

typological study of word-order and word-order functions. Furthermore, Old English offers specimens of indigenous narrative prose which are not available in Old High German.

5. I am indebted to Leonard Babby for drawing my

attention to this distinction.

6. Cf. Gonda 1960. Similar phenomena are pointed out for Old Russian by C. van Schooneveld, 1959.

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AUSTRONESIAN CULTURE HISTORY: SOME LINGUISTIC INFERENCES AND THEIR RELATIONS TO THE ARCHAEOLOGICAL RECORD *

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ABSTRACT

Although subject to limitations of its own, historical linguistics can illuminate fragments of the human cultural past that are often irrecoverable from the archaeological record. Where both lines of evidence bear on a common referent they may be mutually corroboratory or contradictory. A number of inferences of all three types are considered, and certain conclusions reached which differ markedly from recent word-based reconstructions of Austronesian culture history, but lend support to the early ideas of Kern (1889). In particular, it is argued that

the original Austronesian speakers (circa 4,000 B.C.) were sedentary villagers who possessed (in addition to a universally acknowledged sophisticated maritime technology) root and grain crops, the pig, dog and fowl, pottery, apparently some knowledge of iron, probably the loom and possibly an indigenous syllabary. To account for a variety of observations it is simplest to assume that this community was located west of the Wallace Line, and that Austronesian culture history in its eastern efflorescence was to a significant extent a history of (material) culture loss.

1. INTRODUCTION

TWO METHODS OF PREHISTORIC INFERENCE. If we discount studies of the modern distribution of culture-traits (e.g. the analysis of 'culture areas' by scholars such as Wissler, or the 'culture-historical method' of the German diffusionist Kulturkreis school) as a major method of prehistoric inference, it can be argued that there are two dominant disciplines relevant to the reconstruction of the pre-literate human cultural past: archaeology and linguistics. The demands of archaeological method differ from those of linguistics in requiring direct observation of some features of the past that is to be reconstructed. These features, however, are limited to surviving elements of material culture, and their interpretation as evidence for prehistoric cultural connections or contacts is based on similarities in which the role of independent invention often looms large.

THE COMPARATIVE METHOD. The historical linguist

compares attested linguistic forms in two or more languages, and based on the establishment of regular correspondences of sound in words of related meaning (i.e. cognate words), posits ancestral forms (proto-forms, etyma or reconstructions) from which the observed cognates (called reflexes in relation to their reconstructed prototypes) can most simply and naturally be derived. The chief strength of this systematic procedure of comparison and reconstruction (the Comparative Method) is the almost complete arbitrariness and great range of combinatorial possibilities for the sound-meaning relationship in language as compared with the more limited possibilities and weaker demands of correspondence for such other cultural features as house types, art motifs, etc. Not only does this characteristic of language drastically reduce the role of chance as a plausible explanation for the resemblances observed, but the general regularity of phonological change in many cases provides a supplement-

tary tool for the detection of borrowing between historically distinct (though ultimately related) linguistic traditions.

GENETIC RELATIONSHIP. If neither chance nor borrowing can be considered sufficient to explain the resemblances between two or more languages, the languages in question are assumed to derive from a common ancestor, or to be genetically related. Each descendant is a daughter language, or a witness for the reconstruction of their common parent, or proto-language.

A major problem - the problem of subgrouping - arises when three or more linguistic communities are compared. Stated in its simplest form, the problem of subgrouping can be framed as the following question: given related languages A, B, C is the genetic distance between all three equal, or is there evidence in the form of exclusively shared features that two of the languages are more closely related to one another than either is to the third? An answer to this question presupposes that for each of the features compared between the living languages a prototype has been reconstructed for the common ancestor of the group, proto-ABC. Yet in order to assign a feature that is not present in all daughter languages to proto-ABC at the highest level it is first necessary to determine the subgrouping relations. If a feature is found only in A and B, for example, and these are found to subgroup as against C (i.e. to derive from a common ancestor proto-AB which postdated the break-up of proto-ABC), there is no guarantee that the feature in question can be attributed to any language more remote in time than proto-AB. This apparent circularity of method, where a correct subgrouping and the reconstruction of the highest order proto-language each presupposes the other (Greenberg 1957: 49-50) is in reality nothing more than the hypothetico-deductive circle of inference and prediction: a hypothesis is formulated and used as a basis for reconstruction, this reconstructed language is tested against new observations, the scheme revised if necessary to account for these facts, and the process repeated until maximum explanatory power is attained with a minimum of assumptions.

Acceptable evidence for subgrouping languages is of a special kind: only innovations, or changes in what we assume to be the original state of things are considered strong grounds for positing a period of common development for the languages that share them. The separation of innovations from retentions (original features which have been preserved), of course, depends crucially on one's concept of the subgrouping relations. As with any scientific theory, the entire network of relations thus shifts together with one's basic assumptions.

A subgrouping hypothesis for a family of languages can be represented as a 'family tree' indicating the order of divergence of the attested languages from progressively more remote posited intermediate ancestors. As such it is important to note that a linguistic classification is more concerned with fissions of originally identical speech communities than with contacts between such communities once they have already become distinct.

AUSTRONESIAN SUBGROUPING. There is no generally accepted subgrouping of the 600 or more Austronesian (AN) languages, though some linguists (Dempwolff 1934-38, Milke 1938, and subsequent works, Grace 1955 and subsequent works, Biggs 1965, Pawley 1972, Blust 1972a) have recognized the existence of a large subgroup, now called 'Oceanic' (OC), which includes all of the AN languages east

of a north-south line running through Teluk Sarera (formerly Geelvink Bay) in Irian Jaya except Palauan, Chamorro and possibly Yapese. Others (Dyen 1963, Ferrell 1969, Dahl 1973) have observed that the languages of Formosa are internally quite diverse (falling into three remotely related groups), and that some of these diverge considerably from all other members of the AN family. In the present state of uncertainty reconstructed forms will be assigned to Proto-Austronesian (PAN) only if reflected in at least two of the following partly geographical groups: 1. Oceanic, 2. Western, 3. Formosan. In 1-2 comparisons 2 will be defined as including Sumbawa-Sumba, Sulawesi and the Philippines, but excluding islands further to the east; in 2-3 comparisons 2 will be defined as including all non-OC languages south of the Philippines. There is some evidence that the OC group is part of a larger genetic unit extending into eastern Indonesia (Blust 1974a). It is therefore possible that the comparison of words in languages of western Indonesia or the Philippines with cognate forms in eastern Indonesia is equivalent to comparison with cognates in OC languages. This assumption will be maintained here only where the languages compared are not contiguous or near-contiguous, and the probability of borrowing as an alternative explanation can thus be kept to a minimum.

GOALS. Comparative-historical linguistics offers a method for reconstructing the past which is largely independent of the technique of the prehistorian. In some cases the insights reached through the two approaches are complementary, it being inherently unlikely that certain types of inferences would be supported by both lines of evidence. In others, conclusions justified through the synchronic comparison of linguistic forms appear to be mutually corroboratory with those based on physical survivals. In addition, the differing subject matter of linguistics and archaeology may sometimes bear witness to conflicting historical propositions.

The major purpose of this paper is to demonstrate the application of the Comparative Method to the reconstruction of culture history in the AN-speaking world and to illustrate some of the ways in which this tool may complement, corroborate or contradict the independent testimony of archaeology. Because it is still imperfectly understood and in many ways constitutes a self-contained problem, the reconstruction of the PAN kinship system will not be undertaken here. Similarly, no attempt is made to deal with features of the natural environment, since these relate more directly to the problem of the AN homeland - a question that I hope to take up in a separate paper.

2. THE LINGUISTIC EVIDENCE

Limitations of space prevent citation of the full evidence for many of the linguistic inferences in sections 3-6. Since most of the supporting data can be found in Dempwolff (1920, 1925, 1934-38) or Blust (1970, 1972a, 1972b, 1973), however, this should not constitute a serious problem.

The following reconstructions are intended simply as a guide to that portion of the published material which is relevant to the reconstruction of AN culture history and that can be assigned to Proto-Austronesian on the subgrouping assumptions adopted in section 1. The material is organized into partly arbitrary semantic groups, and each reconstruction followed by at least two of the symbols W, N or E to indicate that a reflex is known in a western, northern

(Formosan) or eastern (Oceanic; eastern Indonesian) AN language. Some traditional etymologies (as those under *kiRat 'outrigger' and *paraSu 'boat' in Dempwolff 1938) have been rejected as unconvincing, and others (as *karabaw 'water buffalo' and *pirak 'silver', found also in Austroasiatic languages) have been dismissed as probable loans. In a number of cases more restricted published cognate sets have been expanded by the addition of Formosan reflexes. The data that justify this higher assignment can be found in Ferrell (1969, 1970) and Jeng (1972). For some of the more crucial reconstructions the full evidence is presented in the course of the discussion.

An effort has been made to restrict the list to items which are probably culturally distinctive. Thus reconstructed terms such as *taNek 'cook' or *qaNitu 'ghost' add little to our knowledge of AN culture history, since cooking and belief in an immaterial counterpart of the body are presumably found in all human societies and can therefore be added *a priori* on the basis of cultural universals.

Abbreviations of language names in the following sections, geographical locations and sources of material are as follows:

AA : 'Āre'Āre, South-central Malaita, British Solomon Is. (Geerts 1970)
 Akl: Aklanon, central Philippines (Zorc 1969)
 Am: Amis, eastern Formosa (Ferrell 1969)
 Ar: Arosi, northern San Cristoval, British Solomon Is. (Fox 1970)
 AtC: Ci'uli Atayal, north-central Formosa (Ferrell 1969)
 AtSq: Squliq Atayal, north-central Formosa (Ferrell 1969)
 Bar: Bare'e, central Sulawesi (Adriani 1928)
 Bim: Bimanese, eastern Sumbawa (Blust n. d.)
 BM: Bolaang Mongondow, eastern Sulawesi (Dunnebie 1951)
 Btk: Batak, northeastern Palawan (Warren 1959)
 Buli, eastern Halmahera, Moluccas (Maan 1940)
 Bun: Bunun, central Formosa (Teng 1972)
 Caj: Cajeli, Buru, Moluccas (Wallace 1869)
 CB: Cebuano Bisayan, central Philippines (Wolff 1972)
 Chm: Chamorro, Marianas islands (von Preissig 1918)
 Fi: Fijian (Dempwolff 1934-38)
 Ib: Iban, southwestern Sarawak (Scott 1956)
 Ilc: Ilocano, northwestern Luzon (Carro 1956)
 Isg: Isneg, northern Luzon (Vanoverbergh 1972)
 Jv: Javanese, Java (Dempwolff 1934-38)
 Kad: Kadazan, western Sabah (Antonissen 1958)
 Kan: Kankanay, northern Luzon (Vanoverbergh 1933)
 Kei: Kei islands, between the southern Moluccas and the Aru group (Geurtjens 1921)
 Kel: Kelabit, northern Sarawak, northwestern Kalimantan (Blust n. d.)
 Kn: Kakanabu, south-central Formosa (Ferrell 1969)
 Kuv: Kuvalan, northwestern Formosa (Ferrell 1969)
 LA: Long Anap, northern Sarawak (Blust n. d.)
 Li'o, central Flores (Arndt 1933)
 Mal: Maloh, southwestern Kalimantan (Ray 1913)
 Mar: Maranao, southern Mindanao (McKaughan and Macaraya 1967)
 MbT: Tigwa Manobo, eastern Mindanao (Reid 1971)
 Mer: Merina (=Hova), Malagasy Republic (Dempwolff 1934-38)
 Ml: Malay, Malay peninsula; plus widespread regional dialects (Dempwolff 1934-38, Wilkinson 1957)
 Mor: Morella, Ambon, Moluccas (Wallace 1869)
 Mys: Mysol, Mysol island, Moluccas (Wallace 1869)

Nf: Numfor, Numfor and Biak islands, Teluk Sarera (van Hasselt 1947)
 Ngadha, western Flores (Arndt 1962)
 NgD: Ngaju Dayak, southeastern Kalimantan (Dempwolff 1934-38)
 Nias, Nias island, west of Sumatra (Sundermann 1905)
 PAM: Proto-Ambon, southern Moluccas (Stresemann 1927)
 PMA: Proto-Manus, Admiralty islands (Blust n. d.)
 Pn: Pangasinan, north-central Luzon (Benton 1971)
 Pul: Puluwat, western Carolines (Elbert 1972)
 Puy(T): Puyuma (Tippon dialect), southeastern Formosa (Ferrell 1969)
 Pw: Paiwan, southern Formosa (Ferrell 1970)
 Pz: Pazeh, west-central Formosa (Ferrell 1969)
 Se: Sediq, north-central Formosa (Ferrell 1969)
 Sich: Sichule, Simalur island, west of Sumatra (Kähler 1959)
 Sim: Simalur island (Kähler 1961)
 Sm: Samoan (Dempwolff 1934-38)
 Ss: Saisiat, northwestern Formosa (Ferrell 1969)
 SubS: Siocon Subanon, western Mindanao (Reid 1971)
 TB: Toba Batak, northern Sumatra (Dempwolff 1934-38)
 Tbl: Tagabili, southern Mindanao (Forsberg and Lindquist 1955)
 'Tel: Teluti, Ceram, Moluccas (Wallace 1869)
 Teor, Watubela archipelago, between the southern Moluccas and Kei (Wallace 1869)
 Tg: Tagalog, central Luzon (Dempwolff 1934-38, Panganiban 1966)
 Th: Thao, central Formosa (Ferrell 1969)
 Tim: Timorese, western Timor (Blust n. d.)
 To: Tongan (Dempwolff 1934-38)
 Ts: Tsou, south-central Formosa (Ferrell 1969)
 UJ: Uma Juman, central Sarawak (Blust n. d.)
 Uma, west-central Sulawesi (Esser 1964)
 Way: Wayapo, Buru, Moluccas (Wallace 1869)
 WBM: Western Bukidnon Manobo, central Mindanao (Elkins 1968)

Linguistic symbols are: * : reconstruction, > : becomes, < : is derived from, Ø : zero; parentheses mark a choice between the enclosed segments which is not further specifiable on available evidence; square brackets mark the possible presence of an additional segment; hyphens mark the boundary between analyzable elements within a word.

The orthography of sources has generally been modified in accordance with conventions adopted in Blust (1970). Unless otherwise noted, Proto-Oceanic reconstructions follow Grace (1969).

A. The house and its contents

1. *balay 'public building' (WE)
2. *bu(qS)uŋ bu(qS)uŋ 'ridgepole' (WE)
3. *dapuR 'hearth' (WE)
4. *kasaw 'rafter' (WE)
5. *paRa 'storage rack above the hearth' (WE)
6. *qatep 'thatch (usually sago leaf)' (WE)
7. *Rumaq 'house, family dwelling' (NWE)
8. *SaDiRi 'housepost' (WE)
9. *SaRəZaSan 'notched log ladder' (WE)

B. Tools, utensils, weapons

1. *buli(Ct) 'putty, caulking substance' (WE)
2. *busuR 'bow' (NWE)

3. *(cs)aRu 'comb' (WE)
4. *(CtT)ambuRi 'conch shell trumpet' (WE)
5. *kuDen 'cooking pot' (WE)
6. *paku 'nail' (WE)
7. *panaq 'shoot an arrow' (NWE)
8. *qulupa 'pillow, wooden headrest' (WE)
9. *sual 'digging stick' (WE)
10. *suja 'bamboo trail or pitfall spikes' (WE)
11. *suluq 'torch' (WE)
12. *taliS 'rope, cord' (NWE)
13. *(tT)aRaQ 'hew, plane' (WE)

C. Arts

1. *añam 'plait, weave' (WE)
2. *ba(C+T)u(lØ) 'plait, make with the hands' (WE)
3. *bari [] 'iron, metal' (NW)
4. *(CtT)u(cs)i 'draw, write' (WE)
5. *malat 'parang, machete' (NW)
6. *surat 'write' (NW)
7. *Sasaq 'whet, sharpen' (WE)
8. *tinequn 'weave (cloth)', *tincqun-an 'loom' (NW)
9. *zaqit 'sew' (WE)
10. *ZaRum 'needle' (NWE)

D. Adornment

1. *beCik 'tattoo' (NW)

E. Refreshment

1. *apuR 'lime (for betel quid)' (WE)
2. *buqaq 'betel nut' (WE)
3. *ma-buSek 'drunk' (NW)

F. Hunting and fishing

1. *bañi 'bait' (WE)
2. *buqu buqu 'bamboo basket trap for fish' (WE)
3. *(cs)a(Dlr)uk 'kind of fishnet' (WE)
4. *kawil 'fish-hook' (WE)
5. *kebu(rR) 'fish drive' (WE)
6. *puket 'dragnet' (WE)
7. *pulut 'bird lime' (WE)
8. *qaNup 'hunt, go hunting' (NW)
9. *tuba 'derris root fish poison' (WE)
10. *zariñ 'snare' (WE)

G. The canoe

1. *bañkaq 'canoe' (WE)
2. *be-R-say 'canoe paddle' (WE)
3. *(cs)a-R-man 'outrigger' (WE)
4. *lane(nN) 'rollers for beaching a canoe' (WE)
5. *layaR 'sail' (WE)
6. *limas 'canoe bailer' (WE)
7. *paluja 'to paddle' (WE)
8. *qabañ 'canoe, boat' (NW)
9. *quliñ 'rudder; steer' (WE)
10. *Rakit 'raft' (WE)
11. *senkar 'cross-seat in a boat' (WE)
12. *teken 'punting pole' (WE)
13. *wanpañ 'canoe' (WE)

H. Domesticated animals

1. *beRek 'domesticated pig' (NWE)
2. *lalun 'cock, rooster' (WE)
3. *Wasu [] 'dog' (NWE)

I. Garden and field

1. *babaw 'to weed' (WE)
2. *beRas 'husked rice' (NW)
3. *biRaQ 'giant arum, Alocasia spp.' (WE)
4. *kulu(rR) 'breadfruit' (WE)
5. *laqia 'ginger' (WE)
6. *lesuñ 'mortar' (NW)
7. *limaw 'citrus fruit' (WE)
8. *pajay 'riceplant, paddy' (NWE)
9. *pun(tT)i 'banana' (WE)
10. *qaSelu 'pestle' (NWE)
11. *qubi 'yam' (WE)
12. *qumaH 'garden; cultivated field' (NWE)
13. *rampia 'sago' (WE)
14. *Semay 'cooked rice' (NW)
15. *tales 'taro' (WE)
16. *talun 'fallow land' (WE)
17. *tanem 'to plant' (WE)
18. *tapeS 'winnow' (NW)
19. *tebuS(u) 'sugarcane' (NWE)
20. *timun 'melon' (WE)
21. *zawa 'millet' (NW)
22. *ZaRami 'rice straw' (NW)

J. General foodstuffs and food preparation

1. *Capa 'to smoke meat or fish' (NWE)
2. *qasiRaQ 'salt' (NW)

K. Sociopolitical organization

1. *datu 'chief, headman' (WE)
2. *pe(nñN)e(dDj) 'official gathering' (WE)

L. Pathology

1. *bulaR 'cataract of the eye' (WE)
2. *bu(nñ)i 'ringworm' (WE)
3. *kurap 'scaly skin disease' (NW)
4. *panaw 'skin disease leaving white patches' (WE)

3. COMPLEMENTARY INFERENCES

Complementary inferences can be divided into two types: 1) those in which linguistic evidence permits an inference which is practically closed to archaeology, and 2) those in which archaeology is the exclusively illuminating discipline.

PERISHABLE REFERENCES. The material in section 2 provides a basis for numerous inferences of the first type. Thus, while archaeological evidence may enable us to determine the general floorplan of an ancient living structure, it is unlikely - given the combination of materials and physical environment in the tropical world - to shed light on such features as form of the roof (A2, 4, 6), or on any structure which does not leave traces in the soil (A5, 9).

This is true of virtually the entire canoe complex (G), and of many utensils, weapons, and so forth. As illustrating the need for interdisciplinary cooperation in prehistoric research, the importance of this observation cannot be emphasized too strongly: despite the improbability of ever recovering archaeological correlates, we can be virtually certain that Proto-Austronesian speakers used the bow, bamboo trail or pitfall spikes, the bamboo basket trap for fish, etc., and carried these into the Pacific by about 3,000 B. C. (Pawley and Green 1973).

TERMINOLOGICAL NON-DISTINCTNESS. A second type of complementary inference involves discrete or semi-discrete stylistic traditions (prehistoric or modern) for which there are no known corresponding terminological distinctions. Thus, a number of prehistoric ceramic traditions have been reported for areas that were probably AN-speaking at the time of manufacture and use (Solheim 1964, Chang 1964, Bellwood 1975). Yet reflexes of *kuDen 'clay cooking pot' are distributed from at least the central Philippines (CB kulun) through Borneo (Kad kuon, LA kuden) to Sumatra (TB hudon), Sulawesi (Bar kura), the Moluccas (PAM (64) *kudēn, Buli ulan), the Admiralties (PMA *kur(o)) and eastward as far as Fiji (kuro) and even western Polynesia (To kulo, Sm gulo), where pottery has not been made in historic times. From the linguistic evidence it thus seems clear that there has been an unbroken tradition of pottery manufacture and use in the AN-speaking world for well over 5,000 years. Although functional differences are often labelled linguistically (PMA *kur(o) 'cooking pot', but *p^w(ei)n(V)tan(V) 'water jar'), the waves of manufacturing and decorative innovations that have swept various parts of this ever-expanding territory during the period in question, providing the archaeologist with much valuable material for tracing past culture contacts, are simply not known to be reflected in linguistic usage. To take one specific example, the Pacific pottery tradition known as Lapita is fairly discrete and appears to correlate with the ancestral community of identifiable contemporary groups (Golson 1971) - conclusions which are of considerable interest to Pacific prehistory -, but the existence of such a tradition certainly would not be inferable from the available linguistic evidence.

4. CORROBORATORY INFERENCES

From a somewhat more general point of view the preceding discussion can be taken as illustrative of a corroboratory inference - that pottery was known to speakers of Proto-Austronesian. Indeed, whenever the members of a cognate set refer to non-perishable material the potential exists for linguistic and archaeological evidence to lead investigators independently to the same conclusion. Ideally this is what should happen in all cases, and where significant discrepancies exist one is led to suspect the presence of one or more erroneous assumptions.

THE PIG. A particularly striking example of partial agreement between linguistic and archaeological inferences involves the pig. To account for the agreement of Tg báboy, TB, Jv, Ml babi, NgD bawoi 'pig' Dempwolff (1934-38) posited PAN *babuy 'pig'. Reflexes of this word are in fact considerably more widespread than Dempwolff indicated, occurring as well in all major Formosan subgroups (Se bábui

'domesticated pig'; Kn baburu, Pw vavui 'wild pig'), Sulawesi (Bar wawu) the Lesser Sundas (Tim fafi) and the southern Moluccas (Way fafu, Mor, Tel hahu, Teor faf, Kei wāv 'pig'). It is thus noteworthy that a cognate form has been reported in no AN language east of the Moluccas except Palauan, Chamorro and Yapese, in all of which phonological irregularities suggest that the item is a loan.

Somewhat later Capell (1943 : 38) called attention to the frequent appearance of words of the type Nemea boro 'pig' in southeastern Papua, but hesitated to admit their AN provenience. More recently Milke (1968) demonstrated the assignability of such forms to Proto-Oceanic (POC) *mpoRo 'pig', and slightly later the present writer found that cognates are also widespread in the west, extending from Formosa (PuyT varék 'domesticated pig') through the Philippines (Pn belék 'piglet, suckling pig', Tg biik 'suckling pig', Tbl balak 'male pig') to Borneo (Kad vogok 'pig', Kel berek 'domesticated pig'). A cognate (wök) has since been recognized in Old Javanese (Prentice 1974). Based on the distribution of attested meanings it was suggested that Dempwolff's *babuy originally meant 'wild pig', and that forms belonging to the second set could be attributed to a PAN reconstruction *beRek 'domesticated pig'. Two sets of facts unknown to me at the time now appear highly relevant to an understanding of the foregoing observations.

First, words for 'pig' which strikingly resemble Milke's *mpoRo are widespread in New Guinea - often far from the coast - in non-Austronesian languages belonging to several posited genetic groupings not known to be related to one another. Thus Wurm, Voorhoeve and McElhannon (1975 : 318-19) cite Gadsup (East New Guinea Highlands stock) po, Moni (Wissel Lakes-Kemandoga stock, western highlands, Irian Jaya) woro, Sentani (Sentani stock, northeastern Irian Jaya) bo and Afoa (Goilala stock-level family, central mountain range, Papua) polu. D. C. Laycock has called my attention to the following additional examples: Boiken (Ndu family, Sepik-Ramu phylum) bwale, Elepi (Torricelli phylum) mbale, mountain Arapesh (Torricelli phylum; reported in Fortune, 1942 : 34) mbul 'pig'.

Second, radiocarbon dates obtained by Bulmer (1966) for pig bone from the Kiowa rock shelter (near Chuave patrol post, Eastern Highlands District) suggest that the pig was present in the eastern highlands by 2,890 ± 140 B. C. Slightly earlier dates have been obtained by White (1967) from Kafiavana, in the eastern highlands. Since it is generally agreed that the pig is not native to New Guinea (Darlington 1957), its present distribution would seem to imply human introduction. The assumption that this introduction accompanied the AN penetration of the western Pacific provides a natural explanation both for the widespread occurrence of words resembling POC *mpoRo in non-AN languages, and for the absence of reflexes of *babuy east of the Moluccas, since it is clearly the domesticated, not the wild pig that would be transported. Strengthening this impression is the close agreement of archaeological chronology as reported by Bulmer, and by White, with the date (3,000 B. C.) suggested by Pawley and Green (1973) for the dispersal of the POC speech community.

Against this body of observations is the more recent C-14 dating of a single pig incisor from the Kiowa rock shelter at 10,350 B. P. (Bulmer 1974), and a second, similar find from the Yuku rock shelter, Western Highlands District (R. Bulmer, p. c.). To the extent that these two independent pieces of evidence cannot be explained as intrusive, they pose a serious problem to the interpretation

advanced here. Since Bulmer's dates are earlier than the formation of Torres Strait, however, her claim fails to account for the absence of the pig in Australia. Moreover, at least three superficially unrelated facts (absence of directly inherited reflexes of *babuy in New Guinea and the Pacific, presence of a form of POC *mpoRo in many non-AN New Guinea languages, the agreement of linguistic time-depth estimates for the break-up of Proto-Oceanic with the earliest well-attested dates for the pig in the highlands) become intelligible on the assumption of an AN introduction of the pig into New Guinea, and any adequate theory of Pacific prehistory must ultimately account for this agreement.

POLYNESIA. There is at least one portion of the AN world in which the evidence of linguistics and archaeology appears to be leading overwhelmingly toward the same conclusions: Polynesia. Thus Pawley (1966) first explicitly challenged the traditional theory of Western and Eastern first-order Polynesian (PN) subgroups, suggesting instead that the split-up of the PPN speech community produced one language (Proto-Tongic) ancestral to Tongan, Niue and possibly Uvean, and another (Proto-unclear PN) ancestral to all remaining PN languages. The implications of this scheme were considerable: the settlement of eastern Polynesia and New Zealand could not have been effected from Tonga; since a western PN source was ultimately required in any case, this left Samoa as the most likely homeland of the Nuclear PN group, and Tonga as the likely homeland of the Tongic group and possibly of the entire PN family. Archaeological evidence not available at the time of its original formulation now appears to offer strong support for the view that Tonga was the first PN island group to be settled (by at least the late second millennium B.C.), and that Samoa probably was peopled from Tonga (by about 600-700 B.C.) in the second major PN movement (Pawley and Green 1973, Pawley p.c. Bellwood 1975, p.c.). More recently Pawley and Green (1971) have shown that lexical inferences about the PN homeland are not incompatible with such a hypothesis.

5. CONTRADICTIONARY INFERENCES

Like *kuDen 'clay cooking pot', *beRek 'domesticated pig' involves relationships that can be construed on different levels as examples now of one type of inference and now of another. Thus, if we wished to emphasize the difficulty of reconciling the abovementioned chronologically anomalous pigs teeth with the other facts considered, we could regard the linguistic and archaeological evidence for the presence of the pig in New Guinea as essentially contradictory. In contrast to this case, an apparent contradiction may often result simply from gaps in our knowledge - the lack to date of known support from one line of evidence for an inference based on the other.

IRON. Such gaps may underlie a growing discrepancy between the linguistic and archaeological evidence for early use of iron in the AN-speaking world. To account for the agreement of Ml běsi, TB bosi, Jv wěsi, Mer vi (*s > Ø unexpl.) 'iron', Fi vesi 'name of a spear', Dempwolff (1934-38) reconstructed *besi 'iron'. Dyen (1971) has observed that the Fijian word probably is not cognate with the other forms, and argues (8) that '...there is no fundamental evidence for the early knowledge of iron among Austronesians'. While Dyen's doubts regarding Fi vesi are shared by others,

and the phrase 'early knowledge' is safely non-specific, the above remark was apparently made without awareness of a growing body of linguistic evidence for knowledge of iron in the AN world which would seem to predate the available archaeological evidence by several millenia.

Consider the following comparisons:

- C3 *bari [] 'iron'
Ib bari 'steel', Btk baribari 'iron, metal',
AtSq balig, AtC bali, Th baliθ, Kuv balis
'iron/metal'.
C5 *malat 'parang, machete'.
Ib malat 'short sword', UJ malat 'parang,
machete', Ss malat 'knife/sword'.

In terms of the general theoretical framework sketched in section 1, there are three possible explanations for the formal resemblances between members of these sets:

- 1) the resemblance is due to chance
- 2) the resemblance is due to borrowing
- 3) the resemblance is due to common origin

Similarly, the agreement of attested meanings for directly inherited forms of common origin (category 3) would seem to have two possible sources:

- 3a) the agreement is due to the retention of an original meaning
- 3b) the agreement is due to semantic convergence

It now appears possible to account for reflexes of *besi in terms of fairly recent borrowing (if Mer vi, which exhibits irregularities, is regarded as non-cognate), or of common inheritance from a relatively low-order proto-language (ancestral to at least Malay and Javanese), or both. Such explanations, however, are considerably more difficult to maintain for cps. C3 and C5.

C3. Apart from the minor matter of reduplication, Iban bari 'steel' (gloss apparently overspecific) shows completely regular correspondences with Palawan Batak baribari 'iron, metal'. Given the number of segments compared, the probability that the resemblance of these forms is due to chance (1) must be regarded as quite small. Neither can borrowing (2) offer a compelling alternative. The Batak are described as an isolated hunting and gathering group of 800-1,000 persons wandering the forested mountains of northeastern Palawan (Warren 1959). Although the source of their knowledge of iron remains unclear, and a cognate word could occur in coastal Palawan, a reflex of *bari [] has not yet been noted for any other language in Indonesia or the Philippines. If this comparatively wide and broken distribution is taken as minimizing the plausibility of (2), the same can be said to apply a fortiori to the similar forms in Formosan languages.

In including the latter languages in C3, however, we are seriously confronted with alternative (1). It has not been established that *r > AtSq, AtC, Th, Kuv 1, and the final consonant correspondence is difficult to account for under any known formula. Nonetheless, there is no reported counterevidence to the first assumption, and weakly attested correspondences similar to the final of C3 (corresponding to zero in extra-Formosan non-suffixed forms) appear to be relatively common among Formosan languages (Dyen 1965a).

There is thus a fairly high probability that the Iban and

Palawan Batak forms are cognate with some or all of the Formosan material. If so, the determinable time depth for a knowledge of iron in the AN-speaking world, not presently datable from the archaeological record to earlier than 600 B. C. (Fontaine 1972), is vastly extended. Dyen's (1963) citation of lexicostatistical percentages for Formosan languages shows a maximum agreement for an Atayalic with a non-Atayalic list (Sediq with Paiwan) of 15.8%, indicating a most proximate common ancestor some 4,500 years in the past. However, Ferrell (1969 : 32), has pointed out that the percentages of Sediq with Paiwanic are probably inflated, and estimates (73) a minimum separation time for Atayalic from all other AN languages of 5,000 - 6,000 years. The highest percentage cited for Atayal proper with a non-Atayalic language (9.3% with Paiwan) supports a date of nearly 6,000 B. P., yet may itself be inflated by borrowing. Finally, in view of the vacillating glosses given for the Batak and Formosan items, it is possible that *bari [] did not mean 'iron', but carried the general meaning 'metal'. Such a view is more nearly compatible with the emerging archaeological picture for mainland Southeast Asia, where Solheim (1968) has reported a well-developed bronze industry prior to 2,300 B. C. All carefully described AN languages that had a precontact term, however, apparently use distinct roots to refer to iron, copper, bronze, gold and silver. For this reason chances are great that the Batak and Formosan words refer specifically to iron, and the probability that *bari [] meant 'iron' must accordingly be regarded as higher than any currently conceivable alternative.

C5. The comparison Iban malat 'short sword', Kayan malat 'parang, machete', Saisiat malat 'knife/sword' shows a distribution similar to that of *bari []. The likelihood of borrowing is equally low, and the implied time depth nearly as great (Ferrell 1969). Furthermore, if (1) cannot be considered a serious explanation for the non-Formosan members of C3, its value is smaller still in the case of C5.

It seems likely then, that a word *malat referring to a knife-like or sword-like cutting implement was found in a language ancestral to most if not all members of the AN family. But there are difficulties associated (3b) with using this item as evidence for early knowledge of iron. In both Iban and Kayan (which probably count as a single witness) the malat is an iron parang or machete. Saisiat malat, on the other hand, is cited in a comparative word-list under the general gloss 'knife/sword', and the exact meaning remains unclear. Moreover even if the attested referents prove to be similar there is a significant chance, given only two independent witnesses, that the original was of some other material (as bamboo) or some other form (as a knife). C5 thus adds some thrust to the argument for early knowledge of iron, but its force must be tempered by due recognition of the potential role of semantic convergence.

Even if the Formosan members of C3 are assumed to be chance resemblances, however, and C5 is dismissed as not necessarily implying iron, the assignable time-depth for *bari [] would be considerable. Thus basic vocabulary cognate percentages calculated by the author (1974b for a number of the languages of Borneo and the southern and central Philippines yield an average figure of about 28.5% (separation time = 3,000 years) for North Sarawak languages with Palawan Batak. Implied separation times for

North Sarawak languages with subgroup relatives of Palawan Batak, however, are considerably greater (Western Bukid-non Manobo, Tiruray 3,800 years), suggesting that the Batak percentages reflect a lower than average rate of lexical replacement. Figures are not available for Iban, but there is no reason to believe that Batak would score higher with it than with North Sarawak languages, and a minimum separation time of 3,500 years can probably safely be assumed.

MORE EVIDENCE FOR EARLY IRON. Several other comparisons support this general picture, as follows:

- a) *(cs)al(cs)al 'blacksmithing'
NgD tasal 'hammer', Kel aar (*l > r unexpl.) 'bellows', n-aar 'the process of making iron tools, blacksmithing', WBM salsal 'to blacksmith, work in metal, forge', CB salsal 'forge into shape, of making metal tools; blacksmithing'.
- b) *lanDas-an 'anvil'.
Mer landaizanā (*s > Ø unexpl.), Jv landēsan (ě for expected a), TB, Ml, CB landasan, Kad. handasan 'anvil'.
- c) *kara(Ct) 'rust'.
Ml, Btk karat 'rust'.

a) It is conceivable that *(cs)al(cs)al is a loan of no great antiquity, but the likelihood of this possibility is reduced by two observations: 1) if the word spread into the Philippines from a source to the south, the source language remains unidentified; if the opposite direction of diffusion is assumed, it is difficult to account for the apparent absence of cognate forms in northern Borneo or Sarawak coastal languages. Although Ngaju has been subject to external contact influences for an appreciable period (Dyen 1956), Kelabit has not, and it is difficult in any case to imagine a contact situation of such obvious benefit which would have left no linguistic traces elsewhere, 2) Kel aar shows regular loss of *s. Since this change has occurred in all Kelabit dialects and Kelabit has s from an unknown source in some items, s would presumably be retained in a recent borrowing of a form like salsal.

It might be argued that even if Kel aar is not a recent loan, it could be an ancient loan. But the question of chronology again intrudes itself, since it is precisely this that we wish to determine.

b) Although recent borrowing may be partially responsible for the distribution of reflexes of *lanDas-an (the western Indonesian and Philippine forms could be Malay loans), this hypothesis can effectively be ruled out in the case of the Merina cognate. Likewise, despite an unexplained phonological irregularity in the latter item (parallel to the change assumed by Dempwolff in vi < *besi 'iron'), the number of comparable segments greatly weakens chance as an alternative explanation. Since it is now generally agreed that the ancestral Malagasy speech community departed from southeastern Borneo at least 1,500 years ago (Dahl 1951, Dyen 1956, where a date of A. D. 400 is proposed and accepted; Vérin, Kottak and Gorlin 1969, where a date some 500 years earlier is suggested), it is difficult to argue that the anvil, and hence presumably iron was not already known in western Indonesia by that time.

c) All of the objections that might be raised against *kara(Ct) 'rust' have already been met. The distribution is partially similar to C3; chance and borrowing do not

appear to offer strong alternatives, and although convergent development may lie behind the observed semantic agreement, comparative evidence that would suggest a differing earlier meaning is unknown.

Certain observations may also suggest early knowledge of some other metals. Dempwolff posited **luyan* 'bracelet'. Ngaju Dayak, however, has been heavily influenced by Malay, and even if we add Kad *luzan* 'copper', Mar *loian* 'bronze' to the comparison, borrowing from Malay still provides a plausible explanation of the facts.

To explain the comparison Tg *bulaw* 'red', NgD *bulaw* 'gold', Dempwolff posited **bulaw* 'reddish glitter'. Dempwolff's comparative treatment of this root, however, misses an important derivative found throughout the Philippines (Kan *bulawan* 'gold', CB *bulaw* 'bronze color of pigs', *bulaw-an* 'gold', Mar *bolao* 'blond', *bolao-an* 'gold'), in Borneo (Kad *buhavan* 'gold', Kel *belawan* 'iron'), the Barrier islands west of Sumatra (Sich *bulawa* 'gold'), Sulawesi (Uma *bulawa* 'gold') and the southern Moluccas (PAM: 54 **vulawan* 'gold'). Borrowing is possible, but must have preceded several independent phonological changes (**l* > Kad *l*, **b* > PAM **v*, etc.), and hence been fairly early in any case.

There is a remote possibility that some other explanation will ultimately be found for all of the above observations that seem to point to early knowledge of iron in the AN-speaking world. Because of their number and mutual independence, however, the probability is small that a collection of unrelated hypotheses will provide a more plausible explanation of these facts than the single hypothesis that iron was known and worked at an early date, perhaps as early as Proto-Austronesian times.

6. ADDITIONAL PROBLEMS

The foregoing example can be taken as an instance of a major disconformity between present archaeological and linguistic evidence. There are in addition a number of problems connected with inferences that may be complementary or contradictory. The most important of these involve the history of 1) rice, 2) millet/barley, 3) systems of writing, 4) the loom, 5) headhunting and 6) the blowpipe. Limitations of space require that the discussion be kept brief.

RICE. Based on the comparison.

I8

Tg *pálay* 'riceplant', TB *pa-l-ge* 'especially fine rice grains', NgD *parei* 'rice in the field'

Dempwolff (1934-38) reconstructed **pajay* 'riceplant, rice in the field'. Reflexes of this term are actually much more widely distributed, including all major Formosan subgroups (AtSq *pagai*, Ts *pái*, Pw *padai*), all parts of the Philippines (Kan *págey*, Tbl *halay*), the Marianas (Chm *fage*), Borneo (Kad *paai*, UJ *pare*, Mal *ase*), the Barrier islands west of Sumatra (Sim *axae*, Nias *fache*), Madagascar (Mer *tsimpari-fari* 'wild rice'), Sulawesi (BM *pajoi*, Bar *pae*), the Lesser Sundas (Li'o *pare*, Tim *ane*), the southern Moluccas (Caj *hálai*, Tel *fála*, Mys *fás*) and northern New Guinea (Nf *fas*).

The above items clearly are cognate, and on the subgrouping assumptions of section 1 are assignable to Proto-Austronesian at the highest level. The nearly universal and exclusive meaning 'riceplant, rice in the field, un-

husked rice' leaves little choice but to attribute a similar meaning to the reconstructed form. One might argue, however, that rice could be a secondary introduction. It is noteworthy that a number of investigators not familiar with the linguistic evidence have found it unnecessary to assume early knowledge of rice in the AN world. Such a position is adopted by the Harrissons (1971 : 253, fn. 2) for Borneo, and according to Ferrell (1969 : 10), who rejects it, was long the dominant point of view regarding the prehistory of Formosa. Let us call the theory of secondary acquisition T1 and the opposing view T2.

In earlier examples the problem of borrowing was decided in part by distributional characteristics of the proposed cognate set. In particular, a wide and scattered distribution was not considered compatible with the assumption of recent borrowing. The converse proposition - that distributional continuity is compatible with such an assumption - might, then, be taken as support for T1.

Several observations, however, are difficult to reconcile with the theory of secondary acquisition. First, if **pajay* was a loanword acquired within the past two or three millennia one would expect some evidence for a source language on the Asian mainland. To date no one has suggested a candidate. Second, because of the great phonemic range of its reflexes, **j* must have been phonetically unusual and highly unstable. T1 thus assumes a rather remarkable coincidence - that the medial consonant in the word for 'rice-plant' was quite similar to **j* even though from an unrelated language.

Either of these objections could be met by an *ad hoc* argument allowing the relatively recent existence of an appropriate source language, that then disappeared without leaving a trace besides those for which it was posited. Apart from the logical shortcomings of such an alternative, however, it can be shown by a somewhat technical linguistic argument that the wide attestation of **pajay* is more likely to represent the persistent retention of a term that has been of central importance throughout the reconstructible period of AN culture history.

In each of the languages cited above the medial reflex of **pajay* is the expected development of PAN **j*. Moreover, **j* has merged with some other PAN phoneme (usually **d*, **D*, **g*, **r*, **s*, **y*, **z* or **Z*) in every reported AN language. This regularity of historical development is compatible with T1 only on the assumption that the word for 'riceplant' was borrowed before **j* had ceased to be distinct from all other PAN phonemes. There seem to be two choices: either we accept the improbable conclusion that there has been massive late merger of **j* throughout the AN family, or we assign the putative loan for all practical purposes to Proto-Austronesian itself. But then the question of borrowing ceases to be significant, since in any case the antiquity of rice in the AN world would be admitted.

The difficulty of accounting for reflexes of **pajay* with T1 is further increased when we consider that this item is a single point in a constellation of terms relating to rice. Thus, terms for 'husked rice' and 'cooked rice' have a distribution nearly as wide as that for **pajay*, and similarly contain reconstructed segments (**R* and **S* respectively) of considerable diagnostic value in ruling out late borrowing;

I2

**beRas* 'husked rice'

AtSq *buax* (?), Ts *fúesə*, Puy *vərás*, Tg *bigás*, CB *bugas*, Chm *pugas*, UJ *bahah*, BM *bogat*,

MI běras, Jv wos 'husked rice'.

II4 *Semay 'cooked rice'

Pz sumái, Am hemái, Aki humáy, MbT himiý, Subs gimay, Ml imai (*e > i unexpl.) 'cooked rice'.

In addition various other terms which can be assigned to Proto-Austronesian on present subgrouping assumptions (16, II0, I22) and certain items of more problematic chronological status (Isg bayo, Bim mbaju < *bayu 'pound rice') clearly imply early knowledge of rice or some other cereal crop.

MILLET/BARLEY. To account for the agreement of

I21 Tg dáwa, NgD jawe 'millet',

Dempwolff (1934-38) proposed *zawa 'millet'. This comparison can now be extended as follows: Puy dáwa?, CB dáwa 'millet'. Ml jawa 'millet, barley'. Wilkinson (1957) marks Ml jawa as a Sanskrit loan, an identification confirmed by Gonda (1952) who regards the AN forms as derived from Skt yawa. It is curious that this interpretation should be adopted. Wilkinson himself points out that Java is described by early Indian writers as rich in millet and gold, and may have been named from the former. Similarly, Ferrell (1969 : 10) notes that millet is universally grown by modern Formosan aboriginal groups, and it is around the growing cycle of this crop that the native religious calendars are constructed. There is, moreover, a distinct possibility that millet was already known in Formosa by the Lungshanoid Horizon (beginning c. 2,500 B.C.). Since the probability is small that a word of Sanskrit origin would be adopted for a culture-complex present in Java at Indian contact, and then spread as far as Formosa, where millet has evidently long been of central importance, there appear to be grounds for questioning the traditional view of the history of this item.

SYSTEMS OF WRITING. Based on the resemblance of

C6

Tg súlat, TB, Jv, Ml, NgD surat, Mer suratră 'write, writing'

Dempwolff (1934-38) posited *surat 'write'. This comparison can now be extended to languages representing at least two of the three major Formosan subgroups: Sa sułatə 'paper', s-um-a-sułatə 'write', Sir soulat 'book, letter', s-m-oulat 'write', Kuv s-əm-ulál 'write'. Given its often modern meanings one is tempted to explain away C6 as a recent loan. The occurrence of Mer suratră, however, makes it virtually certain that reflexes of *surat were present in western Indonesia by the time of the Malagasy migration. Since all reported 'indigenous' scripts in Indonesia and the Philippines (Harrisson 1966, Jaspán 1964, Postma 1971) appear to be based on Indian originals, there is no known physical reason to suppose a pre-Indian tradition of 'bamboo literacy'. *surat is not a Sanskrit loanword, however, invariably and exclusively refers to writing, and must have existed in Western Indonesia only slightly later than the earliest inscriptions in an Indian-based script. It therefore seems unlikely that writing was introduced to Indonesia entirely as a result of direct or stimulus diffusion from India.

A second term, *(CtT)u(cs)i (Tim tuis 'picture, writing, tattoo', Sm tusi 'write'), sometimes associated

with writing, is not sufficiently well-attested to permit secure semantic reconstruction.

THE LOOM. To account for the similarity of

C8

TB tonun, Jv, Ml těnun, Mer tenuna 'weave'

Dempwolff (1934-38) proposed *tenun 'weave'. This comparison can now be extended and refined as follows: Pw tj-m-enun 'to weave (cloth)', tjenun-an 'loom', Ml těnun 'weaving (of cloth from cotton, silk or fibre)', těnunən (Sumatra) 'loom', Tim teun 'weave (cloth)'.

All of these items refer specifically to the weaving of cloth (forms in some other languages, as Bun tin?un 'weave' may also refer to the weaving of baskets, etc.), and in the case of Paiwan and Malay the addition of the locative suffix -an forms the word for 'loom' (possibly a convergent development). There thus appears to be a significant probability that the loom was known by AN speakers at an early time.

This probability is further strengthened by the comparison *balija: Ilc balíga 'flat wooden bar inserted in the shed of the warp to facilitate insertion of the stick used to hold the threads in place', Ml. bělera~bělira 'weaver's "sword" or beater-in', Tg balila, TB baliga 'stick used in weaving'. Once again we can rely upon the diagnostic value of *j to rule out recent borrowing. The conclusion seems inescapable that the loom was known to speakers of a language ancestral to at least Malay, the Batak languages and various languages of northern Luzon. A minimum time depth of 4,000 years would seem to be implied.

HEADHUNTING. To account for the agreement of Ml, NgD kayaw Dempwolff (1934-38) proposed *kayaw 'go headhunting'. This comparison can now be extended as follows: Ilc, Isg kayaw 'hunt heads'.

Dempwolff's comparison could be explained as a local innovation in Borneo, with Malay borrowing of the Dayak term. In a similar vein Middelkoop (1963, 1 : 37) has argued for a secondary introduction in Timor. But the occurrence of a cognate form among some of the relatively remote mountain peoples of northern Luzon clearly attests to the antiquity of headhunting (and presumably of various associated religious ideas) in the AN world. On present linguistic evidence this term cannot be assigned to Proto-Austronesian, but the assumption of a minimum time depth comparable to that for the loom seems warranted.

THE BLOWPIPE. To account for the comparison Tg sumpit, TB suppit 'blowpipe', Ml sumpit 'shooting with a blowpipe; blowpipe' Dempwolff (1934-38) posited *sumpit 'blowpipe'. This comparison can now be extended by the addition of Ngadha, Li'o supi 'blowpipe'.

In addition we can cite a second semantically similar comparison: UJ heput~hemput, Um hopu < *(cs)empu(Ct) 'blowpipe'.

In some cases it is possible that the meaning 'blowpipe' is a secondary development. Thus, Tombatu seput 'blow' may more faithfully reflect the original meaning of *(cs)empu(Ct) than do the forms cited above. This possibility is strengthened by isolation of the monosyllabic root *pu(Ct) 'puff', reflected also in Tim fufut 'blowpipe', presumably < *pu(Ct)pu(Ct) 'puff, blow suddenly'.

Since the Tagalog, Toba Batak and Florinese forms

could be Malay loans, and the semantic agreement of the Uma Juman and Uma words could be a convergent development, the antiquity of the blowpipe - sometimes cited as one of the more striking examples of independent invention (in Indonesia and South America) - remains indeterminate.

7. OVERVIEW

FIT OF THE EVIDENCE. For various reasons the foregoing attempt to coordinate archaeological and linguistic evidence has only partially succeeded in yielding a consistent picture of AN culture history. In addition to a few areas in which the two disciplines appear to point similar conclusions (section 4), we have discovered a major disconformity between archaeological and linguistic inferences relating to iron (section 5), and possibly similar contradictions with respect to other features of material culture (section 6).

To some extent this lack of fit is undoubtedly a product of the complex human history of much of the AN-speaking world (the Philippines, Indonesia, New Guinea), coupled with the fragmentary state of current prehistoric knowledge. In historically simpler areas, as Polynesia, the dovetailing of linguistic and archaeological inferences in recent years in relation both to sequence and to chronology, has been impressive.

CULTURE-HISTORICAL RECONSTRUCTION. In a paper remarkably resourceful for its time, Hendrik Kern (1889) presented lexical evidence that the original AN speech community must have inhabited an environment in which sugarcane, the coconut, various kinds of bamboo, rattan, the cucumber, stinging nettle, derris root, taro, banana, pandanus, yam and such animals as the dark-haired langur were found. Kern argued further that the AN homeland must have been insular or littoral, as many far-flung cognates relating to the sea, marine life and maritime technology would otherwise be unexplained. In addition he attributed to PAN speakers domestication of the dog, pig, and fowl, a knowledge of rice and of iron; in this way he was able to limit the class of possible homelands to the coastal zone of the southeast Asian mainland. As a consequence of his reconstructional inferences, Kern concluded that certain original cultural possessions (as iron-working) must have been lost as AN-speaking groups moved east.

A strikingly different view is developed by Murdock (1964). Basing himself on Dyen's (1963, 1965b) claim that the highest index of (lexicostatistically-defined) diversity within the AN family, and hence the probable earliest center of dispersal is in the New Guinea-Bismarck archipelago area, Murdock proceeds to sketch an imaginative picture of AN culture history. It is argued (124) that the assumed westward expansion of AN speakers would 'almost certainly antedate the spread of Southeast Asian agriculture and its major crops (bananas, breadfruit, taro and yams) into Indonesia'. As a consequence, the conclusion is reached that these plants, together with the pig and fowl, and later iron, rice, the water buffalo and writing were borrowed from 'peoples of a different language and superior culture' on the Southeast Asian mainland. Murdock's paper is quite extraordinary in its disregard for well-established linguistic evidence (known at least since Kern) which requires - on almost any conceivable subgrouping assumptions - the assignment to Proto-Austronesian of many of the very culture items he proposes to introduce through borrowing. No attempt is made

to identify a possible source language for any of these putative loans, nor to explain why many of them (at least banana, breadfruit, taro, yam, pig and rice) show regular correspondences between widely divergent members of the AN family.

Given the data of section 2, the broad outlines of AN culture history can be summarized as follows: PAN speakers occupied settled villages which contained both dwelling units (*Rumaq: Bun lumaq 'family, house, home', Ml rumah 'house, specif. a dwelling-house in contrast to a mosque or to a balai, or meeting-house open to all', Ar ruma 'house, family') and some kind of public building (*balay: Ml balai 'public building, in contrast to a private house; an unwallled or low-walled building where people met, public business was transacted, and strangers spent the night', Pul faál, Aua pale, 'boat house', AA hare 'house of retirement for women during menstruation and after childbirth', Ar hare 'shed for yams; house with one side of roof only, made in gardens; shrine, small house on poles'). Dwelling units were evidently raised on posts (A8) and entered by a (probably notched log) ladder (A9). The roof (which was, therefore, gabled) contained a ridgepole (A2); possibly covered by an inverted log or bamboo rain shield (Pn kolób 'bamboo used to cover ridge or roof', Kel kulub, UJ kulum 'hollowed log laid inverted over the ridge of the roof to shed water') and was thatched, probably with sago leaf (A6). A hearth (A3) was built on the floor (probably in one corner) and one or more storage shelves for pots, firewood, etc. above it (A5). The inhabitants slept using a wooden pillow or headrest (B8). They possessed the pig (H1), fowl (H2) and dog (H3), but also hunted (F7, F8, F10); made pottery (B5), plaited (presumably) mats and baskets (C1), but also wove true fabrics on a (probably simple back) loom (C8); mended torn materials with needle and thread (C9, C10), tattooed themselves (D1), chewed betel (E1, E2) and evidently had a form of intoxicating drink (E3). The known linguistic evidence for the presence of bark cloth is restricted to eastern languages (Buli mal, POC *malo 'the paper mulberry: Broussonetia papyrifera; cloth of same'), but it is likely that bark cloth has an older history. Iron was apparently known (C3, C5?), though its uses remain unclear. In addition, some form of native script may have been invented, and used on perishable materials (C4?, C6).

There is persuasive evidence that PAN speakers possessed a well-developed maritime technology (G1-13), cultivated a variety of root and tree crops (I3, I4, I5, I7, I9, I11, I12, I13, I15, I17, I19, I20) rice (I2, I8, I14, I22) and possibly millet (I21). Cereal crops were hulled by pounding in a wooden mortar (I6, I10).

The bow (B2, B7), and sharpened bamboo trail or pitfall spikes (B10) were used (probably both in hunting and in warfare), and headhunting with its associated complex of religious ideas must certainly have existed as early as 2,000 B.C. It seems likely that there was a high degree of social stratification (Cad garipan, NgD jipen 'slave' suggest the presence of slavery at a time level comparable to that for headhunting), but the available linguistic data for social organization are sparse and difficult to interpret. Various tropical skin diseases were evidently prevalent (L).

In summary, the somewhat mixed picture that emerges from these interpretations (with stone tools next to iron, probable bark cloth next to textiles, root crops next to grain) suggests a polymorphous economic base incompatible with the somewhat rigid notion of 'progress' from one exclusive level to the next.

EPILOGUE: CULTURE LOSS. Given the culture-historical reconstruction suggested above, a major question arises concerning the metamorphosis of the proposed PAN culture type into the substantially different immediate post-contact Oceanic culture type lacking grain crops, iron, writing and (except for Micronesia) the loom. It is sometimes argued that nothing of real importance has ever been lost in human history (Wissler 1923). While this claim may be true for the human species as a whole (as Wissler evidently meant), contrary cases among particular groups can easily be cited. Thus, pottery evidently disappeared altogether in Micronesia and eastern Polynesia, and survived in western Polynesia only long enough to leave archaeological traces of its former presence (but was reacquired by Tonga from Fiji in precontact times).

Some of the people of eastern Indonesia (as of Ceram) rely primarily on sago (Wallace 1869), yet plant some rice and refer to it by terms that appear to be directly inherited. A similar partial or complete transition to sago by earlier rice-growing populations is found in the Melanau coastal area of Sarawak (Morris 1953). It seems likely then that the early AN settlers of the Pacific took rice with them (simultaneously exploiting sago), but that rice did not succeed under Oceanic conditions and sooner or later passed away altogether. A consideration of this possibility in future archaeological work on particularly early (presumptive) AN sites in the western Pacific may prove worthwhile.

It is conceivable that some iron was similarly carried into the western Pacific during the earliest period of AN settlement but that the absence of replenishment led to eventual loss of familiarity with it. The astonishing assertion of Cook (Lloyd 1949 : 309) that the Hawaiians had heard of iron and were aware of its superior properties at first contact is difficult to place in a coherent context. Since no metal was actually observed this report is perhaps best attributed to misunderstanding.

The Micronesian loom is sometimes described (Howells 1973 : 28) as of 'Indonesian type'. Because reflexes of *tinequn or *balija are unknown in Micronesia there are no linguistic grounds for assuming transportation by speakers of Proto-Oceanic. Independent invention is a logical possibility, but the close formal similarity to the Indonesian back-loom is suggestive of common origin. Whether the loom was part of the POC cultural equipment, or was lost during the initial AN penetration of the Pacific and only later reacquired in Micronesia by chance contact and borrowing is indeterminate on present evidence.

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method, and in certain explanatory details connected with Table 1.

REFERENCES

- ADRIANI, N. 1928. Bare'e-Nederlandsch woordenboek met Nederlandsch-Bare'e register. Leiden: E.J. Brill.
- ANTONISSEN, A. 1958. Kadazan-English and English-Kadazan dictionary. Canberra: Government Printing Office.
- ARNDT, P. 1933. Li'onesisch-Deutsches Wörterbuch. Ende.
- _____. 1962. Wörterbuch der Ngadha-Sprache. Studia Instituti Anthropos 1.
- BELLWOOD, Peter. 1975. The prehistory of Oceania. CA 16.1 : 9-28.
- BENTON, Richard A. 1971. Pangasinan dictionary. PALI language texts: Philippines. Honolulu: University of Hawaii Press.
- BIGGS, Bruce. 1965. Direct and indirect inheritance in Rotuman. Lingua 14 : 383-415.
- BLUST, Robert A. 1970. Proto-Austronesian addenda. Oceanic Linguistics 9.2 : 104-62.
- _____. 1972a. Proto-Oceanic addenda with cognates in non-Oceanic Austronesian languages: a preliminary list. University of Hawaii Working Papers in Linguistics 4.1 : 1-43.
- _____. 1972b. Additions to 'Proto-Austronesian addenda' and 'Proto-Oceanic addenda with cognates in non-Oceanic Austronesian languages'. UHWPL 4.8 : 1-17.
- _____. 1973. Additions to 'Proto-Austronesian addenda' and 'Proto-Oceanic addenda with cognates in non-Oceanic Austronesian languages' - II. UHWPL 5.3 : 33-61.
- _____. 1974a. Eastern Austronesian: a note. UHWPL 6.4 : 101-07.
- _____. 1974b. The Proto-North Sarawak vowel deletion hypothesis. Unpublished Ph.D. dissertation, University of Hawaii, Honolulu.
- _____. n.d. personal fieldnotes.
- BULMER, Susan. 1966. Pig bone from two archaeological sites in the New Guinea highlands. JPS 75.4 : 504-05.
- _____. 1974. Settlement and economy in prehistoric Papua New Guinea. Department of Anthropology, University of Auckland, Working Paper 30.
- CAPELL, Arthur. 1941. A new Fijian dictionary. Sydney: Australasian Medical Publishing Co.
- _____. 1943. The linguistic position of South-Eastern Papua. Sydney: Australasian Medical Publishing Co.
- CARRO, Andrés. 1956. Iloko-English dictionary. Translated, augmented and revised by Morice Vanoverbergh. Manila.
- CHANG, Kwang-chih. 1964. Prehistoric and early historic culture horizons and traditions in south China. in Kwang-chih Chang, George W. Grace and Wilhelm G. Solheim II, Movement of the Malayo-Polynesians: 1500 B.C. to A.D. 500. CA 5.5 : 359-406.
- DAHL, Otto Christian. 1951. Malgache et Maanjan: une comparaison linguistique. Oslo: Studies of the

- Egede Institute, 3.
- _____. 1973. Proto-Austronesian. Lund: Scandinavian Institute of Asian Studies monograph series, 15.
- DARLINGTON, Philip J., Jr. 1957. Zoogeography: the geographical distribution of animals. New York: Wiley & Sons.
- DEMPWOLFF, Otto. 1920. Die Lautentsprechungen der indonesischen Lippenlaute in einigen anderen austronesischen Sudseesprachen. Zeitschrift für austronen-Sprachen, Supplement 2. Berlin: Dietrich Reimer.
- _____. 1925. Die L-, R- und D-Laute in austronesischen Sprachen. ZfES 15 : 19-50, 116-38, 223-38, 273-319.
- _____. 1934-38. Vergleichende Lautlehre des austronesischen Wortschatzes. ZfES. 1. Induktiver Aufbau einer indonesischen Ursprache, Supplement 15 (1934); 2. Deduktive Anwendung des Urindonesischen auf austronesische Einzelsprachen, Supplement 17 (1937); 3. Austronesisches Wörterverzeichnis, Supplement 19 (1938). Berlin: Dietrich Reimer.
- DUNNEBIER, W. 1951. Bolaang-Mongondowsch-Nederlandsch Woordenboek 's-Gravenhage : Martinus Nijhoff.
- DYEN, Isidore. 1953. Review of Malgache et Maanjan: une comparaison linguistique, by Otto Christian Dahl. Language 29 : 577-90.
- _____. 1956. The Ngaju-Dayak 'old speech stratum'. Ig. 32 : 183-87.
- _____. 1963. The position of the Malayo-Polynesian languages of Formosa. Asian Perspectives 7 : 261-71.
- _____. 1965a. Formosan evidence for some new Proto-Austronesian phonemes. Lingua 14 : 285-305.
- _____. 1965b. A lexicostatistical classification of the Austronesian languages. International Journal of American Linguistics 31.1, Memoir 19.
- _____. 1971. The Austronesian languages and Proto-Austronesian. Pp. 5-54 in Sebeok, Thomas (ed.), Current Trends in Linguistics, vol. 8. The Hague: Mouton & Co.
- ELBERT, Samuel H. 1972. Puluwat dictionary. Pacific Linguistics Series C, no.24. Canberra: The Australian National University.
- EIKINS, Richard E. 1968. Manobo-English dictionary. Oceanic Linguistics Special Publication no.3. Honolulu: University of Hawaii Press.
- ESSER, S. J. 1964. De Uma-taal. Verhandelingen van het Koninklijk Instituut voor Taal-, Land- en Volkenkunde, deel 43. 's-Gravenhage: Martinus Nijhoff.
- FERRELL, Raleigh. 1969. Taiwan aboriginal groups: Problems in cultural and linguistic classification. Institute of Ethnology Academia Sinica, Monograph no. 17.
- _____. 1970. Paiwan stem vocabulary (draft).
- FONTAINE, H. 1972. Nouveau champ de jarres dans la province de Long-Khanh. Bulletin de la Société des études Indochinoises 47 : 399-446.
- FORSBERG, Vivian and Alice Lindquist. 1955. Tagabili vocabulary. Manila: Summer Institute of Linguistics.
- FORTUNE, R. F. 1942. Arapesh. New York: J. J. Augustin.
- FOX, C. E. 1970. Arosi-English dictionary. Pacific Linguistics Series C, No. 11. Canberra: The Australian National University.
- GEERTS, P. 1970. 'Āre'Āre dictionary. Pacific Linguistics Series C. no.14. Canberra: The Australian National University.
- GEURTJENS, H. 1921. Woordenlijst der Keieesche taal. Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen 63.3.
- GOLSON, Jack. 1971. Lapita ware and its transformations. Pp. 67-76 in R. C. Green and M. Kelly (eds.) Studies in Oceanic culture history (2), Pacific Anthropological Records, no.12. Honolulu: Bernice P. Bishop Museum.
- GONDA, J. 1952. Sanskrit in Indonesia. Sarasvati Vihara Series, 28. Nagpur.
- GRACE, George W. 1955. Subgrouping of Malayo-Polynesian: a report of tentative findings. AA 57: 337-39.
- _____. 1969. A Proto-Oceanic finder list. University of Hawaii Working Papers in Linguistics 1.2: 39-84.
- GREENBERG, Joseph H. 1957. Essays in Linguistics. Chicago: University of Chicago Press.
- HARRISSON, Tom (ed.). 1966. Borneo writing and related matters. Sarawak Museum Journal Special Monograph no.1.
- _____. and Barbara Harrisson. 1971. The pre-history of Sabah. Sabah Society Journal Special Monograph no.1.
- HOWELLS, W. W. 1973. The Pacific islanders. New York: Scribner's; London: Weidenfeld and Nicolson.
- JASPAN, Mervyn. 1964. Folk literature of South Sumatra, Rejang ka-ga-nga texts. Canberra: The Australian National University Press.
- JENG, Heng-hsiung. 1972. A Bunun-English dictionary. Taipei.
- KÄHLER, Hans. 1959. Vergleichendes Wörterverzeichnis der Sichule-Sprache auf der Insel Simalur an der Westküste von Sumatra. Veröffentlichungen des Seminars für Indonesische und Südseesprachen der Universität Hamburg, vol. 1.
- _____. 1961. Simalur-Deutsches Wörterbuch mit Deutsch-Simaluresischem Wörterverzeichnis. VSISUH, vol. 3.
- KERN, Hendrik. 1889. Taalkundige gegevens ter bepaling van het stamland der Maleisch-Polynesische volken. Verslagen en Mededeelingen der Koninklijke Akademie van Wetenschappen, afdeling Letterkunde. 3de reeks, dl. 6 : 270-87 (reprinted in Verspreide Geschriften 6 : 105-20. 's-Gravenhage, 1917.
- LLOYD, Christopher (ed.). 1949. The voyages of Captain James Cook around the world, selected from his journals. London: Cresset Press.
- MAAN, G. 1940. Boelisch-Nederlandsche woordenlijst. Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen 74.3.
- McKAUGHAN, Howard P. and Baiua A. Macaraya. 1967. A Maranao dictionary. Honolulu: University of Hawaii Press.
- MIDDELKOOP, Pieter. 1963. Head hunting in Timor and its historical implications. Oceania Linguistic Monographs, 8a, b, c.
- MILKE, Wilhelm. 1938. Die Benennungen der Geschwister in den austronesischen Sprachen ozeaniens. Zeitschrift für Ethnologie 70 : 51-66.
- _____. 1968. Proto-Oceanic addenda. Oceanic Linguistics 7.2 : 147-71.

- MORRIS, H.S. 1953. Report on a Melanau sago producing community in Sarawak. (Colonial Research Studies, 9.) London: Her Majesty's Stationery Office for the Colonial Office.
- MURDOCK, George P. 1964. Genetic classification of the Austronesian languages: a key to Oceanic culture history. *Ethnology* 3.2 : 117-26.
- PANGANIBAN, Jose Villa. 1966. Talahuluganang Pilipino-Ingles. Manila: Government Printing Office.
- PAWLEY, Andrew K. 1966. Polynesian languages: a subgrouping based on shared innovations in morphology. *Journal of the Polynesian Society* 75 : 39-64.
- _____. 1972. On the internal relationships of eastern Oceanic languages. *Studies in Oceanic culture history* (3), Pacific Anthropological Records, no. 13. Honolulu: Bernice P. Bishop Museum.
- _____. and Kaye Green. 1971. Lexical evidence for the Proto-Polynesian homeland. *Te Reo* 14 : 1-35.
- _____. and R. C. Green. 1973. Dating the dispersal of the Oceanic languages. *Proceedings of the First International Conference on Comparative Austronesian Linguistics*, vol. 1: Oceanic languages: 1-67. Honolulu: University Press of Hawaii.
- POSTMA, Antoon. 1971. Contemporary Mangyan scripts. *The Philippine Journal of Linguistics* 2.1 : 1-12.
- PRENTICE, D.J. 1974. Yet another Proto-Austronesian phoneme? To appear in *Proceedings of First International Conference on Comparative Austronesian Linguistics*, vol. 2 : western Austronesian languages. Honolulu: University Press of Hawaii.
- RAY, Sidney H. 1913. The languages of Borneo. *Sarawak Museum Journal* 1.4 : 1-196.
- REID, Lawrence A. (ed.). 1971. Philippine minor languages: word lists and phonologies. *Oceanic Linguistics Special Publication no. 8*. Honolulu: University of Hawaii Press.
- SCOTT, N.C. 1956. A dictionary of Sea Dayak. London: School of Oriental and African Studies, University of London.
- SOLHEIM, Wilhelm G. II. 1964. Pottery and the Malayo-Polynesians. in Kwang-chih Chang, George W. Grace and Wilhelm G. Solheim II, *Movement of the Malayo-Polynesians: 1500 B.C. to A.D. 500*. CA 5.5 : 359-406.
- SOLHEIM, Wilhelm G. II. 1968. Early bronze in north-eastern Thailand. CA 9 : 59-62.
- STRESEMANN, Erwin. 1927. Die Lauterscheinungen in den ambonischen Sprachen. *Zeitschrift für Eingeborenen-Sprachen*, Supplement 10. Berlin: Dietrich Reimer.
- SUNDERMANN, H. 1905. Niassisch-Deutsches Wörterbuch. Moers: J.W. Spaarmann.
- VAN HASSELT, J. L. and F.J.F. van Hasselt. 1947. Noemforsch Woordenboek. Amsterdam: J.H. de Bussy.
- VANOVERBERGH, Morice. 1933. A dictionary of Lepanto Igorot or Kankanay. *Anthropos Linguistic Monograph*, vol. 12.
- _____. 1972. Isneg-English vocabulary. *Oceanic Linguistics Special Publication no. 11*. Honolulu: University Press of Hawaii.
- VÉRIN, Pierre, Conrad P. Kottak and Peter Gorlin. 1969. The glottochronology of Malagasy speech communities. *Oceanic Linguistics* 8.1 : 26-83.
- VON PREISSIG, Edward R. 1918. Dictionary and grammar of the Chamorro language of the island of Guam. Washington: Government Printing Office.
- WALLACE, Alfred Russell. 1869. The Malay archipelago. London: Macmillan.
- WARREN, Charles P. 1959. A vocabulary of the Batak of Palawan. Transcript no. 7, Philippine Studies Program, University of Chicago.
- WHITE, J. Peter. 1967. Taim bilong bipo. Investigations towards a prehistory of the Papua New Guinea Highlands. Unpublished Ph. D. dissertation, Australian National University, Canberra.
- WILKINSON, R.J. 1957. A Malay-English dictionary (romanised). London: Macmillan & Co.
- WISSLER, Clark. 1923. Man and culture. New York: Thomas Y. Crowell.
- WOLFF, John U. 1972. A dictionary of Cebuano Visayan. *Philippine Journal of Linguistics Special Monograph no. 4*.
- WURM, S.A., C.L. Voorhoeve and K. McElhanon. 1975. The Trans-New Guinea phylum in general. Pp. 299-322 in *New Guinea area languages and language study*, vol. 1 : Papuan languages and the New Guinea linguistic scene. Pacific Linguistics Series C, no. 38. Canberra: The Australian National University.
- ZORC, R. David. 1969. A study of the Aklanon dialect, vol. 2 : dictionary. Kalibo, Aklan.

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