sherds recorded by SSPHAP can be expected to mimic stone tools through chance breakage alone. Two pieces, however, seem to go beyond chance. Every lithics expert to whom I have shown them has accepted either or both as seemingly knapped deliberately. That would imply that other ceramic sherds collected by SSPHAP have also been intentionally knapped, as confirmed by Nguyen Kim Dung (Institute of Archaeology, Vietnam) for a dozen smallish Chinese celadon pieces from SSPHAP's Macassar and Soppeng sites. My claim that at least some South Sulawesi tradewares were knapped is not totally without precedent; Naniek *et al.* (1984:5) make the same claim for the Golo Watu Pajung site in western Flores, even though they do not depict or describe the flaked tradewares.

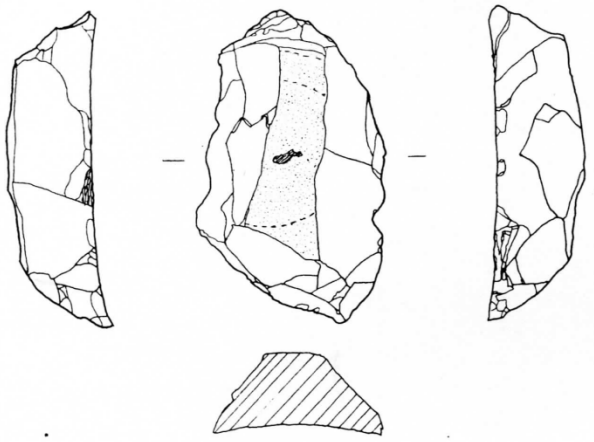
The Botto suspected core

This specimen, S.3.4.1, is a basal sherd from a Che-chiang celadon plate (glaze colour Green/Brown A4). It can be dated to the 13th-14th centuries mainly from its roughly finished, unglazed base. It was found at Botto, a prominent hilltop in Watansoppeng, the capital of the county of Soppeng (see Figure 1). Local memories of the site's having served as the ancient palace of East Soppeng, before it united with West Soppeng in the 16th century, are confirmed by the surface tradewares. More recent constructions include the Dutch colonial controleur's residence, built in the early 20th century, and modern Indonesian government offices (Kallupa *et al.* 1989:19-20, 34, 46). There have thus been ample opportunities for a discarded plate to have been accidentally smashed. On the other hand, if this piece was indeed intentionally flaked, as would seem to be the case, then it would have occurred under the noses of the East Soppeng aristocracy.

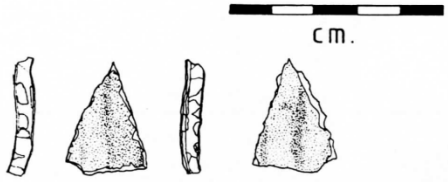
As interpreted here, S.3.4.1 has been utilized as a two-platform core with the glazed interior providing the main platform and the unglazed base the secondary platform (Figure 12). The glazed platform measures 75 mm long and 44 mm wide, while the extant base is 53 mm by 17 mm. The core has a maximum thickness of 21 mm and a weight of 67 gm. Knappability is enhanced by the stoneware body which is harder than quartz. However, the fabric comprises around 10% of white and dark-red inclusions, some of which are large enough to constitute distinct flaws.

The 17 scars struck from the glazed interior usually terminate well above the base, and represent small flakes (varying between 12.5 x 9.5 mm and 22.5 x 26.5 mm) and a bladelet (15 x 7 mm). Of the 14 scars still retaining the glazed platform edge, three (oriented at around 90° to the

striking platform) show pronounced stepping. The remainder are associated with flakes whose bulbar angles would have exceeded 110°, and whose striking platform would have been focalized in three cases. The numerous miniature scars along the margin, affecting especially the glaze but also the ceramic body, do not appear typical of usewear under the microscope (Jo Kamminga pers. comm.) and probably represent spalls from percussion or overhang removal. Observable terminations include three steps, two hinges and five feathers. The three scars from the base represent two flakelets, both with feather terminations, and a larger flake 12 mm long (as extant) by 25 mm wide.



S.3.4.1 - Botto celadon core



G.58.7.7 - Pabundukang Tua projectile point

Figure 12 South Sulawesi stoneware sherds which are suspected of having been knapped.

The Pabundukang Tua point

Pabundukang Tua lies on a levee of the Pabundukang stream at the eastern flank of the Gowa coastal plain (Figure 3). Four sherds, labelled G.58.7.7-10, appear to have come from the cavetto of the same vessel, a foliated bowl with its glaze coloured Green/Brown A6 and squiggles of red overglaze decorations. I have identified the vessel as a 14th-15th century "early overglaze" Chinese bowl, making it the oldest evidence for

the site's occupation (Bulbeck 1992:327-28). The pink stoneware body on all four sherds generally shows a hackly fracture, but is approximately as hard as quartz, and only about 3% of it consists of inclusions.

The combination of hackly fracture and moth-eaten glaze edges on three of the sherds produces crudely serrated edges. This serration could conceivably be intentional on G.58.7.9 which conjoins with G.58.7.7, the regularly serrated piece which is described here (Figure 12). Although lacking the hollowed base of the Maros point, G.58.7.7 resembles the numerous examples of other types of serrated projectile points excavated from South Sulawesi rockshelters, and so suggests continuity of this type of stone tool until early historical times. Length from point tip to base is 25.5 mm, breadth across the base is 20 mm, the sherd's greatest thickness is 4.5 mm, and weight is 2 gm.

The point tip sits at an inflexion point in the bowl's external wall, at the bottom of the moulded fluting. The initial fragmentation into a useful point could have been accidental, but the unifacial nibbling retouch from the interior surface of the bowl appears otherwise. The 16 regularly spaced, pressure flakes taken from this surface (scars measuring 2-3 mm x 2-3 mm) contrast with the two possible, tiny instances from the exterior surface. In addition possible pressure flaking on the interior sherd wall directly beneath the tip of the point may have been executed to sharpen the point. The only technical flaw which can be observed in this point is a largeish scar (3.5 x 6 mm) from a flake removed from the interior wall at one corner of the base.

APPENDIX C.

Iron Knife Fragment from Manjalling Lompoe (G.21.18.3)

The fragment was sent to Len Hogan in 1988, a consultant with the Department of Mining and Metallurgical Engineering at the University of Queensland, who graciously provided the results of his analysis in two letters. As summarized here the fragment's properties, notably the very high slag content, are consistent with 19th century puddled iron, perhaps produced from scrap salvaged from European imports. Any attempt to select the scrap for its metallurgical properties, and then exploit those properties, appears minimal.

Len Hogan cut the specimen twice with a saw to expose the metallic blade beneath the fairly heavy coating of loose rust (Figure 13). The section near the end which probably lay away from the handle exposes a composition of two alloys flattened and welded together, and then shaped to form a blade. One face is wrought iron full of elongated slags, and the other face is a thin layer of medium-carbon steel with around 0.15% carbon. A photomicrograph near the handle end (Plate 8) reveals the extension of these two layers along the blade, plus a third layer of steel with approximately 0.4% carbon. Had this alloy been placed centrally and sandwiched on both faces with the softer wrought iron, it could have produced a useful cutting edge that would have retained its hardness with sharpening. However, not only does the alignment of the layers avoid any attempt to exploit the relative properties of the alloys, but also the carbon steel had been heated to about 700°C for an hour or so, rendering it into its softest state.

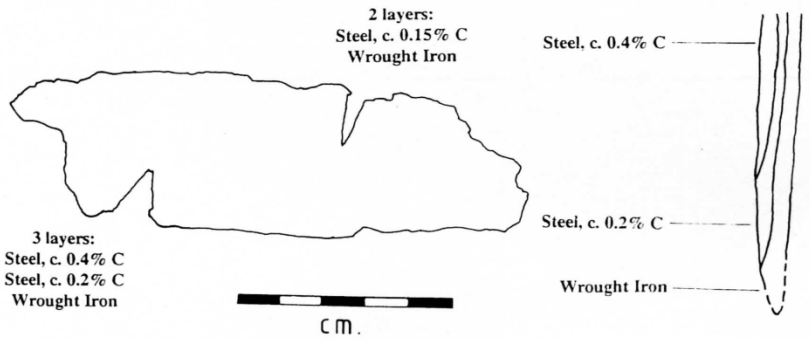


Figure 13 Knife fragment G.21.18.3 from Manjalling Lompoe, Macassar survey – cut sections and reconstructed cross-section.

Len Hogan suggests that the blacksmith was working in an unsophisticated cottage industry. His interpretation is consistent with my observations made on the peninsula's two surviving village workshops, Massepe in the central Bugis lowlands, and Pandai Besi on a Selayar

Island beach. In these workshops, bamboo bellows are pumped vertically to stoke up open fires where pieces of iron scrap are repeatedly heated and pulled out with tongs for shaping with hammer blows. A similar setup among the Toraja in the highlands towards the north of South Sulawesi is described in some detail by Zerner (1981) who adds that Land Rover suspension parts and railway sleepers are particularly favoured sources of iron.

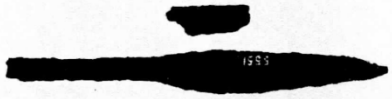


Plate 1 Iron spearhead (l. 11 cm) and fragment from Leang Codong, National Museum of Indonesia Accession No. 5551.

Plate 2 Iron-knife fragments (>l. 11 cm) from Leang Tomatoa Kacicang, Lamoncong, National Museum of Indonesia Accession No. 1553.

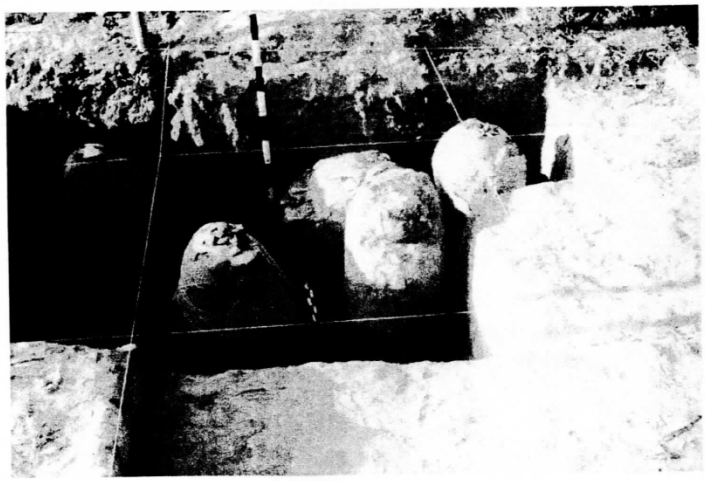


Plate 3 Group of jars excavated at Takbuncini, Galesong, Burial Urns Nos 4, 5, 6, 9 and 10. Photograph courtesy of Nusriat, Suaka Peninggalan Sejarah dan Purbakala Sulawesi Selatan.

Plate 4 Bronze cup reportedly looted at Bonto Ramba Tua, Macassar survey. Height 3 cm, rim diameter 3.5 cm, footring diameter 2 cm. Decorations consist of a line of circles embracing a band of vertical strokes on the top and bottom panels, and on the middle panel, a zigzag pattern made of short parallel lines above, and a band of touching triangles below.

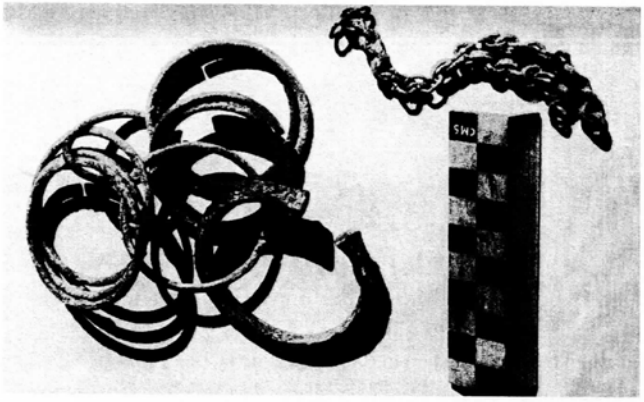


Plate 5 Bronze bracelet and ankle bands (internal d. 6 cm) reportedly looted at Baebunta, Luwu.

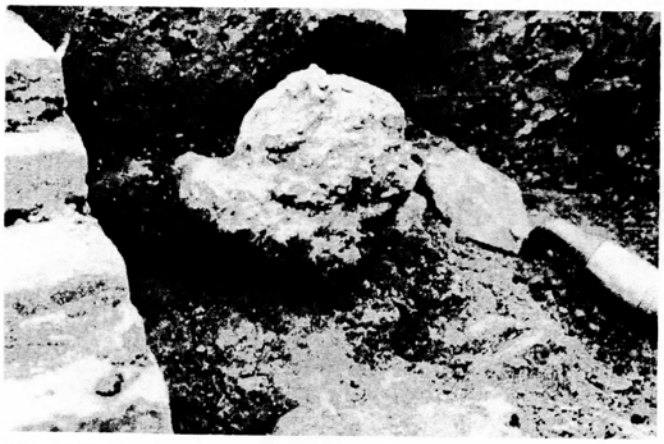


Plate 6 Rusted iron cannonball, fused to fortress bricks, revealed at Benteng Sanrabone by Campbell Macknight, 11 September 1986. SSPHAP No. T.6.7.1.

Plate 7 Lead shot collected near Kalukuang, Macassar survey. SSPHAP No. T.30.1.61.

Plate 8 Photomicrograph (x35) of section 1 showing three layers with 0.4% carbon steel (top), 0.2% carbon steel (middle), and wrought iron heavy with slag (bottom). Photograph and analysis courtesy of Len Hogan.

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