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Dedicated to Gert-Jan Bartstra

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9. Divided in space, united in time: The Holocene prehistory of South Sulawesi

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1. INTRODUCTION

Excavation and survey of prehistoric Holocene sites in South Sulawesi (see Fig. 1) have proceeded throughout the twentieth century. This province of Indonesia is probably best known for its Toalean tradition, characterised by bone points and morphologically specialised microliths. However, some archaeological evidence relates to the initial Holocene, prior to the appearance of the Toalean; and the best understood interval of the province's prehistory, the Early Metal Phase, postdates the Toalean. As will be detailed in this article, the following broad chronology can now be recognised:

- Initial Holocene, until c. 7500 BP, identified by an unspecialised industry of stone tools at two sites in the southwestern lowlands of the South Sulawesi peninsula.
- Early Toalean, dated to c. 7500-5500 BP, and characterised by bone points and microliths in the South Sulawesi peninsula, including backed microliths in the southwestern lowlands.
- Late Preceramic Toalean, dated to c. 5500-3500 BP, marked by the appearance of Maros points in the southwestern peninsula.
- Ceramic Toalean in the southwestern peninsula, dated to c. 3500-2000 BP, contemporary with Neolithic traces to the immediate north of the peninsula (and, perhaps, one site in the peninsula hinterland).
- Early Metal Phase, at c. 2000-1000 BP, the formative period when well-established communities of farmers, artisans and traders laid the basis for the stratified chiefdoms whose early history stretches back to the fourteenth century AD (Bulbeck 1996-97: 1049; Bulbeck & Caldwell 2000: 107).

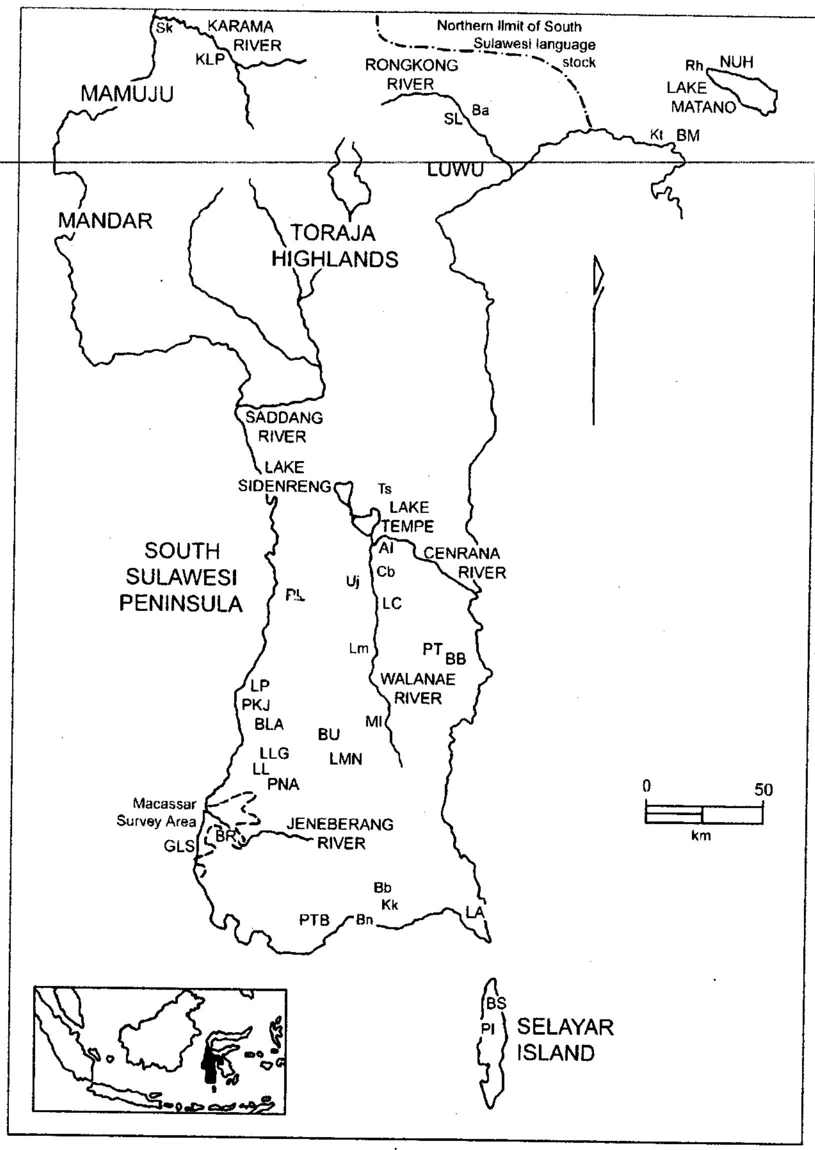


Figure 1. South Sulawesi (dark area in inset) showing sites and places mentioned in the text.

Site complexes: LLG: Leang-Leang (Ulu Leang, Leang Burung, Leang Pattae, Leang Paja, Leang Pette Kere); PNA: Patanuang Asue (Leang Karassa, Leang Saripa, Leang Jarie); PTB: Panganreang Tudea, Batu Ejaya, Leang Batu Tuda, Campagaloe; LMN: Lamoncong (Leang Cakondo, Leang Balisao, Leang Ululeba, Leang Tomatoa Kacicang); PKJ: Pangkajene (Sumpang Bita, Gua Bulusumi, Gua Macinai, Gua Garunggung); KLP: Kalumpang (Minanga Sipakko, Kamassi); NUH: Nuha, Sukoyu, Pontanoa Bangka; BLA: Belae karsts (including Gua Sakapao); GLS: Galesong (including Pakka Mukang).

Individual shelters: peninsula: LC: Leang Codong; BB: Bola Batu; LP: Leang Panameanga; PT: Panisi Tabutu; LA: Leang Ara; LL: Leang Lompoa.

Individual open sites: north of peninsula: Sk: Sikendeng; SL: Sabbang Loang; Kt: Katue; Rh: Rahampuíu; Ba: Pinanto (Baebunta); BM: Bola Merajae.

Individual open sites: peninsula: Ts: Tosora; PL: Padang Lampe; BR: Bonto Ramba; Al: Allangkanange; Lm: Lamuru; Bb: Bonto-Bontoa; Cb: Cabenge; Ml: Mallindrung; Kk: Kiling-kiling; Uj: Ujung; BU: Bulu Bakung; Bn: Bontonompo.

Open sites: Selayar Island: BS: Batang Mata Sapo; Pl: Papanlohea.

A few explanatory remarks should accompany this chronological scheme. The Toalean does not appear in evidence in the far north of the peninsula. Rather, a low-lying zone that runs along the Cenrana valley, through the Tempe depression, and past the northern rim of the peninsula's western cordillera (see Fig. 1), appears to define the northern boundary where the Toalean disappears. In direct contrast, certified Neolithic farming settlements are known only north of the peninsula. Although the Austronesian languages which belong to the South Sulawesi 'stock' are distributed virtually across the whole province (Grimes & Grimes 1987), and the origins of their dispersal may reasonably be attributed to Neolithic immigrants (Bellwood 1997: 122), the consolidation of South Sulawesi into one cultural bloc dates only to the last two millennia.

Moreover, the South Sulawesi peninsula is divided into southwestern and northeastern landscapes. This is evident from the divergent expression of the Toalean in these two regions, the virtually isomorphic distribution of the 'classical' variant of the Toalean with Makasar (an Austronesian language) in the southwest, and the coincidence of a more attenuated variant with Bugis (another Austronesian language) in the northeast (Bulbeck et al. 2000: 101). Accordingly, this paper will argue that prehistoric South Sulawesi has comprised three 'social landscapes', two within the peninsula and one to its immediate north, each with its own long-term trajectory of human interaction that has shaped certain patterns of social organisation through to the ethnographic present.

A large number of radiocarbon determinations are now available from South Sulawesi sites (Bulbeck & Caldwell 2000: 134; Bulbeck et al. 2000: 78). Where this paper expresses them in the form 'range cal BP', this expression denotes the calibrated, two-sigma confidence interval provided by the 'area under the curve' method of the CALIB 3.03 computer program (Stuiver & Reimer 1993). Unfortunately, many of the shelters excavated before 1960 do not have radiometric determinations, and these can be dated only by artefactual comparisons. For biostratigraphic chronological evaluations, this paper will also make passing references to the analysis of the faunal assemblages by Simons and Bulbeck (this volume).

Microliths are here defined to include all small, retouched stone artefacts which conform to one of several recurring morphologies. Maros points are unifacially trimmed triangular points with serrated margins and a hollowed base, such as the example illustrated by Van Heekeren (1972) from 'Panganreang Tudea I' (see Fig. 2). Miscellaneous points (Chapman 1986) lack the hollowed base, in which case they equate to Hakim's (1990) Malindrung points. They may also lack serrated margins but exhibit dorsal retouch, resulting in pirri points in the Australian terminology (McCarthy 1940; Van Heekeren 1949). Several examples of both are illustrated from Panganreang Tudea I and II (see Fig. 2). Backed microliths are defined by bi-directional blunting along one margin, and include lunate-shaped geometric microliths (Panganreang Tudea Level II; see Fig. 2) as well as the narrower backed blades. Miscellaneous microliths include denticulated tools, a term which reflects the common occurrence of scalloped serrations along the margins of stone (and sometimes bone) pieces that lack a clearly definable morphotype (Bulbeck et al. 2000: 75, 79). Scrapers (for example, in Panganreang Tudea III; see Fig. 2) include most retouched stone artefacts other than those defined above, and are generally too large to be called microliths. Finally, note that South Sulawesi

Holocene lithic assemblages typically include blades, as defined by parallel elongated dorsal arrises, and a length from ringcrack to termination at least twice as large as the perpendicular breadth at any point (see the Panganreang Tudea II and III examples in Figure 2). However, the proportion of blades to other flakes is usually small, and the Toalean cannot be characterised as a blade industry (Glover & Presland 1985: 193; Pasqua & Bulbeck 1998: 224-225; Bulbeck et al. 2000: 94).

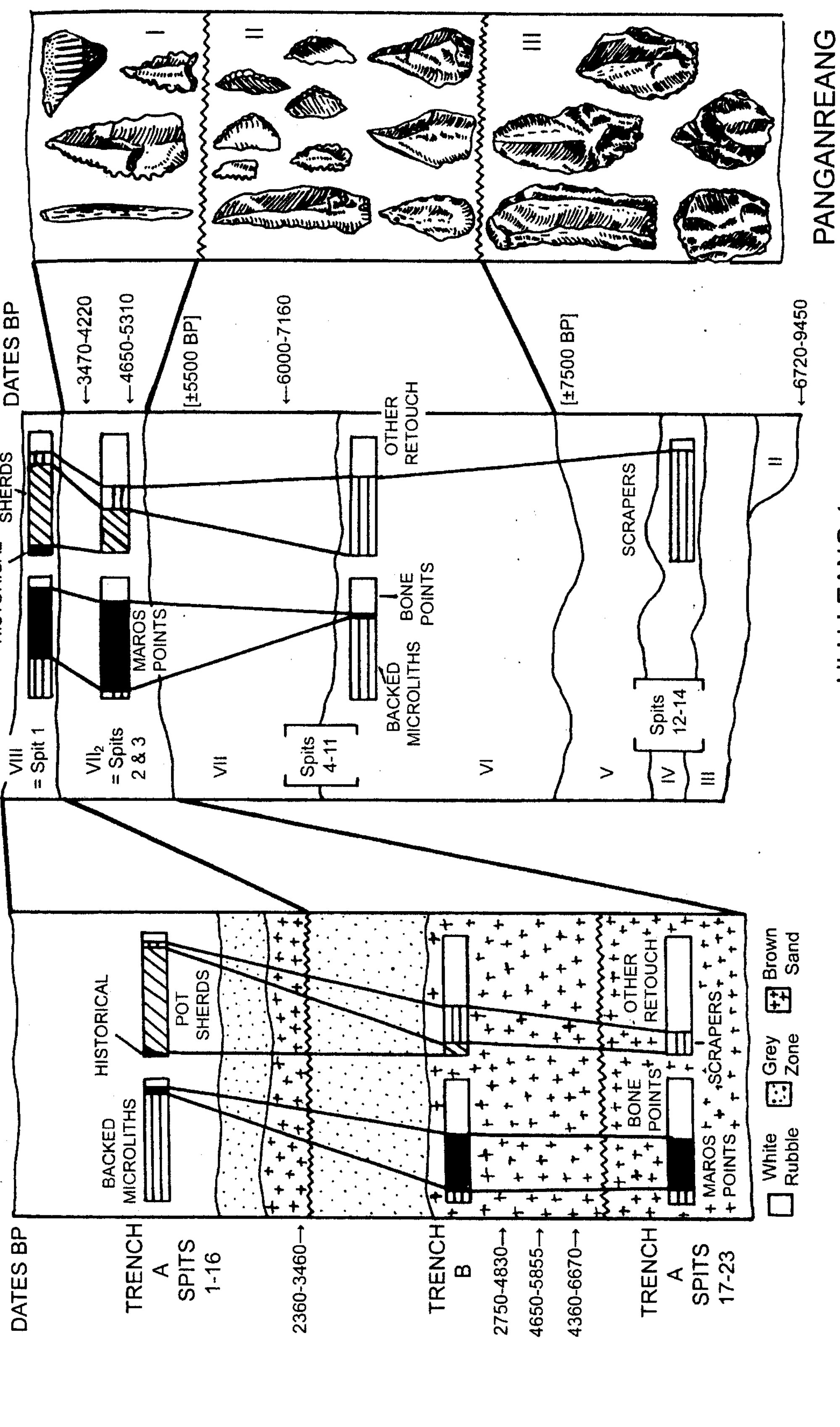
2. CHRONOLOGY FROM ROCKSHELTERS OF THE SOUTHWESTERN PENINSULA

Two limestone rockshelters in the Leang-Leang district of Maros complement each other to produce the radiocarbon-dated 'master sequence' for the Holocene in the southwest peninsula. They are Ulu Leang 1, where most of the deposit is early to middle Holocene, and Leang Burung 1, where deposits span the middle and late Holocene (see Fig. 1 for site locations). Two further sites, Leang Pattae (also in Leang-Leang) and Panganreang Tudea (on the south coast) have sequences which essentially match the Ulu Leang 1 sequence. All other Holocene assemblages excavated from limestone rockshelters in the southern third of the peninsula could be related, if desired, to the Leang-Leang 'master sequence'.

2.1. *Ulu Leang 1 and Leang Burung 1*

Ulu Leang 1 was excavated by Ian Glover in 1969, 1973 and 1975, employing 10 cm spits. No final report of the excavation has appeared, but several accounts (Glover 1976, 1978, 1979; Glover & Presland 1985) provide a reasonable description of the site's stratigraphy, chronology, stone artefacts, bone points, shellfish, and macroscopic plant remains. Much of the deposit has been disturbed, even between field seasons. However, the section published for the south wall of the D6 and D7 squares (Glover 1976: Fig. 4) relates to one part of the site where disturbance seems to have been slight. In this area of the shelter, Layer VIII at the top would basically correspond to spit 1, Layer VII_2 to spits 2-3, Layers VII and VI to spits 4-11, and Layers II-V to spits 12-14 (see Fig. 2). Layer I was reserved for a sterile yellow-red clay at the base of the deposit. A charcoal date of 7170 ± 650 BP (ANU-606), at the junction of Layers I and II in squares C6 and C7 (Bronson & Glover 1984), calibrates to 6720-9450 cal BP, and suggests that the site was uninhabited during the Pleistocene and possibly the initial Holocene.

Three other charcoal dates, from square C2 (Bronson & Glover 1984), are plotted as two-sigma ranges on the schematised section in Figure 2. Bronson and Glover (1984) also cited four dates on freshwater shell. They are not included here because of uncertainties over the correction factor that should be applied to compensate for the radiometrically dead carbon ingested by local shellfish (see Bulbeck et al., this volume). However, subtraction of 2000-2500 years from their mean determinations (and ignoring calibration effects) would produce dates consistent with the chronology favoured here, including a transition from Layer V to VI at around 7500 BP, and a boundary between layers VII and VII_2 dating to about 5500 BP (see Fig. 2). Glover (1979: 307) cites



ure 2. Schematised comparison of Leang Burung 1 (stratigraphy from Pasqua & Bulbeck 1998: Fig. 4), Ulu Leang 1 (stratigraphy from Glover 1976: Fig. 4), and Panganreang Tudea (abstracted and redrawn from Van Heekeren 1972: Fig. 24).

another charcoal date of 4050 ± 90 BP (4280-4830 cal BP) from the middle third of a lump of cemented breccia containing glass, potsherds, microliths and other stone tools; its age would relate the charcoal to Layer VII_2. A final charcoal date of 1490 ± 210 BP (960-1860 cal BP) from a hearth in Layer VI of the J9 square (see Glover 1979: Fig. 3) is obviously far too young for its stratigraphic context, and so is excluded from Figure 2. The hearth presumably relates to Layer VIII habitation, as indicated by the abundance of domestic rice remains in the hearth (see Glover 1985: 272).

Some main artefact categories identified in the C-D squares from the 1969 field season (Glover 1976: Tables 1 to 4) are summarised in Table 1, and represented proportionally in bar-chart form in Figure 2. Scrapers dominate the retouched artefacts in Layers II to V (spits 12-14). Notwithstanding the small size of the assemblage (231 pieces in all), the lack of Maros points, backed microliths and bone points may be significant. Glover (1976: 140-141) further describes an assemblage of single-platform cores and a wide array of scrapers beneath the shell midden, that is, in a context possibly older than Layer II. Whatever the precise age of this latter assemblage, the deepest artefacts at Ulu Leang 1 would appear to relate to the large flakes, two of them being retouched tools (Mulvaney & Soejono 1970a: 169), and attributed to Van Heekeren's (1972: Fig. 24) 'Toalean III' at Panganreang Tudea (see Fig. 2).

The early-middle Holocene Layers VI and VII show a decline in scrapers compared to other retouched artefacts, as well as the appearance of backed microliths and bone points (see also Glover & Presland 1985). The Maros points are few and restricted to spits 4-5, suggesting they had intruded post-depositionally from Layer VII_2. The latter layer contained abundant Maros points but very few backed microliths, and an increased proportion of miscellaneous microliths ('other retouched') compared to scrapers. Layer VIII suggests a mild resurgence in backed microliths, and contains the bulk of the earthen sherds and all of the historical (second millennium AD) artefacts. Glover (1976) noted that his Toalean sequence broadly parallels Van Heekeren's at Panganreang Tudea – specifically, the correspondence between Layers VI-VII and Van Heekeren's 'Toalean II', and the match between Layer VII_2 and Van Heekeren's 'Toalean I' (see Fig. 2). Within the constraints that hindered Van Heekeren's (1972: 113-114) reconstruction of the Panganreang Tudea sequence, a better fit between the virtually pan-Holocene sequences at this site and Ulu Leang 1 would be hard to expect.

Ulu Leang 1 is clearly not the ideal site to illustrate chronological change over the last five thousand years (Bulbeck et al. 2000: 85-87). Some post-depositional mixing of materials between the three top spits has certainly occurred, given that the main body of the deposit had slumped to a degree prior to excavation (Glover 1979), and that recent disturbance of the upper sediments is the rule. Glover's (1978: 95, 1985: 272) claims for rice remains from several preceramic contexts should, for the moment, be attributed to post-depositional intrusion or indiscernible disturbance, in view of the c. 1500 BP date cited earlier on charcoal associated with rice. Hence, the 30 potsherds in spit 2 and nine potsherds in spit 3 should not be construed as reliable evidence of middle Holocene pottery at Ulu Leang 1. The direct dating on the pottery itself, a thermoremnant magnetism assay on sherds from spits 1 to 3 in the C2 square, is 3000-4000 BP (Glover 1978: 94). The excavation at Leang Burung 1, the site that best represents the prehistoric sequence after 5000 BP, would indicate absence of pottery until about 4000 years ago.

Table 1. Frequencies of some main artefact categories at Ulu Leang 1 (UL1) and Leang Burung 1 (LB1).

	backed microliths	Maros points	bone points	total of 'Toalean types'
UL1 spit 1	7 (31.8%)	13 (59.1%)	2 (9.1%)	22
UL1 spits 2-3	3 (6.1%)	36 (73.5%)	10 (20.4%)	49
UL1 spits 4-11	57 (67.9%)	4 (4.8%)	23 (27.4%)	84
UL1 spits 12-14	0	0	0	0
total Ulu Leang 1 (1969)	67 (43.2%)	53 (34.2%)	35 (22.6%)	155
LB1 Trench A spits 1-16	103 (88.0%)	7 (6.0%)	7 (6.0%)	117
LB1 Trench B	8 (15.7%)	24 (47.1%)	19 (37.3%)	51
LB1 Trench A spits 17-23	2 (13.3%)	6 (40.0%)	7 (46.7%)	15
total Leang Burung 1	113 (61.7%)	37 (20.2%)	33 (18.0%)	183

	historical	earthen sherds	scrapers	other retouched	total misc.
UL1 spit 1	10 (6.8%)	99 (67.3%)	14 (9.5%)	24 (16.3%)	147
UL1 spits 2-3	0	39 (34.8%)	24 (21.4%)	49 (43.8%)	112
UL1 spits 4-11	0	0	94 (47.0%)	106 (53.0%)	200
UL1 spits 12-14	0	0	13 (92.9%)	1 (7.1%)	14
total Ulu Leang 1 (1969)	10 (2.1%)	138 (29.2%)	145 (30.7%)	180 (38.1%)	473
LB1 Trench A spits 1-16	4 (0.4%)	963 (87.5%)	43 (3.9%)	90 (8.2%)	1100
LB1 Trench B	0	8 (9.2%)	21 (24.1%)	58 (66.7%)	87
LB1 Trench A spits 17-23	0	0	2 (20.0%)	8 (80.0%)	10
total Leang Burung 1	4 (0.3%)	971 (81.1%)	66 (5.5%)	156 (13.0%)	1197

Note: 'historical' includes glazed sherds, metal and glass fragments. Ulu Leang 1 backed microliths include the geometric and elongated classes of Glover's (1976) blunted-back flake category. Leang Burung 1 'other retouched' includes Chapman's (1981, 1986) miscellaneous points and denticulated tools. Ulu Leang 1 'other retouched' includes the other classes of Glover's blunted-back flakes, and Glover's (1976) other worked pieces. Ulu Leang 1 tallies from Glover (1976). Leang Burung 1 tallies calculated from Chapman (1981, 1986), except 'historical' which is taken from Bulbeck (1996-97: 1026-1027). Percentages add across.

The thickness of the late Holocene deposit at Leang Burung 1 counteracts its disturbance which is generally more pronounced than at Ulu Leang 1. Trenches A (under the overhang) and B (outside the overhang) displayed a vague stratigraphic procession from brown sand at the base, to a grey zone overlying the brown sand, and a white rubble which dominated the upper levels of Trench A (Chapman 1981; Pasqua & Bulbeck 1998). As well as can be expected, given the evident disturbance, these three stratigraphic zones accord loosely with the schematised chronology illustrated in Figure 2. The entire Leang Burung 1 sequence would appear to postdate 5500 BP, to judge from the numerical dominance of miscellaneous retouched pieces over scrapers, and the prominence of Maros points in all deposits older than c. 3500 BP. These older deposits are found throughout Trench B, where all three available dates are middle Holocene (Pasqua & Bulbeck 1998; Bulbeck et al. 2000: 78), and beneath the 2360-3460 cal BP date (2820 ± 210 BP, ANU-391) in Trench A. Although the older deposits are illustrated separately for Trench B and Trench A in Figure 2, they should be considered effectively contemporary.

Two marked changes are evident in spits 1-16 in Trench A compared to the older deposits. Earthen sherds increase from virtual absence to nearly a thousand specimens, and backed microliths succeed Maros points as the dominant Toalean type. The temporary, middle Holocene popularity of Maros points, during a period when backed microliths declined before enjoying a subsequent resurgence, is also implied in Glover and Presland's (1985: 192-193) datings for these two classes: 5500-3500 BP for Maros points, and 6500-2000 BP for (backed) microliths. A third change in spits 1-16 of Trench A is the appearance of some 190 grams of human bone with radiocarbon dates between approximately 1000 and 2000 BP. As I discuss elsewhere in this volume, the bone evidently represents the secondary burial of predominantly cremated human remains during an Early Metal Phase mortuary use of the rockshelter, subsequent to the ceramic Toalean phase of c. 3000-2000 BP. The Early Metal Phase burials are probably associated with three glazed monochrome sherds (AD thirteenth to fourteenth centuries?), a rusted iron fragment and two cross-mending, ornate potsherds, as well as the deposit's disturbance (Bulbeck et al. 2000: 84).

2.2. *Leang Pattae*

The Leang Pattae sequence, as described by Van Heekeren (1972: 116-118), echoes Ulu Leang 1. Potsherds were restricted to the sub-surface deposit, while Maros points continued slightly deeper but not below the upper layer. Backed blades and geometric microliths are implied to have occurred throughout much or all of the deposit, along with stone scrapers and convex-based points. Van Heekeren (1972: 116) also identified tanged tools towards the bottom of Leang Pattae, which evokes his claim for tanged blade tools in the 'Toalean III' at Panganreang Tudea, and so may reflect an early, pre-microlithic assemblage at Leang Pattae. However, it should be noted that the existence of tanged tools at Panganreang Tudea is specifically disputed by Mulvaney and Soejono (1970a: 169). Only one bone point was identified at Leang Pattae, in contrast to the greater frequency of bone points at Leang Burung 1 and Ulu Leang 1, but 14 shell points and four shell scrapers were exhumed (Van Heekeren 1972: 118). Shell artefacts at the Leang-Leang site complex may be predominantly preceramic, as they also occur at healthy frequencies in two other contexts with scanty pottery – Ulu Leang 1 (Glover 1976: 138) and Trench B at Leang Burung 1 (Simons 1997: 76) – but were not identified from Trench A at Leang Burung 1 (Simons 1997: 86).

2.3. *Leang Karassa*

The sequence at Leang Karassa, on the Patanuang Asue River in the Maros karsts (see Fig. 1), can also be loosely related to the Leang-Leang sequence. Broadly, two phases are evident, a ceramic phase excavated by Campbell Macknight (in 1969) to a depth of about 90 cm, and an underlying shell midden. Van Heekeren (1972: 110-111) described the shell layer as about one metre thick, and full of stone artefacts, based on his 1936 excavation. Macknight's *in situ* ceramic phase includes his spits 2 to 6 in square A, with their preponderance of potsherds over lithics, and the only two certain geometric microliths from the site (Table 2). It dates between 370 ± 50 BP (300-510 cal BP) at the top, associated with iron fragments and Chinese sherds, and 2690 ± 60 BP (2740-2880 cal BP) at the base (Pasqua & Bulbeck 1998). Macknight's top spit in square A, however, and much of the deposit in square B, appear to include redeposited older material. This inference is based on reports of recent disturbance at the site, the brown sediment that uncomformably caps the *in situ* layers (Pasqua & Bulbeck 1998: Fig. 2), and an increase in stone artefacts relative to potsherds (Table 2). The butt of a Maros point excavated in the brown sediment could accordingly be middle Holocene, to judge by the Leang-Leang chronology (Pasqua & Bulbeck 1998). Van Heekeren's (1972: 111-112) excavation of the shell layer may also have produced three classical Toalean microliths notwithstanding his statements to the contrary (Bulbeck et al. 2000: 81). This interpretation would render Leang Karassa consistent with Leang Saripa, directly across the Patanuang Asue, where an essentially preceramic deposit yielded numerous Maros points and other arrowheads, geometric microliths, a wide range of other retouched stone tools, and some polished bone points (Van Heekeren 1972: 111-112; see Fig. 1). The distinction between Leang Karassa's shell midden, with its abundance of faunal refuse but its limited artefactual repertoire, and Leang Saripa's atelier aspect, probably reflects economic specialisation rather than a chronological difference.

Table 2. Schematic representation of the Leang Karassa chronology.

excavation	sediments	earthen sherds	stone artefacts	geometric microliths	Maros points
Square A spits 2-6	*in situ* layers (shelly deposit at very base)	757	678	2	0
Square B spits 4-6	mainly brown sediment (slump)	233	365	0	0
Square A spit 1	brown sediment (redeposited)	193	401	0	1
Van Heekeren (1972)	shelly deposit	none/few	abundant	1?	2?

Note: Squares A and B data (Macknight's excavation) from Pasqua (1995). One possible geometric microlith is recognised from Van Heekeren's excavation on the basis of the registration of No. 3424 as a geometric knife (Van der Hoop 1941: 176). Two possible Maros points are recognised from Van Heekeren's (1972: Pl. 91) illustration of No. 3409, and the registration of No. 3411 as a denticulated, winged arrowhead (Van der Hoop 1941: 175).

2.4. *Batu Ejaya*

The other enclosed sites with radiocarbon dates are Batu Ejaya 1 and 2, near Panganreang Tudea on the south coast (see Fig. 1). Batu Ejaya 2 is a small rockshelter whose shallow deposit yielded ten geometric microliths, miscellaneous points, potsherds and historical artefacts at all depths, and a modern determination on charcoal at the base (Mulvaney & Soejono 1970a; Chapman 1981). As discussed by Simons and Bulbeck (this volume), its faunal remains are dominated by murids and may largely reflect civet predation. The much larger rockshelter called Batu Ejaya 1 is more interesting but similarly recalcitrant. Mulvaney and Soejono (1970a; Chapman 1981) interpreted approximately half of the deposit which they excavated as trench refill (a pale clay) and surface wash (black soil) from the original excavation by Van Stein Callenfels in 1938. Beneath Van Stein Callenfels' refill, more or less along the shelter's dripline, lay a reddish brown clay. It is dated to merely 920 ± 275 BP (340-1340 cal BP) on the basis of charcoal sealed beneath a semi-complete pot. Yet two samples of marine shell from the top of the refill are now dated to 4430 ± 50 BP (Wk-5464) and 4370 ± 70 BP (Wk-5465), much older than the charcoal from the underlying, undisturbed clay (Bulbeck et al. 2000: 77-78). To add to the confusion, Mulvaney and Soejono (1970b: 28) could not relocate the finds from Van Stein Callenfels' excavation, and assumed they had been lost (but see below).

The radiocarbon dates suggest the contents of the pale clay are older than the finds in the reddish brown clay, as broadly confirmed by itemisation of the contents (Table 3). Flaked stone dominates over potsherds in the pale clay, whereas the reverse relationship holds for the red-brown clay. The faunal contents are similar in both clays, with a focus on endemic forms and occasional cases of *Rattus rattus* and the Timor deer, species

Table 3. Recorded contents of Batu Ejaya 1.

type of find	black soil	pale clay	red-brown clay	Van Stein Callenfels collection
late 19th to 20th century porcelain	5	10	0	0
Netherlands East India coins	0	0	0	2
bronze fragments	0	0	0	2
polished stone bracelet fragments	(1)	(1)	(1)	2
polished stone axes	0	0	0	3
domestic faunal specimens	33	1	0	0
introduced wild faunal specimens	4	3	3	0
endemic faunal specimens	11	18	17	27
bone artefacts	0	0	0	11
earthenware sherds	952	844	1621	0
all flaked stone	276	1628	1160	256

Note: Van Stein Callenfels' collection from Van Heekeren (1949: 93-94) and Van Stein Callenfels (1938a) except for the fauna (Simons & Bulbeck, this volume). Other Batu Ejaya 1 contents from Bulbeck (1996-97: 1027), Mulvaney & Soejono (1970a, including the stone bracelet fragment which they did not relate to any layer), Simons (1997, excluding the dog burial), Flavel (1997) and Di Lello (1997).

that would appear to have arrived in South Sulawesi by 4000 years ago (Simons & Bulbeck, this volume). The seemingly contradictory indication of modern artefacts in the pale clay may be attributed to the chattels brought by Van Stein Callenfels and his party, if we follow the interpretation of this layer as Van Stein Callenfels' refill. Van Stein Callenfels evidently collected materials that span several millennia (Table 3), and presumably 'picked the eyes' out of what he dug up, returning everything else (including the abundant pottery) to his trench. His excavation of the deposit beneath the overhang may have tapped older materials than those in the red-brown clay, to explain why he alone encountered bone artefacts, and why the marine shell in the pale clay is of middle Holocene age. The black soil is dominated by domestic fauna (Table 3), entirely consistent with the practice of chicken and other sacrifices in the shelter recorded by Van Stein Callenfels (1938a) at the time of his excavation. This layer would appear to combine traces of the site's ethnographic use with substantially older materials, many of them probably disturbed through Van Stein Callenfels' excavation.

If Van Stein Callenfels' dig had been the only source of disturbance at Batu Ejaya 1, we would expect potsherds to tend to cross-mend within the same layer, but such is not the case. Of the 28 cross-mends which Flavel (1997: 51) effected, only eight were between sherds in the same layer, and the other 20 cases involved every possible combination, including three instances of sherds from all three layers. Repeated ritual burying of the pottery would account for this pattern, as well as for the semi-complete status of many of the identifiable vessels, the tendency for pottery to occur as deep as the stone artefacts, and the ceremonial role of the vessels as indicated by their frequently lavish decorations (Flavel 1997). The pots may have held cremated human remains, to explain why no human bone (apart from some teeth in the black soil) has yet been identified. The paucity of domestic fauna in the clay (and in Van Stein Callenfels' collection) would reflect a usage of the site distinct from the ethnographic practices represented by the black soil (Table 3). Hence the bulk of Van Stein Callenfels' collection, and the items from the clay, should be treated as a churned-over assemblage dating to between approximately 1000 BP (the charcoal date) and 4500 BP (the marine shellfish dates).

The flaked stone artefacts from the 1969 excavation of Batu Ejaya 1, which include a bi-directionally backed blade (Mulvaney & Soejono 1970a: 167), 45 serrated and other miscellaneous points, ten utilised flakes and 38 scrapers (Chapman 1981), should accordingly be dated as simply middle to late Holocene. Further, all is not lost of Van Stein Callenfels' collection of artefacts from the site; rather, they seem to have been mixed with the Panganreang Tudea collection at Jakarta's National Museum. This is particularly the case with the artefacts of bronze and polished stone, where the majority accessioned under Panganreang Tudea must have come from Batu Ejaya (Table 4). Counts of bone points and flaked stone artefact classes suggest the same inference: the quantities indicated by Chapman (1981) for the Panganreang Tudea collection can only be approached by adding together the frequencies recorded by Van Heekeren (1949) for both Panganreang Tudea and Batu Ejaya. Accordingly, an unknown proportion of the backed microliths, points and other stone artefacts which Chapman attributed to Panganreang Tudea apparently came from Batu Ejaya 1, confirming the likelihood of a substantial quantity of middle Holocene material at the latter site.

Table 4. Comparison of archaeological records on Panganreang Tudea and Batu Ejaya 1.

type of find	'Panganreang Tudea', Jakarta National Museum	Panganreang Tudea	Batu Ejaya
bronze coins	2	0	2
bronze fishhook	1	1	0
bronze fragments	4	0	2
stone bead	1	1	0
Neolithic axes/fragments	4	0	3
polished stone pounder	1	0	1
potsherds	4	13	0
bone implements	± 100	55	11
barbed stone artefacts	± 400	143	53
points lacking serrated edges	± 280	(88)	(140)
cores	22	0	11
scrapers	present	70	52

Note: Panganreang Tudea and Batu Ejaya finds from Van Heekeren (1949: 93-94) and Van Stein Callenfels (1938a) – numbers in brackets represent 'stone knives'. Bronze and polished stone accessioned under Panganreang Tudea at the Jakarta National Museum are from Van der Hoop (1941), and the other counts are from Chapman (1981: 133-143). The 400 'barbed stone artefacts' are estimated on the basis of Chapman's (1981) study of 55 backed microliths and 47 points with serrations, these representing about a quarter of the total; similarly, 280 unserrated points estimated by quadrupling the total of 70 which Chapman (1981) recorded (Bulbeck et al. 2000: Table 2). There is no evidence that Van Heekeren, or any other Dutch archaeologist who worked in South Sulawesi, could identify backing before the 1950s, hence I assume that Van Heekeren would have classified backed microliths as barbed implements.

2.5. *Pottery comparisons and summary*

The Batu Ejaya pottery supports other evidence that the decorated wares in the peninsula are not as old as the early, utilitarian wares represented by the 3500 to 4000 year old sherds at Ulu Leang 1. The Batu Ejaya 1 ceramics, which show a remarkable focus on punctate lines within or bordering a myriad of curvilinear shapes such as scrolls, meanders, lunates and leaf patterns, may only date to around 1000 BP (Flavel 1997). Truly comparable pottery is elsewhere known only from Kiling-kiling and Bonto-Bontoa, two open sites to the east (Ali Fadillah 1999; see below). Interestingly, the illustrated sherds from Batu Ejaya 2 (Mulvaney & Soejono 1970a) show a quite different focus on motifs like impressed circles, incised triangles with parallel infill, and arca shell impresssions. These sorts of designs are particularly characteristic of Ulu Leang 2 (Flavel 1997), a cave used for secondary mortuary disposals dated to the early centuries AD on the basis of the site's iron fragments and 171 monochrome glass beads (Andrews & Glover 1986).

Some other shelters in Leang-Leang have produced small quantities of ornate pottery suspected to date broadly to the period 2500-1000 BP (Bulbeck 1996-97: 1026-1027, 1049). Specimens include the cross-mended sherd with chevrons and exquisite stamped circles from Trench A, Leang Burung 1 (Mulvaney & Soejono 1970a: Pl. VIc), the fragmentary jars with horizontal bands of geometric motifs near their neck at Leang

Pette Kere (Flavel 1997), and the intricate dentate sherds from the site known as 'Maros 9' (Clune 1996). The most striking mortuary pottery, however, would be the Leang Paja bowls with their stamped, punctate and incised 'Lapitoid' geometric motifs arranged in horizontal bands near the mouth (Flavel 1997). The lack of metals in the Leang Paja surface collection, plus its bifacially flaked basalt axe with lenticular cross-section (see Glover 1978: 72), and the similarity to Kalumpang in its repertoire of pottery motifs (Flavel 1997), may suggest a Neolithic antiquity, notwithstanding Glover's (1978: 72) suggestion of an Early Metal Phase dating. Despite the highly variable decorations in these assemblages from Leang-Leang and the south coast, and a chronological range that could span 2000 years, formal statistical analysis demonstrates the overarching unity of the Kalumpang, Leang Paja, Ulu Leang 2 and Batu Ejaya 1 repertoires (Bulbeck n.d.a).

To summarise the evidence from the dated rockshelter assemblages, scraper-like forms apparently dominated the retouched stone artefacts before c. 7500 BP, when microliths and bone points may not have yet been present in South Sulawesi. Backed microliths, stone points with unserrated edges, and bone points were subsequently manufactured throughout much of the Holocene, both before and after the production of Maros points during the middle Holocene (c. 5500-3000 BP). Pottery probably arrived at around 4000 BP, and possibly as late as 3500 BP. Early pottery appears to be consistently associated with typologically Toalean artefacts, suggesting that we should refer to the period until around 2000 BP as the 'ceramic Toalean'. Only Leang Paja (see Fig. 1) provides any hint of a 'Neolithic' presence independent of the Toalean. Polished stone artefacts have been found only in sites that have bronze (Tables 3 and 4), suggesting they were part of the Early Metal Phase signature.

3. CHRONOLOGY FROM OPEN SITES OF THE SOUTHWESTERN PENINSULA

3.1. *The Macassar survey*

The Toalean chronology indicated by the Leang-Leang rockshelters is confirmed by my 1986-87 'Macassar survey' (see Fig. 1). This survey attempted the universal documentation of twelfth to seventeenth century burial grounds and major settlements within the study area. Any stone artefacts and lithic scatters encountered during the survey were also mapped and collected (Bulbeck 1992: 695-700, with revisions; Pasqua 1995). Bone points were not recovered, presumably reflecting poor preservation and difficulties in visibility. However, 1764 knapped lithics were documented under laboratory conditions from 68 sites, including backed microliths at six sites (Pakka Mukang, Saukang Boe, Balang Sari, Bonto Sunggu Asli, Gentung, Bonto Ramba Tua) and Maros points at four (Salekowa Tua, Bukit Bikulung, Pammangkulang Batua, Moncong Moncong) (Bulbeck et al. 2000: 89-90). The lack of sites having both backed microliths and Maros points corroborates the chronological distinction between these types suggested in Figure 2. This lack of an association cannot be easily attributed to sampling error, because four of these ten lithic scatters were rich, yielding between 113 and 669 artefacts (82% of the total).

Approximate maximum ages for the stone artefacts can be deduced from the surface geology of where they were collected. The Macassar survey area comprises Miocene Camba Formation, Pliocene volcanics, and Holocene deposits of predominantly alluvial origin (Bulbeck 1992: Fig. 5-2). The soils that developed on non-alluvial landforms ('old landforms') could in theory contain materials from any time during the Quaternary, though of course the vast majority of surface finds (notwithstanding tillage, foundation digging, and looting) would be Holocene. The survey area's Holocene deposits can be divided between late Holocene sediments along the coast, and potentially older alluvium inland, beyond the reach of the mid-Holocene marine transgression. The effects of this transgression were observed at Bone-Bone, approximately six km inland and eight metres above sea level (Bulbeck 1992: 202). Intertidal shellfish exhumed from a well at seven and a half to nine metres depth were radiocarbon dated to 5800 ± 90 BP (ANU-5925), a result which corresponds very well to the 6000 BP interval when sea levels in South Sulawesi rose to their present level (Whitten et al. 1987: 19-20). Immediately above the intertidal shellfish in the well, the deposit consisted of silts and black sand mixed with some shell grit, corresponding to the encroachment of the sea until it peaked at five metres above the present level at around 4500 BP. Accordingly, coastal deposits to the west of Bone-Bone can be regarded as a broadly late Holocene landform, and alluvium to the east of Bone-Bone as pan-Holocene (Bulbeck et al. 2000: 90-92).

During the Macassar survey, sites were mapped and the surface contents recorded as far as a perimeter of empty zones (land-use units) which were considered to mark the end of the site. The actual exposed surface area in each of the mapped zones was also estimated, to accommodate differences in vegetation cover, modern improvements such as ground level buildings and asphalt roads, and other impediments to visibility (Bulbeck 1992: 186-192). The application of a consistent methodology in recording the same target sites suggests that differences between areas within the Macassar survey area should reflect archaeological variation rather than sampling error. As shown in Table 5, there is a weak positive correlation between area and number of recorded earthen sherds, in the survey area's three landforms. Most of this sherdage is presumably historical, given the survey's target sites, but a proportion could date to between 1000 and 4000 BP, especially inland from the coast.

Table 5. Flaked stone and earthen sherds from the Macassar survey per land form.

	old landforms	pan-Holocene alluvium	late Holocene (coastal) deposits
mapped exposed area (ha)	24.9	28.2	72.2
earthenware sherds	23,374	25,106	27,900
flaked stone artefacts	798	703	263
Maros points	10	2	0
backed microliths	5	1	2
potsherds per hectare (exposed surface)	939.2	889.6	386.6
flaked artefacts per hectare	32.1	28.2	3.65
flaked artefacts per thousand potsherds	34.1	24.9	9.5

Note: Data from Bulbeck (1992: 656-700) as modified by Pasqua (1995) for Pammangkulang Batua, and my own revisions for other sites.

The frequencies of flaked artefacts do not correlate with the mapped, exposed area but instead correlate with the age of the landform. Old landforms produced the densest occurrence of flaked stone, whether calculated per hectare or per thousand sherds, while the pan-Holocene alluvium produced the second densest occurrence (Table 5). The low densities along the coast accord with the expectation of a diminished importance of flaked stone during the late Holocene, especially after the introduction of metal. Toalean types, notably the Maros points, show a particularly strong relationship with the approximate antiquity of landform, even if the numbers involved are small. In particular, the lack of Maros points near the coast, and the recovery of two geometric microliths, corroborate the evidence from Leang Burung 1 of continued fabrication of backed microliths into the late Holocene, after Maros points had faded away.

The average density of around 30 flaked stone artefacts per hectare on old landforms and the pan-Holocene alluvium can be considered quite high. In comparison, Bulbeck and Boot (1991) recorded an average weighted density of 50 flaked stone artefacts per hectare in the Tidbinbilla Nature Reserve, an area in Australia's southeastern highlands that would seem to have been an Aboriginal 'estate' until about 100 years ago. Further, most of the knapped artefacts from the Macassar survey should be middle Holocene or earlier, given the much lower per hectare density on the coast. Most lithic scatters can be expected to have been destroyed or deeply buried through geomorphological processes over the last few millenia, so the surface densities of knapped stone would presumably have been much higher during the Toalean period. Of the sites recorded on old landforms, 82% produced at least one flaked stone artefact (cf. Bulbeck 1992: Fig. 5-2; Bulbeck et al. 2000: Fig. 4), suggestive of a ubiquitous presence of stone-knapping denizens on at least this sector of the survey area.

3.2. *Bulu Bakung and other sites*

When the evidence from open sites is considered, the frequently rich assemblages of Toalean remains excavated from rockshelters in Maros and along the peninsula's south coast are not indicative of a troglodytic lifestyle, as Van Heekeren (1972: 123) saw it. Rather, Toalean sites, whether under shelter or in the open, apparently reflect high population densities by hunter-gatherer standards. The establishment by 4000 BP at Leang-Leang of *R. rattus*, which in Indonesia depends on human disturbance of the forests to provide appropriate habitat (Simons & Bulbeck, this volume), bolsters the impression of healthy Toalean population densities in the southwestern reaches of the peninsula.

According to Bellwood (1997: 88-89, 202, 229), these Toaleans should have been replaced or absorbed by early, Austronesian-speaking farmers who would have begun expanding across the peninsula after c. 3500 BP. However, the only radiometrically dated site in the peninsula that could potentially reflect a pre-Metal Phase farming settlement is Bulu Bakung in Mallawa, Maros, in the upper Walanae valley (see Fig. 1). A program of repeated surface surveys has compiled abundant bifacially flaked basalt artefacts, numerous chert flakes, and masses of plain and decorated pottery. Hammer-dressed axes, adzes and knives (function inferred from morphology) with a lenticular cross-section are common at Bulu Bakung, but polished examples are rare (Bulbeck 1996-97: 1017; Intan 1998). The polished specimens can be matched against similar artefacts from Kalumpang, but Kalumpang has a wider repertoire which includes shouldered axes and axes with a quadrangular cross-section, neither of which have been found at Bulu Bakung (Ikhsan 1995).

Although the available radiocarbon dates from Kalumpang exceed 2500 BP (see section 6), there are sufficient differences in material culture to disqualify automatic application of the same chronology to Bulu Bakung. Indeed, illustrated pottery decorations from the latter site (Najemain 1998: 24) find their best match with the simpler motifs from Ulu Leang 2 (Flavel 1997: 68-70) which, as noted above, is estimated to postdate 2000 BP. No metal has been reported from Bulu Bakung, but this may reflect hostile preservation conditions in an eroding slope deposit, and I have heard vague reports of glass beads. Small samples of charcoal were obtained during the 1999 excavation of one part of the site with a reasonable depth of deposit and have been dated by Accelerator Mass Spectrometry (AMS). Tanwir Tane's (pers. comm.) summary provides the basis for the following interpretation which, it must be stressed, is provisional, pending full consideration of the excavated materials.

Three AMS dates were obtained from Square 1, in Sector 3 of Bulu Bakung. Spits 1 and 2 both yielded over 140 earthen sherds each and the only 'neoliths' in the test pit, which are four axe blanks in spit 2. The materials in spits 1 and 2 are probably redeposited as they overlie a charcoal sample dating to the early historical period in spit 3. Spits 3 to 9 contained between 55 (spit 6) and 448 earthen sherds (spit 5), usually in association with a small number of stone flakes (up to five). Spit 10 produced 37 sherds, and spit 11 yielded six sherds and a stone flake. These two basal spits probably lie beneath the oldest occupation layer at the site, as a small proportion of artefacts would be expected to have been trodden into pre-occupation deposits during the site's use. Accordingly spit 9, with 201 earthen sherds and five stone flakes, may be taken to represent the commencement of permanent habitation in the area of the test pit.

The charcoal sample from spit 3 dates to 576 ± 80 BP (ANU-11275). Under the intercept method (Stuiver & Reimer 1993), its two-sigma calibration is calculated as 500 (545, 614, 616) 668 BP, and using the method of the area under the curve, it calibrates to 472-670 BP at two sigma. The charcoal date from spit 7, 1860 ± 70 BP (ANU-11274), calibrates as 1573 (1745, 1817) 1946 BP at two sigma using the intercept method. In terms of the area under the curve method, the result is 1574-1946 BP at two sigma. The charcoal date from spit 9, which is 2490 ± 220 BP (ANU-11276), unfortunately has a rather wide standard error, and sits on a long plateau in the calibration curve. Hence, at two sigma the calibrated date is 1953 (2399, 2407, 2493, 2528, 2538, 2583, 2589, 2604, 2706) 3136 BP applying the intercept method, and 1991-3100 BP using the method of the area under the curve.

For two reasons, the bottom date is best interpreted as c. 2500 BP. This figure lies close to the centre of the two-sigma range, and also close to the median of the intercept dates (which is specifically 2553 BP). Secondly, the three available dates conform to a pattern of each excavated spit representing approximately 300 years of time. As the median intercept date is 581 BP in spit 3, and 1781 BP in spit 7, the extrapolated date for spit 9 would be 2381 BP, close to the 2553 BP date actually obtained from the median of this determination's intercepts with the calibration curve. Accordingly, the available dates show that habitation at Bulu Bakung may postdate the Kalumpang Neolithic sites. Indeed, the major phase of occupation at Bulu Bakung is arguably represented by the materials between spits 3 and 7, which date between about 2000 BP and the fourteenth or fifteenth century AD. Even the spit 9 determination could conceivably be as recent as 2000 BP, although 2500 BP is the best available estimate.

On the other hand, the lack of 'Neolithic' tools in the dated assemblage casts a shadow of doubt over applying the chronology from the excavated test pit to the industry represented by numerous blanks and occasional polished basalt tools on the surface at Bulu Bakung. It remains possible that an earlier use of the site as a workshop was followed by the period of continuous habitation registered in the radiocarbon determinations from Square 1 in Sector 3. This scenario would be consistent with the occurrence of a bifacially flaked basalt axe in the possibly Neolithic assemblage from Leang Paja although, at Bulu Bakung at least, the earthen pottery perhaps postdates 2500 BP, and most of it would postdate 2000 BP.

During the time of the major occupation phase at Bulu Bakung, bronzes were either being imported to the south coast of South Sulawesi or perhaps being locally produced. Glover (1997) reports calibrated radiocarbon dates of 1620-2105 cal BP and 1370-1720 cal BP on charcoal from the core of two bronze figurines of dogs reportedly found on the peninsula's south coast. The similarity between the dogs would suggest comparable antiquity and, hence, a most likely age of around 1600-1700 BP, the interval of overlap between the two radiocarbon determinations. The unique nature of these dog figurines in an Indonesian context would suggest they were locally cast and, by extension, support the case for a similar antiquity for the 'Makassar flask' purchased in the 1930s. This unique flask (and two smaller versions reportedly looted in the vicinity) bears a facial mask and other decorations that relate it to the Pejeng drums cast in Java and Bali during the first millennium AD (Bulbeck 1996-97: 1036).

Similarly old are three bronze Buddhist figurines, dated by art historians to around 1250 BP, collected in the village of Bontonompo on the south coast (see Dupont 1957: 121-125; Scheurleer & Klokke 1988: 111-113). Although stylistically related to Buddhist bronzes in Kalimantan, Java and Sumatra, these unusual figurines appear unique to South Sulawesi, and could have been local imitations of imported icons. When the Heger IA bronze kettle drum from Papanlohea on Selayar Island is considered (see Fig. 1), along with the reported kettle drum with frog-shaped handles from Bonto Ramba in the Macassar survey area (Bulbeck 1996-97: 1030), a substantial case emerges for the regular importation of bronzes to the vicinity of the peninsula's south coast between 2000 and 1000 BP. The tendency of Bulbeck (1996-97: 1036) and Glover and Syme (1993: 65) to associate these bronzes with the post-1000 BP emergence of the historical Makasar chiefdoms, and my dismissal of the likelihood of early local bronze casting, appear over-cautious assessments in view of more recent information at hand.

A professionally excavated open site on the south coast, Bonto-Bontoa, has produced fragments of ornate and plain bronzes, along with an iron knife and 21 faceted, hexagonal, biconical carnelian beads (Ali Fadillah 1999; see Fig. 1). Ali Fadillah (1999) suggests a date of around 1000 BP based on the age estimates for similar carnelian beads in Java and Sumatra and the radiocarbon date from Batu Ejaya 1, with its stylistically similar pottery. Charcoal from the spit directly above the beads and bronze fragments dates to only 170 ± 55 BP, or calibrated, AD 1650-1950, and would appear to relate to the modern use of the site as an orchard (Bulbeck & Ali Fadillah 2000). Hence, Ali Fadillah's (1999) estimate remains our best indication of the age of the Bonto-Bontoa assemblage, and of the bronze armbands and earrings from Kiling-kiling with its similarly decorated pottery. The hexagonal carnelian beads from Bonto-Bontoa appear unique in the Indonesian context east of Java (Ali Fadillah 1999), and enhance the case for regular contact between the peninsula's south coast, and the islands to the west, during or at least by the close of the Early Metal Phase (2000-1000 BP).

4. SPATIAL CHARACTERISTICS OF THE SOUTHWESTERN PENINSULA

4.1. *Backed microliths*

Backed microliths evidently had a focal distribution along the south coast, as far north as Leang-Leang along the west coast. Four further sites can be added to the eight rockshelters and six open sites mentioned previously (Bulbeck et al. 2000: 73, 89, 94). Glover (1978: 72) collected backed blades from the highly disturbed surface of the Leang Paja shelter. Mulvaney and Soejono (1970a: 168) excavated a small number of geometric microliths at Leang Batu Tuda, approximately 200 m from Batu Ejaya, and observed backed blades in a large surface collection from a cultivated field at Campagaloe, another site in the vicinity of Batu Ejaya (see Fig. 1). Finally, Van Heekeren (1937: 32) described how some of the small points he excavated at Leang Ara, on the peninsula's southeast corner, had blunt serrations cut perpendicularly into the long axis of the point, in three cases along only one margin (see Fig. 1). Later he described these blunt invaginations as having often been worked along the margin in the direction of the point (Van Heekeren 1949: 91, 103). These accounts sound like bi-directional backing as described by an archaeologist who did not have a clear idea of the retouching technique and, based on the illustrations (Van Heekeren 1937), Nos 9 and 15 look like backed blades, and No. 16 like a geometric microlith.

There is no clear evidence of backed microliths to the north of Leang-Leang. The two instances claimed by Van Heekeren (1972: 106, 114) are textual amendments to the first edition of his book (1957: 86, 94) without provision of new evidence, and which I cannot support based on the published illustrations and descriptions (see also Bulbeck et al. 2000: 75, 80). Where Van Heekeren (1957: 86) described the pioneering excavations of the Sarasins in Lamoncong as having discovered 'a blade industry of a semi-microlithic and microlithic character', he later changed the passage to read 'a blade industry with geometric microliths'[1] (Van Heekeren 1972: 106). And where he had described 'scalene triangles of a semi-microlithic character' among the blade tools from his excavation at Bola Batu (Van Heekeren 1957: 94), he later claimed 'types of a geometric-microlithic character' (Van Heekeren 1972: 114).

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[1] Van Heekeren's amendments are correct – see Simons & Bulbeck, this volume. The text, which reflects knowledge at the time of writing, has not been updated.

The lack of backed microliths at two rockshelters north of Leang-Leang, where Australia's Frederick McCarthy participated in the excavation (Panisi Tabutu and Leang Codong), would appear secure (see Fig. 1). McCarthy already had abundant experience in microliths with bi-directional backing prior to his 1937 trip to South Sulawesi. Yet his 1940 paper avoided claiming any geometric microliths in South Sulawesi, and the asymmetrical points (backed blades) that he associated with the Toalean were already accessioned in Jakarta by the time of his visit (McCarthy 1940: 38-39). (Leang Ara and Leang Karassa had been excavated in 1933 and 1936, and Leang Saripa was excavated in 1937 prior to McCarthy's visit.) Nor have backed microliths been claimed at the four sites with a Holocene assemblage excavated in the karsts of Pangkajene Kepulauan, to the immediate north of Maros. These include Van Heekeren's (1972: 111) unreported excavation at Leang Panameanga in 1937, Sumantri's (1986) quite detailed description of the finds from Gua Garunggung, and Subagus's (1986) brief account of the stone artefacts from Gua Bulusumi and Gua Macinai (see Fig. 1). Even though it is far from clear that any of the excavators could recognise backing at the time when they observed their artefacts, on present evidence the distribution of backed microliths should be restricted to the coast and foothills between Leang-Leang and Leang Ara (see Fig. 3).

4.2. *Maros points*

Maros points were evidently more widely distributed than backed microliths, with a focus on Maros (Bulbeck et al. 2000: 73, 89, 94). Van Heekeren (1937) illustrated three small examples, with moderately to weakly concave bases, among his 'fishing spearheads' from Leang Ara. As is the case with the serrated points ascribed to Panganreang Tudea (see Fig. 2; Chapman 1981: 138A-B), the extent of hollowing of the bases is always modest, and this seems to be a feature of Maros points along the south coast. At Leang-Leang, Glover (1978: 72) collected Maros points at Leang Paja while, according to the visitors sign at the entrance to Leang-Leang, Hadimuljono excavated examples from Leang Pette Kere in 1970. Bartstra (1998: Pl. 6) illustrates two specimens from the surface of Leang Jarie, another site in Maros (see Fig. 1). Leang Lompoa may be the only rockshelter in Maros to have produced a large assemblage of Holocene stone artefacts which excluded Maros points (see Franssen 1949; see Fig. 1). Sarasin and Sarasin (1905a: Tafel II) illustrated several exemplary Maros points which presumably were recovered from their most productive excavations, in the upper and lower chambers of Leang Cakondo (see Van Heekeren 1972: 108; see Fig. 1). Van Stein Callenfels (1938a) recovered comparable barbed arrowheads from his excavation of Leang Tomatoa Kacicang in Lamoncong (see Fig. 1).

Confident claims of Maros points have also been made for the central segment of the peninsula's western cordillera, the middle reaches of the Walanae valley, and even Selayar Island off the peninsula's southeast coast (Bulbeck et al. 2000: 89-90, 94). Bartstra (1978: 71, and pers. comm.) reported hollow-based points with denticulated margins along the present banks of the Walanae, more specifically at Lamuru (see Fig. 1). Darmawan et al. (1993a) mention serrated arrowheads at Padang Lampe,

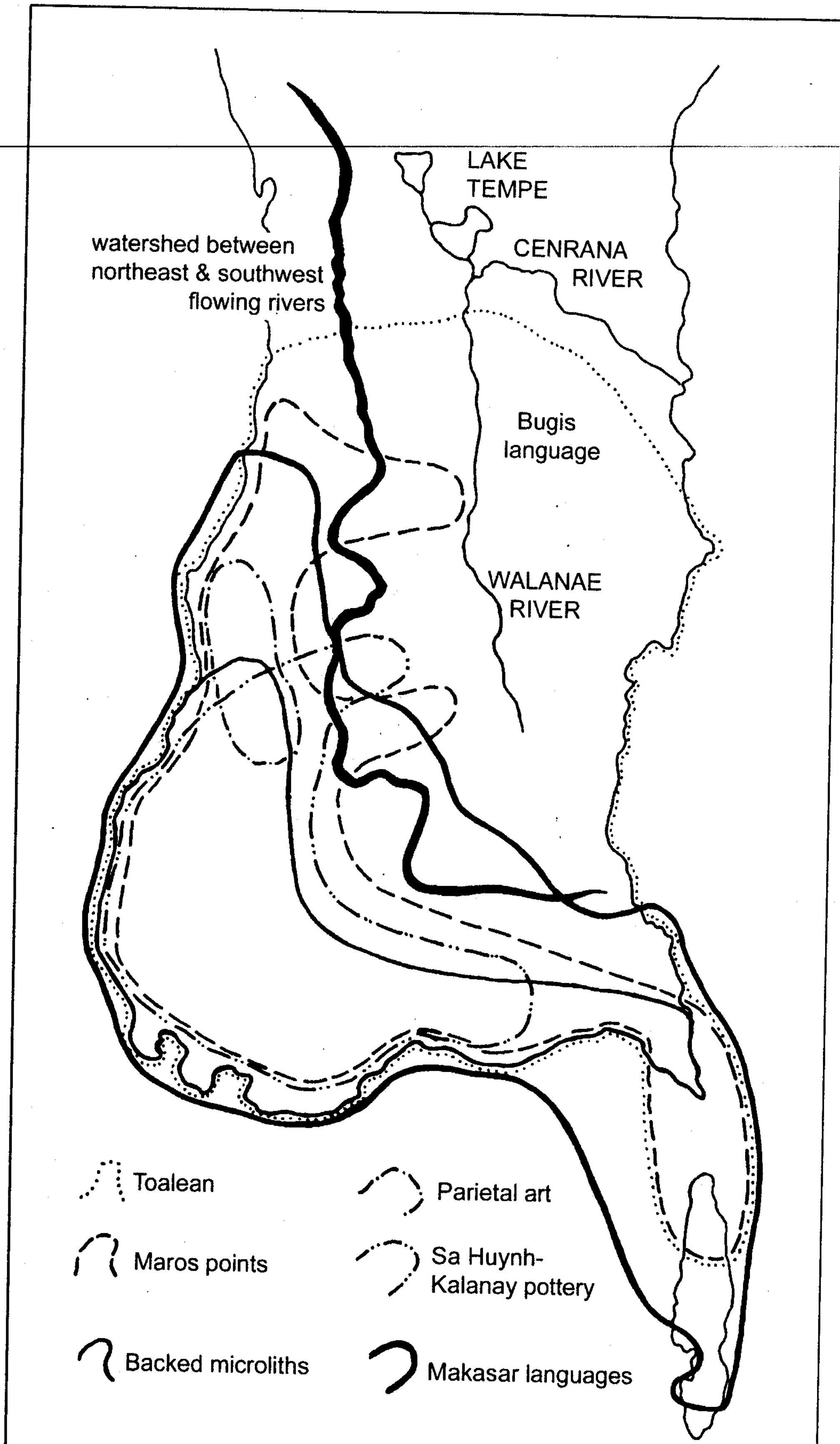

Figure 3. Approximate known distribution of the Toalean (and its southwestern elements), and Sa Huynh-Kalanay pottery in the South Sulawesi peninsula, compared to the Makasar languages and the divide between the northeastern and southwestern landscapes of the peninsula.

about half way up the peninsula's west coast, and some of them have hollowed bases, according to a local archaeologist who helped to supervise the surveys (Tanwir Tane pers. comm.; see Fig. 1). Sumantri (1996) recorded Maros points on the surface of three of the 22 rockshelters which he surveyed in the Belae karsts of Pangkajene Kepulauan. Hakim (2000) reports Maros points from Batang Mata Sapo, Selayar, in contrast to his 'Malindrung points' (Hakim 1990) from the Walanae valley (see section 5; see Fig. 1). Although none of these outlying examples of Maros points have been illustrated, making their identification less secure than the specimens from Lamoncong, Maros and the south coast, they may still be accepted, to produce the distribution shown in Figure 3.

4.3. *Bone points*

Bone points occur in rockshelters across the peninsula (Bulbeck et al. 2000: 73), including Leang Ara (Van Heekeren 1937), Leang Lompoa (Franssen 1949), Leang Jarie (Bartstra 1998: Pl. 6) and Gua Bulusumi (Darmawan et al. 1993a: 10). The interesting note as regards their distribution may be their occasional absence from sites in the peninsula's southwest, specifically Leang Karassa, Batu Ejaya 2 and Gua Garunggung (Bulbeck et al. 2000: 73). The Lamoncong sites provide some evidence for the local preceramic production of bone points, possibly even preceding the arrival of microlithic points. Bone points are the only Toalean type specified at Leang Ululeba, a site which lacked pottery or any other definitely late Holocene debris (Table 6; see Fig. 1). At the other extreme, Leang Balisao evidently lacked both bone points and microliths, and may be directly related to the *Toale'* whom Sarasin and Sarasin (1905b: 274-286) recorded as metal-using hunter-horticulturalists who had dwellings in some of the Lamoncong rockshelters (see Fig. 1). Leang Tomatoa Kacicang, which produced fragments from two glass bracelets at the base of the excavation, may link the Toalean and *Toale'* occupations of the Lamoncong shelters.

Table 6. Suggested chronology of the Lamoncong sites.

chronological indicator	Leang Ululeba	Leang Cakondo	Tomatoa Kacicang	Leang Balisao
bone points	X	X	X	
Maros points	?	X	X	
other stone points	?	X	X	
earthen sherds		X	X	X
domestic fauna		X	X	X
polished axe and barkcloth beater			X	
glass bracelet			X	
iron			X	X
glazed ceramics				X

Note: Artefactual contents from Sarasin and Sarasin (1905a; 1905b: 288, 293), Van Stein Callenfels (1938a: 580), Van der Hoop (1941: 280, 306), Van Heekeren (1972: 109), and Bulbeck (1996-97: Pl. 2). Simons & Bulbeck (this volume) switch Leang Cakondo and Leang Balisao in the chronological sequence, based on Bulbeck's observations of the sites' contents.

4.4. *Holocene fauna*

A distinctive feature of the rockshelters in Maros and the far south, noted by Simons and Bulbeck (this volume), is the tendency for the endemic boar, *Sus celebensis*, to account for 50 percent or more of the faunal identifications dated from about 7500 to 2000 BP. Elsewhere in the peninsula, only one site shows a comparable focus on the Celebes boar (Leang Tomatoa Kacicang). The same north-south distinction is evident from three more assemblages, described by Hooijer (1950), which Simons and Bulbeck (this volume) excluded on the basis of small sample size. At Leang Lompoa, Maros, 14 of the 18 identifications (78%) are *S. celebensis*. In contrast, this species accounts for only five of the 17 identifications at Panisi Tabutu (29%) and two of 15 at Leang Codong (13%), both sites of the northeastern peninsula.

The spatial coincidence of sites with 50% plus *S. celebensis*, and sites with backed microliths, may suggest these tools served as spear barbs among hunters specialised in the pursuit of the Celebes boar. However, Simons and Bulbeck (this volume) look to human ecology to explain why one large species dominates the faunal assemblages at Maros and along the south coast between the early Holocene and 2000 BP. They suggest a commensal or mutualistic relationship between the Toaleans and *S. celebensis* in environments constituted of a mosaic of primary forest, secondary forest, and more open habitats. Here I would add that the ability of *S. celebensis* to thrive in grasslands and forest mosaics indicates that forest clearance by the Toaleans of the southwestern peninsula may have formed the basis for their close relationship with the Celebes boar. Evidence of systematic, possibly intentional habitat alteration accords with the indications of a high hunter-gatherer population density in the southwest (Section 3) and, by implication, may suggest lower Toalean population densities to the north of Maros, where *S. celebensis* was less prominent as a prey.

4.5. *Parietal art*

Another characteristic of the southwestern peninsula, specifically the Maros and Pangkejene karsts, is the common occurrence of parietal art. Darmawan and Albertinus (1991) report paintings in 15 of the 17 Maros rockshelters they surveyed, and Darmawan et al. (1991a) illustrate three further instances (Gua Pannampu 1, Gua Pattebakang 1 and 2). Glover (1978) and Makkulasse (1986a) described paintings in nine more rockshelters (Leang Balang, Ellepusae, Pattae, Pette Kere, Lambatorang, Tinggi Adat, Ulu Wae, Tapuang Lompoa and Lambarugae). In Pangkajene, Darmawan et al. (1991b) report paintings in 21 of the 23 surveyed shelters, Sumantri (1996: 185) documents paintings in two of seven further shelters in the Belae karsts, and Suaka Peninggalan Sejarah dan Purbakala Sulawesi Selatan (1984) described the spectacular gallery of Sumpang Bita. Rupestral art has not been reported from the peninsula's other limestone outcrops near the headwaters of the Walanae, in the vicinity of Bola Batu in Bone, or on the peninsula's southeast tip (see Glover 1976: Fig. 1). Although rock art is but one expression of figurative symbolism, which itself may be only loosely related to cultural complexity or hunter-gatherer residential patterns, the Maros and Pangkajene paintings are perhaps unsurprising in the context of the evidence for high Toalean population densities.

Hand stencils are the usual signature which the Toaleans left of their artistic tendencies. Anthropomorphs, in scenes of up to nine individuals, appear to be a feature of the Belae karsts, occurring in nine of 22 rockshelters (Sumantri 1996: 185), compared to only two in the Maros karsts (Leang Jing, Leang Bata-Batae). However, the most revealing anthropomorphs are at Gua Pattebakang 1, only 100 m from the present coastline, which appear fairly clearly to depict fishing from canoes (Darmawan et al. 1991a). Canoe depictions may be entirely a ceramic Toalean (or later) representation, because their four representations in the Belae karsts (cf. Darmawan et al. 1991b: Table 1; Sumantri 1996: 185), and the spectacular canoe at Sumpang Bita (Subagus 1986), occur in shelters with surface finds of pottery. Fish paintings have been recognised at two Belae shelters with pottery, including one of the examples with a canoe. A clear anoa buffalo is represented only at Sumpang Bita (SPSPSS 1984) and Bata-Batae (Makkulasse 1986a). Suids, either the babirusa 'pig deer' or the Celebes boar, emerge as the most common faunal representation, appearing at Sumpang Bita (SPSPSS 1984), Leang Sakapao 1 (Bulbeck et al., this volume), and Gua Pannampu 1, Leang Pattae, Leang Pette Kere, Leang Lambatorang and Leang Tapuang Lompoa in Maros (Van Heekeren 1972: 118-119; Glover 1978: 74; Makkulasse 1986a: 37; Darmawan et al. 1991a). The figurative focus on suids in the Maros sites is not inconsistent with the prominence of *S. celebensis* in the faunal refuse.

5. FEATURES OF THE NORTHEASTERN PENINSULA

Hakim (1990) nominated the term Malindrung point for the points with serrated margins, showing a straight or convex rather than a concave base, collected from a large lithic scatter at Malindrung on the upper Walanae. Points with these features are also reported from open sites on the middle and lower Walanae (Bulbeck et al. 2000: 89), and from the three published, excavated rockshelters of the northeastern peninsula: Panisi Tabutu on the eastern slopes (Van Stein Callenfels 1938b), Leang Codong on the middle Walanae (Van Heekeren 1972: 112), and Bola Batu in the neighbourhood of Panisi Tabutu (Van Heekeren 1949). Van Heekeren (1949) also illustrated and described 'pirri points', i.e. unserrated symmetrical points retouched on the dorsal surface (McCarthy 1940: 39), among the Bola Batu finds. In other words, the lack of Maros points in the northeastern peninsula does not correspond to any shortage of other, morphologically less specialised stone points [of the 'miscellaneous' varieties also found in southwestern sites (Bulbeck et al. 2000: 73)]. Similarly, bone points have been recovered from all three excavated shelters in the northeastern peninsula (Bulbeck et al. 2000: 73, 79-80).

The Toalean could well be aceramic in all three rockshelters discussed here. Potsherds are not mentioned in any account of Panisi Tabutu. The unspecified quantity of sherdage reported by Van Heekeren (1972: 112) from Leang Codong is probably associated with the site's Early Metal Phase finds (see below). At Bola Batu, the eight earthen sherds are less common than the site's sixteenth and nineteenth century Chinese sherds which, moreover, had penetrated to the same depth in the deposit (Van Heekeren 1949: 99-101), suggesting that all the pottery is historical. Only a fragment from a polished 'round axe', in the uppermost level where the Toalean tools were found, might represent a 'Neolithic' element (Van Heekeren 1949: 106). Van Heekeren (1949: 104) valiantly attempted to reconstruct a Toalean chronology at Bola Batu, notwithstanding the extensive stratigraphic overlap between all of his artefact classes, which he attributed to infiltration. From early to late, his Toalean types were tanged implements (no more convincing than at Panganreang Tudea), pirri points and denticulated triangular points; then blades, core scrapers and miscellaneous points; followed by barbed arrowheads (Malindrung points) along with bone points and shell artefacts. Counterparts to all of Van Heekeren's Toalean I, II and III elements are present, more or less in the order reconstructed for Panganreang Tudea (see Fig. 2), which might suggest a predominantly middle Holocene occupation at Bola Batu, with some scope for still earlier habitation.

Light Toalean population densities along the Walanae are suggested by the only site survey whose target sites and methodology are comparable to those of the 'Macassar survey'. Kallupa et al. (1989) recorded 15 sites (including Ujung) associated with the pre-Islamic history of the Bugis chiefdom of Soppeng. The mapped, exposed area of 4.76 hectares, virtually all of it on 'old landforms' rather than alluvial sediments, presented 5351 earthen sherds but only four flaked stone artefacts (Bulbeck 1992: 700-705). The average density of 1123 potsherds per hectare exceeds that in any sector of the Macassar survey (Table 5), but the density of stone artefacts is much lower, whether calculated per hectare (0.8) or per hundred sherds (0.07). Care must be exercised in relying on these results though, given the much smaller area recorded along the Walanae than in the Macassar survey. The results are, however, consistent with the abundance of primary forest in the environs of Bola Batu indicated by the high frequency of babirusa, and substantial counts of anoa and monkey, in the site's faunal refuse (Simons & Bulbeck, this volume). Granted the lack of evidence for fragmentation of the local forests, either as the passive consequence of population build-up, or as an exercise in landscape management to increase the yield of preferred edible resources, the Walanae valley and the peninsula's eastern slopes perhaps carried the low hunter-gatherer population densities which Bellwood (1997: 155-158, 202) apparently visualises as the general situation in the Indo-Malaysian Archipelago on the eve of the postulated Austronesian migration. The lack of evidence of a 'ceramic Toalean' phase in the northeastern peninsula could conceivably reflect lack of resistance, on the part of the Toaleans, to the late Holocene incursion of farming groups.

Apart from survey and excavations of the river terraces along the middle and lower Walanae (e.g. Keates & Bartstra 1994), the northeastern peninsula has hosted rather little archaeological research, precluding any great confidence in the reliable reconstruction of its prehistory. One area that has been comparatively well researched is the Cenrana valley but, apart from a single barkcloth beater (Budianto Hakim pers. comm.), and considerable numbers of undated megaliths and potsherds, there are few if any indications of prehistoric habitation. Flaked stone artefacts are yet to be reported from the numerous surveys and excavations along the southern flanks of the Cenrana valley (Van Heekeren 1958: 84-85; Kaharuddin 1994; Bulbeck 2000a; Salam 2000; Sarjiyanto 2000). Survey and excavation at Tosora, on the floodplain north of the Cenrana River, have yielded only two tiny, amorphous flaked stone pieces (Darmawan et al. 1993b; Kallupa 1994-95; see Fig. 1).

Cores taken from the Cenrana and Tempe wetlands suggest the intrusion of saline influences right along the Cenrana, and possibly as far inland as Lake Tempe, until approximately 2500 BP (Gremmen 1990; Caldwell & Lillie, this volume). A continuous saline channel could have extended further west again, along a belt of low lying land west-northwest of Lake Sidenreng, to judge from local stories of how boats here used to sail from one coast to the other (Whitten et al. 1987: 20). Saline influences as far as Lake Tempe are further suggested by the recovery of a sea-urchin spine and artefacts of shell at Leang Codong (Jakarta Museum Acc. Nos 5529, 5553, 5554). The evidence for a middle to late Holocene saline channel or swampy expanse, that transected the peninsula in the vicinity of the Tempe basin, may relate to the lack of discovered traces of the Toalean along the Cenrana or northeast of Cabenge. Maritime trade along the Cenrana may also be reflected in the impressive inventory of Early Metal Phase items recovered from Leang Codong: 15 beads, including one of white stone and two of carnelian; bronze leaf; and an iron point (Bulbeck 2000b: 18).

Bola Batu is the critical site in drawing comparisons between the Toalean assemblages in the southwest and northeast of the peninsula. It yielded a substantial assemblage both in terms of artefacts (for example, 106 stone points, 24 bone points, and 41 shell artefacts) and fauna (Simons & Bulbeck, this volume), and Van Heekeren's (1949) documentation is adequate to suggest a predominantly middle Holocene antiquity. The absence of Maros points and backed microliths at Bola Batu would therefore appear to reflect a real difference rather than sampling error. However, differences in hunting technology need not be implied. Serrated points throughout the peninsula are functionally interpreted as arrowheads (Van Heekeren's 'fishing spearheads' from Leang Ara are the exception that proves the rule, as they would seem to have been perfectly functional arrowheads for smaller game). Other, larger pointed stone artefacts may be interpreted as spearheads (Van Heekeren 1949: 103). Furthermore, while the evidence from Australia indicates that the main purpose of backed microliths was to function as spear barbs (McBryde 1985), backing is not obligatory for suitably shaped microliths to be hafted along a wooden shaft. Van Stein Callenfels (1938b: 140-141) proposed that the unilaterally serrated pieces he recovered from Panisi Tabutu served as spear barbs, and Van Heekeren (1949: 103) suggested the same function for his asymmetric triangular points from Bola Batu. Accordingly, the smaller range of morphologically specialised tools in the northeastern peninsula, compared to the southwest, should be viewed as a simpler solution to producing tools utilised in the same range of subsistence procurement activities, not as the symptoms of a discrete economy. Denser forest cover may have hidden many of the outcrops of flakeable stone and offered a wider range of hard plant materials for use instead. In sum, the more restricted lithic repertoire of the Toaleans of the northeast peninsula would seemingly cohere with the evidence for lower population densities, larger expanses of primary forest, and lack of recorded rock art.

6. SOUTH SULAWESI NORTH OF THE PENINSULA

North of the Tempe basin lies a large highland block, referred to as the Toraja highlands, bordered by substantial coastal plains to the east (Luwu) and the west (Mandar and

Mamuju, see Fig. 1). Sufficient archaeological research has now taken place to have some confidence in the absence of the Toalean across this region. To my knowledge, the only survey with a Toalean focus was Willems' failed attempt, in 1939, to discover Toalean traces in the abundant limestone cavities of the Toraja highlands (Van Heekeren 1949: 94). However, local Indonesian archaeologists on subsequent surveys of the caves' more recent relics (Makkulasse 1986b; Darmawan et al. 1994; Bernadeta 1998) might be expected to have noticed any of the familiar Toalean types, were they there. Repeated surveys and excavations along the Karama River in Mamuju, and my joint project in Luwu (Bulbeck & Caldwell 2000), have not reported any signs of the Toalean.

The only strong hint of habitation of appropriate antiquity is the 5680 ± 130 BP radiocarbon date (ANU-11082) obtained on charcoal from Rahampu'u on the western rim of Lake Matano (Bulbeck & Caldwell 2000). Even this determination is problematical because other radiocarbon dates in the same spit, and the next spit down, are merely 1000 ± 40 BP (OZE646) and 1400 ± 110 BP (ANU-11081). Furthermore, although abundant stone artefacts were excavated at the site, the vast majority occur in deposits that date to the fifteenth century AD or later, and these artefacts are currently interpreted as strike-a-lights associated with local iron smelting (Bulbeck & Caldwell 2000: 26-33, 134; Bulbeck n.d.b). One would certainly expect occupation at an early date across the northern reaches of South Sulawesi, but all currently available evidence would suggest that the associated industries were less archaeologically conspicuous than the Toalean.

The oldest definite dates for habitation come from Minanga Sipakko, one of the Kalumpang sites on the Karama River (see Fig. 1). The Bandung Radiocarbon Dating Laboratory provided Truman Simanjuntak (pers. comm.) with a date of 2570 ± 110 BP for charcoal from towards the base of his major test pit. A second test pit, in a part of the site deflated by erosion, yielded a carbonised bone fragment which Colin Groves (pers. comm.) identified as a deer's terminal phalanx. Its AMS date of 2810 ± 50 BP (OZE132), or 2800-3140 cal BP, overlaps with the calibrated two-sigma range of Simanjuntak's date (2350-2850 BP). The two dates suggest Neolithic habitation at the site between approximately 2500 and 3000 BP. Minanga Sipakko has yielded iron fragments and a decorated bronze bangle (Simanjuntak 1994-95: 11, 25), but they are unprovenanced, and quite likely refer to the second habitation phase at the site represented by the top 60 cm in the main test pit (see Nasruddin & Ramli 1995: 18-19).

Bellwood (1997: 227) relates the Kalumpang sites, and Kamassi specifically, to the Taiwan Neolithic, and suggests a dating in excess of 3000 BP on that basis. The excavations at Kamassi by Van Stein Callenfels (1951) and Van Heekeren (1950) certainly recovered numerous items with Taiwan Neolithic parallels. They include human heads and animal figurines of clay; decorated ceramic discs, and ring feet with cut-out decoration; knives and spearheads of polished slate; barkcloth beaters; and polished stone axes which are sometimes waisted or shouldered in outline, or quadrangular in cross-section. Taiwan Neolithic counterparts are rarer at Minanga Sipakko, being restricted to an animal figurine of clay (Flavel 1997: Pl. 4), a barkcloth beater (Van Heekeren 1972: 187), high-necked flasks (Simanjuntak 1994-95: 11, 25), a footring with cut-out decoration, and a possible spearhead of polished slate (pers. observ.). The much larger repertoire at Kamassi could well reflect sampling discrepancies, as 280 m^2 have been excavated there, in contrast to the series of surface collections and three excavated square metres at Minanga Sipakko. Nonetheless, the available data are consistent with a scenario of initial Neolithic habitation at Kamassi during the centuries leading up to 3000 BP.

The wide array of polished stone axes would point to some forest clearance in addition to the more straightforward inference of carpentry. Bellwood (1997: 227) suggests that the polished slate knives were reaping knives, while a range of grinding slabs, grinding stones and millstones have been identified (Van Heekeren 1972: 187; Simanjuntak 1994-95: 20-21; Ikhsan 1995). Some of Kamassi's 'Hoabinhian axes' (Van Stein Callenfels 1951: 84) and 'crude pebble-tools' (Van Heekeren 1972: 187) may also have been used in processing plant matter. The extent to which agriculture supplied the vegetable component of the diet is unclear. Identified faunal refuse from Kamassi includes two *Sus scrofa* canines, a larger number of fragments from the Celebes boar, the horn of an anoa buffalo, and fish bones (Van Heekeren 1972: 189). Along with the deer fragment from Minanga Sipakko, and the slate spearheads, the evidence indicates a greater focus on hunting and fishing than husbandry. Both Kamassi and Minanga Sipakko are modest in area, extending over approximately one tenth of a hectare each. They lie near the farthest point upriver which can be reached by watercraft from the coast, and so provided their residents with access to marine, coastal, riverine, and sub-montane resources. The degree to which farming had provided the population with less than or more than half of the diet would be a matter of speculation.

Approximately five percent of the Kalumpang sherds are decorated in a wide-ranging repertoire of motifs (Van Heekeren 1972: 187; Fatimah 1995: 35). Heine-Geldern considered the pottery from Samrong Sen, a site in Cambodia which may date to about 4000-3000 BP (Higham 1989: 173), as the closest analogue of the Kamassi decorated wares (Van Heekeren 1950). Van Heekeren (1972: 187) himself opted for a relationship with Vietnam's Sa Huynh culture, perhaps dating to around 3000-2000 BP (Higham 1989: 232). While my statistical analysis links the Kalumpang repertoire first and foremost with assemblages in southwestern South Sulawesi, the South Sulawesi assemblages are less closely related to other Island Southeast Asian repertoires than they are to the Sa Huynh repertoire (Bulbeck n.d.a). To the degree that comparisons of pottery decorations can be trusted, they would suggest contact between Indochina and Kalumpang at around 3000 BP, and certainly ameliorate the previously discussed emphasis on influences from Taiwan.

The geographically distant status of the material-cultural comparisons that may be drawn for Kalumpang indicates either that the residents had advanced maritime skills or were in intimate contact with maritime groups. The ocean-going connection could account for the spread of related 'Sa Huynh-Kalanay' assemblages from Kalumpang to South Sulawesi's south coast. A correlation emerges with Mills' (1975) historical linguistic evidence that Makasar, the indigenous language of the southwestern peninsula, was the first of the South Sulawesi languages to split off the common stem, followed by Mandar (which is closely related to Mamuju). It may be more than coincidence that the oldest known pottery in South Sulawesi (approximately 3500 BP) comes from a Makasar-speaking area, and the second oldest pottery (Kalumpang, approximately 3000 BP) derives from a Mamuju-speaking area. Further speculation may be reckless given that our comparisons are between sherds turning up in rockshelters, and full-blown Neolithic settlements. Nonetheless, a reasonable case can be made that Austronesian maritime capacities began to connect communities spread widely across South Sulawesi in excess of 3000 BP.

Communities on the Karama River would appear to have maintained long-distance maritime links until the Early Metal Phase. Sikendeng, near the river's mouth, is the find spot of one of Indonesia's finest bronze Buddha statues, stylistically dated to between 1300-1800 BP (Bosch 1933). Excavations at the site recovered highly polished stone axes, comparable to the finest specimens from Kamassi, and earthen pottery which was plain or scantily decorated (Van Stein Callenfels 1951). The lack of metal fragments may reflect hostile preservation conditions, and/or the persistent use of stone tools for cutting and related tasks. In addition to the polished stone implements, obsidian occurs as a surface find at both Kamassi (Van Heekeren 1972: 185) and Minanga Sipakko (see Simanjuntak 1994-95: 21). The obsidian, presumably imported (from an undetermined location), in view of the lack of reported sources of obsidian in Sulawesi south of the island's northern arm, would appear to postdate the Neolithic, given that it is not reported from any of the excavations. When our enquiries turn to the items that may have been exported from the Karama River in exchange, gold dust emerges as a possibility, based on Caldwell's (1993: 7) report that gold is currently panned in the tributaries of the Karama. A gold-extraction industry need not be expected to leave discernible evidence at the Karama sites, as people would have taken great care against trashing or misplacing this valuable product, and gold dust would be unlikely to be recovered during any but the most meticulous excavation.

A single flake of imported obsidian, dating to the Early Metal Phase, has been recorded at Luwu, to the east of the Toraja highlands. It was excavated as part of an assemblage found immediately outside the lower body of a huge earthen jar at Sabbang Loang (Bulbeck 2000c: 6). Willems (1938) originally excavated a cluster of 11 of these jars, which measure around one metre in height and diameter. Following Willems' dig, many more jars were disturbed during the construction of roads and buildings at the site. The author's excavations in 1998-99 recorded a thin habitation layer just beneath the surface, thicker artefact-bearing deposits which would appear to be a disturbed mixture of habitation debris and massive jar sherds, and one largely intact jar which had been protected by a sacred boulder lying above it. Three AMS dates on cooking char from thinner potsherds, and two charcoal dates from the burial pit with the jar (one sample taken from the interior of the jar), produce a consistent series of overlapping determinations with their means falling between 1750 and 2020 BP. Accordingly, this area of Sabbang Loang would appear to have supported a settlement of people who interred their deceased in massive jars in their yards or beneath their houses (Bulbeck & Caldwell 2000: 60-65). Materials providing radiocarbon dates earlier than 2000 BP have been sought in vain and so, apart from debris associated with housing and office developments, all finds can be dated with confidence to the c. 2000-1750 BP interval.

The obsidian flake was evidently included in the fill packed around the earthen jar after it had been interred. Other items in the fill feature 182 flaked artefacts of quartz and various isotropic siliceous minerals, two corroded iron fragments, an iron-coated gravel, a gravel of ironstone, baked earth, burnt clay, and chert heat shatter. Despite the lack of potsherds which are not attributable to the burial jar, the traces of iron point to an Early Metal Phase dating, and even hint at local ironworking (Bulbeck & Caldwell 2000: 62-63). The sediments inside the jar were sterile, reminiscent of Willems' (1938) report of empty jars. However, the basal spit of an adjacent test pit yielded a possible grave good, an 'Indo-Pacific' glass bead larger than any of the hundreds of other specimens recovered from later Luwu sites (Bulbeck et al. 2002). (To my knowledge, metrical data on glass beads from other Indo-Malaysian sites are unavailable, preventing comparison between the Sabbang Loang specimen and its possible counterparts elsewhere.) The same test pit yielded an apparent iron spearhead, represented by 4.5 cm of its tip (pers. observ.), suggesting that the iron spearheads excavated by Willems (1938) in the soil above his jars also belong to the Early Metal Phase. The same comment would apply to the potsherds, barkcloth beaters and stone mortars excavated by Willems, and the two further fragments of iron from the 1998-99 test pits (Bulbeck & Caldwell 2000: 61-63; Bulbeck n.d.b).

Sabbang Loang lies on a granodiorite hill where the Rongkong River meets the coastal plain (see Fig. 1). A traditional trail along the Rongkong leads to two ethno-historically important sources of iron at Limbong, approximately 30 km away as the crow flies (Bulbeck 2000c: Fig. 1). Cartage of this iron ore to Sabbang Loang, as early as 2000 BP, would explain the site's iron artefacts and traces of ironworking, and the establishment of a well-settled population with at least some access to imported goods. Further, a strong case can be made that the inhabitants 2000 years ago were the direct ancestors of the Lemolang speakers who currently live in the neighbourhood of the site. Lemolang is a linguistic isolate within the South Sulawesi language stock (Bulbeck 1992: 500), suggesting it had split off the main language stem a long time ago. Local Lemolang tradition nominates Sabbang Loang as one of its ancestral villages, along with Pinanto (old Baebunta), where my excavations recovered a barkcloth beater, 11 other polished stone artefacts, and 21 flaked stone artefacts, among a predominantly historical assemblage (see Fig. 1). The potsherds which yielded the early AMS dates at Sabbang Loang (see above) are visually indistinguishable from pottery of clearly historical antiquity in the vicinity. Accordingly, as early as 2000 years ago, some of the foundations of the ethnographically observable situation in Luwu appear to have been established (Bulbeck & Caldwell 2000: 58-65).

Another Luwu site, Bola Merajae, also indicates continuity of occupation over the last two millennia (see Fig. 1). Two one metre square test pits yielded little apart from the consistent recurrence of pottery (up to 166 sherds per spit) and charcoal, but the test pit with the lighter concentration of debris produced four dates in a consistent sequence from 1980 ± 90 BP (OZD843) at the base, to 310 ± 40 BP (OZE578) near the top (Bulbeck & Caldwell 2000: 36-37). Bola Merajae lies near Katue whose radiocarbon dates suggest occupation between approximately 1800 and 1100 BP (see Fig. 1). The range of imported goods includes 208 small 'Indo-Pacific' beads of vivid monochrome glass, a gold star, and a fragment of an agate bead. The lack of Chinese glass beads or imported glazed ceramics confirms the case for abandonment of the site by 1000 BP. Katue is located within the tidal zone of a navigable river (see Fig. 1), and would appear to have been involved in the importation of iron ore, smelting and working it, and exporting the products. Evidence of the site's iron industry includes eight rocks of iron ore, eight iron-slag and heat-fractured gravels, two lumps of baked iron-indurated earth, two iron prills, and six iron artefact fragments (Bulbeck & Caldwell 2000: 38-40; Bulbeck et al. 2002; Bulbeck n.d.b).

Bola Merajae and Katue are situated in an area which, according to local tradition, served as the coastal outlet for iron from Lake Matano (Pelras 1996: 59; see Fig. 1). Lake Matano offers hints of continuous settlement from a time which may have preceded the Early Metal Phase. A test bore at the lake's southwest margin recovered charcoal dating to 2350 ± 140 BP (ANU-11104), i.e. 2740-2060 cal BP, from a slug of sediment interpreted as washout from forest clearance. Also ascribed to forest clearance, abundant charcoal occurred in otherwise sterile deposits in the basal spit at Sukoyu, and dates to 2070 ± 50 BP (ANU-11271) or 2150-1900 cal BP. The 1400 BP charcoal date from Rahampu'u, mentioned above, and a date of 1520 ± 70 BP (ANU-11107) from Pontanoa Bangka, point to continued habitation throughout the first millennium AD at Lake Matano, leading up to its oldest evidence currently available for local iron smelting. This date, 960 ± 70 BP (970-690 cal BP) from Nuha (ANU-11105), tends to link the demise of Katue and its iron industry to the establishment of iron smelting at Lake Matano approximately 1000 years ago (see Fig. 1). Katue and Sabbang Loang together indicate the existence of coastal hinterland exchange before 2000 BP, and the addition of iron ore to the bundles of hinterland produce when ironworkers arrived on Luwu's coast during the Early Metal Phase (Bulbeck & Caldwell 2000: 22-27, 96-97; Bulbeck n.d.b).

7. DISCUSSION AND CONCLUSIONS

The following interpretation of the evidence presented in this paper assumes minimal maritime tendencies among the Toaleans. In support of this assumption, shell middens are yet to be reported from open air locations in the South Sulawesi peninsula (Bulbeck 1992, 1996-97), and marine fish (many of which have large bones, readily recoverable and recognisable archaeologically) have not yet been clearly related to any Toalean faunal assemblage (Simons 1997; Simons & Bulbeck, this volume). While canoe paintings occur in various shelters along the peninsula's west coast, they could arguably depict the watercraft of Austronesian immigrants. The strongest evidence of any Toalean seafaring ability may be the Maros points reported from Selayar Island, separated from the mainland by a narrow strait. However, some evidence clearly points to wider contacts in preceramic times: the introduction of deer and *R. rattus* to South Sulawesi by 4000 BP (Simons & Bulbeck, this volume); and typological comparisons such as hollow-based arrowheads of middle Holocene age in both Java and South Sulawesi (Forestier 1999), and backed microliths in Sumatra, Java and South Sulawesi (Glover & Presland 1985: 188-189). These observations need not imply Toalean voyaging capacities, but they would certainly suggest some preceramic, inter-island traffic in the environs of Sulawesi. The arguments presented in this paper would require modification to the degree that future research may reveal a middle Holocene and earlier maritime network (involving regular exchange rather than hints of occasional contacts) that had embroiled South Sulawesi.

The earliest signs of the Toalean of the South Sulawesi peninsula, defined as a microlithic industry, can be dated to around 7500 BP. The common elements involved small stone points conventionally interpreted as arrowheads, asymmetric retouched points that could have served as spear barbs, and bone points and shell artefacts as usual accompaniments. These elements alone characterise the facies of the Toalean recorded in the northeastern peninsula, where Bugis holds sway as the dominant language (see Fig. 3). North of the peninsula, where a profusion of Austronesian languages prevails (Grimes & Grimes 1987), no trace of the Toalean has yet turned up. The earliest known, morphologically specialised armaments, being polished slate spearheads from Kalumpang and iron spearheads from Sabbang Loang, date to the late Holocene. In stark contrast, the southwest of the peninsula is characterised by an elaborate Toalean that includes backed microliths along the south coast (extending up the west coast), and Maros points with a somewhat wider distribution. Other southwest Toalean features, closely corresponding to the area where the indigenous languages are Makasar and its relatives (see Fig. 3), include rupestral art, a commensal or mutualistic relationship with the Celebes boar, and evidence of dense populations by hunter-gatherer standards.

The tripartite distribution of South Sulawesi's Holocene prehistory (and Austronesian languages) corresponds to geographical barriers. The Toalean and non-Toalean regions lie either side of a belt of wetlands, possibly saline along its entirety during much of the Holocene, transecting the northern peninsula. This barrier also corresponds to an ecological distinction between the predominantly seasonal (monsoonal) climates of the peninsula, and the tendency to wetter and more permanently humid climates north of the peninsula (Bulbeck 1992: 6-8). Further south, the dividing line between the southwest and northeast divisions of the peninsula coincides with a rugged cordillera that loops behind the southern and western coastal lowlands, more or less from Leang Ara to Padang Lampe (see Fig. 3). Significantly, one of the major passes across this cordillera (today a paved highway) emerges at Mallawa in the upper Walanae valley, and around here we find traces of southwestern features. These include Maros points at Lamoncong, and the Bulu Bakung pottery decorations quite similar to the less complex end of the Ulu Leang 2 spectrum of motifs.

The geographical barriers described here are hardly insurmountable, but they would have demarcated separate systems of overland trails. Terrestrial communication and, consequently, marital exchange and other inter-community alliances would have operated continuously within these systems, whereas communication between the systems would have been limited and peripheral. A model along these lines would account for the evidence of backed microliths and Maros points having been fabricated for millennia in the southwest, without having penetrated the northeastern peninsula at archaeologically visible levels. Similarly, the Austronesian penetration of the peninsular landmass would have involved expansion along previously established networks, producing a Makasar-Bugis division that maps onto a much older Toalean distinction (Bulbeck et al. 2000: 101-103).

Accordingly, the similarities in spatial organisation between the Toalean, and the Austronesian languages of the South Sulawesi stock, need not imply that the Toaleans spoke some ancient form of Austronesian. As I discuss elsewhere in this volume, there is some evidence that the Early Metal Phase inhabitants of the peninsula are not entirely descended from Toaleans, but include an exogenous component. One likely source of immigrants, based on comparative Austronesian linguistics and the Kalumpang material culture, would be Taiwan, even if pottery decorations also hint at a connection with Mainland Southeast Asia. As presently discussed, Kalumpang would appear to combine elements of both Solheim's (e.g. 1984-85) and Bellwood's (e.g. 1997) models of Neolithic Austronesian expansion, which these scholars relate to maritime trade and agricultural expansion respectively.

If Kalumpang may be taken as the exemplary Neolithic site, then Austronesian colonisation would appear to have been coastal or, more specifically, focused on major rivers at points with direct access to the sea. The location of several Early Metal Phase Luwu settlements (Sabbang Loang, Bola Merajae, Katue) on riverbanks, at or on the coastal plain (Bulbeck 2000c: 3-6), may echo Neolithic colonisation strategies. Sub-coastal settlements on major rivers would have enjoyed access to potable water, arable land, a wide suite of natural resources, and continued participation in maritime networks. Such locations would have combined excellent mobility prospects with the capacity to sustain many residents, two critical attributes during times of conflict with indigenous hunter-gatherers, notably in the southwestern peninsula with its large Toalean population. Wide-scale deforestation and intensive cultivation during historical times in the peninsula (Macknight 1983) can explain its lack of known Neolithic settlements, as their location along major coastal rivers would have exposed them to burial beneath the alluvium, reworking, or outright destruction. Indeed, if a channel had transected the northern peninsula, it would have invited Austronesian penetration upstream to locations with fresh water and other essential resources, and enabled coastally oriented colonists to circumscribe the southern two thirds of the peninsula.

The upper Walanae site of Balu Bakung is consistent with a time lag of 1000-2000 years for pottery to have arrived in the interior of the peninsula following its initial presence along the South Sulawesi coast (as dated at Ulu Leang 1). The site thus accords with a model of Austronesian colonisation initially along the major rivers of the coastal plain, and delayed penetration of the hinterland. Obviously, for the model to be confirmed we would require supporting evidence from many more open sites that appear to represent ancient kampongs. In addition, analysis of the excavated materials would be required before any suggestion could be tendered on whether Bulu Bakung might represent colonisation of the interior by farming groups from the vicinity of Maros, or from the Lake Tempe basin via the Walanae Valley.

In light of the deficiencies of the Neolithic archaeological record, we may turn to historical linguistics to bear out the hypothesised coastal orientation of South Sulawesi's early Austronesians. Makasar and Mandar/Mamuju, the oldest two language branches (according to Mills 1975) of the South Sulawesi stock, essentially follow a coastal distribution (Grimes & Grimes 1987). All South Sulawesi languages which have a largely or predominantly hinterland distribution would have diverged from the common stem after Mandar/Mamuju had split off. They include Bugis, the next offshoot according to Mills (1975), and which intriguingly has a specific relationship with the Tamanic languages, located in Borneo's deep interior (Adelaar 1995). This unexpected relationship would be truly miraculous unless 'proto-Bugis/Tamanic' speakers had retained a maritime capacity. These points suggest that the adaptations necessary for hinterland penetration had not evolved until a late stage in the diversification of the South Sulawesi stock. From this perspective, the persistence of a ceramic Toalean over one to two millennia, along with abundant evidence of Toalean-Austronesian interaction (Simons 1997; Bulbeck et al. 2000: 102), but without a clear record of an independent Austronesian presence in the peninsula, becomes understandable.

The shadowy status of the Neolithic across most of South Sulawesi, a situation that may be hard to improve on for the reasons discussed above, limits discussion at this juncture to hypothetical speculation. Relatively speaking, the last two millennia are well known archaeologically. At least four settlements in Luwu, one of them associated with an urnfield, date to between 2000 and 1000 BP, and evidently reflect an early iron trade between the hinterland and coast. Three cemeteries in the peninsula (Leang Codong, Ulu Leang 2, Leang Burung 1) belong to this period and, to employ Island Southeast Asian ethnographic analogy, their comminuted human remains suggest an intensively competitive ranked society with an agricultural base (Bulbeck 1996-97: 1028-1029). Buddhist icons of this age are known from the Karama River and the south coast, and numerous other early bronzes (including at least one Dong Son drum) are distributed broadly along the south coast. Some of the socio-economic centres of the early historical period — Sabbang Loang/Baebunta, Bantaeng (as represented by Bonto-Bontoa and Bontonompo), and Galesong (Bulbeck 1996-97: 1029-1034) — had already emerged as population foci during the Early Metal Phase.

While it may be presumed that the primary expansion of farmers across South Sulawesi had been largely completed by 1000 BP, the period 2000-1000 BP also signals the consolidation of overseas trading links, especially between the south coast and islands to the west. The material essentials of the historically recorded cultures (food production, iron, bronze, pottery, etc.), and the basics of their economic organisation (coastal-hinterland trade, the dynamic balance between long-distance trade and agricultural intensification), both appear to have been established during the Early Metal Phase. The archaeological data can often be analysed to advantage in an historical light that considers which language group was probably in residence, as in the Lemolang example Bulbeck & Caldwell 2000: 64-65). Materially, socio-economically and linguistically, the lineaments of early historical South Sulawesi society, as recorded in the indigenous and early external sources, appear to have been established between 2000-1000 BP. The rise of stratified societies after 1000 BP, compared to the ranked societies represented in the Early Metal Phase archaeological record (Bulbeck 1996-97; Bulbeck & Prasetyo 2000), can be attributed to the intensification of traditions laid down during late prehistory.

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