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## Austronesians in Papua:

# Diversification and change in South Halmahera-West New Guinea 

by<br>David Christopher Kamholz<br>A dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy<br>in<br>Linguistics<br>in the<br>Graduate Division of the<br>University of California, Berkeley<br>Committee in charge:<br>Professor Andrew Garrett, Chair<br>Professor Larry Hyman<br>Professor Johanna Nichols

Fall 2014

Austronesians in Papua:
Diversification and change in South Halmahera-West New Guinea

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David Christopher Kamholz

Abstract<br>Austronesians in Papua:<br>Diversification and change in South Halmahera-West New Guinea<br>by<br>David Christopher Kamholz<br>Doctor of Philosophy in Linguistics<br>University of California, Berkeley<br>Professor Andrew Garrett, Chair

This dissertation presents a new subgrouping of South Halmahera-West New Guinea (SHWNG) languages. The 38 SHWNG languages form a small, poorly known branch of Austronesian. The Austronesian family originated in Taiwan and later spread into Indonesia, across New Guinea, and to the remote Pacific. In New Guinea, approximately 3500 years ago, Austronesian speakers first came into contact with so-called Papuan languages-the non-Austronesian languages indigenous to New Guinea, comprising more than 20 families. The Austronesian languages still extant from this initial spread into New Guinea fall into two branches: SHWNG and Oceanic. In great contrast to Oceanic, only a few SHWNG languages are well-described, and almost nothing has been reconstructed at the level of Proto-SHWNG. Contact with Papuan languages has given the SHWNG languages a typological profile quite different from their linguistic forebears.

Chapter 1 puts the SHWNG languages in context, describing their significance for Austronesian and their broader relevance to historical linguistics. It outlines the theoretical framework of the work, covering models of language diversification, diagnostic features for subgrouping, and language contact. A scale is proposed for ranking innovation types from most to least diagnostic for subgrouping. Morphological innovations are ranked above phonological innovations in this scale.

Chapter 2 gives an overview of the Austronesian family, focusing on the aspects most crucial to understanding the rest of the work: an outline of Proto-Austronesian phonology and the history of the branches ancestral to Proto-SHWNG.

Chapter 3 summarizes previous work on SHWNG languages, covering language membership, environmental and social characteristics, descriptive sources, shared innovations, subgrouping, reconstruction, and contact-induced change.

Chapters $4-6$ are the main empirical contribution. Chapter 4 covers segmental sound change in 25 SHWNG languages and dialects. Chapter 5 covers tonogenesis in the Raja Ampat languages Ma'ya and Magey Matbat and the Cenderawasih Bay languages Moor, Yaur, and Yerisiam. Chapter 6 covers subject agreement and inalienable possessive mor-
phology in 37 SHWNG languages and dialects. In these chapters, the goal is to identify shared innovations and determine their usefulness for establishing subgrouping relationships among SHWNG languages. Morphological innovations are found to be more diagnostic than phonological innovations, confirming the scale proposed in chapter 1.

Chapter 7 proposes a new subgrouping for SHWNG languages, synthesizing the results of chapters 4-6. The homelands of Proto-SHWNG and its branches are also discussed. The homeland of Proto-SHWNG is located in southern Cenderawasih Bay.

Chapter 8 concludes by considering the contributions of SHWNG languages to models of language diversification and change, and laying out questions for future research.

The Appendix contains the complete database of SHWNG cognate sets from which the analysis in chapters 4 and 5 is drawn.

To my parents, Barbara and John

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## Abbreviations

| CB | Cenderawasih Bay |
| :--- | :--- |
| CMP | Central Malayo-Polynesian |
| Dus. | Dusner |
| Fia. | Fiawat |
| Gane (S.) | Gane (Saketa dialect) |
| Kur. | Kurudu |
| Lag. | Laganyan |
| M | Mamberamo |
| Mat. | Matbat |
| Ma'ya (M.) | Ma'ya (Misool dialect) |
| Ma'ya (S.) | Ma'ya (Salawati dialect) |
| Moor (A.) | Moor (Ayombai dialect) |
| Moor (H.) | Moor (Hirom dialect) |
| Mun. | Munggui |
| PAn | Proto-Austronesian |
| PCEMP | Proto-Central-Eastern Malayo-Polynesian |
| PEMP | Proto-Eastern Malayo-Polynesian |
| PMP | Proto-Malayo-Polynesian |
| RA | Raja Ampat |
| RASH | Raja Ampat-South Halmahera |
| SH | South Halmahera |
| SHWNG | South Halmahera-West New Guinea |
| SL | Serui-Laut |
| Wan. | Wandamen |
| Wau. | Wauyai |
| Wmb. | Warembori |
| Wrp. | Waropen |
| Yer. | Yerisiam |

## Transcriptional conventions

Transcription closely follows original source orthography. Remijsen (2001b) uses IPA transcription, with superscript numbers indicating tones. For other sources, the principal deviations from IPA are ' = [?], $g=[g], g h=[\gamma], g w=/ g^{\mathrm{w}} /, j=\left[\mathrm{d}_{3}\right], n g=/ \mathrm{y} /, v=$ $[\beta], y=[j]$. See chapter 5 for the tonal transcription of Moor, Yerisiam, and Yaur.

I have modified original source orthography in two cases, in order to create consistency with other languages' orthography. For Held (1942b), I have rewritten $w$ as $v$. For van Hasselt and van Hasselt (1947), I have rewritten $j$ as $y$ and $\breve{e}$ as $\partial$, and removed the nonphonemic grave accent on vowels.

The PMP vowel normally written *e is written *z throughout. This accurately reflects its phonetic value and additionally prevents confusion in comparison with PCEMP and PEMP, which contrast *z and *e.

The Appendix precisely follows original source orthography.
Boundaries written with a hyphen (-) are present in the original sources or otherwise justifiable on synchronic grounds. Boundaries written with a slash (/) have no independent justification; their purpose is to separate a proposed reflex from other material.

Bracketing in reconstructed forms follows the conventions introduced by Ross (1988): $(x)$ indicates that it cannot be determined whether $x$ was present; $(x, y)$ indicates that either $x$ or $y$ was present; and $[x]$ indicates that the item is reconstructible in two forms, with and without $x$.

In tables of synchronic paradigms, $(x)$ indicates that $x$ is not present in all contexts; $[x]$ indicates that $x$ is optional in all contexts. Commas separate equivalent forms, with the selection of form determined by phonological context, inflection class, or dialect. Semicolons separate forms which belong to distinct subparadigms that the comparative table does not otherwise differentiate.

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While on the subject of my intellectual development, it would be remiss not to also mention Sarah Thomason, who first taught me how to think like a historical linguist when I was an undergraduate at the University of Michigan, and also sparked an interest in language contact.

The germ for this dissertation was planted in 2005, when Mark Donohue suggested Indonesia as a possible field site. He later specifically proposed that I work on Moor, thus putting me on the path to documenting South Halmahera-West New Guinea languages and understanding their history. Mark has continued to provide practical and theoretical advice over the years.

I had the opportunity to take Malcolm Ross's 2009 LSA Summer Institute course on Austronesian and Papuan historical linguistics, greatly expanding my knowledge of those topics. Since then, he has continued to provide encouragement and research advice. His extensive comments on dissertation chapters were especially valuable.

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## Chapter 1

## Introduction

### 1.1 South Halmahera-West New Guinea in context

The South Halmahera-West New Guinea (SHWNG) languages form a small, poorly known branch of the vast Austronesian family. The largest of the 40 -odd SHWNG languages is Biak, with 30,000 speakers; most languages have many fewer. And yet, the SHWNG languages play a significant role in the history of the Austronesian family, in the course of its spread from Taiwan into Indonesia, across New Guinea, ${ }^{1}$ and into the Pacific. For it was in New Guinea, approximately 3500 years ago, that Austronesian speakers first came into contact with so-called Papuan languages-that is, the 800 non-Austronesian languages indigenous to New Guinea, comprising more than 20 families.

In New Guinea, Austronesian speakers encountered languages typologically quite unlike their own. The incoming Austronesian speakers would have spoken a language with VSO or SVO basic word order; perhaps a voice system distinguishing active and passive; no inflectional morphology; and no tonal contrasts. Assuming that they were similar to the present-day, the Papuan languages that Austronesian speakers encountered would have had SOV basic word order; clause chaining, but no voice distinctions; moderate to complex inflectional morphology; and tonal contrasts as often as not.

Today, the Austronesian languages still extant from this first incursion into New Guinea fall into two branches: SHWNG and Oceanic. The Oceanic languages, nearly 500 in number, have spread eastwards into the remote Pacific, reaching as far as New Zealand, Hawaii, and Easter Island. Some Oceanic languages remain in New Guinea as well.

The Oceanic subgroup is well-studied; many languages are well-described, and ProtoOceanic speakers' grammar, lexicon, homeland, and culture have been well-reconstructed. ${ }^{2}$ The contrast with SHWNG is stark. Only a few SHWNG languages are well-described, and

[^0]almost nothing has been reconstructed at the level of Proto-SHWNG. We thus possess little knowledge about this group, one of only two independent witnesses to the eastward spread of Austronesian across New Guinea.

In the present work, I contribute to filling this gap by greatly elaborating our knowledge of the internal history of SHWNG. To do so, I employ the standard comparative method, focusing on phonology and morphology. These topics were selected because they are the most likely among the available data to shed light on internal history. For each phonological and morphological feature, I identify inherited Austronesian morphemes, comparing reconstructions with their SHWNG reflexes. This allows for the identification of shared innovations-new features shared by two or more SHWNG languages that are unlikely to have arisen independently or have been borrowed. Shared innovations form the basis of subgrouping arguments-hypotheses about the branching structure of the SHWNG family tree.

The state of available documentation on SHWNG languages makes this procedure a challenging task. Full-length grammars and comprehensive dictionaries are available for only a handful of SHWNG languages (§3.3). The rest are represented by brief sketches and short, often unreliable wordlists. In order to collect additional data, I undertook several field trips to Indonesia, during which I documented four SHWNG languages of southern Cenderawasih Bay: Moor, Umar, Yaur, and Yerisiam. ${ }^{3}$

I selected these four languages because existing documentation indicated that they were quite different both from each other and from other SHWNG languages. Most intriguingly, Moor was reported to be tonal (Laycock 1978). During the course of my fieldwork, I determined that Moor, Yaur, and Yerisiam were all tonal (see chapter 5). One of the major conclusions of my comparative work is that southern Cenderawasih Bay, where these languages are spoken, is the homeland of Proto-SHWNG (§7.7).

In addition to field data, I consulted many published and unpublished sources and archival materials. In order to fill in gaps in morphological paradigms, I found and contacted speakers on Facebook. ${ }^{4}$

Determining the internal history of SHWNG languages also poses significant analytical challenges. The breakup of Proto-SHWNG may have occurred as much as 3500 years ago ( $\$ 2.5$ ). In all likelihood, SHWNG languages were in contact with Papuan languages from the very beginning. This contact has caused the SHWNG languages to have a typological profile that is quite different from their linguistic forebears. In addition to the emergence of tone in some languages, all SHWNG languages have lost their inherited voice system (if indeed it was present: see §2.5), gained inflectional morphology, and undergone certain word order shifts (\$3.10). They have also lost large amounts of their inherited Austrone-

[^1]sian vocabulary, to the extent that one author (Donohue 1999) classified two languages as non-Austronesian (§3.7).

The presence of strong areal pressure for millennia makes it no easy task to detect internal changes in SHWNG and distinguish them from other kinds of change. Well-articulated models of language diversification and change are required in order to accomplish this task. The history of SHWNG, in turn, is an important case study that can inform the further elaboration of such models.

I return to the question of the broader contribution of SHWNG to models of diversification and change in the conclusion (chapter 8). The rest of the introduction contains an overview of the theoretical framework employed in this work, covering models of language diversification, diagnostic features for subgrouping, and language contact.

### 1.2 Models of language diversification

Historical linguists have traditionally used two complementary models of language diversification: the family tree model and the wave model (François 2015). In the family tree model, diversification is viewed as a series of discrete splits of uniform proto-languages. Daughter languages can acquire their features in one of four ways: (1) retentions inherited from their ancestor; (2) innovations with respect to their ancestor; (3) borrowings from other languages or dialects; (4) universal tendencies (e.g., mama for 'mother'). Assuming chance can be ruled out, similarities among languages must have one of these four explanations.

In the wave model, by contrast, diversification occurs as individual innovations independently arise in specific locations and spread to other places. In this way, different speech communities acquire different combinations of criss-crossing innovations, forming a pattern that cannot neatly be captured with a family tree. This basic process of diffusion subsumes the family tree model's concepts of borrowing and inheritance. As François (2015: 168) puts it, "language-internal diffusion of innovations gives rise to the genealogical relations among languages ... such a process is not fundamentally different from what is involved in language contact".

Neither the family tree model nor the wave model fully captures the complexity of language diversification. Ross (1997) is a modern, sophisticated attempt to synthesize these models with more recent variationist work, resulting in what he terms the social network model. The locus of change in Ross's model is the speech community, a socially linked network of individuals who communicate using mutually intelligible lects (dialects or languages). The social network constituting a speech community takes various forms; there might be a close-knit network within a village, a loose-knit network among villages in a larger region, and so on. Multilingual individuals can belong to multiple speech communities. In this way, Ross's model can capture a variety of modes of social interaction and differentiation.


#### Abstract

Ross (1997: 210) terms language diversification events speech-community events (SCEs), "since a linguistic event often reflects a change in the life of the speech-community (e.g. division, growth, contact)". He recognizes several kinds of SCE, of which the most relevant for this work are language fissure and lectal differentiation. Language fissure "occurs when speakers of a lect become geographically or socially isolated from other speakers of the same or closely related lects, thereby forming a new speech community" (1997: 212). Lectal differentiation is described as follows (1997: 223):

As a community grows, it establishes new settlements which remain in contact with each other, contact being naturally greatest with the geographically most accessible sister settlements. There is an increase in structural heterogeneity, but, unlike language fissure, it does not entail a sharp reduction in the density of links so that one unit becomes two but rather a gradual reduction in intensity and multiplexity which shades into a reduction in network density. ${ }^{5}$


These two kinds of SCEs produce different patterns of innovations. Language fissure results in a discrete, family-tree-like split, producing what Ross (1997: 220) terms an innovation-defined subgroup, "since its membership is defined by shared innovations relative to a proto-language". Lectal differentiation typically results in criss-crossing, wavelike innovations, producing what he terms an innovation-linked subgroup or linkage (1997: 224).

Ideally, different innovation patterns can be used to work backwards and infer a subgroup's complex history of SCEs. However, there are at least three situations in which this is challenging. If an innovation arises in one lect of a linkage and spreads to all other lects, it produces a pattern that is identical to what would result from language fissure (Ross 1997: 224). Likewise, if an innovation spreads only to some lects of a linkage, but those lacking the innovation are no longer extant, it appears to have been present in all lects. Finally, related lects may undergo parallel changes because of a common tendency inherited from their ancestor, a process known as drift.

In these three situations, the traditional practice has been to reconstruct the innovation to a common proto-language. Babel et al. (2013) argue for a more nuanced procedure which distinguishes inherited from diffused or parallel innovations. They define clade as "a group consisting of all the languages or dialects descended from a single ancestor", taxon as "a group of related languages or dialects sharing a significant set of features", and apomorphic taxon as a taxon whose defining features are innovations (2013: 446). The important distinction between clade and apomorphic taxon is conflated in Ross's concept of innovation-defined subgroup: clades reflect descent, whereas apomorphic taxa may also reflect diffusion or parallel change (Babel et al. 2013: 448). Attending to this distinction allows for a more accurate model of language diversification.

[^2]The primary goal of this work is to infer as accurately as possible the sequence of proto-languages that formed during the diversification of SHWNG languages. Only once this family-tree-like branching is worked out will it be possible to properly consider what other SCEs may have taken place. As Ringe and Eska (2013: 263) put it, "it is much easier to fit recalcitrant data into a network model; for exactly that reason a hypothesis of non-treelike diversification is less useful and should be preferred only when reasonable alternatives have proved untentable". I will therefore from now on exclusively use the term subgroup to mean a group of languages descended from a common proto-language (Babel et al.'s clade).

In order to increase the probability that my proposed subgroups are clades, I focus on innovations that have what Ross (1997: 220) terms diagnostic substance-that is, innovations that are unlikely to have arisen independently and unlikely to have diffused across lects. This crucial concept, not always explicitly discussed in subgrouping proposals, deserves a more in-depth presentation.

### 1.3 Diagnostic features for subgrouping

One must cite shared innovations in order to properly justify a subgroup. Ideally, these innovations should be exclusively shared, i.e., not present in any languages outside the subgroup. The most important criterion, however, is the likelihood that the innovations are the result of diffusion or parallel development. Lower likelihood of diffusion or parallel development means higher likelihood of inheritance from a common proto-language. Innovations that meet this criterion therefore carry more weight for subgrouping (in Ross's terms, they have greater diagnostic substance).

Various different kinds of innovations can be used to justify subgroups. Proto-SHWNG itself was established mainly on the basis of phonological innovations (see chapter 3). Two recent Austronesian subgrouping proposals are summarized here to further illustrate norms in the field.

Adelaar (1994) argues that the Tamanic languages of West Kalimantan (Borneo) form a subgroup together with the South Sulawesi languages. To justify this, he cites phonological innovations, lexical replacements, irregular phonological changes in particular words, and semantic changes. He also cites innovations in the pronominal system, including the development of ergative/absolutive marking, the specific forms of these markers, and their syntactic distribution.

Van den Berg (2003) argues for a subgrouping of the Muna-Buton languages of southeast Sulawesi that includes Tukang Besi but excludes other languages such as Wolio. Van den Berg's evidence includes phonological innovations, sporadic sound changes, irregular phonological developments, morphological innovations (e.g., in the pronominal system, derivational morphology, and demonstratives), and lexical replacements.

The above authors would presumably recognize that not all of their proposed innovations have equal diagnostic substance, but such evaluations are rarely made explicit in
the literature. Rather, it is the cumulative weight of innovations that implicitly renders a subgrouping argument convincing. However, in some cases, such as SHWNG, large numbers of innovations are not readily identifiable. It is therefore useful to have a more explicit model of diagnostic substance. I outline such a model here.

Phonological innovations have traditionally been widely used for subgrouping, but they are not always ideal for this purpose. Babel et al. (2013: 482) conclude that several shared regular sound changes in Western Numic (a subgroup of Uto-Aztecan) are best explained by diffusion, and so are not diagnostic for subgrouping. In their view, which I share, diffusion of phonological change is an under-recognized confounding factor in subgrouping.

Ringe et al. (2002: 66-68) make the important observation that parallel phonological changes are widely attested, including within the same family, so that they are not individually reliable for subgrouping. They conclude that, while this problem is substantially mitigated when multiple shared phonological innovations are cited, or when changes have unusual conditioning environments, "sound changes provide much less information for subgrouping than might be supposed".

Morphological change bears a different profile from phonological change. Commenting specifically on changes in inflectional morphology, Ringe et al. (2002: 68) note that parallel developments are rare, "apparently because inflectional systems are such tightly integrated constructs that conditions which would give rise to similar changes are unlikely to recur in different languages". Diffusion of inflectional change is also rare. ${ }^{6}$

The main disadvantage of morphological innovations, as Ringe at al. also observe, is that it can be difficult to distinguish innovations from retentions. Fortunately, in SHWNG this problem generally does not arise. Proto-Malayo-Polynesian (PMP), the most recent well-reconstructed ancestral stage to Proto-SHWNG, is known independently of SHWNGderived evidence. PMP retentions can thus easily be recognized in SHWNG languages.

As with phonological changes, not all morphological changes are equally valuable for subgrouping. For example, some changes entail the remodeling of an entire inflectional paradigm-what I term a paradigmatic innovation. These are clearly more diagnostic than innovations that affect only a single paradigm cell.

I turn now to lexical innovations. These deserve a longer treatment than they are sometimes given, both because they are often cited in the Austronesian literature, and because they are crucial to many recent applications of computational phylogenetic methods to historical linguistics (e.g., Gray et al. (2009)).

There are at least three distinct phenomena that might be termed lexical innovations. The first is lexical replacement-the replacement of the etymon used to express a particular meaning with an unrelated (perhaps non-inherited) etymon. Lexical replacement can come about when a borrowed or newly derived word replaces an old word for a con-

[^3]cept (presumably after a period of coexistence). It can also occur when a word changes meaning, filling the same "slot" as another word and eventually winning out.

The second phenomenon is semantic change, which is basically the flip side of the second kind of lexical replacement. For example, when PMP *waRaj 'vine' came to mean 'rope' (probably prior to Proto-SHWNG), the form *waRaj underwent semantic change, while the meaning 'rope' underwent lexical replacement.

The third phenomenon is irregular phonological change-a phonological development that unpredictably affects only a small number of etyma. An example is the change in quality of the first vowel of PMP *inum 'drink' > Moor anum-î. Changes of this sort can only be identified once regular sound changes have been established.

Lexical replacement and semantic change have often been used in Austronesian subgrouping arguments (e.g., by Blust: see chapters 2-3). However, this procedure has serious pitfalls. It can be difficult to distinguish innovations from retentions, diffusion generally cannot be ruled out, and parallel cases of semantic change are common. For these reasons, I have not used these kinds of innovations in my SHWNG subgrouping proposals.

Irregular phonological changes have significantly greater diagnostic substance than other kinds of lexical innovation. Precisely because they are irregular, these changes are unlikely to arise in the same words independently. Innovations are sometimes difficult to distinguish from retentions, but fortunately, in SHWNG this is not the case (see above). Diffusion cannot always be ruled out, but its likelihood is reduced if the changes occur in basic vocabulary and so are unlikely to be borrowed. Marck (2000) is a well-known study that relies largely on irregular phonological changes to subgroup Polynesian languages.

A final kind of innovation that is sometimes used in subgrouping arguments is structural/typological change. Examples are changes in basic word order, changes in alignment (nominative/accusative vs. ergative/absolutive vs. split intransitive), development or loss of particular morphology (e.g., case markers, subject markers), development or loss of tone, and so on. Dunn et al. (2005) use typological features to classify the Papuan languages of Island Melanesia as a single family, and to subgroup these languages. However, as Donohue and Musgrave (2007) point out, typological features are likely to diffuse areally, and so are highly unreliable for classification and subgrouping. Additionally, typological features typically only have a small number of realizations (e.g., there are only so many basic word order types), so it can be difficult to rule out independent development (Ringe and Eska 2013: 262). For these reasons, typological features have limited diagnostic substance.

I have developed a scale of diagnostic substance in order to guide my SHWNG subgrouping decisions, shown in Figure 1.1. This scale is intended as a rule of thumb rather than an absolute. The specific details of any change must always be evaluated in order to determine its usefulness for subgrouping. However, I consider the final two members of the scale (lexical replacement/semantic change and typological change) to have sufficiently low diagnostic substance that I have not investigated them systematically in SHWNG.

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Ranking from more to less diagnostic:
paradigmatic morphological change
single morphological change
irregular phonological change
regular phonological change
lexical replacement/semantic change
typological change
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Figure 1.1: Proposed diagnostic substance scale.

### 1.4 Language contact

If diversification and change are the foregrounded subjects of this work, language contact is the background: always present, but rarely discussed explicitly.

Two basic kinds of contact-induced change are borrowing and shift-induced interference (Thomason and Kaufman 1988). In borrowing, a speaker bilingual (to some degree) in languages A and B takes a feature present in A and uses it in B. If other speakers of B adopt it and it becomes an established feature of B, borrowing has occurred. Thomason and Kaufman (1988: 74) propose a borrowing scale, going from casual contact with lexical borrowing only to very strong cultural pressure with heavy structural borrowing.

Shift-induced interference can occur when a speaker shifts his or her primary language from A to B. As a new learner of B, he or she may learn it imperfectly and unconsciously use features of A when speaking B (may have an "accent"). If there is a group of speakers shifting from A to $B$ and they are numerous or influential enough, or isolated from other speakers of B, their imperfectly learned B may become the norm. In such a case, language B has undergone shift-induced interference. This is more likely to occur when the shift is abrupt (Thomason and Kaufman 1988: 41). Effects are typically apparent in the phonology and syntax of $B$, but not the morphology or lexicon.

One outcome of contact-induced change that does not neatly fit the above typology is metatypy, or 'change in type' (Ross 1996, 2007). Metatypy can occur when speakers of A and B communicate with each other in A. If speakers of B use A frequently, they may impose parallel structures on A and B in order to reduce cognitive load. Since speakers of A may not know B or use it frequently, whereas speakers of B use both languages, the tendency in this situation is for structures of $B$ to be remodeled after A, rather than vice versa. Only structural features are affected; grammatical forms are not borrowed. Lexical and grammatical calquing typically precede metatypy, which is distinguished from them by the presence of changed morphosyntactic structure. Metatypy is clearly not shiftinduced interference (Ross 2007: 131). Thomason and Kaufman treat it as a case of 'structural borrowing', but Ross (2007: 133) argues that this is not fully appropriate. In any case, metatypy does not conform to Thomason and Kaufman's borrowing scale, since it typically involves minimal lexical borrowing.

SHWNG languages have undergone various contact-induced changes over the course of their history ( $\$ 1.1, \$ 3.10$ ). The presence of large amounts of non-Austronesian vocabulary suggests borrowing; the emergence of tone suggests shift-induced interference; and the structural features shared with Papuan languages suggest metatypy. However, it is generally not possible to infer the specific languages with which SHWNG speakers came into contact, or to reconstruct the sociolinguistic situation in which it occurred. The time depth of Proto-SHWNG is as great as 3500 years, and its speakers would have likely been in contact with Papuan languages from the beginning (\&1.1). It is entirely possible that these languages belonged to families that are no longer extant, whether as a result of shift to Austronesian languages or historical accident. Furthermore, little is known even now about the ongoing contact situations of SHWNG languages.

Because it is generally not possible to say anything very precise about the effects of language contact in SHWNG, the focus of this work is on internal change. However, there is a good chance that future documentation of SHWNG languages and their Papuan neighbors, especially lexical documentation, will make it possible to better detect some of the effects of contact.

### 1.5 Outline

The plan of the rest of the work is as follows:
Chapter 2 provides a very basic overview of the Austronesian family, focusing on the aspects most crucial to understanding the rest of the work: an outline of ProtoAustronesian phonology and the history of the branches ancestral to Proto-SHWNG.

Chapter 3 summarizes previous work on SHWNG languages, covering language membership, environmental and social characteristics, descriptive sources, shared innovations, subgrouping, reconstruction, and contact-induced change.

Chapters 4-6 are the main empirical contribution. Chapter 4 covers segmental sound change in 25 SHWNG languages and dialects. Chapter 5 covers tonogenesis in the Raja Ampat languages Ma'ya and Magey Matbat and the Cenderawasih Bay languages Moor, Yaur, and Yerisiam. Chapter 6 covers subject agreement and inalienable possessive morphology in 37 SHWNG languages and dialects. In these chapters, the goal is to identify shared innovations and determine their usefulness for establishing subgrouping relationships among SHWNG languages.

Chapter Zproposes a new subgrouping for SHWNG languages, synthesizing the results of chapters 4-6. The most likely homelands of Proto-SHWNG and its branches are also discussed.

Chapter 8 concludes by considering the contributions of SHWNG languages to models of language diversification and change, and laying out questions for future research.

The Appendix contains the complete database of SHWNG cognate sets from which the analysis in chapters 4 and 5 is drawn.

## Chapter 2

## The Austronesian family

### 2.1 Introduction

The Austronesian family contains over 1200 languages, most of which are spoken in insular Southeast Asia and Oceania (Lewis 2009). Figure 2.1 on the following page shows the geographic extent of the family and its major language groupings.

Linguistic evidence places the Austronesian homeland in Taiwan. The most persuasive argument for this hypothesis is the fact that Taiwan is home to nine of the ten primary branches of Proto-Austronesian, i.e., the 14 Formosan languages (Blust 1999). ${ }^{1}$ ProtoAustronesian is generally correlated with the Neolithic in Taiwan around 5000-4000 BP (Bellwood 2007: 119; Pawley 2007: 23). ${ }^{2}$

Austronesian languages first spread southwards into the Philippines, then into the Indonesian islands of Borneo and Sulawesi. In Indonesia, the spread continued both westwards (towards Java, Sumatra, and the Malay peninsula) and eastwards (towards the Moluccas and New Guinea). Proto-Oceanic was spoken in the Bismarck Archipelago east of New Guinea 3400-3100 BP. Linguists and archaeologists generally equate it with the Lapita culture (Pawley 2007).

Figure 2.2 on page 12 shows the higher order subgroups of the Austronesian tree, according to Blust's generally accepted model. These branches are discussed further in §2.3-§2.5.

[^4]

Figure 2.1: Map of the Austronesian family and major language groupings (Pawley 2007: 22, originally published as Ross et al. 1998: xx).


Figure 2.2: The higher branches of the Austronesian family tree, after Blust (2013: 729-743), originally appearing as Blust (1977). Nodes in italics are not proto-languages, but rather are cover terms for multiple primary branches.

### 2.2 Proto-Austronesian phonology

Tables 2.1 and 2.2 show the reconstructed vowel and consonant inventories of ProtoAustronesian, adapted from Blust (2013: 554). ${ }^{3}$ The diphthongs in Table 2.1 were not separate phonemes. The proto-vowel *z is usually written *e in the Austronesianist literature (with no implied difference in phonetic value). It is written *z throughout this work in order to avoid confusion with PCEMP and PEMP *e, which is a mid front vowel and contrasts with *a. The phonetic values of the proto-consonants in Table 2.2 follow Blust (2013: 554). Not all scholars would agree with them.

There is disagreement over whether Proto-Austronesian had contrastive stress. Blust (2013: 554-558) examines the main proposals and concludes that there is not sufficient

| monophthongs | diphthongs |  |
| :--- | :--- | :--- | :--- |
| i $\quad$ u | -iw | -uy |
|  |  |  |
| a | -ay, -aw |  |

Table 2.1: Proto-Austronesian vowels.

[^5]| p | t, C [t] ] |  | c [cç] |  | k | q |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| b | d | D [d] | z [jid] | $\mathrm{j}\left[\mathrm{g}^{\mathrm{j}}\right]$ | g |  |  |
| m | n |  | n [n] |  | 〕 |  |  |
|  | S [s] |  | s [ç] |  |  |  | h |
|  | 1 |  | $\mathrm{N}\left[\mathrm{l}^{\mathrm{j}}\right]$ |  |  |  |  |
|  | r [r] |  |  |  |  |  |  |
| w |  |  | y [j] |  |  |  |  |

Table 2.2: Proto-Austronesian consonants. Assumed phonetic values follow in IPA transcription, when different.
evidence to support the hypothesis. Stress has not been reconstructed at the levels of PMP, PCEMP, or PEMP. In $\$ 5.4$, I propose that Proto-SHWNG had penultimate stress.

Most Proto-Austronesian roots were disyllabic, taking the form CVCVC (Blust 2013: 212). Medial clusters also occurred as a result of fossilized reduplication (e.g., *səpsəp 'suck').

### 2.3 Proto-Malayo-Polynesian

Proto-Malayo-Polynesian is the ancestor of all Austronesian languages spoken outside of Taiwan (about 1200 languages). It was most likely spoken in the Batanes Islands and North Luzon, about 4000-3600 BP (Pawley 2007: 23). PMP divides into the Western Malayo-Polynesian languages, spoken mainly in the Philippines and Indonesia (about 500 languages), and Proto-Central Eastern Malavo-Polynesian. The evidence for the integrity of PMP is substantial (Blust 1977, 2001, 2013). PMP is characterized by an extensive set of phonological, morphological, and lexical innovations.

The principal PMP sound changes are PAn ${ }^{*} t$, ${ }^{*} C>$ PMP ${ }^{*} t$; PAn * $n,{ }^{*} N>$ PMP ${ }^{*} n$; and PAn *S > PMP *h, which apparently did not merge with PAn *h (Adelaar 2005: 5; Blust 2013: 748). Additionally, there was sporadic prenasalization of medial obstruents ( $* b>* m b, * s>* n s$, etc.). The phonological inventory of PMP was therefore the same as PAn, except that it lacked ${ }^{*} C,{ }^{*} S$, and ${ }^{*} N$.

PMP's morphological and lexical innovations are not relevant to this work, so they are not summarized here.

More has been reconstructed at the level of PMP than at any other level ancestral to SHWNG. ${ }^{4}$ There are reconstructions of pronominal paradigms (Ross 2006), verbal paradigms and clausal syntax (Ross 2002), derivational morphology (Blust 2013: 370), and more than 4000 individual forms (Blust 2014).

[^6]
### 2.4 Proto-Central-Eastern Malayo-Polynesian

Proto-Central Eastern Malayo-Polynesian is the ancestor of the Central Malayo-Polynesian languages, spoken in southeastern Indonesia and East Timor (about 160 languages), and Proto-Eastern Malayo-Polynesian (Blust 1982, 1983-4, 1993). Blust's proposed innovations characterizing PCEMP are *c $>*$; the reduction of medial consonant clusters ( ${ }^{*} \mathrm{C}_{1} \mathrm{C}_{2}$ $>{ }^{*} \mathrm{C}_{2} / \mathrm{V} \_\mathrm{V}$ ); 9 irregular phonological changes; 33 lexical innovations; and 6 semantic innovations. Blust also proposes that PCEMP innovated proclitic subject markers and an alienable/inalienable possessive distinction.

The most significant irregular phonological changes involve sporadic lowering of high vowels to mid vowels: PMP *uliq > PCEMP *oliq/*uliq 'return'; PMP *ma-qitzm > PCEMP *ma-qetzm/*ma-qitzm 'black'. Another important irregular change is PMP *maRi > PCEMP *mai 'come'. Some of the important lexical innovations are PMP *tawa > PCEMP *malip 'laugh'; PCEMP *kandoRa 'cuscus, phalangerid'; PCEMP *mans( $a, \partial$ )r 'bandicoot, peramelid'; PCEMP *kazupay 'rat'; and PCEMP *keRa(n, $\eta$ ) 'hawksbill turtle, Eretmochelys imbricata'. As can be seen, two of these words also contain mid vowels. PCEMP thus possessed two new proto-vowels, *e and *o. Otherwise, the phonological inventory of PCEMP was the same as PMP, except that it lacked ${ }^{*} c$ and ${ }^{*} D .{ }^{5}$

The PCEMP words for cuscus and bandicoot are particularly significant, since these marsupial mammals are only found east of the Wallace Line (Blust 1982). Since PMP was spoken west of the Wallace Line, *kandoRa and *mans(a,a)r must be innovations (they also do not resemble any PMP faunal terms). Some WMP languages are located east of the Wallace Line, but they do not have reflexes of these forms. Since reflexes of *kandoRa and *mans $(a, a) r$ are found over a large geographical area and mostly show mostly regular sound correspondences, Blust argues that they must have been present in PCEMP.

According to Ross (1995: 81), of all the right-hand branches in Figure 2.2, PCEMP is "the least well supported by the comparative method". Adelaar (2005: 25) points out that Blust's morphological innovations are highly problematic, because it is not possible to reconstruct subject agreement and inalienable possession paradigms for PCEMP (as can be done, for example, for Proto-Oceanic). But by far the most serious challenge to the PCEMP hypothesis has come from Donohue and Grimes (2008). They examine the non-lexical innovations proposed by Blust and argue that most are not found consistently throughout the CMP area, and many are found in the WMP area as well. Their conclusion is that PCEMP did not exist: instead, PMP split into many primary branches, most of which are small subgroups that do not span more than one large island, with the only large subgroup being PEMP.

Blust (2009) is an extended rejoinder to Donohue and Grimes (2008). His most significant objection is that they do not give weight to the lexical innovations, which he considers to be among the strongest evidence for PCEMP, particularly *kandoRa, *mans(a,a)r,

[^7]and *keRa(n, $\eta$ ). Donohue and Grimes (2008: 117) state that *kandoRa and *mans(a,ə)r "could be (and likely are) borrowed from an as yet unidentified non-Austronesian source. Once established in any trade vernacular, they would be spread through all and any subgroups in contact." As Blust (2009: 24) rightly points out, no known Papuan language can be cited as the source of these words, and there is no evidence for a prehistoric trade language of such wide extent.

Schapper (2011) further criticizes the PCEMP hypothesis, claiming that the linguistic evidence for *kandoRa and *mans $(a, a) r$ is weak. In her view, *kandoRa cannot be reconstructed for PCEMP, and "it remains to be seen whether PCEMP *mans(az)r (and in turn the subgroup itself) will stand the test of time" (2011: 270). In his response, Blust (2012) argues that, like Donohue and Grimes, Schapper fails to provide a more convincing proposal than his original one.

Resolving the question of PCEMP's integrity is outside the scope of this work. Fortunately, it is also not crucially relevant, as for any given PCEMP reconstruction, there is generally sufficient evidence to reconstruct the same form at the level of PEMP or ProtoSHWNG. I am therefore justified in citing Blust's PCEMP reconstructions as evidence for sound change within SHWNG.

### 2.5 Proto-Eastern Malayo-Polynesian

Proto-Eastern Malayo-Polynesian divides into Proto-SHWNG and Proto-Oceanic (Blust 1974, 1978a, 1983-4). Most of the proposed evidence is in the form of 47 lexical innovations, 6 irregular phonological changes, and 4 semantic innovations. ${ }^{6}$ According to Blust (2013: 732), the most important of these are PMP *anak > PEMP *natu 'child'; PMP *bahuq > PEMP *boi/bui 'smell, stench'; PMP *nunuk > PEMP *qayawan 'banyan, strangler fig'; PEMP *ka(d,R)a 'cockatoo, parrot'; PEMP *sakaRu 'reef'; and PMP *basuR $>$ PEMP *m( $a, o$ )suR 'satiated, full after eating'. While some of the proposed innovations may turn out to be retentions, they are numerous enough that the PEMP hypothesis deserves serious consideration.

Only one potentially significant phonological change characterizes PEMP: the change of penultimate *z to *o. Remaining instances of *2 would have then changed to *o in ProtoOceanic. As Blust (1978a: 211) and Ross (1995: 84) both point out, this is not a very convincing shared innovation. It is more likely that two changes occurred indepenently, conditioned in Proto-SHWNG and unconditioned in Proto-Oceanic.

PEMP also underwent two minor sound changes (Blust 2013: 748): *h $>\varnothing$, and monophthongization of final diphthongs (*-ay $>{ }^{*}-e$; *-aw $>{ }^{*}-o$; *-uy, *-iw $>{ }^{*}-i$ ). The phonological inventory of PEMP was therefore the same as PCEMP, except that it lacked *h.

[^8]Van den Berg and Boerger (2011) reconstruct a Proto-Oceanic passive formed from the inherited PMP infix *ins. This morpheme would thus have been present in PEMP, possibly with a passive function as well.

Ross considers it most likely that PEMP was spoken on Halmahera, "on the principle that the location of the more conservative members of a language group is likely to be its homeland". The speakers who went in the first wave east were the ancestors of ProtoOceanic. Later, after the formation of Proto-SHWNG, other groups went east and settled in Cenderawasih Bay (1995: 85). It is not obvious why Ross considers South Halmahera languages to be the most conservative. In any case, it is not clear why the rapidity of language change should depend on how far speakers have spread from their ancestors' point of origin. The location of the PEMP homeland is therefore best treated as an open question (see also chapter 8).

The time depth of PEMP is not known, but given the estimated time depths of ProtoAustronesian, PMP, and Proto-Oceanic (see above), a plausible figure is about 3500 BP . The time depth of Proto-SHWNG is less certain: it must be more recent than PEMP, but it is not known by how much.

Most Austronesianists have accepted the validity of PEMP, if they have considered the question at all. The principal objector is Dyen (1978), who cites a number of lexical items which are shared by Buli and Numfor with WMP and CMP languages, but are not found in Oceanic. Dyen argues on this basis that the SHWNG languages should not be grouped with Oceanic. The obvious problem with his argument is that the forms he cites could just as well be retentions as innovations, and he makes no attempt to distinguish the two.

## Chapter 3

## The South Halmahera-West New Guinea subgroup

### 3.1 Introduction

SHWNG languages are spoken in Indonesia on the southern half of Halmahera in the northern Moluccas, on the Raja Ampat islands to the east of Halmahera, and-continuing eastwards and skipping over the Bird's Head peninsula of New Guinea-along the coast and on the islands of Cenderawasih Bay, ${ }^{1}$ ending at the mouth of the Mamberamo river. ${ }^{2}$ Some putative SHWNG languages are also spoken on the Bomberai Peninsula south of the Bird's Head. Figures $3.1-3.3$ show the locations of individual SHWNG languages.

SHWNG contains 42 languages ( 38 if the Bomberai languages are excluded), listed below according to geographic location (ISO 639-3 codes in brackets, alternative names and dialects in parentheses): ${ }^{3}$

- South Halmahera (6 languages): Buli [bzq] (dialect: Wayamli), Gane [gzn] (Gimán; dialect: Saketa), Maba [mqa] (Bicoli), Patani [ptn], Sawai [szw] (Weda), Taba [mky] (East Makian, Makian Dalam; dialects: Kayoa, Southeast Makian)
- Raja Ampat (8 languages): Ambel [wgo] (Amber, Waigeo), As [asz], Bata, Biga [bhc], Gebe [gei] (dialect: Minyaifuin), Maden [xmx] (Palamul; dialects: Banlol/Butleh/Fiawat, Kawit, Tepin/Tipin), Matbat [xmt] (dialects: Magey, Tomolol), Ma'ya [slz] (dialects: Kawe [kgb], Laganyan [lcc], Misool, Salawati, Wauyai [wuy])

[^9]- West New Guinea (28 languages):
- Bomberai: Bedoanas [bed] (Kambran), Erokwanas [erw] (Yarik), Irarutu [irh], Kuri [nbn] (Nabi)
- Cenderawasih Bay: Biak [bhw] (dialect: Numfor), Dusner [dsn], Meoswar [mvx], Moor [mhz] (Mor, dialects: Ayombai, Hirom, Kama), Roon [rnn] (Ron), Tandia [tni], Umar [gop] (Yeretuar), Wandamen [wad] (Wamesa, dialects: Windesi, Wondama), Waropen [wrp], Yaur [jau], Yerisiam [ire] (Iresim)
- Yapen Island: Ambai [amk] (Wadapi-Laut), Ansus [and], Busami [bsm], Kurudu [kjr], Marau [mvr], Munggui [mth], Papuma [ppm], Pom [pmo], Serui-Laut [seu], Wabo [wbb] (Nusari), Wooi [wbw] (Woi)
- Mamberamo: Warembori [wsa], Yoke [yki]

In this work I sometimes refer to the Magey dialect of Matbat simply as 'Matbat', since it is the only dialect for which data are available. Because the Waigeo dialects of Ma'ya are somewhat divergent, I refer to them simply as 'Kawe', 'Laganyan', and 'Wauyai', compared with 'Ma'ya (M.)' for the Misool dialect and 'Ma'ya (S.)' for the Salawati dialect.

Consensus is lacking for the inclusion of the Bomberai and Mamberamo languages in SHWNG. For the purposes of this work, the Bomberai languages are excluded and the Mamberamo languages are included (see §3.7).

### 3.2 Environmental and social characteristics

Speakers of SHWNG languages typically live on or near the coast. Their staple diet is fish and sago. Supplementary items include tubers, maize, beans, bananas, and coconuts, grown on small-scale garden plots, as well as wild forest products and game.

Languages are generally associated with ethnic groups. Settlement is in small villages of 100-500 people. Each village is headed by a non-hereditary 'big man'. The population is made up of various patriclans, some of which are spread across multiple villages.

Throughout recorded history, the most important political and trade influences on the SHWNG region were the sultanates of Ternate and Tidore. These two sultanates, located on neighboring volcanic islands in the North Moluccas just west of Halmahera, were already vying for control of the spice trade when the first Europeans arrived in the early 16th century.

When Dutch gained control of the Moluccan spide trade, they solidified an existing system whereby each sultanate had a recognized sphere of influence (Andaya 1993; Huizinga 1998). The sultans were expected to enforce Dutch regulations within their territories (e.g., on the cultivation and sale of cloves), and had the right to collect tribute. If tribute was not received from a locality, it could be taken by force with a so-called hongi raid.

Ternate's sphere of influence mainly extended to the west, but also included the islands of Makian and Kayoa (where Taba is spoken) and the region of Gane in southern


Figure 3.1: Map of the SHWNG region, with South Halmahera languages marked. The Raja Ampat language As, also marked, is spoken on the mainland just east of the Raja Ampat archipelago.


Figure 3.2: Map of Raja Ampat languages, from Remijsen (2001b: 16). Kawe is spoken on Waigeo in the villages of Selpale and Salyo. Laganyan is spoken on Waigeo in the villages of Lupintol, Arway, and possibly Bew (Remijsen 2001b: 15).


Figure 3.3: Map of Bomberai, Cenderawasih Bay, and Mamberamo languages, adapted from an unpublished SIL Papua map. Austronesian languages are shaded in gold.

Halmahera (where the language of the same name is spoken). Makian was an important source of cloves. Gane was a source of sago, areca nut, and slaves (Andaya 1993: 95).

Tidore's sphere extended to the east, including the east coast of Halmahera (where the remaining South Halmahera languages are spoken), the Raja Ampat archipelago, and western New Guinea. Tidore's influence in New Guinea theoretically extended as far as Cenderawasih Bay, but in practice decreased greatly with distance. These regions remained subjects of the sultanates of Ternate and Tidore until the Dutch put an end to this system in the early 20th century. The Halmahera territories were sources of ambergris, tortoiseshell, birds of paradise, slaves, and spices. The Raja Ampat islands were sources of slaves, sago, tortoiseshell, ambergris, and spices (Andaya 1993: 99).

Regarding religion, Ternate's territories Makian, Kayoa, and Gane were Muslim at the time of Dutch contact, and have remained so. Tidore's territories in Halmahera and Raja Ampat were approximately half Muslim at the time of Dutch contact. The other half of the population adhered to traditional beliefs, as did the entire population of Cenderawasih Bay. Missionaries from the Utrechtse Zendingsvereniging later converted these populations to Christianity in the early to mid-20th century (Kamma 1981-93).

In Tidore's Halmahera territories, the Maba, Patani, and some of the Buli and Sawai were Muslim at the time of contact, and have remained so. The remaining Buli and Sawai later converted to Christianity (Hueting 1929: 181ff).

The inhabitants of the Raja Ampat archipelago are divided by Remijsen (2001b: 163) into sea- and land-oriented groups. The Ma'ya, the sole sea-oriented group, are primarily Muslim; ${ }^{4}$ practice fishing as their main economic activity; and engage in trade with the Moluccas. The remaining groups are land-oriented, and in contrast are Christian (since their conversion in the mid-20th century); produce sago, both for themselves and for the sea-oriented people, as their main economic activity; and had little contact outside Raja Ampat until the later 20th century. The Raja Ampat archipelago is also home to a sizable number of Biak migrants, known locally as Beser, who have maintained their language (Remijsen 2001b: 180).

From the beginning of recorded history in the 16th century until the Indonesian takeover in 1963, the territory of the Raja Ampat archipelago was formally divided among four rajas ('raja ampat' in Malay): East Misool, West Misool, Salawati, and Waigeo (Remijsen 2001b: 172). The rajas lived in Ma'ya villages and were vassals of the sultan of Tidore. The rajas in turn held sway over the local Raja Ampat big men, as well as some nearby coastal areas of New Guinea.

In Cenderawasih Bay, there were no significant political institutions larger than the village. The Biak were the primary direct recipients of trade and influence from Tidore, which they then passed on to the interior of the bay (Held 1957: 4). The Wandamen also exerted influence on southern Cenderawasih Bay. Cenderawasih Bay was a source of birds of paradise, tripang (sea cucumber), massoy (an aromatic bark), tortoiseshell, and

[^10]pearls (Swadling 1996: 122). In return for these items, locals received iron tools, textiles, beads, and china.

### 3.3 Descriptive sources

The major published descriptive materials for SHWNG languages, as well as some important unpublished and archival materials, are summarized here. Unless otherwise specified, I have examined all published, unpublished, and archival materials mentioned below, and make use of them where relevant in this work.

In South Halmahera, the best documented language is Buli, for which there is both a grammar (Maan 1951) and dictionary (Maan 1940). There is a good grammar of Taba (Bowden 2001), but only a limited lexicon (Collins 1982). For Sawai, there is a phonology (Whisler 1992), a study of pronominal prefixes (Thomas 1983), and a substantial lexicon and brief sketch in the Comparative Austronesian Dictionary (Whisler and Whisler 1995). The remaining South Halmahera languages are represented only by the wordlists of Teljeur (1982) and Stokhof (1980).

In Raja Ampat, the best documented language is Ma'ya, for which there are several phonological studies (van der Leeden 1983, 1993, 1997; Remijsen 2001a, 2001b, 2002), and unpublished lexical and grammatical materials (van der Leeden, n.d.). For Matbat, there is a phonological description (Remijsen 2001b, 2007) and morphological sketch (Remijsen 2010). Remijsen (2001b) also contains short wordlists and paradigms for most Raja Ampat languages. Cowan (1953) and Grace (1955-6) contain brief notes on several languages.

In Cenderawasih Bay, the best documented language is Biak, for which there are two substantial recent grammars (van den Heuvel 2006; Mofu 2008) and two dictionaries (van Hasselt and van Hasselt 1947; Soeparno 1977). Wandamen is also well-represented, possessing a brief sketch (Cowan 1955), a dictionary (Henning 1991), an unpublished sketch and wordlist (Kamma, n.d.), another unpublished sketch (Saggers 1979), and a recent dissertation focused on morphophonology (Gasser 2014). For Waropen, there is a grammar (Held 1942a), dictionary (Held 1942b), and unpublished sketch (van Velzen, n.d.). For Dusner, there is a recent sketch (Dalrymple and Mofu 2012) and short lexicon (Dalrymple and Mofu 2011). David Gil has given several recent presentations on Roon, of which one is Gil (2008). Cowan (1953) and Grace (1955-6) contain brief notes on several languages.

In southern Cenderawasih Bay, the only substantial published work is Laycock (1978) on Moor. As a result of recent fieldwork, there are now fairly substantial published lexicons of Moor, Umar, Yaur, and Yerisiam (Kamholz 2013). Approximately 70 hours of recordings, including 9 hours of transcribed texts, are to be deposited at the Endangered Languages Archive (ELAR) in 2014.

Among the Yapen languages, the best described is Ambai, for which there is a grammar (Silzer 1983), a book of fish names (Silzer et al. 1986), a substantial unpublished
lexicon (Price, n.d.) (not available to me), and an unpublished prosodic analysis (Price and Donohue 2008). For Ansus, there is a recent lexicon (Price and Donohue 2009). For Serui-Laut, there is an unpublished sketch and wordlist (Slump 1924-38). There is an ongoing Wooi documentation project at the Center for Endangered Language Documentation at the Universitas Papua in Manokwari, but the materials are so far unpublished. I have examined only Sawaki (2009).

For the Mamberamo languages Warembori and Yoke, the only published description is Donohue (1999). There is a small amount of additional Yoke data in Clouse et al. (2002).

There are several wordlist collections, sometimes containing material not available elsewhere. Anceaux (1961a) contains short wordlists and paradigms for most Cenderawasih Bay languages. Smits and Voorhoeve (1992a, 1992b) is the complete dataset used in Anceaux (1961a), containing comparative wordlists for all Cenderawasih Bay and Raja Ampat languages; unfortunately, the data vary greatly in reliability. The Austronesian Basic Vocabulary Database (Greenhill et al. 2008) currently contains wordlists from 12 SHWNG languages, some of which are otherwise unpublished.

The Koninklijk Instituut voor Taal-, Land- en Volkenkunde (KITLV) in Leiden contains two important archival collections for SHWNG languages. The J. C. Anceaux collection (aanvraagnummer D Or. 615) contains several notebooks with short grammatical notes on many languages of Cenderawasih Bay. The I. S. Kijne collection (aanvraagnummer D Or. 421) contains notebooks with wordlists and transcribed texts in many languages of Cenderawasih Bay.

Finally, there are several early publications containing lexical data. Fabritius (1855) gives numerals for Ma'ya and most Cenderawasih Bay languages. Wallace (1869) contains wordlists of Ma'ya and Matbat. The reports of de Clercq (1888, 1889a, 1889b, 1889c) note various lexical items in Ma'ya, Moor, Wandamen, Waropen, and Yaur. Peski (1914) contains a wordlist of Ma'ya. Adriani and Kruyt (1914) contains lexical data and brief grammatical notes on all South Halmahera languages. Aside from the grammatical notes in Adriani and Kruyt (1914), these early sources have largely been supplanted by later sources.

There are no clearly evident structural differences between varieties described in earlier and later sources, and few lexical differences. The only substantial structural difference of which I am aware is Umar, which shows $s$ in earlier sources for modern $h$.

### 3.4 Early classifications

Adriani and Kruyt (1914: 3:302-305) were the first to propose the subgroup that later became known as SHWNG. ${ }^{5}$ They present a 101 -item comparative wordlist from Buli, Gane, Sawai, and Taba, and state: "From this list it is entirely clear that [Taba] belongs with the languages of South Halmahera [ = Buli, Gane, and Sawai], the region of the

[^11]Kalana Fat (Waigeo, Salawati, Misool), Numfor [a dialect of Biak], and its relatives." ${ }^{6}$ In support of their claim, Adriani and Kruyt note four "typical features" shared by this group of languages:

1. final vowels are lost
2. many words show a syncopated form in which the syllable preceding the (new) stress is reduced, probably owing to stress shift
3. the third person plural pronoun si is postposed as a nominal plural marker
4. the "reverse genitive" (possessor-possessum order) is used

Adriani and Kruyt made no attempt to determine whether these four features were exclusively shared innovations (arguably none actually are). Nonetheless, their proposal was significant because it recognized previously unnoticed shared characteristics among languages that were geographically quite widely separated.

Esser (1938) was the first to use the label South Halmahera-West New Guinea for Adriani and Kruyt's unnamed subgroup. He included the South Halmahera languages, Biak, Wandamen, Kowiai (classified as CMP by Blust (1993)), and other unspecified languages (indicated by "etc."). The Sarmi coast languages (spoken east of Warembori and Yoke), later conclusively shown by Grace (1971) to be Oceanic, were placed in the Melanesian subgroup, not SHWNG. Esser did not provide any justification for his classification.

Dyen (1965) presented a lexicostatistical classification of about 250 Austronesian languages, among them 9 languages now considered to be SHWNG. These were classified into three groups: the Bigic Subfamily (As, Biga, Buli, Gebe); the Geelvink Hesion (Biak, Numfor, Wandamen, and Ambai ${ }^{7}$ ); and Waropen. The Bigic Subfamily was classified as a primary branch of Austronesian, while the Geelvink Hesion and Waropen were placed in the Moluccan Linkage. The Moluccan Linkage, which extended from Flores in the west to the Sarmi coast in the east, was a primary branch of the Malayo-Polynesian Linkage (not coextensive with what is now called Malayo-Polynesian). Dyen's classification has not been accepted by other Austronesianists.

### 3.5 SHWNG according to Blust

Blust (1978a) was the first attempt to put the SHWNG hypothesis on a sound empirical basis using the comparative method, that is, on the basis of exclusively shared innovations. It is the only previously published work to present a detailed argument for SHWNG and its subgroups. Blust (1978a) is an abridged version of a much longer, unpublished paper presented at the 2ICAL conference (Blust 1978b). A partial copy of the unpublished paper

[^12]has been made available to me, which I have used to supplement the published work when relevant.

Blust's starting point for investigating the subgrouping of SHWNG languages is a comparison of PMP reflexes and other phonological developments in Buli and Numfor (a dialect of Biak), which he summarizes in a rather hard-to-read table (1978a: 192). Given this table's significance for understanding Blust's arguments for SHWNG and the difficulty of reading the original, I have reproduced it in clearer form as Table 3.1 on the following page. ${ }^{8}$ Numbered changes are those which are common to both languages. Blust groups sound changes so as to highlight what he treats as single changes for the purpose of subgrouping (e.g., the four rows that make up change 4). When Buli and Numfor show divergent reflexes, these are sometimes presented in separate rows (e.g., the outcome of PMP *-j).

Blust cites Buli and Numfor forms to support the numbered sound changes in Table 3.1. His presentation of supporting forms, though generally persuasive, suffers from two drawbacks: paucity of forms, and irregularity of reflexes. ${ }^{9}$ In several cases, only one or two supporting forms are given. Sometimes additional supporting forms can be found elsewhere in the paper. ${ }^{10}$ The small number of forms is probably due both to the small percentage of inherited PMP words in Buli and Numfor (in fact, in all SHWNG languages) and to limitations of space in Blust (1978a), but without full access to Blust (1978b), it is not easy to know whether a given sound change has more supporting evidence.

Not all changes proposed by Blust are exceptionless. For example, the Buli reflex of PMP * $a$ is listed as $a$ in change 9, but in change 10, $i$ is listed as a "rare" Buli reflex for PMP *a in the ultima (e.g., PMP *uRat > Buli uit 'vein, tendon'). Another case is Numfor reflexes of *b, which are sometimes $p$ rather than $b$ (1978a: 222, fn. 9). Some irregularities go unmentioned: PMP *yajan > Numfor nasan 'name' instead of expected **nasen, and PMP *tazim > Buli dalim 'sharp' instead of expected **talim (or "rare" **calim). ${ }^{11}$

In the unpublished version of the paper, Blust makes it clear that he views rare and irregular correspondences as expected: "the definition of regularity adopted here is that of recurrent (rather than exceptionless) correspondences" (1978b: 29), and "it is not uncommon for morphemes ... to show some irregularity in their correspondences" (1978b: 28). He devises what he calls "the deficit system" as a way of rating the level of irregularity

[^13]|  |  | PMP | Buli | Numfor |
| :---: | :---: | :---: | :---: | :---: |
| consonant shifts | 1. | *p | $f$ | $f$ |
|  |  | * $t$ | $c$ (rare) | $k$ |
|  |  | * $b$ | $p$ | (b) |
|  |  | *-d- | $r$ (rare) | [s.b.] |
| vowel shifts | 2. | * 2 (in penult) | $o$ | $o$ |
| epenthesis | 3. | * ${ }^{\text {- }}$ | ya | ya |
| consonant mergers | 4. | * $/$ /*i | $s$ | $s$ |
|  |  | * $c$ | $s$ | $s$ ? |
|  |  | *-j- | $s$ | $s$ |
|  |  | * | $s$ | $s$ |
|  |  | ${ }^{2}$ | [s.b.] | $s$ ? |
|  | 5. | *k | $\varnothing$ | $\varnothing$ |
|  |  | * $q$ | $\varnothing$ | $\varnothing$ |
|  |  | *h | $\varnothing$ | $\varnothing$ |
|  |  | *-j | [s.b.] | $\varnothing$ |
|  |  | *R | $\varnothing$ | $r$ |
|  |  | *- $\quad$ | $\varnothing$ (rare) | [s.b.] |
|  | 6. | *d, *D | $l$ | $r$ |
|  |  | * | $l$ | $r$ ? |
|  |  | * 1 | $l$ | $r$ |
|  |  | * $r$ | $l$ | $r$ |
|  |  | ${ }^{*}$-j | $l$ | [s.a.] |
|  | 7. | *n | $n$ | $n$ |
|  |  | * $\tilde{n}$ | $n$ | $n$ |
|  |  | * $\eta$ | $\eta$ | $n$ |
|  |  | *-n | $y$ (rare) | [s.a.] |
|  | 8. | cluster reduction (C merges with zero) | + | + |
| vowel and diphthong mergers | 9. | *a | $a$ | $e$ |
|  |  | * (in ultima) | $a$ | $e$ |
|  | 10. | *i | $i$ | $e$ |
|  |  | * $u$ (in ultima) | i | $e$ |
|  |  | *a (in ultima) | $i$ (rare) | $e$ |
|  | 11. | apocope 1 (V merges with zero) | + | + |
|  | 12. | syncope (V merges with zero) | + | + |
|  | 13. | apocope 2 (original final vowels and final vowels from diphthongs merge with zero) | + | + |
|  |  | contraction | - | + |

Table 3.1: Phonological developments in Buli and Numfor (Blust 1978a: 192, adapted). (s.b./s.a $=$ see below/above in table for reflex)
in a given word's correspondences, and only admits cases with zero or low irregularity as cognates. It should be kept in mind, then, that although there is good evidence for most of the sound changes that Blust proposes, the data are also fairly messy and may indicate a more complex historical scenario.

I turn now to Blust's analysis of the sound changes in Table 3.1 and their value in arguing for the SHWNG subgroup. In the course of his discussion, it becomes apparent that changes 4 and 5 should be separated into component changes, which I indicate as follows:

4a. PMP * $t$ became $s$ before *i
4b. PMP *c, *s, and *-j- merged as $s$
5a. PMP * $q$ and *h were lost
5b. PMP *-k- was lost
5c. PMP *k- and ${ }^{*}-k$ were lost
The special status of change 12, syncope, should also be mentioned. It falls somewhere between a regular sound change and a lexically specific change of form. Blust (1978a: 207) states that "syncope is to some extent lexically specific", but that the lexical items affected are mostly consistent across SHWNG languages. ${ }^{12}$

Blust presents evidence for the relative chronology of some of the changes in Table 3.1. He shows that change 3 ( $* a->y a-$ ) must have come after 5 a and before 5 c in both Buli and Numfor, since forms derived from * $q$ - and *h- undergo it, whereas forms derived from *k- do not. Similarly, change 13 (final vowel loss) followed 5 a, since forms derived from *- $q$ and *-h undergo it in both languages. The relative chronology of changes 13 and 5 c appears to vary: in Buli, words derived from *-k preserve their final vowels (13 precedes 5 c ), whereas they are lost in Numfor (5c precedes 13). Blust attributes this ordering difference to wave-style diffusion: change 13 spread west-to-east and change 5b/5c spread east-to-west (1978a: 195).

Having made a good prima facie case for a subgroup that includes Buli and Numfor, Blust next examines nearby languages to see whether they also underwent the shared changes in Table 3.1. His conclusion is that all languages of South Halmahera, as well as "all of the languages of Misool for which information is available" (Ma'ya and Matbat: see Remijsen (2001b: 22)), underwent all changes in Table 3.1 except 4a (for which no evidence was available to decide), 5 c , and the *a part of change 10 (1978a: 198). The Cenderawasih Bay languages all underwent changes $2,4,5,6,9$, and "apparently" 12, and the Bomberai language Irarutu underwent at least changes 2, 4, 6, and 9 (1978a: 206). On the basis of subgrouping assumptions (see $\S 3.8$ ), Blust presents supporting forms for

[^14]a subset of languages only: Gane and Taba (South Halmahera); Dusner, Kurudu, Moor, Serui-Laut, Wandamen, and Waropen (Cenderawasih Bay); and Irarutu.

I infer from the above claims that Blust considers the following sound changes to be common to all SHWNG languages: ${ }^{13}$
2. PMP penultimate syllable *a became $o$

4b. PMP * $c$, *s, and *-j- merged as $s$
5a. PMP *q and *h were lost
5b. PMP *-k- was lost
6. PMP *d, *D, *z, *l, and * $r$ merged as $l$ or $r$
9. PMP final syllable *z merged with *a as $a$ or $e$
12. lexically-specific syncope

Although he does not explicitly say so in all cases, Blust apparently holds that these changes had all occurred by the Proto-SHWNG stage. As he notes, some changes are of greater subgrouping value than others. The most distinctive changes from an Austronesian perspective, and therefore the most valuable as subgrouping evidence, are 2,6 , 9, and 12 (1978a: 194). Particularly distinctive is the outcome of PMP *z (changes 2 and 9), which "sets these languages off from all other members of the AN family, and could be taken by itself as subgrouping evidence to be reckoned with" (1978a: 208).

In addition to regular sound changes, Blust claims that SHWNG languages exclusively share a set of lexical innovations, semantic innovations, and irregular phonological changes. He cites "representative examples" of four irregular phonological changes and one semantic change (1978a: 208): *(ma-)Dalom 'deep' undergoes consonant metathesis and the irregular change ${ }^{*} l>n$ (Buli m-laman, Numfor ramen); *pəñu 'sea turtle' shows $e$ for expected o (Buli fen, Waropen eni); *si iDa 'they' shows irregular loss of *D (Buli, Wandamen si); *t-ina 'mother' shows sporadic palatalization (Buli hñe, Wandamen siña); and *qabara 'shoulder' > 'carry on the shoulder'.

As a final argument, Blust gives what he considers "perhaps the most interesting and powerful piece of evidence for a SHWNG subgroup": the wave-style diffusion of changes $5 c$ and 13, whose territories overlap in a "transition area". In the westmost languages (Gane and Taba), only change 13 is attested. As one progresses eastward, in Buli, change 13 occurred before 5c. Further east, in Numfor, change 5c occurred before 13. Finally, in the eastmost languages (e.g., Waropen), only change 5 c is attested. This is claimed to be highly significant because "it is commonly believed that the diffusion of linguistic innovations is possible among dialects of the same language, but difficult or even impossible over distinct languages" (1978a: 209).

[^15]However, by admitting dialect differences in Proto-SHWNG, Blust is essentially admitting that some changes occurred after the breakup of the proto-language. In other words, they are not Proto-SHWNG innovations after all. These sort of spreading innovations, while obviously important for other reasons, shoyld not be used as evidence for a subgroup if they clearly occurred after its breakup (§1.2).

In a later paper, Blust (1993: 272) states that the "most useful" innovations for showing that a language belongs to SHWNG and not CMP are changes 2 and 12, and the replacement of PMP *anak 'child' with PEMP *natu. It is not clear whether he is referring to the ease of verifying that a language has undergone these innovations, given the state of available documentation, or to their strength as subgrouping features.

Blust (1978a: 211) locates the Proto-SHWNG homeland in Cenderawasih Bay on the basis of its much greater linguistic diversity.

### 3.6 SHWNG according to Ross

Ross (1995) is an overview of the entire Austronesian family, within which is included is a brief evaluation and revision of Blust (1978a)'s SHWNG proposal. Ross (1995: 84) considers the subgroup to be very well supported ("the unity of Proto-SHWNG is remarkable"). Having made his own analysis of the lexical data in SHWNG languages, Ross (1995: 84) gives the following list of phonological innovations that in his view define Proto-SHWNG: ${ }^{14}$

1. PMP *p became Proto-SHWNG *f
2. PMP penultimate *z became Proto-SHWNG *o
3. PMP initial *a- became Proto-SHWNG *ya-

4a. PMP *t became Proto-SHWNG *s before *i
4b. PMP *-j- merged with *s as Proto-SHWNG *-s-
5. PMP *k, *q, *h, *H and *? were lost
6. PMP *d, *Z, *l and *r merged as Proto-SHWNG *l
7. PMP *n and *ñ merged as Proto-SHWNG *n
9. PMP final syllable *z merged with final syllable *a as Proto-SHWNG *z

Ross (1995: 85) states that changes 2, 6 , and 9 "are quite striking and their occurrence in combination proves the integrity of Proto-SHWNG as a language".

Ross (1995: 102, fn. 33) also notes that "these innovations differ in their formulation somewhat from Blust's not only because my reconstruction of PMP differs from his PAN, but also because I have checked data from a larger number of SHWNG languages and

[^16]obtained somewhat different results". He does not mention which languages he checked (only that it was a greater number than Blust), and does not provide supporting forms for his sound changes.

I evaluate and compare Blust and Ross's proposals in $\S 4.4$ below.

### 3.7 Boundaries

Blust (1978a) does not fully delineate the boundaries of SHWNG. He explicitly includes all languages of South Halmahera, the Raja Ampat languages Ma'ya and Matbat, and all languages of Cenderawasih Bay classified by Anceaux (1961a). ${ }^{15}$ He presents evidence that various other Austronesian languages close to Halmahera and New Guinea (Bacan, Ambon, Seram, Buru, Kei, and Sula) have clearly different phonological histories from SHWNG languages (1978a: 209). These languages were later classified as CMP (Blust 1983-4).

Van der Leeden (1993: 14), having examined materials from more Raja Ampat languages than Blust, concludes that "in view of the many obvious similarities between all languages about which I have more than superficial information, I do not doubt that all [Raja Ampat] languages ... are to be classified either as SH languages, or as belonging to a separate subgroup of [SHWNG]". He presents no evidence for this claim. I show in chapter 4 that Raja Ampat languages undergo most sound changes proposed for ProtoSHWNG.

It is difficult to determine Blust (1978a)'s position on Irarutu. He claims to have determined whether or not Irarutu belongs in SHWNG (1978a: 206), but never mentions what the decision was. Since he claims that Irarutu underwent changes 2, 4, 6, and 9, one is led to the conclusion that he means to include it in SHWNG. ${ }^{16}$ However, Blust (1993: 271) claims that in the earlier paper, "based on information from the late Professor J. C. Anceaux, Irarutu was excluded from SHWNG." This may have been a personal communication from Anceaux, since Anceaux (1961a) merely excluded Irarutu from his Cenderawasih Bay subgroup (see below) and did not address the question of SHWNG.

Blust (1993: 270) attempts to more precisely delimit the boundary between CMP and SHWNG. For Irarutu (and "by implication" its neighbor Kuri), he finds no conclusive evidence to classify it as CMP or SHWNG. Voorhoeve (1989: 114) and Ross (1995: 85) are two further attempts to classify Irarutu. Voorhoeve presents evidence that Irarutu underwent Blust's changes 2 , 4 b , and 6 , but not 4 a , and probably not 9 . Ross presents supporting forms to show that Irarutu underwent his changes 1, 2, 5, and 6. Both authors argue, contra Blust (1993), that Irarutu belongs in SHWNG. I agree with Voorhoeve and Ross that there may be some kind of shared history between Irarutu and other SHWNG languages, but if so, Irarutu was probably the first language to branch off (Voorhoeve has

[^17]a similar view). Due to its ambiguous status, Irarutu has been excluded from SHWNG for the purposes of this work. As for Kuri, its similarity to Irarutu should not be assumed until more data is available. ${ }^{17}$ It has been excluded in this work due to lack of evidence.

Blust (1993) classifies Sekar, Onin, Uruangnirin, Arguni, and Kowiai (all spoken on the Bomberai peninsula or nearby islands) as CMP, on the basis of phonological and lexical innovations. Nearby Bedoanas and Erokwanas are not classified due to lack of data. I have excluded Bedoanas and Erokwanas in this work for the same reason. ${ }^{18}$

Donohue (1999) classifies Warembori and Yoke (spoken near the mouth of the Mamberamo river) as non-Austronesian. He now (p.c.) considers them to be Austronesian, and based on the published materials, I agree. Given their geographic location, and the fact that they are clearly not Oceanic, Warembori and Yoke are good candidates for membership in SHWNG. I show in chapter 4 that Warembori underwent most SHWNG-defining sound changes. The evidence from Yoke is not sufficient to be conclusive. Since Donohue (1999) states that the two languages are closely related, Warembori and Yoke are both included in SHWNG for the purposes of this work.

### 3.8 Previous internal subgrouping proposals

I now consider previous subgrouping proposals that have been made within SHWNG, starting with the South Halmahera languages.

Blust (1978a: 198) states that available descriptions of Buli, Maba, Patani, and Sawai suggest that they are "a dialect continuum in which even the extremes do not vary greatly". He terms these the Central-Eastern languages, which are distinguished from the other South Halmahera languages by "a major bundle of phonological and lexical isoglosses". The other two South Halmahera languages, Gane and Taba, are termed the Southern languages. The only evidence presented for either group is a list of lexical innovations in Gane and Taba to justify the Southern subgroup (1978a: 199). However, since the lexical divergence between these two groups is obvious on first inspection, this classification is a reasonable starting point.

To justify joining the Central-Eastern and Southern groups under a South Halmahera branch, Blust (1978a: 201) notes that Buli, Gane, and Taba share some innovations that set it apart from Numfor (and other Cenderawasih Bay languages): PMP *b $>p$ and PMP *R $>\varnothing .{ }^{19}$ These sound changes are sufficiently distinctive to provide an initial justifi-

[^18]cation for a subgroup. Ross (1995: 85) states that he has independently examined the evidence for a South Halmahera subgroup and accepts its validity, but does not mention on what basis.

Blust (1978a: 202) considers Ma'ya to be a South Halmahera language on the basis of phonological and lexical innovations. ${ }^{20}$ Only the lexical innovations are exemplified, in the form of a list of shared, non-inherited words between Buli and Ma'ya, because they are "more specific".

Remijsen (2001b: 34) argues that all South Halmahera and Raja Ampat languages belong to one subgroup of SHWNG, which he proposes should be called RASH to reflect its geographic extent. His evidence, for which he provides supporting forms, is that they share the outcome of change 6 as $l$ and the loss of $* R$. Of these two changes, only the latter is sufficiently distinctive to be probative. ${ }^{21}$

Van der Leeden (1993: 15) considers it likely that the Raja Ampat languages constitute a subgroup of their own, since they innovated tone. ${ }^{22}$ However, as Remijsen points out, some Raja Ampat languages, such as Ambel, are not tonal. Furthermore, the two Raja Ampat languages for which tone has been described have rather different tone systems (see $\S 5.2$ ), so it is far from clear that tonogenesis occurred only once. This is thus not convincing evidence for a subgroup.

Turning now to the West New Guinea languages, it is sometimes assumed that Blust (1978a) demonstrated the validity of Proto-WNG (e.g., by Ross (1995: 85)). In fact, he simply took over the proposal of Anceaux (1961a) that all Cenderawasih Bay languages belong to a single subgroup. However, Anceaux's subgroup was mainly based on lexicostatistics, and since the only other language in his sample was Irarutu, Anceaux's argument is quite weak: he does not consider what other languages might belong to the group, or what innovations define it. Blust never claims that there are any innovations exclusive to the Cenderawasih Bay languages or the West New Guinea (Cenderawasih Bay plus Irarutu) group. A possible phonological innovation is the outcome of change 6 as $r$, but this cannot be an innovation in both Proto-RASH and Proto-WNG (unless ProtoSHWNG started with neither ${ }^{*} l$ or ${ }^{*} r$, which seems unlikely), and is of inconsequential subgrouping value in any case. Ross (1995: 85) claims to have independently verified the validity of Proto-WNG, but does not present any evidence. Thus, although Proto-WNG is sometimes assumed to exist, no evidence for it has ever been published.

I turn now to Anceaux (1961a)'s classification, shown in Figure 3.4 on the next page. ${ }^{23}$ Anceaux describes Waropen as occupying a "central position" between Biakic and Yapen,

[^19]

Figure 3.4: Anceaux (1961a)'s lexicostatistical classification of Cenderawasih Bay languages. The dots stand for the remaining Austronesian languages of Yapen Island.
with Moor "about half-way" between Waropen and Yapen (1961a: 146-7). As Blust points out, these statements are inconsistent with a tree model, so as a matter of convenience, he considers Waropen and Moor to be primary branches (1978a: 205). ${ }^{24}$

Since Anceaux's classification is not based on the comparative method, he does not propose any shared innovations to justify his subgroups. The only subgroup that is clearly justifiable on these grounds is Biakic. Roon (David Gil, p.c.) and Dusner (Dalrymple and Mofu 2012) clearly share numerous morphological innovations with Biak that could not have arisen by chance. There are few data available for Meoswar. Several Biak speakers have told me that Meoswar is partly mutually intelligible with Biak, so it is reasonable to include it on a preliminary basis.

Silzer (1983: 232-243) argues for a Western Yapen group on the basis of a striking series of shared morphological features in verbal subject prefixes. This group includes all of Anceaux's Yapen languages except for East Yapen. A few of Silzer's features are analyzable as retentions, but the rest are sufficiently numerous and specific that his argument is quite convincing. Silzer (1983: 15-19) internally subgroups the Western Yapen languages on the basis of shared sound changes (e.g., final consonant loss and *s $>\varnothing$ ). This subgrouping is much less convincing, as the cited sound changes are phonetically natural and could have easily diffused or occurred independently.

Van Velzen (1994) proposes a Sarera Bay subgroup containing all Cenderawasih Bay languages except Tandia, Umar, Yaur, and Yerisiam, which were excluded for lack of data. The Sarera Bay group splits into two primary branches: Biakic (containing the

[^20]same languages as above) and West Sarera Bay (containing the remaining languages). The West Sarera Bay group splits into Wandamen-Yapen (similar to Silzer's Western Yapen) and Waropen-Moor. Van Velzen justifies these groups on the basis of shared phonological and morphological features, but he does not distinguish innovations, retentions, and areal features, and is not always explicit about how the subgrouping was produced.

Of the above proposed subgroups, I accept as already sufficiently demonstrated only Central-Eastern and Southern South Halmahera, Biakic, and Western Yapen. However, in chapters $4-6$ I perform all comparisons at the level of individual languages. This is done in order to permit revisions to these subgrouping assumptions if compelling evidence is found.

### 3.9 Van den Berg's reconstruction of possessive marking

Van den Berg (2009) tentatively reconstructs Proto-SHWNG possessive marking on the basis of data from eleven languages: Buli, Sawai, Taba (South Halmahera); Irarutu (Bomberai); Ambai, Biak, Moor, Wandamen, Waropen (Cenderawasih Bay); and Warembori (Mamberamo). ${ }^{25} \mathrm{He}$ reconstructs two different possessive paradigms, alienable and inalienable, since the distinction is exhibited in almost all SHWNG languages. ${ }^{26}$ Van den Berg first reconstructs possessive paradigms at the level of Proto-SH, Proto-RA, and Proto-WNG, and then reconstructs up to Proto-SHWNG. ${ }^{27}$ He claims that Proto-SHWNG had nominal suffixes for inalienable possession, and two classifiers for alienable possession, *na and *ri, which also took suffixes. Van den Berg then compares the Proto-SHWNG inalienable paradigm to the Proto-Oceanic direct possession paradigm, and shows that there is substantial agreement.

Van den Berg's is the first serious attempt to reconstruct the morphology of ProtoSHWNG or any of its putative subgroups. I present an analysis of inalienable possessive marking aimed at subgrouping rather than reconstruction in $\S 6.4$.

### 3.10 Contact-induced change

Certain structural features of SHWNG languages have been attributed to contact-induced change from Papuan languages. The features most frequently mentioned in the litera-

[^21]ture are the alienable/inalienable possession contrast, possessor-possessum word order, clause-final negation, and lexical tone. Here I summarize the main proposals that have been made.

The most detailed argument regarding the appearance of the inalienable/alienable possession contrast in Austronesian comes from Donohue and Schapper (2008). They first observe that prefixal possessive marking and an alienable/inalienable contrast are common in Papuan languages. Austronesian languages usually have suffixal possessive marking, only showing the alienable/inalienable contrast in languages that are spoken near Papuan languages (or in their descendents, such as Oceanic languages). A few of these Austronesian languages have also developed prefixal possession. Donohue and Schapper proceed to argue that the appearance in Austronesian of the alienability contrast, prefixal possession, and the "indirect" possession construction for alienables (using a possessive classifier) are all attributable to Papuan contact. Although they are not fully explicit on this point, it appears they believe that this change happened many times independently as "a response to regional norms" (2008: 323), but that the construction had been fixed by the time of Proto-Oceanic and possibly PEMP.

Klamer et al. (2008) argue that shift-induced interference from Papuan to Austronesian is responsible for a number of features of CMP and SHWNG languages: the alienable/inalienable contrast, possessor-possessum order, clause-final negation, and possibly lexical tone. Their approach is more typologically-oriented than Donohue and Schapper's, but Klamer et al. also discuss in detail language-specific differences among Austronesian and Papuan languages in the expression of possession and negation. They argue that these changes probably occurred separately as different Papuan groups intermarried with more powerful Austronesians and shifted to their languages, but that at least the features of alienable/inalienable possession and clause-final negation had emerged by the time of Proto-Oceanic (2008: 138).

In the case of clause-final negation, Klamer et al. (2008: 133) note that there are striking resemblances in the form of the negator in CMP, SHWNG and some nearby Papuan languages: it is $\beta a$ in Moor, Wandamen, and Biak; wo(mo) in one dialect of Waropen; (u)wa in North Halmahera; bar in Mansim and big in Hatam of the East Bird's Head family (apparently -ar/-ig is a regular correspondence in these languages); waeid in the CMP language Kei off the southwest coast of New Guinea; and even *bwali with a shortened form * $b^{w} a$ in Proto-Oceanic. I have found similar negators in Yerisiam (ve) and the East Geelvink Bay language Tarunggare (wawa). It would indeed seem that there are too many similarities to be due to chance, although the mechanism that could produce such an outcome is unclear.

Donohue (2004) argues that split intransitivity in Taba is attributable to Papuan influence (e.g., from North Halmahera languages). Reesink (2005: 191-194) notes that an "experiential construction", with experiencers expressed as objects, is found throughout the Bird's Head and Cenderawasih Bay, in both Papuan and Austronesian languages. Donohue and Reesink's claims are suggestive, but in my opinion neither presents enough data to justify that the constructions in question are comparable across languages. Holton
(2008)'s description of split intransitivity in North Halmahera, on the other hand, bears a striking resemblance to the stative predicate split that I have observed in Moor (although Holton makes no claims about contact with SHWNG languages).

Remijsen (2001b: 11-13) suggests that some features of SHWNG languages may be attributable to Papuan contact, including lexical tone in Raja Ampat languages and Moor, lack of an $l-r$ contrast, and a possible imperfective/perfective aspect contrast in Ambel. In the case of tone in Ma'ya and Matbat, the scenario is sketched out in more detail: tone arose under shift from a tonal Papuan language (2001b: 119). Remijsen claims that this hypothesis is able to account for otherwise hard to explain features of the Ma'ya tone system, such as a lack of preference for monosyllabic words. However, it is not obvious why contact should be the best explanation for lack of monosyllabism; the outcome of tonogenesis need not be so uniform.

Price and Donohue (2008) make a similar claim for the Austronesian languages of Yapen. They first describe the Ambai stress system, and concluding that there is "no known way of justifying" its complexity. They then note that other languages of Yapen also have complex stress systems (including Saweru, a Papuan language), and that tonal languages have been found around Cenderawasih Bay: the East Bird's Head languages have been described as pitch-accented, Moor is tonal, and the inland Papuan languages (Wissel Lakes and Lakes Plains) are tonal. Their conclusion is that the original (Papuan) languages of Yapen were tonal, and that with the arrival of Austronesian languages, there has been a process of language shift and tono-exodus. This is a very interesting claim, but it would be more convincing if Price and Donohue specifically stated why the Ambai stress system could not have arisen from internal change alone.

## Chapter 4

## SHWNG historical phonology I: Segmental phonology

### 4.1 Introduction

This chapter evaluates the historical segmental phonology of SHWNG languages, on the basis of current lexical data and PMP, PCEMP, and PEMP reconstructions.

Table 4.1 on the following page lists the sources consulted in compiling this chapter. Given the state of available documentation, language coverage is necessarily uneven. The diversity of SHWNG is nonetheless well represented, with the unavoidable exceptions of Kurudu and Wabo.

PMP, PCEMP, and PEMP reconstructions are drawn from Blust (1978a, 1993, 1999, 2014) and Ross (2006). Blust (1978a, 2014) and Greenhill et al. (2008) were consulted as starting points for cognacy judgments. Final cognacy decisions are my own. See the Appendix for the complete list of cognate sets from which the data in this chapter are drawn.

To make the presentation of data more manageable, reflexes are organized according to three geographic groupings: South Halmahera, Raja Ampat, and Cenderawasih Bay/Mamberamo. This is for convenience only, and does not represent a subgrouping claim.

Tables of PMP, PCEMP, and PEMP reflexes contain a representative sample of the available data, whenever possible illustrating reflexes in initial, medial, and final positions. Uncertain reflexes have generally been excluded from the tables.

A recurrent issue throughout the chapter is irregularity in sound change. The same proto-sound does not always produce the same reflex in a given language. Some potential ways to resolve discrepancies of this sort are (1) more precise specification of the conditioning environment; (2) appeal to dialect mixture; (3) categorization as something other than sound change; (4) rejection of the regularity hypothesis.

Strategy (1) is rarely possible in the case of SHWNG, since only a small number of
proto-form reflexes are typically attested in any given SHWNG language. For example, Moor reflects medial *p only in PCEMP *kanzupay $>$ arùha 'rat'; PMP *qapuR >ár$a$ 'lime'; and PMP *sa-puluq > tàura 'ten'. The discrepancy between $h$ and $\varnothing$ could conceivably be explained by phonological conditioning. However, it is difficult to make

|  | Language | Works consulted |
| :--- | :--- | :--- |
| SH | Buli | Blust (2014); Greenhill et al. (2008) |
|  | Gane | Greenhill et al. (2008) |
|  | Sawai | Whisler and Whisler (1995) |
|  | Taba | Bowden (2001); Greenhill et al. (2008) |
| RA | Ambel | Remijsen (2001b) |
|  | As | Greenhill et al. (2008) |
|  | Biga | Greenhill et al. (2008); Remijsen (2001b) |
|  | Fiawat | Remijsen (2001b) |
|  | Gebe | Greenhill et al. (2008) |
|  | Kawe | Remijsen (2001b) |
|  | Laganyan | Remijsen (2001b) |
|  | Matbat | Remijsen (2001b) |
|  | Ma'ya | Blust (2014); Remijsen (2001b) |
|  | Wauyai | Remijsen (2001b) |
| CB | Ambai | Blust (2014); Greenhill et al. (2008); Silzer (1983) |
|  | Ansus | Blust (2014); Price and Donohue (2009) |
|  | Biak | Blust (2014); Greenhill et al. (2008); van Hasselt and van Hasselt (1947) |
|  | Dusner | Dalrymple and Mofu (2011) |
|  | Kurudu | Blust (2014) |
|  | Marau | Blust (2014) |
|  | Moor | Kamholz (2013) |
|  | Munggui | Blust (2014) |
|  | Pom | Blust (2014) |
|  | Roon | Blust (2014) |
|  | Serui-Laut | Blust (2014); Slump (1924-38) |
|  | Umar | Kamholz (2013) |
|  | Wandamen | Blust (2014); Gasser (2013); Greenhill et al. (2008); Henning (1991) |
| Waropen | Blust (2014); Greenhill et al. (2008); Held (1942b) |  |
| Wooi | Blust (2014) |  |
|  | Yaur | Kamholz (2013) |
|  | Yerisiam | Kamholz (2013) |
| $M$ | Warembori | Donohue (1999) |
|  | Yoke | Donohue (1999) |

Table 4.1: Sources of lexical data in this chapter.
solid generalizations on the basis of the small number of examples.
Strategy (2) is sometimes plausible, but often difficult to substantiate. To take another example from Moor, initial *k is reflected in the Hirom dialect as PMP *kahiw > ka/'úata 'wood' and PMP *kutu > kú'-a 'louse'. In the Ayombai dialect, we find $k a /$ 'úata 'wood' and u'-a 'louse'. We might therefore suppose that the original reflex was $k$ in Hirom and $\varnothing$ in Ayombai, and that Ayombai has borrowed 'wood' from the Hirom dialect. This argument would be more convincing if we could show a systematic pattern of borrowing, and if 'wood' were a more likely word to be borrowed. As it stands, the argument is suggestive, but not conclusive.

Strategy (3) is applicable when there is reason to believe that a morphological process has altered the form of a word in some way. For example, Yaur reflects *a in PMP *manuk $>$ mà'-ré 'bird' and PCEMP *matay > mèé'-rè 'die'. It initially appears that there is a variable outcome of $a$ or $e$. However, on closer inspection it turns out the citation form mèé'-rè is also the third person form, and shows the effect of a historical infix <i (§6.3.2). The first person form ì-màá'-rè did not have an infix. Therefore, the regular outcome is a.

Strategy (4) is not really an explanation, but rather an admission that one cannot further account for irregular phonological developments. This is presumably what Blust (1978b: 29) means when he states, "the definition of regularity adopted here is that of recurrent (rather than exceptionless) correspondences". In practice, this is often the best one can do. Indeed, for many instances of irregularity noted in this chapter, none of the above strategies is convincing. In such cases, the irregularity is generally noted without comment; however, I hope that further research will be able to clarify some of them.

### 4.2 Comparative phonology

### 4.2.1 * $\boldsymbol{q}$

The regular outcome of * $q$ is $\varnothing$ in all SHWNG languages (see Tables 4.2-4.4). The change of *q> $>$ is very common in Austronesian, so does not provide good subgrouping evidence.

| PMP *daRaq 'blood' | Buli la |
| :--- | :--- |
| PMP *ma-Ruqanay 'man' | Buli mān, Gane maón, Sawai mon, Taba mon |
| PMP *qabu 'ash' | Buli gigi/ap, Sawai ge/yap, Taba yap-yap |
| PMP *qinəp, PCEMP *qenəp | Sawai -y nef |
| 'lie down to sleep' |  |
| PMP *Rumaq 'house' | Gane um, Sawai um |
| PMP *tinraqi 'intestines' > <br> 'belly' | Buli hñao, Sawai sno |

Table 4.2: Reflexes of * $q$ in South Halmahera.

| PMP *daRaq 'blood' | Gebe la |
| :---: | :---: |
| PMP *ma-Ruqanay 'man' | Ambel man, As -man, Biga wa/'man, Gebe man, Kawe 'man[a], Lag. 'man[a], Mat. $w a^{3} y / m a^{21} n, ~ M a ' y a ~ ' m a a^{12} n$, Wau. 'man[a] |
| PMP *qabu 'ash' | As yap-apin |
| PMP *qinəp, PCEMP *qenəp 'lie down to sleep' | Ambel -ane, Biga -e'nef, Fia. -ene, Gebe yencf, Kawe -e'nef, Lag. -'enef, Ma'ya (S.) -'ene ${ }^{3} f$, Mat. - $e^{41} n$, Wau. -'enef |
| PMP *Rumaq 'house' | Biga um, Gebe um, Kawe um, Ма'уа ' $u^{3} m$ |
| ```PMP *tinsaqi 'intestines' > 'belly'``` | Ambel nyay, Biga nyao, Fia. na, Gebe hñao, hñainora, Kawe a-'nyay(o), Lag. a-'nyay(o), Ma'ya 'na(o), Wau. ka-'nyay(o) |

Table 4.3: Reflexes of *q in Raja Ampat.

| PMP *daRaq 'blood' | Moor ràra, Wrp. rara, Yer. rárà |
| :--- | :--- |
|  | Wmb. ke-ra-ro |
| PMP *qabu 'ash' | Umar au, SL wabu, Wrp. avu |
| PMP *qinəp, PCEMP *qenap | Ambai ena, Ansus ena, Biak enəf, Dus. enep, Moor enâ, SL ena, |
| 'lie down to sleep' | Wan. ena, Wrp. ena-ko, Yer. éen/é |
| PMP *Rumaq 'house' | Biak rum, Dus. rum, Moor rùma, Umar ron, Wrp. ruma, Yaur |
|  | rúùg-ré'ceremonial house', Yer. rúmà 'ceremonial house' |
| PMP *tinsaqi 'intestines' > Ambai ene-, Ansus ane/u, Biak sne-, Moor siné, SL ane, Umar <br> 'belly' hna, Wan. sane, Yaur hnáa-rè, Yer. hìná |  |

Table 4.4: Reflexes of *q in Cenderawasih Bay and Mamberamo.

### 4.2.2 *h

The regular outcome of *h is $\varnothing$ in all SHWNG languages (see Tables 4.5-4.7). The change of $h>\varnothing$ is very common cross-linguistically and in Austronesian, so does not provide good subgrouping evidence.

```
PMP *hapuy, PCEMP *api Buli yap
    'fire'
PMP *hikan, PEMP *ikan Buli ian, Gane ian, Sawai in
    'fish'
PMP *kahiw, PCEMP *kayu Buli ai, Sawai ay, Taba ai
    'wood'
PMP *ma-hiaq, PCEMP Buli ma
    *mayaq 'ashamed'
PMP *paRih, PCEMP *paRi
    Buli fā `stingray', Sawai fa 'stingray`
    'sting'
```

Table 4.5: Reflexes of *h in South Halmahera.

| PMP *hapuy, PCEMP *api 'fire' | Ambel lap, As yap, Biga lap, Fia. lap, Gebe yap, Kawe lap, Lag. lap, Mat. $y a^{3} p$, Ma'ya ${ }^{\prime} l a^{12} p$, Wau. lap |
| :---: | :---: |
| PMP *hikan, PEMP *ikan 'fish' | Gebe in, Kawe 'in[i], Mat. yi'n, Ma'ya (M.) ${ }^{1} i^{12} n$ |
| PMP *kahiw, PCEMP *kayu 'wood' | Ambel ay, As $a$, Biga $a y(o)$, Gebe kai, Kawe w/ay(o), Ma'ya 'ai(o) |
| PMP *ma-hiaq, PCEMP *mayaq 'ashamed' | Gebe moi, Ma'ya -'ma ${ }^{3}$ |

Table 4.6: Reflexes of *h in Raja Ampat.

| PMP *hapuy, PCEMP *api 'fire' | Yer. jáai |
| :---: | :---: |
| PMP *hikan, PEMP *ikan 'fish' | Biak in, Dus. in, Moor (H.) ìjana |
| PMP *ma-hiaq, PCEMP *mayaq 'ashamed' | Biak ma, Umar mae, SL mamaya, Wan. mamaya, Yer. mái |
| PMP *kahiw, PCEMP *kayu 'wood' | Ambai ai, Ansus ai, Biak ai, Dus. ai, Moor ka/'úat-a, SL ai, Umar $a e$, Wan. ai, Wrp. ai, Yaur à-jé, Yer. áì Wmb. ayo-ro, Yoke a |
| PMP *tzbuh 'sugarcane' | Ambai tovu, Ansus towu, Biak kob, SL tovu, Umar to, Wrp. kovu, Yaur òo-jé, Yer. kóou |

Table 4.7: Reflexes of *h in Cenderawasih Bay and Mamberamo.

### 4.2.3 * $\boldsymbol{p}$

The regular outcome of $* p$ is $f$ in most South Halmahera and Raja Ampat languages (see Tables 4.8 and 4.9). Exceptions are Taba, where the outcome is $h$ (presumably via $f$ ), and Ambel, where the outcome is $f \sim \phi \sim h .{ }^{1}$ Apparent reflexes of PCEMP *api 'fire' show the irregular outcome $p$ in all attested examples.

Outcomes of $* p$ in Cenderawasih Bay and Mamberamo are more varied (see Table 4.10). In Dusner, it remains $p$, whereas it becomes $f$ in closely related Biak. In Yerisiam, the outcome is $\varnothing \sim p$. In Moor, the outcome is $\varnothing \sim h$. (There are no obvious conditioning factors in either case.) In the remaining languages, ${ }^{*} p>\varnothing$.

I assume, on the basis of phonetic plausibility, that languages reflecting *p as $h$ or $\varnothing$ first underwent the change $* p>* f$. However, this is such a cross-linguistically common change that it cannot persuasively be used as subgrouping evidence. Furthermore, the fact that Biak and Dusner, both members of the small Biakic subgroup, have divergent outcomes shows that this change must have happened independently at least twice.

```
PMP *zpat, PEMP *pat 'four'
PMP *hapuy, PCEMP *api
    'fire'
PMP *ma-nipis 'thin
    (materials)'
PCEMP *marip 'laugh'
PMP *paniki 'fruit bat'
PMP *paRih, PCEMP *paRi
    `sting'
PMP *qatzp 'roof'
Buli fat, Gane -fot, Sawai -fot, Taba -hot
Buli yap
Buli m-lifis, Gane manifis, Sawai -menifes, Taba mnihis
Buli a-mlif, Gane mlif, Sawai -mlif, Taba -(ha)mlih
Buli fni, Gane fnik, Sawai fni
Buli fā 'stingray'
Buli yataf, Gane yotaf, Sawai yot\varepsilonf
```

Table 4.8: Reflexes of $* p$ in South Halmahera.

| PMP *zpat, PEMP *pat 'four' | Ambel $\phi$ at, As fat, Biga fat, Gebe pi-fat, Lag. fat, Ma'ya 'fa ${ }^{12} t$ |
| :---: | :---: |
| PMP *hapuy, PCEMP *api 'fire' | Ambel lap, As yap, Biga lap, Fia. lap, Gebe yap, Kawe lap, Lag. lap, Mat. ya3p, Ma'ya 'la ${ }^{12} p$, Wau. lap |
| PCEMP *kazupay 'rat' | Biga kalof, Ma'ya keluf |
| PMP *ma-pənuq 'full' | Ambel an/hon, Biga fon, Fia. fon, Kawe fon, Lag. fon, Mat. fo ${ }^{3} n$, Ma'ya ${ }^{\prime} f o^{12} n$ |
| PCEMP *marip 'laugh' | As -meli/s, Biga -mlef, Gebe -mnif |
| PMP *qatzp 'roof' | Gebe yataf |

Table 4.9: Reflexes of *p in Raja Ampat.

[^22]```
PMP *zpat, PCEMP *pat-i,
    PEMP *pat 'four'
PCEMP *kazupay 'rat'
PMP *ma-nipis 'thin
    (materials)'
PCEMP *marip 'laugh'
PMP *paRih, PCEMP *paRi
    'sting'
PMP *punti 'banana`
PMP *qapuR 'lime, calcium'
PMP *qatzp 'roof'
PMP *sa-puluq 'ten' Ambai sura, Ansus ura, Biak sa-m-fur, Dus. sa-m-pur, Moor
Ambai -a, Biak fiak, Dus. pati, Marau ati, Moor á'-ó, SL -a,
    Umar eat, Wan. at, Wrp. ak/o, Yaur r-ía-hè, Yer. áak/à
Ambai karu, Moor arùha, SL karu
Umar mnieh, Wan. minis, Yaur né-mníhè, Yer. máníjáhé
Ambai miri, Ansus mari, Biak mbrif, Moor marí/'-a, SL mari,
    Umar mari, Wan. mari
Yer. pár/éèmà ‘stingray', ari máanáà 'ray sp.'
Moor hút-a, Umar idi, Wrp. ui, Yaur ìdí-e, Yer. píití
Wmb. uti-ro, Yoke si
Biak afor, Dus. aper, Moor (A.) áua, Moor (H.) ár-a, Umar au,
    Yer. áau
Moor r/à'a, Wrp. aka, Yer. áká-ráaníà
    tàura, SL sura, Wrp. sauro
```

Table 4.10: Reflexes of *p in Cenderawasih Bay and Mamberamo.

### 4.2.4 ${ }^{*} \boldsymbol{b}^{2}$

The regular outcome of $* b$ is $p$ in South Halmahera (see Table 4.11).
Raja Ampat languages show considerable variation between $p$ and $b$ (see Table 4.12). The variation is partly predictable by word, partly by language. In the available data, As and Gebe consistently show $p$, and Matbat consistently shows $b$. The remaining languages all show some variation. ${ }^{3}$ Variation by word is evident when we compare reflexes of PMP *batu 'stone' and PMP *buaq 'fruit', which are consistently p; reflexes of PMP *bəRay 'give', which are consistently $b$; and reflexes of PMP *ba-bsinsahi 'woman', which are evenly divided.

In Cenderawasih Bay and Mamberamo, the regular outcome of * $b$ is $b$ in Biak, Munggui, and Warembori; ${ }^{4} \beta$ in Dusner, Moor, Yaur, and Yoke; and, on the basis of a single word, $w$ in Kurudu (see Table 4.13). The remaining languages show word by word variation, as in Raja Ampat: Ambai shows $b \sim \beta \sim w$; Ansus shows $b \sim w$; Serui-Laut shows $\beta \sim w$; Wandamen and Waropen show $b \sim \beta$; Umar shows $\beta \sim \varnothing$; and Yerisiam shows $b \sim \varnothing$.

There is no obvious phonological conditioning accounting for the observed variation, and it would be difficult in any case to generalize on the basis of the small number of examples. It is clear that there was a change $* b>p$ in South Halmahera, and possibly some Raja Ampat languages. This change is distinctive enough to be of moderate subgrouping

[^23]value. However, the irregularity of reflexes in Raja Ampat significantly weakens the case for a shared innovation with South Halmahera. It is unclear precisely what happened without further evidence.

In Cenderawasih Bay, there was evidently a progression of changes from *b> $\beta>w>$ $\varnothing$. These changes are less distinctive than the devoicing change, and the fact that closely related languages (Biak and Dusner; Ambai and Serui-Laut) show divergent outcomes weighs against using them as subgrouping evidence.

| PMP *ba-bsinsahi, PCEMP | Buli ma-pin, Gane mapín, Sawai mepin, Taba mapin |
| :--- | :--- |
| *binai 'woman' |  |
| PMP *batu 'stone' | Buli pāt |
| PMP *buaq 'fruit' | Buli pio, Taba sa/po |
| PMP *bunuq 'kill' | Buli pun, Gane pun, Sawai -pun, Taba -pun |
| PMP *Rzbək 'to fly' | Buli opa, Gane opa, Sawai -ops, Taba -opa |

Table 4.11: Reflexes of *b in South Halmahera.

| PMP *ba-biinsahi, PCEMP *binsai 'woman' | Ambel bin, Biga wa/'bin, Fia. bin, Gebe mapin, Kawe pin, Lag. pin, Ma'ya 'pi ${ }^{3} n$, Wau. pin |
| :---: | :---: |
| PMP *batu 'stone' | As pa, Biga ka-pat, Gebe ka-pat, Kawe $a$-'pat, Lag. $a-{ }^{\prime} p a t$, Mat. $p a^{12} t$, Ma'ya $k a-{ }^{\prime} p a^{12} t$, Wau. ka-'pat |
| PMP *baRay 'give' | Ambel -bi, Fia. bi, Lag. 'bi(o), Mat. be ${ }^{21}$, Ma'ya 'bi(o), Wau. bi(o) |
| PMP *buaq 'fruit' | As $n u / p u$-, Biga pus, Gebe ka-pio |
| PMP *bunuq 'kill' | Ambel buni, As -bun, Biga bun, Fia. bun, Gebe -pun, Kawe bun, Lag. 'bu ${ }^{3} n$, Mat. $b u^{3} n$, Ma'ya 'bu ${ }^{3} n$, Wau. bun, fal/'pun |
| PMP *Rabək 'to fly' | Ambel -apo, As n/aps, Biga -o'bo, Fia. -op, Gebe -opo, Kawe -'op[o], Lag. -'op[o], Ma'ya (S.) -'opo ${ }^{3}$, Wau. -'op[o] |

Table 4.12: Reflexes of *b in Raja Ampat.

| PMP *ba-binsahi, PCEMP *binıai 'woman' | Ambai vivin, Ansus wawing, Biak bin, Moor vavín-a, Umar ing/go, SL vavin, Wan. vavi, Wrp. bino, Yer. ûnà Wmb. bin-do |
| :---: | :---: |
| PMP *baRa 'arm' | Ambai wara-, Ansus wara/u, Biak bra, Dus. vra, Moor veréa, Mun. bara, SL wara, Wan. vara, Wrp. va(ha)-, Yaur vrá'ùgwájè, Yer. bà-kí |
|  | Wmb. ke-vera-ro, Yoke $\beta$ ura- |
| PMP *baqəru 'new' | Ambai wa/woru, Ansus wa/woru, Biak ba/bo, Kur. woru, SL va-voru, Wan. va/voru, Wrp. voa, boa |
| PMP *batu 'stone' | Moor vá'-a, Umar atu, Yer. áakú |
| PMP *baRay 'give' | Dus. ve, Umar ve, Yaur vè-né |
| PMP *bəRsay 'canoe paddle' | Ambai bo, wo, Ansus bo, wo, Biak -boras, Dus. vors, Moor vór$a$, SL bo, Wan. bo, vo |
| PMP *buaq 'fruit' | Ambai bon, Ansus ai/bong, Biak ai/bon, Moor vó, SL bo, Wan. buo, Wrp. vo, Yer. ú <br> Wmb. bua, Yoke $\beta u a$ |
| PMP *buku 'knot' | Moor vư'-a, Umar vu, Yaur vúu-jè, Yer. bú-gùa |
| PMP *bulu 'feather, body hair' | Ambai na-wa/vuru, Moor vùru, Umar uru, Wrp. vuro, Yer. úurú-gùa |
|  | Wmb. ke-vun-do, Yoke bo |
| PMP *qabu 'ash' | Ansus $w / a w u$, SL $w / a b u$, Umar $a u$, Wan. $w / a b u$, Wrp. $a v u$ Wmb. aivu-ro |
| PMP *Rabak 'to fly' | Biak rob, Wrp. ro/ko (?) |
|  | Wmb. dove |
| PMP *tzbuh 'sugarcane' | Ambai tovu, Ansus towu, Biak kob, SL tovu, Umar to, Wrp. kovu, Yaur òo-jé, Yer. kóou |

Table 4.13: Reflexes of *b in Cenderawasih Bay and Mamberamo.

### 4.2.5 $\quad t^{5}$

The regular outcome of *t in South Halmahera and Raja Ampat is $t$ (see Tables 4.14 and 4.15). In Buli, a few words irregularly reflect *t as $c$, and in one case as $d$ ( $m$-dalim 'sharp'). In Raja Ampat, the reflex of PCEMP *todan 'sit' irregularly shows $s$ in Ma'ya and $h$ in Matbat.

In Cenderawasih Bay and Mamberamo, there is evidence in several languages for a progression of the form *t $>k>?>\varnothing$. Biak, Roon (not shown here), Warembori, Waropen, and Yerisiam consistently reflect *t as $k$. In Moor, there is variation between $k$ and $2 .{ }^{6}$ In Yaur, *t becomes $?$ word-initially and $\varnothing$ elsewhere. In Ambai, Ansus, and

[^24]Serui-Laut, * $t$ is lost finally, otherwise it is preserved as $t$. In the other languages, * $t$ remains unchanged.

We might suppose that all languages that underwent the change *t $>k$, before possibly progressing further, share an innovation-i.e., Biak, Moor, Roon, Warembori, Waropen, Yaur, and Yerisiam. However, there are three convincing arguments against this claim. First, this putative grouping would cross-cut the well-established Biakic subgroup, including Biak and excluding Dusner. Second, there are no other known innovations subgrouping this particular set of languages. Finally, Blust (2004) has shown that the change $t>k$ has occurred independently numerous times in the history of Austronesian. On this basis, I conclude that the change *t $>k$ most likely occurred independently several times, and so does not provide good subgrouping evidence.

| PMP *batu 'stone' | Buli pāt |
| :--- | :--- |
| PMP *zpat, PEMP *pat 'four' | Buli fat, Gane -fot, Sawai -fot, Taba -hot |
| PMP *kita 'we (incl.)' | Buli ite, Gane kit, Sawai it, Taba tit |
| PMP *kulit 'skin' | Gane kulit, Taba kulit |
| PMP *kutu 'louse' | Buli ut, Gane kut, Sawai kit, Taba kut |
| PMP *lanit 'sky' | Buli lanit, Gane langit, Taba langit |
| PMP *mata 'eye' | Buli mta, Gane mto, Sawai mts, Taba mto |
| PMP *ma-takut 'afraid' | Buli am-cait |
| PMP *ma-tazim 'sharp' | Buli m-dalim |
| PMP "tanzm 'to plant' | Gane tonam, Sawai tonem |
| PMP *tanis 'to cry' | Buli tanis, Gane tangis |
| PMP *tzlu 'three' | Sawai -tel, Taba -tol |
| PMP *tuzuq 'indicate' | Buli culi |

Table 4.14: Reflexes of *t in South Halmahera.

```
PMP *batu 'stone' As pa, Biga ka-pat, Gebe ka-pat, Kawe a-pat, Lag. a-pat, Mat.
PMP *rpat, PCEMP *pat-i, Ambel \phiat, As fat, Biga fat, Gebe pi-fat, Lag. fat, Ma'ya 'fa'12
    PEMP *pat 'four'
PMP *kutu 'louse'
PMP *lanit 'sky'
PMP *qatay 'liver'
PMP *taliya 'ear'
PMP *ta\etais 'to cry'
PMP *tu(n)da\eta, PCEMP
    *todan 'sit'
```

```
    \(p^{12} t\), Ma'ya \(k a-\) 'pa \({ }^{12} t\), Wau. ka-'pat
```

    \(p^{12} t\), Ma'ya \(k a-\) 'pa \({ }^{12} t\), Wau. ka-'pat
    ```
Ambel ut, Biga wut, Fia. wut, Gebe ut, Kawe wut, Lag. wut,
```

Ambel ut, Biga wut, Fia. wut, Gebe ut, Kawe wut, Lag. wut,
Mat. wu ${ }^{3} t$, Ma'ya (S.) ' $u^{3} t$, Wau. wut
Mat. wu ${ }^{3} t$, Ma'ya (S.) ' $u^{3} t$, Wau. wut
As lanit
As lanit
Ambel latey, Gebe atai, Kawe la'te(y), Lag. 'lati, Mat. $t^{21} y$,
Ambel latey, Gebe atai, Kawe la'te(y), Lag. 'lati, Mat. $t^{21} y$,
Ma'ya (S.) 'lati ${ }^{3}$
Ma'ya (S.) 'lati ${ }^{3}$
As tana, Fia. tena, Ma'ya ta'na(o), Wau. ta'na(o)
As tana, Fia. tena, Ma'ya ta'na(o), Wau. ta'na(o)
As -tanis, Biga -tinis, Gebe -tenis
As -tanis, Biga -tinis, Gebe -tenis
Gebe tolon, Kawe to'lon, Lag. to'lon, Mat. $h o^{121} l$, Ma'ya (S.)
Gebe tolon, Kawe to'lon, Lag. to'lon, Mat. $h o^{121} l$, Ma'ya (S.)
'solo ${ }^{3} n$, Wau. to'lon

```
    'solo \({ }^{3} n\), Wau. to'lon
```

Table 4.15: Reflexes of *t in Raja Ampat.

| PMP *batu 'stone' | Moor vá'-a, Umar atu, Yer. áakú |
| :---: | :---: |
| PMP *zpat, PCEMP *pat-i, PEMP *pat 'four' | Ambai -a, Biak fiak, Dus. pati, Marau ati, Moor á’-ó, SL $-a$, Umar eat, Wan. at, Wrp. ak/o, Yaur r-ía-hè, Yer. áak/à |
| PMP *kutu 'louse' | Ansus utu, Biak $u k$, Moor (H.) kú'-a, SL itu, Umar utu, Wrp. ghui, vui, Yaur óò-jé |
| PMP *ma-takut 'afraid' | Ambai matai, Ansus matai, Biak mkāk, Dus. mtat, Moor (A.) mu'ă'-a, Moor (H.) muká'-a, SL maitai, Umar mtat, Wan. matai(t), Wrp. akak/o, Yer. ngkák/é |
| PMP *qatay 'liver' | Biak ke/n, Kur. ate, Moor à'a, Wan. ate/ni, Yer. ákéè/nà |
| PMP *t-ama 'father' | Ambai tama-, Biak kəma, Dus. tma, Moor kamá 'grandparent', Wan. tama |
| PMP *tanam 'to plant' | Ambai tana(m), Ansus tanam/i, Moor 'anam-î, SL tana, Umar tnam, Wan. tanam, Wrp. ana/ko, Yaur ì-'àm-né 'I plant', Yer. káamán/é |
| PMP *tunu 'roast food over a fire' | Biak kun, Dus. un, Moor 'un-î, SL tunu, Yaur 'ún-dè, Yer. kúuná <br> Wmb. kuni |

Table 4.16: Reflexes of *t in Cenderawasih Bay and Mamberamo.

### 4.2.6 Palatalization of * $\boldsymbol{t}$ before * $\boldsymbol{i}$

There is evidence for palatalization of *t to *s preceding *i in most SHWNG languages for which evidence is available (see Table 4.17).

The Raja Ampat evidence is hard to interpret, because there is only a single attested candidate word in each language, the reflex of PMP *trin aqi 'belly'. However, the devel-
opment of syncopated *tin- > hñ- in Gebe, as well as in the South Halmahera language Buli, suggests that palatalization of some sort did take place in these languages. ${ }^{7}$ Raja Ampat languages other than Gebe evidently underwent the same development in this word, after which the $h$ was lost.

In Cenderawasih Bay, the palatalized *t merged with *s and became $s, h$, or $\varnothing$, in line with the regular developments in the particular language. However, in Moor, *s resulting from palatalization does not feed *s $>t$. That is, PMP *tinsaqi > siné 'belly', not **tiné. This can be explained if we assume that original * $s>*$ *s (or a similar intermediate stage) prior to palatalization, after which *ts $>t .^{8}$

In the Mamberamo language Warembori, it is not possible to determine if *t > *s > $t$, following the regular development of *s, or if palatalization never happened in the first place. The outcome would be identical in both scenarios.

The lack of palatalization in some reflexes of PMP *punti 'banana' is due to the medial nasal cluster (see §4.2.21). Lack of palatalization in the Biak and Dusner reflexes of PMP *qatimun 'cucumber' most likely indicates that the word was borrowed from another Austronesian language.

| PMP *bitil 'hungry' | Ambai wa/wisi, Ansus wawi, Biak bisar, Dus. m/buser, Wan. va/wisi |
| :---: | :---: |
| PMP *ma-putiq 'white' | Sawai -mfus |
| PMP *punti 'banana' | Moor hút-a, Umar idi, Wrp. ui, Yaur ìdí-e, Yer. piití Wmb. uti-ro, Yoke si |
| PMP *qatimun 'cucumber' | Buli ti-timin |
|  | Dus. tinem |
| PMP *qutin 'penis' | Sawai fsi |
|  | Ambai $i$-, Moor ùsi |
| PMP *timuR 'south or east wind' | Buli simi 'south (wind)' |
| $\qquad$ | Buli hñao, Sawai sno |
|  | Ambel nyay, Biga nyao, Fia. na, Gebe hñao, hñainora, Kawe a-'nyay(o), Lag. a-'nyay(o), Ma'ya 'na(o), Wau. ka-'nyay(o) |
|  | Ambai ene-, Ansus ane/u, Biak sne-, Moor siné, SL ane, Umar hna, Wan. sane, Wrp. n/ina, Yaur hnáa-rè, Yer. hìná |
| PMP *utik 'marine fish with thorny skin' > 'pufferfish' | Biak us, Yaur bàb/ùh-ré |

Table 4.17: Palatalization of $* t$ before *i in SHWNG.

[^25]
### 4.2.7 * $c$

There are no attested reflexes of *c in SHWNG languages.

### 4.2.8 ${ }^{*} k^{9}$

In South Halmahera, the outcome of *k is regular only in Buli, where it is $\varnothing$ (see Table 4.18). In Gane and Taba, there are cases of $* k$ preserved as $k$ in all positions, but it is lost in reflexes of PMP *hikan 'fish' (in Gane), PMP *kahiw 'wood', PMP *kami 'we (excl.)', and PMP *Rəbək 'to fly'. In Sawai, * $k$ is generally lost, but it is exceptionally preserved in the reflex of PMP *kutu 'louse'.

In Raja Ampat, the change $* k>\varnothing$ is attested in all languages (see Table 4.19). *k is exceptionally preserved in Gebe kai 'wood' and Matbat $y a^{21} k$ ' I '.

In Cenderawasih Bay and Mamberamo, the change of $* k>\varnothing$ is attested in all languages except Moor. In Moor, the outcome is $k \sim 1$, with a tendency towards $k$ in the Hirom dialect and $?$ in the Ayombai dialect. ${ }^{10}$ In Warembori and Yaur, *k is unexpectedly not lost in reflexes of PMP *kita 'we (incl.)': it is reflected as $k$ in Warembori, and 3 in Yaur. ${ }^{11}$ In Wandamen, * $k$ is irregularly preserved in kruya 'thunder', most likely due to onomatopoeia.

The loss of * $k$ appears to have occurred independently many times throughout SHWNG languages; it is difficult to account for the occasional intact $k$ without assuming this. However, the evidence is at least consistent with the change having been completed by the time of Proto-Biakic and Proto-Western Yapen.

| PMP *hikan, PEMP *ikan <br> 'fish' | Buli ian, Gane ian, Sawai in |
| :--- | :--- |
| PMP *i-aku 'I' | Buli ya, Gane yak, Taba yak, Sawai ya |
| PMP *kahiw, PCEMP *kayu | Buli ai, Sawai ay, Taba ai |
| 'wood' |  |
| PMP *kami 'we (excl.)' | Buli ame, Gane ame, Sawai am, Taba am |
| PMP *kulit 'skin' | Gane kulit, Taba kulit |
| PMP *kutu 'louse' | Buli ut, Gane kut, Sawai kit, Taba kut |
| PMP *manuk 'bird' | Buli mani, Gane manik, Sawai mane, Taba manik 'chicken' |
| PMP *ma-takut 'afraid' | Buli am-cait |
| PMP *Rzbak 'to fly' | Buli opa, Gane opa, Sawai -ope, Taba -opa |
| PMP *wakaR 'root' | Buli wā |

Table 4.18: Reflexes of *k in South Halmahera.

[^26]```
PMP *hikan, PEMP *ikan
    'fish'
PMP *i-aku 'I'
PMP *kahiw, PCEMP *kayu
    'wood'
PMP *kutu 'louse'
PMP *manuk 'bird' Ambel mani, As mani, Biga mi'ni, Fia. min, Gebe mani, Lag.
PMP *ma-takut 'afraid'
PMP *Rab\partialk 'to fly'
PMP *wakaR 'root'
Gebe in, Kawe 'in[i], Mat. yi'n, Ma'ya (M.) 'i'12n
Mat. ya 21k
Ambel ay, As a, Biga ay(o), Gebe kai, Kawe w/ay(o), Ma'ya
    'ai(o)
Ambel ut, Biga wut, Fia. wut, Gebe ut, Kawe wut, Lag. wut,
    Mat. wu't, Ma'ya (S.) ' 'u}\mp@subsup{}{3}{3}t\mathrm{ , Wau. wut
    'min[i], Ma'ya (S.) 'mini'12, Wau. 'min[i]
Biga -mtat, Gebe -mtait
Ambel -apo, As n/apэ, Biga -o'bo, Fia. -op, Gebe -opo, Kawe
    -'op[o], Lag. -'op[o], Ma'ya (S.) -'opo 3},\mathrm{ Wau. -'op[o]
Mat. wa 21/po
```

Table 4.19: Reflexes of $* k$ in Raja Ampat.

| PMP *buku 'knot' | Moor vú'-a, Umar vu, Yaur vúu-jè, Yer. bú-gùa |
| :---: | :---: |
| PMP *hikan, PEMP *ikan 'fish' | Biak in, Dus. in, Moor (H.) ìjana |
| PMP *i-aku 'I' | Ambai yau, Ansus yau, Biak ya, Dus. ya, SL yau, Wan. yau, Wrp. ya |
| PMP *kahiw, PCEMP *kayu 'wood' | Ambai ai, Ansus ai, Biak ai, Dus. ai, Moor ka/'úat-a, SL ai, Umar ae, Wan. ai, Wrp. ai, Yaur à-jé, Yer. ái Wmb. ayo-ro, Yoke a |
| PMP *kudug 'thunder' | Moor kururú'-a, Wan. kru/ya |
| PMP *kutu 'louse' | Ansus utu, Biak $u k$, Moor (A.) ú'-a, Moor (H.) kú'-a, SL itu, Umar utu, Wrp. ghui, vui, Yaur óò-jé Wmb. ki-ro |
| PMP *manuk 'bird' | Ambai man-, Biak man, Moor mànu, Umar mna, Wrp. mani, Yaur mà'-ré |
|  | Wmb. mani-ro, Yoke mani |
| PMP *ma-takut 'afraid' | Ambai matai, Ansus matai, Biak mkāk, Dus. mtat, Moor (A.) mu'ă'-a, Moor (H.) muká'-a, SL maitai, Umar mtat, Wan. matai(t), Wrp. akak/o, Yer. ngkák/é |
| PMP *Rabok 'to fly' | Biak rob, Wrp. ro/ko |
|  | Wmb. dove |
| PMP *wakaR 'root' | Ambai ne-wa(sa), Pom wa-wari, Wan. war, Wrp. ghai, vai, Wooi wari |

Table 4.20: Reflexes of * $k$ in Cenderawasih Bay and Mamberamo.

### 4.2.9 * $g$

There are only four known possible reflexes of $* g$ in SHWNG (see Table 4.21). PMP *gakgək is rather dubious, owing to its onomatopoeic nature and the irregular preservation of $* k$ in its putative reflexes. The other three cases consistently show $* g>\varnothing$.

This change is of no SHWNG-internal subgrouping value, because there is not enough evidence to establish which languages participate in the change. If it proves to be shared by all SHWNG languages, it may be of some value as a Proto-SHWNG innovation.

| PMP *angəm 'hold in the <br> mouth' | Yer. óom/à |
| :--- | :--- |
| PMP *gəkgək 'animal sound', | Buli gokgok 'crow', Sawai gok?gok 'crow' |
| PMP *kudug 'thunder' | Moor kururú'-a, Wan. kru/ya |
| PMP *ma-gatal 'to itch' | Ambai maitata (?), Ansus matata (?), Biak maker |

Table 4.21: Reflexes of *g in SHWNG.

### 4.2.10 *s and *j

These two proto-consonants are treated together, because they merge in all SHWNG languages.

The regular outcome is $s$ in most South Halmahera and Raja Ampat languages (see Tables 4.22 and 4.23). The exceptions are Fiawat and Laganyan, where *s, *j>h.

The reflex of PMP *gajan 'name' is irregular in the Raja Ampat languages Biga, Kawe, and Matbat, showing $\varnothing$ instead of the expected $s$. Since there are no other known reflexes of $* j$ in these languages, it is not possible to determine if this is due to the presence of *j as opposed to *s or is simply a lexical irregularity.

In Cenderawasih Bay and Mamberamo, the most widespread outcome is $s$ (see Table 4.24). The change of ${ }^{*} s, * j>h$ occurs in Umar, Yaur, and Yerisiam. ${ }^{12}$ In Ambai and Ansus, the reflex is $\varnothing$ (presumably via $h$ ). ${ }^{13}$ In Moor and Warembori, the reflex is $t$.

Since the changes $s>h>\varnothing$ and $s>t$ are quite common cross-linguistically, the reflexes of *s and *j are of little subgrouping value.

[^27]| PMP *asa, *isa, *zsa 'one’ | Buli asa, isa, Gane p/so, Sawai -so, Taba -so |
| :---: | :---: |
| PMP *bisik 'sick' | Buli pisi, Sawai -pise |
| PMP *hajak 'sniff, kiss' | Buli yās |
| PMP *ma-nipis 'thin (materials)' | Buli m-lifis, Gane manifis, Sawai -menifes, Taba mnihis |
| PMP *pajan 'name' | Buli jasan, Sawai ŋoseŋ |
| PMP *p-ijan 'when?' | Buli ma-fis, Gane ha/fis/ak |
| PMP *si-ida 'they' | Buli sil(e), Gane si, Sawai si, Taba si |
| PMP *susu 'female breast' | Buli sus, Gane susu, Sawai sus, Taba susu |

Table 4.22: Reflexes of $* s$ and $* j$ in South Halmahera.

| PMP *asa, *isa, *asa 'one' | As $s a$, Gebe -sa, Ma'ya (S.) 'sa |
| :---: | :---: |
| PMP *yajan 'name' | As gassn, Biga nan, Fia. nahan, Gebe yasn/0-, Kawe nan, Lag. na'han, Mat. $n a^{21} n$, Ma'ya (S.) 'nasa ${ }^{3} n$, Wau. nan |
| PMP *si-ida 'they' | As sia, sire, Gebe sia, Lag. 'hia, Ma'ya 'sia |
| PMP *susu 'female breast' | Ambel su, As sus, Biga sus, Gebe sus, Kawe su, Lag. 'tut[u], Mat. $s u^{3}$, Ma'ya ${ }^{\prime} s u^{3}$ s, Wau. $s u$ |
| PMP *tajis 'cry' | As -tanis, Biga -tinis, Gebe -tenis |

Table 4.23: Reflexes of *s and *j in Raja Ampat.

| PMP *asa, *isa, *zsa 'one’ | Biak sai, Moor ta-tá, Wan. esa |
| :---: | :---: |
| PMP *ma-nipis 'thin (materials)' | Wan. minis, Yaur né-mníhè, Yer. máníjáhé |
| PMP *nusa 'island' | Ambai $n u$, Ansus $n u$, Biak nus, Moor nút-a, SL $n u$, Umar nuh/man, Wan. nu, Wrp. nusa, Yaur nùh-ré, Yer. núùhà |
| PMP *pajan 'name’ | Biak nasan 'title', Moor nàtan- $a$, Umar han, Wan. san/o, Wrp. nasan/o, Yaur áhg-rè, Yer. áahán/à <br> Wmb. nan-do, Yoke nand |
| PMP *sa-puluq 'ten' | Ambai sura, Ansus ura, Biak sa-m-fur, Dus. sa-m-pur, Moor tàura, SL sura, Wrp. sauro |
| PMP *si-ida 'they' | Ambai ea, Biak si, Dus. si, Moor ti-'ó, Umar i-hi, Wrp. ki (?), Yaur ó-hè, Yer. íníi-hí |
|  | Wmb. ti |
| PMP *susu 'female breast' | Ambai $u i$, Ansus $u$, Biak sus, Moor tút- $a$, Umar huhu, SL $s u$, Wan. susu, Wrp. susu, Yaur húhì-e, Yer. húuhú-gùa Wmb. ke-tutu-ro |
| PMP *tanis 'cry' | Biak kanzs, Moor 'ànit-a, Wrp. anis/a, Yaur 'àáh-rè, Yer. káh/é |

Table 4.24: Reflexes of *s and *j in Cenderawasih Bay and Mamberamo.

### 4.2.11 * $\boldsymbol{d}^{14}$

The regular outcome of *d in South Halmahera is $l$ (see Table 4.25).
In Raja Ampat, the outcome is also $l$ in several attested cases (see Table 4.26). However, the picture is complicated by reflexes of PMP *dəクวR 'hear', showing $d$ in several languages and $n$ in Matbat, and reflexes of PMP *ma-diydin 'cold', showing $r$ in all cases. There is no obvious phonological explanation for these discrepancies.

The case of *ma-dindiy is quite striking, because Raja Ampat languages generally do not have $r$ in native words. Cenderawasih Bay languages are a possible source for borrowing, as they show *d $>r$ (see $\S 4.2 .11$ ). However, the only Cenderawasih Bay language currently in contact with Raja Ampat languages is Biak, which has the unrelated word prim 'cold'.

In Cenderawasih Bay and Mamberamo, the outcome of *d is generally $r .{ }^{15}$ However, it apparently survives intact as $d$ in PMP *duha 'two' > Umar e-dih, Yaur re-du. Umar also shows preservation of *d in PMP *ma-diydiy > drin and apparent word-final devoicing in PCEMP *todan > tot.

The shared outcome *d>l in South Halmahera and Raja Ampat is not convincing for subgrouping, because the merger of *d, *l, and *z is shared among all SHWNG languages

[^28](see chapter 3). The most likely explanation for an outcome of $l$ versus $r$ is areal: laterals are atypical in New Guinea languages, but common in the islands to the west.

```
PMP *də弓\partialR 'hear'
PMP *dәpa 'span, fathom'
PMP *di 'at'
PMP *duha 'two'
PMP *quda\eta 'shrimp'
PMP *tiduR, *tuduR 'sleep'
PMP *tu(n)da\eta, PCEMP
Buli lo\etaa, Gane longa, Sawai -loy\varepsilon, Taba -ma/longo
Buli lof, Sawai lof
Buli li, Gane li, Taba li
Buli lu, Gane p/lu, Sawai -lu, Taba -lu
Buli ulay
Buli tuli
Buli -tola\eta, Sawai -tol\varepsilonn, Taba bat/talón
*todan 'sit'
```

Buli lona, Gane longa, Sawai -lone, Taba -ma/longo
Buli lof, Sawai lof
Buli li, Gane li, Taba li
Buli lu, Gane $p / l u$, Sawai -lu, Taba -lu
Buli ulay
Buli tuli
Buli -tolay, Sawai -tolen, Taba bat/talón

Table 4.25: Reflexes of *d in South Halmahera.

| PMP *daRaq 'blood' | Gebe la |
| :---: | :---: |
| PMP *dəyวR 'hear' | Biga do'no, Gebe lıyว, Kawe 'don[o], Lag. 'don[o], Mat. no ${ }^{41} \eta$, Ma'ya 'do ${ }^{12} n$, Wau. 'don[o] |
| PMP *duha 'two' | Ambel low, As lu, Biga lu, Gebe -lu, Lag. ' $l u^{3}$, Mat. $l u^{3}$, Ma'ya 'lu ${ }^{3}$, Wau. lu |
| PMP *ma-diydin 'cold' | Kawe mari'rin, Lag. mari'rin, Wau. mari'rin |
| PMP *tu(n)day, PCEMP *todan 'sit' | Gebe tolon, Kawe to'lon, Lag. to'lon, Mat. ho ${ }^{121}$ l, Ma'ya (S.) 'solo ${ }^{3}$ n, Wau. to'lon |

Table 4.26: Reflexes of *d in Raja Ampat.

| PMP *dahun 'leaf' | Ambai re/raun, Moor rànu, SL re-rau, Wan. rau, Wrp. rana Wmb. an/dan-do, Yoke tan/du (?) |
| :---: | :---: |
| PMP *dalam 'inside' | Ambai roron, Ansus rarong, Wan. raro |
| PMP *danum 'fresh water' | Moor ràrum-a, Umar $i /$ ran, Wrp. rauno, Yer. ráarám/à Wmb. dan-do |
| PMP *daRaq 'blood' | Moor ràra, Wrp. rara, Yer. rárà Wmb. ke-ra-ro |
| PMP *duha 'two' | Ambai -ru, Biak su/ru, Dus. nu/ru, Moor rú-ró, Umar e-dih, Wan. muan/du, Wrp. vo/ru, Yaur ré-dú-hè, Yer. rúu-hí |
| PMP *duyun 'dugong' | Biak rowin, Moor rún-a, Wrp. rui, Yaur rì-ré |
| PMP *ma-dindin 'cold' | Umar drin |
| PMP *tu(n)day, PCEMP *todan 'sit' | Umar tot |

Table 4.27: Reflexes of *d in Cenderawasih Bay and Mamberamo.

### 4.2.12 *D

The Cenderawasih Bay language Biak is the only SHWNG language with attested reflexes of ${ }^{*} D$. The outcome is $r$ in both cases (see Table 4.28).

```
PMP *hateD `accompany, Biak yakar
    escort'
PMP *siDsiD 'sail along the Biak sisar 'coast'
    coast'
```

Table 4.28: Reflexes of *D in Biak.

### 4.2.13 *l

The regular outcome of * $l$ is $l$ in South Halmahera and Raja Ampat (see Tables 4.29 and 4.30). There is an idiosyncratic change of *l>n in the Gebe reflex of PCEMP *malip 'laugh'.

In Cenderawasih Bay and Mamberamo, the regular outcome is $r$ (see Tabke 4.31). ${ }^{16}$ In Warembori, the outcome is $n$ in $k e-v u n-d o$ 'body hair'. This apparently reflects a regular change of $r>n$ in syllable-final position: another example is PMP *niuR $>$ nuan-do. In Yoke, $r>\varnothing$ word-finally.

The same arguments against using the outcome of *d for subgrouping apply to *l (see §4.2.11).

| PMP *bulan 'moon' | Taba bulan |
| :--- | :--- |
| PMP *bulu 'feather, body | Buli plu, Sawai plu |
| hair' |  |
| PMP *lapit 'sky' | Buli lapit, Gane langit, Sawai layst, Taba langit |
| PMP *lima 'five' | Buli lim, Sawai -lim, Taba -lim |
| PCEMP *malip 'laugh' | Buli -mlif, Gane mlif, Sawai -mlif, Taba -(ha)mlih |
| PMP *qitaluR 'egg' | Buli tolo, Gane toli, Taba tolo |
| PMP *zalan 'road' | Buli lalig, Gane lolan, Taba lolan |

Table 4.29: Reflexes of *l in South Halmahera.

[^29]| PMP *lajit 'sky' | As lanit |
| :---: | :---: |
| PMP *lima 'five' | Ambel lim, Biga lim, Kawe lim, Lag. 'li ${ }^{3} m$, Mat. $l i^{3} m$, Ma'ya ${ }^{\prime} i^{3}$ m, Wau. lim |
| PMP *lipən 'tooth' | Biga lifo-, Kawe $a$-'lif(o), Lag. $a^{-}$'lif(o), Ma'ya (S.) $k a$-'lif(o), $^{-1}$, Wau. la-'lif |
| PCEMP *malip 'laugh' | As -meli/s, Biga -mlef, Gebe -mnif |
| PMP *qitaluR ‘egg' | Ambel talo, As tals, Biga to'lo, Fia. tol, Kawe 'tol[o], Lag. 'tol[o], Mat. to ${ }^{2 l} l$, Ma'ya (S.) 'to ${ }^{12} l$, Wau. 'tol[o] |
| PMP *zalan 'road' | As alin, Biga li'lin, Kawe li'lin, Lag. li'lin, Ma'ya (S.) 'lili ${ }^{3} n$ |

Table 4.30: Reflexes of *l in Raja Ampat.

| PMP *bulu 'feather, body hair' | Ambai na-wa/vuru, Moor vùru, Umar uru, Wrp. vuro, Yer. úurú-gùa <br> Wmb. ke-vun-do, Yoke bo |
| :---: | :---: |
|  | Ambai ai-rau, Ansus raw/anang, Moor rú, Wan. rau, Wrp. rau |
| PMP *lakaj, *lakaw 'go, walk' | Ambai ra, Ansus ra, Biak rā, Moor rá, SL ra, Umar ra, Wan. ra, Wrp. ra, Yaur rèé-rè 'come', Yer. rá Wmb. da, Yoke da |
| PMP *lima 'five' | Ambai rin, Ansus ring, Biak rim, Dus. rim/bi, Moor rím-ó, Mun. -rim, SL ri, Wan. rime, Wrp. rim/o, Yer. rûmà Wmb. rin/ti, Yoke -rim/si |
| PMP *ma-kapal 'thick' | Biak kpor (?) |
| PCEMP *malip 'laugh' | Ambai miri, Ansus mari, Biak mbrif, Moor marí/'-a, SL mari, Umar mari, Wan. mari |
| PMP *sa-puluq 'ten' | Ambai sura, Ansus ura, Biak sa-m-fur, Dus. sa-m-pur, Moor tàura, SL sura, Wrp. sauro |
| PMP *talu 'three' | Ambai -toru, Ansus toru, Dus. tori, Moor ór-ó, Umar e-tro, Wan. toru, Wrp. or-o, Yer. kóorí-hé |

Table 4.31: Reflexes of $* l$ in Cenderawasih Bay and Mamberamo.

### 4.2.14 *z

There are few attested reflexes of *z in SHWNG. In South Halmahera and Raja Ampat, the regular outcome is $l$ (see Tables 4.32 and 4.33).

In Cenderawasih Bay, the general outcome is $r$ (see Table 4.34). The small amount of available evidence suggests $*_{z}>\varnothing$ in Umar, Yaur, and Yerisiam. The initial $j$ in the reflex of PMP *zalan 'road' in Umar and Yerisiam is due to later glide insertion (see §4.2.27). There is no available evidence for the Mamberamo languages.

The arguments against using the outcomes of *d and *l for subgrouping generally apply to $* z$ as well (see $\S 4.2 .11$ ). However, the divergent outcome shared by Umar, Yaur, and Yerisiam is sufficiently distinctive that it may indicate a more closely shared history among these languages. By itself this evidence is too scant to be conclusive, but is significant in light of other innovations shared by these three languages (see $\$ 4.2 .19$ and $\S 4.2 .25$ below).

```
PMP *haRazan 'notched log Buli olan 'ladder'
    ladder'
PCEMP *kazupay 'rat' Buli luf, Gane luf, Sawai luf
PMP *quzan 'rain' Buli ulan, Gane ulan, Taba ulan
PMP *zalan 'road' Buli laliy, Gane lolan, Taba lolan
PMP *zauq 'far'
Buli lau,Gane lou, Sawai low, Taba na/lou
```

Table 4.32: Reflexes of *z in South Halmahera.

| PCEMP *kazupay 'rat' | Biga kalof, Ma'ya keluf |
| :--- | :--- |
| PMP *zalan 'road' | As alin, Biga li'lin, Kawe li'lin, Lag. li'lin, Ma'ya (S.) 'lilin |
| PMP *zauq 'far' | As i/lao, Gebe lau, Kawe lau |

Table 4.33: Reflexes of *z in Raja Ampat.

| PMP *haRazan 'notched log | Yaur ròg-ré |
| :--- | :--- |
| ladder' |  |
| PCEMP *kazupay 'rat' | Ambai karu, Moor arùha |
| PMP *ma-tazim, *ma-tazam Umar mtan <br> 'sharp'  <br> PMP *zalan 'road' Ambai ran, Ansus rang, Dus. ran, Moor ràrin-a, SL ran, Umar <br> jar, Wrp. rara/do, Yer. jáàrà |  |

Table 4.34: Reflexes of *z in Cenderawasih Bay and Mamberamo.

### 4.2.15 *r

There are only six known possible reflexes of *r in SHWNG (see Table 4.35). In Buli, Biak, and Moor, the outcome is apparently $r$. In Ambai and Serui-Laut, the outcome is apparently $\varnothing$ (at least in word-final position). This evidence is clearly too meager to be used for subgrouping.

| PCEMP *madar 'ripe, | Buli mara, Moor marar/ù 'withered', SL marai |
| :--- | :--- |
| overripe' |  |
| PMP *pa(n)tar 'bed frame of <br> wooden or bamboo laths' | Ambai fata 'bed', Biak fakər 'foundation of stones, wood, etc.', <br> Wan. patar |

Table 4.35: Reflexes of * $r$ in SHWNG.

### 4.2.16 *R

The regular outcome of *R is $\varnothing$ in South Halmahera and Raja Ampat (see Tables 4.36 and 4.37).

In Cenderawasih Bay and Mamberamo, the regular outcome is $r$ (see Table 4.38). In Ambai, Kurudu, Umar, Waropen, and Yerisiam, there is a tendency for ${ }^{*} R>\varnothing$ wordfinally. In Warembori and Yoke, the developments in word-final position parallel *l (see §4.2.13).

The change of ${ }^{*} R>\varnothing$ found in South Halmahera and Raja Ampat languages is distinctive; this change is not particularly common within Austronesian. It is more likely to be a shared rather than independent innovation. It provides more convincing evidence for Proto-South Halmahera-Raja Ampat than the outcome of the *d, *l, *z merger.

The change of *R>rin Cenderawasih Bay and Mamberamo is less unusual, and does not provide convincing evidence for subgrouping.

| PMP *baqəRu 'new' | Buli po, Gane pou, Taba powo |
| :---: | :---: |
| PMP *buRuk 'rotten' | Gane puik |
| PMP *busuR 'hunting bow' | Buli pusi |
| PMP *daRaq 'blood' | Buli la |
| PMP *dəクวR 'hear' | Buli lona, Gane longa, Sawai -lone, Taba -ma/longo |
| PMP *habaRat 'south' | Buli pāt 'west' |
| PMP *ma-Rayaw 'dry’ | Buli māŋ, Sawai -may |
| PMP *niuR 'coconut' | Sawai niwe, Taba niwi |
| PMP *Rabak 'to fly' | Buli opa, Gane opa, Sawai -ope, Taba -opa |
| PMP *Rumaq 'house' | Gane um, Sawai um |
| PMP *wahiR 'fresh water' | Buli waya, Gane waya, Sawai wวE, Taba woya |
| PMP *zaRum 'needle' | Gane laim |

Table 4.36: Reflexes of *R in South Halmahera.

| PMP *bəRək 'domesticated pig' | Fia. bu, Lag. bo, Ma'ya 'bo ${ }^{3}$, Wau. bo |
| :---: | :---: |
| PMP *dəクวR 'hear' | Biga do'no, Gebe loyว, Kawe 'don[o], Lag. 'don[o], Mat. $n o^{41} \eta$, Ma'ya 'do ${ }^{12} n$, Wau. 'don[o] |
| PMP *maqiRaq, PCEMP *meRaq 'red' | Biga $m a /{ }^{\prime} m e$, Fia. $m e / m e$, Kawe $m e$, Ma'ya (S.) $m a /^{\prime} m e^{3}$, Wau. me |
| PMP *ma-Rajaw 'dry' | Gebe man |
| PMP *niuR 'coconut' | Biga $n i$, Kawe $n u$, Lag. $n u$, Mat. $n u^{1}$, Ma'ya ${ }^{\prime} n u^{12}$ |
| PMP *Rabak 'to fly' | Ambel -apo, As n/aps, Biga -o'bo, Fia. -op, Gebe -opo, Kawe -'op[o], Lag. -'op[o], Ma'ya (S.) -'opo ${ }^{3}$, Wau. -'op[o] |
| PMP *Rumaq 'house' | Biga $u m$, Gebe $u m$, Kawe $u m$, Ma'ya ${ }^{\prime} u^{3} m$ |
| PMP *wahiR 'fresh water' | Ambel we, As we?, Biga wey, Fia. wey, Gebe wa, Kawe 'way[a], Lag. 'way[a], Ma'ya (S.) 'waya33, Wau. 'way[a] |
| PMP *wakaR 'root' | Mat. $w a^{21} / p o$ |

Table 4.37: Reflexes of *R in Raja Ampat.

| PMP *buRbuR 'rice porridge' > 'sago porridge' | Moor vùvur-a, Wrp. vivir/o Wmb. boro-ro |
| :---: | :---: |
| PMP *daRaq 'blood' | Moor ràra, Wrp. rara, Yer. rárà |
|  | Wmb. ke-ra-ro |
| PMP *niuR 'coconut' | Moor nér-a, Wrp. nivar/o, Yer. núi |
|  | Wmb. nuan-do, Yoke nia |
| PMP *qabaRa 'carry on shoulder' | Moor ovar-î, Wrp. avaro, Yer. áar/í |
| PMP *qapuR 'lime, calcium' | Biak afər, Dus. aper, Moor (A.) áua, Moor (H.) ár-a, Umar au, Yer. áau |
| PMP *Rabək 'to fly' | Biak rob, Wrp. ro/ko (?) |
|  | Wmb. dove |
| PMP *Rumaq 'house' | Biak rum, Dus. rum, Moor rùma, Umar ron, Wrp. ruma, Yaur rúùg-ré 'ceremonial house', Yer. rúmà 'ceremonial house' |
| PMP *wahiR 'fresh water' | Ambai waya 'river', Biak wār, Dus. war, Kur. way 'river', Moor gwàjar-a 'river', SL waya 'river', Wrp. ghai Wmb. war/en-do 'river' |
| PMP *wakaR 'root' | Ambai -wa(sa), Pom wa-wari, Wan. war, Wooi wari, Wrp. ghai, vai |

Table 4.38: Reflexes of *R in Cenderawasih Bay and Mamberamo.

### 4.2.17 *m

The usual outcome of * $m$ is $m$ in all SHWNG languages (see Tables 4.39-4.41). There are divergent outcomes in several languages of Cenderawasih Bay. In Ambai and Umar, *m > $n$ word-finally. In Ansus, ${ }^{*} m>y$ word-finally. ${ }^{17}$ In Serui-Laut, Wandamen, and Waropen, * $m>\varnothing$ word-finally. ${ }^{18}$ In Yaur, ${ }^{*} m>g \sim n$ word-finally on nouns (see $\$ 4.2 .20$ for more details).

The sound changes attested in the outcomes of $* m$ are not sufficiently distinctive to be used in subgrouping arguments. ${ }^{19}$ Word-final *m is lost in several Western Yapen languages, but it is also present in a number of words, so the change could not have been complete in Proto-Western Yapen.
PMP *anam 'six'
PMP *kami 'we (incl.)'
PMP *lima 'five'
PCEMP *malip 'laugh'
PMP *manuk 'bird'
PMP *ma-Ruqanay 'man'
PMP *m-atay 'die'
PMP *Rumaq 'house'
PMP *tanam 'to plant'

Buli wonam, Sawai wonem, Taba -wonam
Buli ame, Gane ame, Sawai am, Taba am
Buli lim, Sawai -lim, Taba -lim
Buli -mlif, Gane mlif, Sawai -mlif, Taba -(ha)mlih
Buli mani, Gane manik, Sawai mane, Taba manik 'chicken'
Buli mān, Gane maón, Sawai mən, Taba mon
Buli mat, Gane mot, Taba -mot
Gane um, Sawai um
Gane tonam, Sawai tonem
Table 4.39: Reflexes of *m in South Halmahera.

[^30]| PMP *ənəm 'six' | Ambel wanom, Biga wo'nom, Fia. wonom, Kawe wo'nom, Lag. wo'nom, Mat. no ${ }^{12}$ m, Ma'ya (S.) 'wono ${ }^{3} m$, Wau. wo'nom |
| :---: | :---: |
| PMP *kami 'we (incl.)' | Ambel $\mathrm{am} / \mathrm{ne}$, As $\mathrm{am} / \mathrm{ne}$, Biga am/on, Gebe $\mathrm{am} / \mathrm{ne}$ |
| PMP *lima 'five' | Ambel lim, Biga lim, Kawe lim, Lag. ' ${ }^{\prime} i^{3} m$, Mat. $l i^{3} m$, Ma'ya ${ }^{\prime} l^{3}{ }^{3} m$, Wau. lim |
| PCEMP *malip 'laugh' | As -meli/s, Biga -mlef, Gebe -mnif |
| PMP *manuk 'bird' | Ambel mani, As mani, Biga mi'ni, Fia. min, Gebe mani, Kawe mani, Lag. 'min[i], Ma'ya (S.) 'mini ${ }^{12}$, Wau. 'min[i] |
| PMP *ma-Ruqanay 'man' | Ambel man, As -man, Biga wa/'man, Gebe man, Kawe 'man[a], Lag. 'man[a], Mat. $w a^{3} y / m a^{21} n, ~ M a ' y a ~ ' m a a^{12} n$, Wau. 'man[a] |
| PMP *m-atay 'die' | Ambel -mat, As ma-P, Biga mat, Gebe -mat, Kawe mat, Mat. $m a^{12} t$, Ma'ya ' $m a^{12} t$, Wau. mat |
| PMP *Rumaq 'house' | Biga $u m$, Gebe $u m$, Kawe $u m$, Ma'ya ' $u^{3} m$ |
| PMP *tanam 'to plant' | Gebe fa/tanam |

Table 4.40: Reflexes of *m in Raja Ampat.

| PMP *dalam 'inside' | Ambai roron, Ansus rarong, Wan. raro |
| :---: | :---: |
| PMP *znəm 'six' | Ambai wonan, Ansus wonang, Biak wonam, Wrp. ghon/o |
| PMP *kami 'we (incl.)' | Ambai amea, Moor ám-a, SL ama, Umar emi, Wan. ama(te), Wrp. ami, Yaur ómí-'è, Yer. n/éemé Wmb. ami |
| PMP *lima 'five' | Ambai rin, Ansus ring, Biak rim, Dus. rim/bi, Moor rím-ó, Mun. -rim, SL ri, Wan. rime, Wrp. rim/o, Yer. rûmà Wmb. rin/ti, Yoke -rim/si |
| PCEMP *malip 'laugh' | Ambai miri, Ansus mari, Biak mbrif, Moor marí/'-a, SL mari, Umar mari, Wan. mari |
| PMP *manuk 'bird' | Ambai man-, Biak man, Moor mànu, Umar mna, Wrp. mani, Yaur mà'-ré |
|  | Wmb. mani-ro, Yoke mani |
| PMP *ma-Ruqanay 'man' | Ambai man, Ansus muang, Biak man, Dus. sno/man, SL man, Umar no/man, Wan. mua[n], Wrp. mano, Yaur jò/màg-ré, Yer. máànà |
|  | Wmb. man-do, Yoke mamb- |
| PMP *ma-tazam 'sharp' | Umar mtan |
| PMP *qayam 'bird' | Ansus aya, SL aya, Wan. aya |
| PMP *Rumaq 'house’ | Biak rum, Dus. rum, Moor rùma, Umar ron, Wrp. ruma, Yaur rúùg-ré 'ceremonial house', Yer. rúmà 'ceremonial house' |
| PMP *tanzm 'to plant' | Ambai tana(m), Ansus tanam/i, Moor 'anam-î, SL tana, Umar tnam, Wan. tanam, Wrp. ana/ko, Yaur ì-'àm-né 'I plant', Yer. káamán/é |

Table 4.41: Reflexes of *m in Cenderawasih Bay and Mamberamo.

### 4.2.18 *n and * $\tilde{n}$

These two proto-consonants are treated together, because they merge in all SHWNG languages. The regular outcome is $n$ in all languages (see Tables 4.42-4.44).

In South Halmahera, there are two instances of irregular * $n>\eta$ word-finally: Buli ma-pín 'woman' and Sawai yวsey 'name'.

In the Raja Ampat language Gebe, * $\tilde{n}$ is irregularly preserved as $\tilde{n}$ in the reflex of PMP *ma-ñawa 'breathe'. There is also unexpected palatalization of * $n$ in the reflexes of PEMP *natu 'child'.

In the Cenderawasih Bay language Ansus, * $n>\eta$ word-finally. ${ }^{20}$ In Wandamen and Yerisiam, there is a tendency towards word-final loss of * $n$, similar to that observed for * $m$ above. In Yaur, ${ }^{*} n>g \sim n$ word-finally on nouns; there is also one case of *n $>$ ? (see §4.2.20 for more details).

[^31]As with *m, these changes are not sufficiently distinctive to be used in subgrouping arguments.

| PMP *añam 'weave, plait' | Buli yanam, Sawai -yonem |
| :---: | :---: |
| PMP *ba-bsin ${ }^{2}$ ahi, PCEMP *binıai 'woman' | Buli ma-piy, Gane mapín, Sawai mepin, Taba mapin |
| PMP *bulan 'moon' | Taba bulan |
| PMP *bunuq 'kill' | Buli pun, Gane pun, Sawai -pun, Taba -pun |
| PMP *ma-ñawa 'breathe' | Gane manow, Taba -manowo |
| PMP *məñak 'fat, grease' | Buli mna |
| PMP *yajan 'name' | Buli yasan, Sawai ŋoseŋ |
| PMP *tanam 'to plant' | Gane tonam, Sawai tonem |
| PMP *utaña 'ask' | Buli utan |

Table 4.42: Reflexes of * $n$ in South Halmahera.

| PMP *banua 'inhabited land' > 'village' | Biga pnu, Kawe $n u$, Lag. $n u$, Mat. $n u^{3}$, Ma'ya 'pnu ${ }^{3}$ |
| :---: | :---: |
| PMP *bunuq 'kill' | Ambel buni, As -bun, Biga bun, Fia. bun, Gebe -pun, Kawe bun, Lag. 'bu ${ }^{3} n$, Mat. $b u^{3} n$, Ma'ya 'bu ${ }^{3} n$, Wau. bun, fal/'pun |
| PMP *ma-ñawa 'breathe' | Gebe -fa/ñawa/ya |
| PMP *mañak 'fat, grease' | Biga ma'na(o), Fia. mena, Kawe ma'na, Lag. ma'na, Mat. $m n a^{12}$, Ma'ya (S.) $m a^{\prime} n a^{3}$, Wau. ma'na |
| PEMP *natu 'child' > 'person' | Gebe ñat |
| PMP *niuR 'coconut' | Biga $n i$, Kawe $n u$, Lag. $n u$, Mat. $n u^{1}$, Ma'ya ${ }^{\prime} n u^{12}$ |
| PMP *tajan 'name' | As gasen, Biga nan, Fia. nahan, Gebe yasn/o-, Kawe nan, Lag. na'han, Mat. $n a^{21} n$, Ma'ya (S.) 'nasa ${ }^{3} n$, Wau. nan |
| PMP *pəñu 'the green turtle, Chelonia mydas' | Biga fin, Kawe fin, Lag. fin, Mat. $f e^{31} n$, Ma'ya ' $f e^{3} n$ |
| PMP *tanam 'to plant' | Gebe fa/tanam |
| PMP *zalan 'road' | As alin, Biga li'lin, Kawe li'lin, Lag. li'lin, Ma'ya (S.) 'lili ${ }^{3} n$ |

Table 4.43: Reflexes of * $n$ in Raja Ampat.

| PMP *banua 'inhabited land' $>$ 'village' | Ansus nu 'world', Biak manu, Dus. munu/ai, Moor manù 'forest', SL $n u$ 'world', Umar nu/ae, Wrp. nu, Yaur núù-ré, Yer. nú <br> Wmb. bunu/pune (?) |
| :---: | :---: |
| PMP *bulan 'moon' | Moor vùrin-a, Yer. úùrà |
| PMP *bulaw-an 'gold' | Biak brawən, Roon barawan, SL barawan |
| PMP *bunuq 'kill' | Ambai mun, Ansus mung, Biak mun, Dus. mun, Moor mun/â, SL mun, Wan. mun, Wrp. mun/a <br> Wmb. muni-ro, Yoke $m u$ |
| PMP *manuk 'bird' | Ambai man-, Biak man, Moor mànu, Umar mna, Wrp. mani, Yaur mà'-ré <br> Wmb. mani-ro, Yoke mani |
| PMP *ma-ñawa 'breathe' | Biak mnasu |
| PMP *məñak 'fat, grease' | Ambai ne-main, Moor mananá, Umar mnai, Wan. mai[n], Wrp. mana, Yaur mnáa-rè, Yer. mì/mná |
| PMP *niuR 'coconut' | Moor nér-a, Wrp. nivar/o, Yer. núì Wmb. nuan-do, Yoke nia |
| PMP *nusa 'island' | Ambai $n u$, Ansus $n u$, Biak nus, Moor nút-a, SL nu, Umar nuh/man, Wan. nu, Wrp. nusa, Yaur nùh-ré, Yer. núùhà |
| PMP * $\quad$ ajan 'name’ | Biak nasan 'title', Moor nàtan-a, Umar han, Wan. san/o, Wrp. nasan/o, Yaur áhg-rè, Yer. áahán/à <br> Wmb. nan-do, Yoke nand |
| PMP *pəñu 'the green turtle, Chelonia mydas' | Umar ono, Yer. éenú |
| PMP *tawan 'a tree: Pometia pinnata' | Ambai tawan, Ansus tawan, Moor kagwán-a, Wan. tawa, Wrp. kavan/o |
| PMP *utaña 'ask' | Ambai utan, Biak f-ukən, Dus. p/utna, Moor u'uná, SL utana, Wan. uta |

Table 4.44: Reflexes of * $n$ in Cenderawasih Bay and Mamberamo.

### 4.2.19 " $\eta$

The regular outcome of $* \eta$ is $\eta$ in South Halmahera (see Table 4.45).
In Raja Ampat languages, the outcome is generally $n$, but with two unexplained complications (see Table 4.46). In Gebe and Matbat, there is variation between $\eta$ and $n$. In As, there is one apparent case of $* \eta>g$ : PMP *yajan > gascn 'name'.

In Cenderawasih Bay and Mamberamo, the outcome is also generally $n$ (see Table 4.47). The exceptions are Yaur and Yerisiam, where ${ }^{*} \eta>\varnothing$. In Yaur, there is also one case of ${ }^{*} \eta>$ ? (see §4.2.20).

The change of $\star \eta>n$ is not distinctive enough to be used for subgrouping. However, the change of ${ }^{*} \eta>\varnothing$ is rather striking. This change provides additional support for
grouping Yaur and Yerisiam together in a single low-level subgroup (see §4.2.14). ${ }^{21}$ This change must have preceded Yaur's final nasal changes (see §4.2.20).

| PMP *batay 'fallen tree' | Buli paty-o |
| :---: | :---: |
| PMP *binaq 'kind of volute shell' | Buli pin |
| PMP *buy 'deep resounding sound' > 'heart' | Buli puy, Sawai puy |
| PMP *buya 'flower' | Gane bungan, Taba bungan |
| PMP *dəךวR 'hear' | Buli lona, Gane longa, Sawai -lone, Taba -ma/longo |
| PMP *lanit 'sky' | Buli lanit, Gane langit, Sawai lanst, Taba langit |
| PMP *yajan 'name' | Buli gasan, Sawai yosey |

Table 4.45: Reflexes of * $\eta$ in South Halmahera.

| PMP *batay 'fallen tree' | Fia. batan 'tree' |
| :---: | :---: |
| PMP *dəyวR 'hear' | Biga do'no, Gebe loyว, Kawe 'don[o], Lag. 'don[o], Mat. no ${ }^{41} \eta$, Ma'ya 'do ${ }^{12} n$, Wau. 'don[o] |
| PMP *lanit 'sky' | As lanit |
| PMP *ma-Rayaw 'dry' | Gebe man |
| PMP *gajan 'name' | As gassn, Biga nan, Fia. nahan, Gebe yasn/o-, Kawe nan, Lag. na'han, Mat. $n a^{21} n$, Ma'ya (S.) 'nasa ${ }^{3} n$, Wau. nan |
| PMP *taliya 'ear' | As tana, Fia. tena, Ma'ya ta'na(o), Wau. ta'na(o) |
| PMP *tajis 'to cry' | As -tanis, Biga -tinis, Gebe -tenis |

Table 4.46: Reflexes of ${ }^{*} \eta$ in Raja Ampat.

[^32]```
PMP *duyu\eta `dugong'
PMP *hasay `gills'
PMP *layaw 'housefly'
PMP *lanit 'sky'
PMP *ma-dindiy 'cold'
PMP *gajan 'name'
PMP *taliya 'ear'
PMP *ta\etais 'cry' Biak kanzs, Moor 'ànit-a, Wrp. anis/a, Yaur 'àáh-rè, Yer.
Biak rowin, Moor rún-a, Wrp. rui, Yaur ri`-ré
Biak asan
Biak ran
Biak nanək, Yer. ráak/átè
Umar drin
Biak nasan 'title', Moor nàtan-a, Umar han, Wan. san/o, Wrp.
    nasan/o, Yaur áhg-rè, Yer. áahán/à
Wmb. nan-do, Yoke nand
Ambai tara-, Biak kna, Moor ìna
káh/é
```

Table 4.47: Reflexes of * $\eta$ in Cenderawasih Bay and Mamberamo.

### 4.2.20 Final nasals in Yaur

Final nasal developments in Yaur are complex and require further discussion (see Table 4.48). I noted in $\S 4.2 .17$ and $\S 4.2 .18$ that $* m$ and $* n$ are reflected word-finally in Yaur as $g \sim n$. This variable outcome is part of a synchronic root alternation on nouns: the form with $g$ occurs before the suffix -re (present in citation form among other contexts), while the form with $n$ occurs when the noun is unsuffixed: thus, for example, ròg-ré 'ladder' versus rón méhà 'which ladder?'.

It is noteworthy that the $g$ outcome is only attested on nouns. The most likely trigger of the sound change that led to this alternation is the $r$ of the nominal suffix-re, which would have created a cluster with the root-final nasal. ${ }^{22}$ Following * $\eta>\varnothing$ (§4.2.19), evidently the remaining nasals *m, *n>* $\eta /{ }_{-}^{*} r$ (where ${ }^{*} r$ represents the outcome of the merger of PMP *d, *l, *R). This change also must have followed final vowel loss (§4.2.32): thus, PMP *Rumaq 'house' > *rum, then *rum-re > *ruy-re. The conditioning environment is needed to explain why verb roots did not undergo the same change preceding nasals (ì-'àm-né 'I plant') or finally (ì-'àm ìdí-e 'I plant a banana tree'). ${ }^{23}$

This nasal place change would have created a root alternation between suffixed and unsuffixed nouns (i.e., *ruŋ-re versus *rum). The suffixed alternant was extended to the unsuffixed environment, after which final ${ }^{*} \eta>n$ : thus, *rum $\rightarrow * r u \eta>r u ́ n$ (the shafted arrow indicates an analogical change).

Meanwhile, the medial cluster in the suffixed form would have undergone stop epenthesis (*ruŋ-re > *ruŋg-re), followed by nasal cluster simplification (*rupg-re > rúüg-ré). ${ }^{24}$ The end result was the unusual $g \sim n$ root alternation, which was not leveled.

[^33]Two words show exceptional developments: PMP *manuk > mà'-ré 'bird' and PMP *duyuy > rì'-ré 'dugong'. Apparently, final *n, * $\eta>?$ in these words, which must have occurred prior to ${ }^{*} \eta>\varnothing$. There is no known explanation for this unusual development.

| PMP *duyuy 'dugong' | Yaur ri'-ré |
| :---: | :---: |
| PMP *haRazan 'ladder' | Yaur ròg-ré |
| PMP *mamaq 'chew' | Yaur í-jó'-màm-né 'I chew' |
| PMP *manuk 'bird' | Yaur mà'ré |
| PMP *ma-Ruqanay 'man' | Yaur jò/màg-ré |
| PMP *pajan 'name' | Yaur áhg-rè |
| PMP *Rumaq 'house' | Yaur rúùg-ré 'ceremonial house' |
| PMP *tanam 'to plant' | Yaur ì-'àm-né 'I plant' |
| - | Yaur àág-rè 'driftwood', cf. Umar an |
| - | Yaur dràag-ré 'leaf used to relieve pain', cf. Umar dran |
| - | Yaur hìbòog-ré 'cockroach', cf. Umar hibom/brer |
| - | Yaur jáag-rè 'year', cf. Yer. jámà |
| - | Yaur rìg-ré 'centipede', cf. Umar rien |
| - | Yaur rûģ-ré 'language', cf. Moor rían-a, Yer. árínà |
| - | Yaur tràg-ré 'harpoon', cf. Moor tarán-a, Yer. táráànà |

Table 4.48: Final nasal developments in Yaur.

### 4.2.21 Nasal-stop clusters

The medial clusters *mb, *nt, *nd, and * $\eta k$ have distinct reflexes in some SHWNG languages (see Table 4.49).

In South Halmahera and Raja Ampat, the nasal serves to "protect" the following stop from undergoing sound changes it would otherwise be subject to ( $* b>p, * d>l$, etc.). The nasal is subsequently deleted, leaving just the medial stop. Thus, for example, PCEMP *tumbuq > Buli tub, not **tup.

In the Cenderawasih Bay languages Umar, Yaur, and Yerisiam, the effect is similar, at least for bilabial and alveolar clusters. The stop does not undergo sound changes it would otherwise be subject to ( $* t>k$, *d $>r$, etc.). The nasal is subsequently deleted, leaving just the medial stop. In Yerisiam, the resulting stop is regularly voiceless; in Umar and Yaur, it is voiced. Thus, for example, PCEMP *kandoRa > Yerisiam átóòrà, not **áróòrà. There is a parallel development in a single Moor word: $t$ is preserved in *punti $>$ hút- $a$, instead of **hú' $a$.

In the remaining Cenderawasih Bay and Mamberamo languages, the outcome of medial nasal clusters is apparently the same as the stop alone. For example, in Waropen, PMP *punti 'banana' appears to have developed as follows: *punti $>$ *unti $>$ *unsi $>$ *usi $>$ *uhi > ui.

Although many SHWNG languages share changes for medial nasal clusters, these changes are quite common cross-linguistically, and so cannot reliably be used for subgrouping.

| PMP *Rambia 'sago palm' | Ambel bey, Biga bi, Ma'ya 'bi ${ }^{3}$ Umar abi, Wrp. fi, Yer. pí |
| :---: | :---: |
| PMP *tu(m)buq, PCEMP *tumbuq 'grow' | Buli tub, Gane tub 'to live', Sawai -tub, Taba -an/tub 'to live' Gebe -tub 'to live' <br> Moor ùvu 'branch' (?) |
| PMP *bantun 'pull up, as out of a pit' | Biak bakan |
| PMP *punti 'banana' | Moor hút-a, Umar idi, Wrp. ui, Yaur ìdí-e, Yer. pítí Wmb. uti-ro, Yoke si |
| PCEMP *kandoRa 'cuscus, phalangerid' | Buli do <br> Yer. átóòrà |
| PMP *buykul 'lump' | Buli puk |
| PEMP *bejker 'defecate' | Buli péke |
| PCEMP *wajka 'canoe' | Ma'ya ' $w a^{12} k$ <br> Ambai wa, Ansus wa, Biak wa(i), Dus. wak, Moor gwá'-a, Wrp. gha, Yer. gwáà <br> Wmb. wa-ro, Yoke wa/pi |

Table 4.49: Reflexes of nasal-stop clusters in SHWNG.

### 4.2.22 *y

There is little evidence for the outcome of $* y$ in SHWNG. The available data suggests that it was generally preserved (see Tables 4.50-4.52). The diphthong *ay tends to monophthongize to $e$ or $i$ in word-final position.

| PMP *kahiw, PCEMP *kayu | Buli ai, Sawai ay, Taba ai |
| :--- | :--- |
| 'wood' |  |
| PMP *ma-hiaq, PCEMP | Buli ma |
| *mayaq 'ashamed' |  |
| PMP *qatay 'liver' Buli yatay, Gane yocu (?), Sawai yotzy, Taba yoco 'heart' (?) <br> PMP *waqay 'foot, leg' Gane we, Taba we |  |

Table 4.50: Reflexes of *y in South Halmahera.

```
PMP *kahiw, PCEMP *kayu Ambel ay, As a, Biga ay(o), Gebe kai, Kawe w/ay(o), Ma'ya
    'wood'
PMP *ma-hiaq, PCEMP Gebe moi, Ma'ya -'ma3
    *mayaq 'ashamed'
PMP *qatay 'liver'
Ambel latey, Gebe atai, Kawe la'te(y), Lag. 'lati, Mat. ta '21y,
    Ma'ya (S.) 'lati }\mp@subsup{}{}{3
```

Table 4.51: Reflexes of *y in Raja Ampat.

| PMP *duyun 'dugong' | Biak rowin, Moor rún-a, Wrp. rui, Yaur rì'-ré |
| :--- | :--- |
| PMP *ma-hiaq, PCEMP | Biak ma, Umar mae, SL mamaya, Wan. mamaya, Yer. mái |
| *mayaq 'ashamed' |  |
| PMP *qatay 'liver' | Biak ke/n, Kur. ate, Moor à'a, Wan. ate/ni, Yer. ákéè/nà |
| PMP *qayam 'bird' | Ansus aya, SL aya, Wan. aya |
| PMP *waqay 'foot, leg' | Ambai we, Biak we, Dus. we, SL aen, Wan. ai, Wrp. e |

Table 4.52: Reflexes of *y in Cenderawasih Bay and Mamberamo.

### 4.2.23 *w

The regular outcome of *w is $w$ in South Halmahera and Raja Ampat (see Tables 4.53 and 4.54). The only exception is PMP *siwa > Taba -sio 'nine', where it is lost. Frequency may have played a factor here, or the intervocalic position of $w$ preceding a rounded vowel.

In Cenderawasih Bay and Mamberamo, the outcome is also generally $w$ (see Table 4.55). In Moor, Yaur, and Yerisiam, * $w$ is hardened to $g w .{ }^{25}$ In Waropen, the outcome is $\gamma \sim \beta$ in the Waropen Kai dialect, and consistently $\beta$ in the Napan dialect.

| PMP *lawaq 'spider' | Buli kopo/law, Gane tapi/lou, Sawai lawalawa 'spiderweb' |
| :--- | :--- |
| PEMP *qayawan 'banyan' | Buli yawan |
| PMP *siwa 'nine' | Taba -sio |
| PMP *wahiR 'fresh water' | Buli waya, Gane waya, Sawai wos, Taba woya |
| PMP *wakaR 'root' | Buli wā |
| PMP *waqay 'foot, leg' | Gane we, Taba we |
| PMP *walu 'eight' | Sawai -wal, Taba -wal |
| PCEMP *waRəj 'vine, creeper' | Buli wala, Sawai wole, Taba wola |
| > 'rope' |  |

Table 4.53: Reflexes of *w in South Halmahera.

[^34]```
PMP *lawaq 'spider' Gebe p/law
PMP *ma-ñawa 'breathe' Gebe -fa/ñawa/ya
PMP *wakaR 'root' Mat. wa 21/po
PMP *wahiR 'fresh water' Ambel we, As we?, Biga wey, Fia. wey, Gebe wa, Kawe
    'way[a], Lag. 'way[a], Ma'ya (S.) 'waya3, Wau. 'way[a]
PCEMP *waRaj 'vine, creeper' As wali?, Biga wili, Gebe wala, Kawe wala
    > 'rope'
```

Table 4.54: Reflexes of ${ }^{*} w$ in Raja Ampat.

| PMP *bulaw-an 'gold' | Biak brawən, Roon barawan, SL barawan |
| :---: | :---: |
| PMP *qasawa 'spouse' | Ansus awa/ni, Biak swa-, Wan. sawa 'husband' |
| PMP *siwa 'nine' | Wrp. sigh/iro |
| PMP *tawan 'a tree: Pometia pinnata' | Ambai tawan, Ansus tawan, Moor kagwán-a, Wan. tawa, Wrp. kavan/o |
| PMP *wahiR 'fresh water' | Ambai waya 'river', Biak wār, Dus. war, Kur. way 'river', Moor gwàjar-a 'river', SL waya 'river', Wrp. ghai Wmb. war/en-do 'river' |
| PMP *wakaR 'root' | Ambai -wa(sa), Pom wa-wari, Wan. war, Wooi wari, Wrp. ghai, vai |
| PMP *walu 'eight' | Biak war |
| PCEMP *wayka 'canoe' | Ambai $w a$, Ansus $w a$, Biak wa(i), Dus. wak, Moor gwá'-a, SL wa, Wrp. gha |
|  | Wmb. wa-ro, Yoke wa/pi |
| PMP *waqay 'foot, leg' | Ambai we, Biak we, Dus. we, SL aen, Wan. ai, Wrp. e |
| PCEMP *waRəj 'vine, creeper' $>$ 'rope' | Ambai wai, Moor gwàri/'-a, SL wai, Umar wari, Yaur gwàrí-e, Yer. gwáarí |
| PMP *wiRi 'left (side)' | Moor sa/gwiri, Yaur vráa-gwìri-e, Yer. bá-gírú |

Table 4.55: Reflexes of * $w$ in Cenderawasih Bay and Mamberamo.

### 4.2.24 *i

The regular outcome of $* i$ is $i$ in most SHWNG languages (see Tables 4.56 4.58).
In the South Halmahera language Sawai, ${ }^{*} i>\varepsilon$ in final unstressed syllables of polysyllabic words. ${ }^{26}$

The Raja Ampat language Biga shows irregular *i>e in -mlef 'laugh'.

[^35]In the Cenderawasih Bay languages Biak and Dusner, *i is lowered in final closed syllables of polysyllabic words. The outcome is $a \sim e$ in Biak and $e$ in Dusner. ${ }^{27}$

```
PMP *ba-b<inьahi, PCEMP
    *b<insai 'woman'
PMP *bisik 'sick'
PMP *hikan, PEMP *ikan
    'fish'
PMP *lanit 'sky'
PMP *lima 'five'
PCEMP *malip 'laugh'
PMP *ma-nipis 'thin
    (materials)'
PMP *ma-pia 'good'
PMP *ta\etais 'to cry'
Buli ma-pin, Gane mapín, Sawai mepin, Taba mapin
Buli pisi, Sawai -pise
Buli ian, Gane ian, Sawai in
Buli lanit, Gane langit, Sawai lanst, Taba langit
Buli lim, Sawai -lim, Taba -lim
Buli -mlif, Gane mlif, Sawai -mlif, Taba -(ha)mlih
Buli m-lifis, Gane manifis, Sawai -menifes, Taba mnihis
Buli ma-fia, Gane fia, Taba hia
Buli tajis, Gane tangis
```

Table 4.56: Reflexes of *i in South Halmahera.

| PMP *ba-bsin ${ }^{2}$ ahi, PCEMP *binıai 'woman' | Ambel bin, Biga wa/'bin, Fia. bin, Gebe mapin, Kawe pin, Lag. pin, Ma'ya ' $p i^{3} n$, Wau. pin |
| :---: | :---: |
| PMP *hikan, PEMP *ikan 'fish' | Gebe in, Kawe 'in[i], Mat. yin, Ma'ya (M.) ${ }^{1} i^{12} n$ |
| PMP *lapit 'sky' | As lanit |
| PMP *lima 'five' | Ambel lim, Biga lim, Kawe lim, Lag. 'li ${ }^{3} m$, Mat. $l^{3}$ m, Ma'ya 'li³m, Wau. lim |
| PCEMP *malip 'laugh' | As -meli/s, Biga -mlef, Gebe -mnif |
| PMP *ma-pia 'good' | As $f i$, Biga $f i$, Fia. fiy, Kawe fi, Lag. fi, Mat. $f i^{3}$, Ma'ya ' $f i^{3}$, Wau. fi |
| PMP *tajis 'cry' | As -tanis, Biga -tinis, Gebe -tenis |

Table 4.57: Reflexes of *i in Raja Ampat.

[^36]```
PMP *ba-b<in>ahi, PCEMP
    *binvai 'woman'
PMP *bitil 'hungry' Ambai wa/wisi, Ansus wawi, Biak bisar, Dus. m/buser, Wan.
    va/wisi
PMP *hikan, PEMP *ikan Biak in, Dus. in, Moor (H.) ijana
    'fish'
PMP *lanit 'sky` Biak nanək, Yer. ráak/átè
PMP *lima 'five' Ambai rin, Ansus ring, Biak rim, Dus. rim/bi, Moor rím-ó,
    Mun. -rim, SL ri, Wan. rime, Wrp. rim/o, Yer. rûmà
Wmb. rin/ti, Yoke -rim/si
PCEMP *malip 'laugh' Ambai miri, Ansus mari, Biak mbrif, Moor marí/'-a, SL mari,
    Umar mari, Wan. mari
PMP *punti 'banana` Moor hút-a, Umar idi, Wrp. ui, Yaur ìdí-e, Yer. píití
Wmb. uti-ro, Yoke si
PMP *qasin 'saltiness' > 'salt' Ambai ai, Ansus ai, Biak m/asən, Dus. m/asen, Wan. s/asi
PMP *qubi 'yam, Dioscorea' Ambai uvi, Wan. uwi, Wrp. uvi
PMP *ta\etais 'cry' Biak kan\partials, Moor 'ànit-a, Wrp. anis/a, Yaur 'àáh-rè, Yer.
    káh/é
```

Table 4.58: Reflexes of *i in Cenderawasih Bay and Mamberamo.

### 4.2.25 *u

The usual outcome of * $u$ inSHWNG is $u$ in originally non-final syllables, and $u \sim i$ in final syllables (see Tables 4.59-4.61). There are no attested cases of the $i$ outcome in Fiawat, Matbat, Moor, Umar, and Yoke; this may simply reflect an artifact of the available data.

In the South Halmahera language Sawai, * $u>{ }^{*} i>\varepsilon$ in final syllables, according to the same rule described in $\S 4.2 .24$ above.

The Raja Ampat language Biga shows irregular * $u>o$ in kalof 'rat', paralleling the irregular change mentioned in §4.2.24 above. There is similar sporadic lowering in Raja Ampat reflexes of PMP *qitzluR 'egg'; Umar e-tro 'three'; and Yaur óò-jé 'louse'.

In the Cenderawasih Bay languages Biak and Dusner, *u is lowered and fronted in final closed syllables of polysyllabic words. The outcome is $\partial \sim e$ in $\operatorname{Biak}^{28}$ and $e$ in Dusner. Lowering does not occur, apparently irregularly, in PMP *duyuy > Biak rowin 'dugong'.

Umar, Yaur, and Yerisiam share an irregular change of * $u>i$ in the first syllable of PMP *punti 'banana'. This provides additional evidence that these languages belong to the same low-level subgroup (see $\$ 4.2 .14$ and $\S 4.2 .19$ ). However, the argument is weakened somewhat when we consider that the three languages are geographically proximate and in contact, making it difficult to rule out borrowing.

[^37]It is noteworthy that there is some agreement in which words undergo the irregular * $u>i$ change: it occurs in reflexes of PMP *manuk 'bird' and PMP *bunuq 'kill' in widely separated SHWNG languages. This cannot be used as evidence for a SHWNG subgroup, but it provides good evidence for the unity of SHWNG.

Another shared irregularity is found in Sawai, Serui-Laut, and Warembori, which all show unexpected penultimate * $u>i$ in reflexes of PMP *kutu 'louse'. It is not clear whether this happened independently. In any case, a subgroup of these three languages is not defensible on such a slim basis, especially given the much stronger evidence for deriving Serui-Laut from Proto-Western Yapen.

| PMP *bulu 'feather, body | Buli plu, Sawai plu |
| :--- | :--- |
| hair' |  |
| PMP *bunuq 'kill', | Buli pun, Gane pun, Sawai -pun, Taba -pun |
| PMP *duha 'two' | Buli lu, Gane p/lu, Sawai -lu, Taba -lu |
| PCEMP *kazupay 'rat' | Buli luf, Gane luf, Sawai luf |
| PMP *kutu 'louse' | Buli ut, Gane kut, Sawai kit, Taba kut |
| PMP *manuk 'bird' | Buli mani, Gane manik, Sawai mane, Taba manik 'chicken' |
| PMP *Rumaq 'house' | Gane um, Sawai um |
| PMP *susu 'female breast' | Buli sus, Gane susu, Sawai sus, Taba susu |

Table 4.59: Reflexes of *u in South Halmahera.

| PMP *bunuq 'kill' | Ambel buni, As -bun, Biga bun, Fia. bun, Gebe -pun, Kawe bun, Lag. ' $b u^{3} n$, Mat. $b u^{3} n, ~ M a ' y a ~ ' b u^{3} n$, Wau. bun, fal/'pun |
| :---: | :---: |
| PMP *duha 'two' | Ambel low, As lu, Biga lu, Gebe -lu, Lag. 'lu ${ }^{3}$, Mat. $l u^{3}$, Ma'ya 'lu', Wau. lu |
| PCEMP *kazupay 'rat' | Biga kalof, Ma'ya keluf |
| PMP *kutu 'louse' | Ambel ut, Biga wut, Fia. wut, Gebe ut, Kawe wut, Lag. wut, Mat. wu ${ }^{3} t$, Ma'ya (S.) ' $u^{3} t$, Wau. wut |
| PMP *manuk 'bird' | Ambel mani, As mani, Biga mi'ni, Fia. min, Gebe mani, Kawe mani, Lag. 'min[i], Ma'ya (S.) 'mini ${ }^{12}$, Wau. 'min[i] |
| PMP *qitaluR 'egg' | Ambel talo, As talo, Biga to'lo, Fia. tol, Kawe 'tol[o], Lag. 'tol[o], Mat. to ${ }^{21} l$, Ma'ya (S.) 'to ${ }^{12} l$, Wau. 'tol[o] |
| PMP *Rumaq 'house' | Biga um, Gebe um, Kawe um, Ma'ya ' $\mathbf{u}^{3}$ m |
| PMP *susu 'female breast' | Ambel su, As sus, Biga sus, Gebe sus, Kawe su, Lag. 'tut[u], Mat. $s u^{3}$, Ma'ya ${ }^{~} s u^{3} s$, Wau. $s u$ |

Table 4.60: Reflexes of * $u$ in Raja Ampat.

| PMP *bantun 'pull up, as out of a pit' | Biak bakan |
| :---: | :---: |
| PMP *bulu 'feather, body hair' | Ambai na-wa/vuru, Moor vùru, Umar uru, Wrp. vuro, Yer. úurú-gùa |
|  | Wmb. ke-vun-do, Yoke bo |
| PMP *bunuq 'kill' | Ambai mun, Ansus mung, Biak mun, Dus. mun, Moor mun/â, SL mun, Wan. mun, Wrp. mun/a |
|  | Wmb. muni-ro, Yoke mu |
| PMP *duha 'two' | Ambai -ru, Biak su/ru, Dus. nu/ru, Moor rú-ró, Umar e-dih, Wan. muan/du, Wrp. vo/ru, Yaur ré-dú-hè, Yer. rúu-hí |
| PMP *duyun 'dugong' | Biak rowin, Moor rún-a, Wrp. rui, Yaur rì-ré |
| PMP *kutu 'louse' | Ansus $u t u$, Biak $u k$, Moor (A.) ú'-a, Moor (H.) kú'-a, SL itu, Umar utu, Wrp. ghui, vui, Yaur óò-jé |
|  | Wmb. ki-ro |
| PMP *manuk 'bird' | Ambai man-, Biak man, Moor mànu, Umar mna, Wrp. mani, Yaur mà'-ré |
|  | Wmb. mani-ro, Yoke mani |
| PMP *ma-takut 'afraid' | Ambai matai, Ansus matai, Biak mkāk, Dus. mtat, Moor (A.) mu'á'-a, Moor (H.) muká'-a, SL maitai, Umar mtat, Wan. matai(t), Wrp. akak/o, Yer. ngkák/é |
| PMP *punti 'banana' | Moor hút-a, Umar idi, Wrp. ui, Yaur ìdí-e, Yer. píití Wmb. uti-ro, Yoke si |
| PMP *qapuR 'lime, calcium’ | Biak afor, Dus. aper, Moor (A.) áua, Moor (H.) ár-a, Umar au, Yer. áau |
| PMP *Rumaq 'house' | Biak rum, Dus. rum, Moor rùma, Umar ron, Wrp. ruma, Yaur rúùg-ré 'ceremonial house', Yer. rúmà 'ceremonial house' |
| PMP *susu 'female breast' | Ambai $u i$, Ansus $u$, Biak sus, Moor tút- $a$, Umar huhu, SL su, Wan. susu, Wrp. susu, Yaur húhì-e, Yer. húuhú-gùa Wmb. ke-tutu-ro |
| PMP *tzlu 'three' | Ambai -toru, Ansus toru, Dus. tori, Moor ór-ó, Umar e-tro, Wan. toru, Wrp. or-o, Yer. kóorí-hé |
| PMP *tunu 'roast food over a fire' | Biak kun, Dus. un, Moor 'un-î, SL tunu, Yaur 'ún-dè, Yer. kúuná <br> Wmb. kuni |

Table 4.61: Reflexes of * $u$ in Cenderawasih Bay and Mamberamo.

### 4.2.26 *a

The regular outcome of *a is $a$ in the South Halmahera language Buli (see Table 4.62). In Gane, Taba, and Sawai, there is a tendency to raise * $a$, with an outcome of $o$ in Gane and Taba and $\rho \sim \varepsilon$ in Sawai. Gane, Taba, and Sawai generally show agreement regarding which words undergo the change, though the conditioning factors are unclear.

In Raja Ampat, the outcome is generally $a$ (see Table 4.63). There is a tendency to monophthongize *ai $>e$ in reflexes of PMP *wahiR 'fresh water'. The reflexes of PMP *manuk 'bird' show irregular *a> in several languages. As gasen 'name' shows irregular * $a>\varepsilon$.

In Cenderawasih Bay and Mamberamo, the outcome is also generally a (see Table 4.64). In Biak (and probably Dusner, but evidence is lacking), * $a>\rho \sim e$ in final closed syllables of polysyllabic words. ${ }^{29}$ Additional examples include PMP *bulaw-an > brawan 'gold', PMP *habaRat 'south' > barak 'west', PMP *hasay > asan 'gills', PMP *uRat 'root' > urək 'vein, vessel', and PMP *laman > ramən 'deep'. The only known exception is PMP *yajan 'name' > nasan 'title'.

The raising change in Gane, Sawai, and Taba could plausibly be used to support a subgroup. It is unusual in the context of SHWNG, and the agreement among affected lexical items lends considerable weight to its status as a shared innovation, especially given the lack of clear conditioning. The geographical distribution of the * $a>o$ change is in fact both wider and narrower than it would appear from Table 4.62. Adriani and Kruyt (1914: 3:335) note that it is found in Maba and Patani, apparently in the same words as the other languages. Inspection of Teljeur (1982) shows that it is not found in the Southeast Makian dialect of Taba, spoken in the villages of Samsuma, Peleri, Tahane, and Soma.

A putative subgroup containing the languages undergoing the raising change would be incompatible with Blust (1978a)'s subgroups Central-Eastern (including Buli, Patani, Maba, and Sawai) and Southern (including Gane and Taba). The fact that a single language, Taba, shows different outcomes among its dialects suggests that the change may have spread via diffusion rather than common inheritance.

Two considerations support this analysis. First, the affected languages are found in a geographically contiguous area, with Taba and Buli at each extreme. Second, there is evidence that the Southeast Makian dialect of Taba has a different history than the rest of Taba. Andaya (1993: 95) states that many of the original inhabitants of Gane were deported to repopulate Makian after the Spanish conquest of Ternate in 1606; Bowden (2001: 8) claims that they settled in Tahane. This dialect may therefore represent a relic area, preserving original features that were lost elsewhere.

I therefore assume that the raising change spread via diffusion, and does not define a subgroup. Based on tentative historical evidence, it most likely reached Gane after 1606.

[^38]| PMP *añam 'weave, plait' | Buli yanam, Sawai -yonem |
| :---: | :---: |
| PMP *asa, *isa, *asa 'one’ | Buli asa, isa, Gane p/so, Sawai -so, Taba -so |
| PMP *daRaq 'blood' | Buli la, Sawai lclo, Taba llo |
| PMP *zpat, PEMP *pat 'four' | Buli fat, Gane -fot, Sawai -fıt, Taba -hot |
| PMP *haRazan 'notched log ladder' | Buli olan 'ladder', Sawai lon |
| PMP *kahiw, PCEMP *kayu 'wood' | Buli ai, Sawai ay, Taba ai |
| PMP *lanit 'sky' | Buli lanit, Gane langit, Sawai lanst, Taba langit |
| PMP *manuk 'bird' | Buli mani, Gane manik, Sawai mane, Taba manik 'chicken' |
| PMP *ma-Ruqanay 'man' | Buli mān, Gane maón, Sawai mon, Taba mon |
| PMP *mata 'eye' | Buli mta, Gane mto, Sawai mto, Taba mto |
| PMP *m-atay 'die' | Buli mat, Gane mot, Taba -mot |
| PMP *gajan 'name' | Buli yasan, Sawai yosey |
| PMP *qatzp 'roof' | Buli yataf, Gane yotaf, Sawai yotzf |
| PMP *quzan 'rain' | Buli ulan, Gane ulan, Taba ulan |
| PMP *siwa 'nine' | Taba -sio |
| PMP *wahiR 'fresh water' | Buli waya, Gane waya, Sawai wวE, Taba woya |
| PMP *walu 'eight' | Sawai -wal, Taba -wal |

Table 4.62: Reflexes of *a in South Halmahera.

| PMP *asa, *isa, *asa 'one’ | As $s a, \mathrm{Gebe}-\mathrm{s} a, \mathrm{Ma}$ 'ya (S.) ' $s a$ |
| :---: | :---: |
| PMP *zpat, PCEMP *pat-i, PEMP *pat 'four' | Ambel $\phi$ at, As fat, Biga fat, Gebe pi-fat, Lag. fat, Ma'ya ${ }^{\prime} f a^{12} t$ |
| PMP *kahiw, PCEMP *kayu 'wood' | Ambel ay, As $a$, Biga $a y(o)$, Gebe kai, Kawe w/ay(o), Ma'ya 'ai(o) |
| PMP *manuk 'bird' | Ambel mani, As mani, Biga mi'ni, Fia. min, Gebe mani, Kawe mani, Lag. 'min[i], Ma'ya (S.) 'mini ${ }^{12}$, Wau. 'min[i] |
| PMP *ma-Ruqanay 'man' | Ambel man, As -man, Biga wa/'man, Gebe man, Kawe 'man[a], Lag. 'man[a], Mat. $w a^{3} y / m a^{21} n$, Ma'ya 'ma ${ }^{12} n$, Wau. 'man[a] |
| PMP *m-atay 'die' | Ambel -mat, As ma-P, Biga mat, Gebe -mat, Kawe mat, Mat. $m a^{12} t$, Ma'ya 'ma ${ }^{12} t$, Wau. mat |
| PMP * $\quad$ ajan 'name' | As gassn, Biga nan, Fia. nahan, Gebe yasn/o-, Kawe nan, Lag. na'han, Mat. $n a^{21} n$, Ma'ya (S.) 'nasa ${ }^{3} n$, Wau. nan |
| PMP *qatap 'roof' | Gebe yataf |
| PMP *wahiR 'fresh water' | Ambel we, As we?, Biga wey, Fia. wey, Gebe wa, Kawe 'way[a], Lag. 'way[a], Ma'ya (S.) 'waya3, Wau. 'way[a] |

Table 4.63: Reflexes of *a in Raja Ampat.

| PMP *añam 'weave, plait' | Biak yanəm, Yer. áamán/é |
| :---: | :---: |
| PMP *asa, *isa, *asa 'one' | Biak sai, Moor ta-tá, Wan. esa |
| PMP *daRaq 'blood' | Moor ràra, Wrp. rara, Yer. rárà Wmb. ke-ra-ro |
| PMP *zpat, PCEMP *pat-i, PEMP *pat 'four' | Ambai -a, Biak fiak, Dus. pati, Marau ati, Moor á’-ó, SL $-a$, Umar eat, Wan. at, Wrp. ak/o, Yaur r-ía-hè, Yer. áak/à |
| PMP *hapan 'fishing line' | Biak yafan 'harpoon' |
| PMP *kahiw, PCEMP *kayu 'wood' | Ambai ai, Ansus ai, Biak ai, Dus. ai, Moor ka/'úat-a, SL ai, Umar ae, Wan. ai, Wrp. ai, Yaur à-jé, Yer. ái Wmb. ayo-ro, Yoke a |
| PMP *manuk 'bird' | Ambai man-, Biak man, Moor mànu, Umar mna, Wrp. mani, Yaur mà'-ré |
|  | Wmb. mani-ro, Yoke mani |
| PMP *yajan 'name' | Biak nasan 'title', Moor nàtan-a, Umar han, Wan. san/o, Wrp. nasan/o, Yaur áhg-rè, Yer. áahán/à |
|  | Wmb. nan-do, Yoke nand |
| PMP *qatzp 'roof' | Moor r/àa, Wrp. aka, Yer. áká-ráaníà |
| PMP *wahiR 'fresh water' | Ambai waya 'river', Biak wār, Dus. war, Kur. way 'river', Moor gwàjar-a 'river', SL waya 'river', Wrp. ghai Wmb. war/en-do 'river' |

Table 4.64: Reflexes of *a in Cenderawasih Bay and Mamberamo.

### 4.2.27 Insertion of $\boldsymbol{y}$ before initial *a

The glide $y$ is sporadically inserted before initial *a in a number of SHWNG languages (see Table 4.65). Blust (1978a) has observed that glide insertion must have occurred after the loss of ${ }^{*} q$ and *h, since words with initial * $q$ and *h are also affected, Likewise, it must have occurred after the loss of $*_{z}$ in Umar and Yerisiam (see §4.2.14). In Moor, Umar, Yaur, and Yerisiam, the inserted initial $* y$ was later strengthened to dz. In Raja Ampat languages other than As, Gebe, and Matbat, this initial *y was strengthened to $l$.

Glide insertion is a puzzling change. The conditioning environment is unexpected, making it a sufficiently unusual change to be plausibly used for subgrouping. However, the distribution of glide insertion bears no apparent relationship to subgroups established by other means. Its emergence may be the result of an areal tendenacy, as it is also found in the CMP languages Arguni and Sekar, spoken on the Bomberai peninsula on the west coast of New Guinea. ${ }^{30}$

The glide strengthening changes are of somewhat less plausible subgrouping value. Each is found in a small set of geographically contiguous languages, raising the possibility of diffusion rather than shared inheritance. Of the two changes, *y $>l$ is more distinctive,

[^39]and provides some support for grouping Ambel, Biga, Fiawat, and the various dialects of Ma'ya.

| PMP *añam 'weave, plait' | Buli yanam, Sawai -yगnsM Biak yanam |
| :---: | :---: |
| PMP *hapuy, PCEMP *api | Buli yap |
| 'fire' | Ambel lap, As yap, Biga lap, Fia. lap, Gebe yap, Kawe lap, Lag. lap, Mat. ya ${ }^{3} p$, Ma'ya ' $1 a^{12} p$, Wau. lap Yer. jáai |
| PMP *hasaq 'whet, sharpen' | Ansus asa/sumi, Biak yās, SL aa, Yer. áhà |
| PMP *(q)aRuhu 'a shore tree: Casuarina equisetifolia' | Ambai -yaru, Biak yār, Moor jàru/r-a, Umar jaru, Wan. yaru, Yaur jàr-murí-e |
| PMP *qasu 'smoke' | Buli mama/yás, Gane $n / y a s$, Sawai $m \varepsilon / y a s$, Taba yas/o As kap/yas, Biga ka'p/las, Gebe ma/yas, Ma'ya ${ }^{\prime} l a^{12} s$ |
|  | Biak ās 'to smoke (of a fire)', Wrp. asi, Yer. ógw/áahú-gùa Buli yatay, Gane yocu (?), Sawai yotty, Taba yoco 'heart' (?) |
| 'liver | Ambel latey, Gebe atai, Kawe la'te(y), Lag. 'lati, Mat. $t a^{21} y$, Ma'ya (S.) 'lati ${ }^{3}$ |
|  | Biak ke/n, Kur. ate, Moor à ${ }^{\text {a }}$, Wan. ate/ni, Yer. ákéè/nà |

Table 4.65: Initial glide insertion in SHWNG.

### 4.2.28 * 2

The outcome of *z depends on whether it was originally in the penultimate or final syllable. This is most likely because of a stress difference in Proto-SHWNG: the penultimate syllable was stressed, the final unstressed (§5.4).

In South Halmahera, the regular outcome is $o$ in the penult (see Table 4.66). In Buli, Gane, and Taba, the regular outcome is $a$ in the final; in Sawai, it is $\varepsilon$.

The situation in Raja Ampat is more complex (see Table 4.67). The outcome of *z harmonizes with the other vowel in the word if one is present. ${ }^{31}$ Otherwise, the outcome is penultimate syllable $a$ and final syllable $o / \rho$ in Ambel and As, and general $o$ in the other Raja Ampat languages. ${ }^{32}$

In Cenderawasih Bay and Mamberamo, outcomes are similar to South Halmahera. Penultimate syllable *z $>o$ in all languages. ${ }^{33}$ Final syllable *z is reflected as $\partial \sim e$

[^40]in Biak; ${ }^{34} e$ in Dusner; $e \sim a$ in Warembori (on the basis of two words, neither very conclusive); and $a$ in the remaining languages.

The development of *z in Raja Ampat sets these languages apart from other SHWNG languages. This phonological innovation could be used as a starting point in arguing for Proto-Raja Ampat, with the possible exclusion of Ambel and As.

The developments shared by Biak and Dusner in the final syllable outcomes of * $u$, *i, and *z are striking, and provide good additional support for the Biakic subgroup.

| PMP *znəm 'six' | Buli wonam, Sawai wonsm, Taba -wonam |
| :--- | :--- |
| PMP *hapən 'fishing line' | Buli yafan 'harpoon' |
| PMP *haRazan 'notched log | Buli olan 'ladder' |
| ladder' |  |
| PMP *qatəp 'roof' | Buli yataf, Gane yotaf, Sawai yotef |
| PMP *qinəp, PCEMP *qenəp <br> 'lie down to sleep' | Sawai -yencf |
| PMP *Rəbək 'to fly' |  |
| PMP *tanəm 'to plant', | Buli opa, Gane opa, Sawai -ope, Taba -opa |
| PMP *trbuh 'sugarcane' | Gane tonam, Sawai tonem |
| PMP *tzlu 'three' | Buli top, Sawai tep |

Table 4.66: Reflexes of *z in South Halmahera.

[^41]| PMP *dəクəR 'hear' | Biga do'no, Gebe loŋว, Kawe 'don[o], Lag. 'don[o], Mat. $n o^{41} \eta$, Ma'ya 'do ${ }^{12} n$, Wau. 'don[o] |
| :---: | :---: |
| PMP *ənəm 'six' | Ambel wanom, Biga wo'nom, Fia. wonom, Kawe wo'nom, Lag. wo'nom, Mat. no ${ }^{12}$ m, Ma'ya (S.) 'wono ${ }^{3} \mathrm{~m}$, Wau. wo'nom |
| PMP *lipzn 'tooth' | Biga lifo-, Kawe $a$-'lif(o), Lag. $a$-lif(o), Ma'ya (S.) ka-lif(o), Wau. la-'lif |
| PMP *ma-pənuq 'full' | Ambel an/hon, Biga fon, Fia. fon, Kawe fon, Lag. fon, Mat. $f o^{3} n$, Ma'ya ' $f f^{12} n$ |
| PMP *mañak 'fat, grease' | Biga ma'na(o), Fia. mena, Kawe ma'na, Lag. ma'na, Mat. $m n a^{12}$, Ma'ya (S.) $m a^{\prime} n a^{3}$, Wau. ma'na |
| PMP *qatzp 'roof | Gebe yataf |
| PMP *qinap, PCEMP *qenəp 'lie down to sleep' | Ambel -ane, Biga -e'nef, Fia. -ene, Gebe yencf, Kawe -e'nef, Lag. -'enef, Ma'ya (S.) -'ene ${ }^{3} f$, Mat. - $e^{41} n$, Wau. -'enef |
| PMP *qitaluR 'egg' | Ambel talo, As talu, Biga to'lo, Fia. tol, Kawe 'tol[o], Lag. 'tol[o], Mat. to ${ }^{21} l$, Ma'ya (S.) 'to ${ }^{12} l$, Wau. 'tol[o] |
| PMP *Rabok 'to fly' | Ambel -apo, As $n / a p$, Biga -o'bo, Fia. -op, Gebe -opo, Kawe -'op[o], Lag. -'op[o], Ma'ya (S.) -'opo ${ }^{3}$, Wau. -'op[o] |
| PMP *tanam 'to plant' | Gebe fa/tanam |

Table 4.67: Reflexes of *z in Raja Ampat.

| PMP *bəRsay 'canoe paddle' | Ambai bo, wo, Ansus bo, wo, Biak -boras, Dus. vors, Moor vór$a$, SL bo, Wan. bo, vo |
| :---: | :---: |
| PMP *ənam 'six' | Ambai wonan, Ansus wonang, Biak wonəm, Wrp. ghon/o |
| PMP *hapən 'fishing line' | Biak yafon 'harpoon' |
| PMP *qinap, PCEMP *qenap 'lie down to sleep’ | Ambai ena, Ansus ena, Biak enəf, Dus. enep, Moor enâ, SL ena, Wan. ena, Wrp. ena-ko, Yer. éen/é <br> Wmb. na/n-do |
| PMP *qitaluR 'egg' | Umar tor, Yaur òó'-rè (?), Yer. á/kóor/é |
| PMP *Rəbək 'to fly' | Biak rob, Wrp. ro/ko Wmb. dove |
| PMP *tanam 'to plant' | Ambai tana(m), Ansus tanam/i, Moor 'anam-î, SL tana, Umar tnam, Wan. tanam, Wrp. ana/ko, Yaur ì-'àm-né 'I plant', Yer. káamán/é |
| PMP *tzlan 'to swallow' | Ambai ton, Biak oran, Moor 'oran-î, Umar dor, Yer. kóor/í |
| PMP *tzlu 'three' | Ambai -toru, Ansus toru, Dus. tori, Moor ór-ó, Umar e-tro, Wan. toru, Wrp. or-o, Yer. kóorí-hé |

Table 4.68: Reflexes of *z in Cenderawasih Bay and Mamberamo.

### 4.2.29 *e

The outcome of PCEMP *e is generally $e$ in the small number of attested examples in SHWNG (see Table 4.69). In Sawai, the outcome is $\varepsilon$. In Ambel, the reflex is apparently $a$ in -ane 'sleep'.

| PCEMP *keRa(ny) 'hawksbill turtle, Eretmochelys imbricata' | Moor èran-a |
| :---: | :---: |
| PMP *maqiRaq, PCEMP *meRaq 'red' | Biga $m a /{ }^{\prime} m e$, Fia. $m e / m e$, Kawe $m e$, Ma'ya (S.) $m a /^{\prime} m e^{3}$, Wau. me |
| PMP *qinzp, PCEMP *qenəp | Ansus merai, SL merai, Umar miar, Wan. mirai Sawai -yहnef |
| 'lie down to sleep' | Ambel -ane, Biga -e'nef, Fia. -ene, Gebe yencf, Kawe -e'nef, Lag. -'enef, Ma'ya (S.) -'ene ${ }^{3} f$, Mat. $-e^{41} n$, Wau. -'enef Ambai ena, Ansus ena, Biak enaf, Dus. enep, Moor enâ, SL ena, Wan. ena, Wrp. ena-ko, Yer. éen/é |

Table 4.69: Reflexes of *e in SHWNG.

### 4.2.30 * 0

The outcome of PCEMP/PEMP *o is generally $o$ in the small number of attested examples in SHWNG (see Table 4.70). In Biga, Gebe, and Kawe, the outcome is $\boldsymbol{2}$. Taba bat/talón 'sit' and Warembori vavo ‘above' show unexpected $a$.

| PMP *bawbaw, PCEMP *bobo <br> 'above' | Buli popó <br> Biga pa/pows <br>  <br> Biak bo, Wan. vavo, Wrp. bo |
| :---: | :--- |
| PCEMP *kandoRa 'cuscus, | Buli do |
| phalangerid' | Yer. átóòrà |
| PEMP *molay 'true' | Buli molan |
| PCEMP *tobV 'fishnet float' | Biak kob |
| PMP *tu(n)day, PCEMP | Buli -tolay, Sawai -tolsn, Taba bat/talón |
| *todan 'sit' | Gebe tolon, Kawe to'lon, Lag. to'lon, Mat. ho ${ }^{121}$ l, Ma'ya (S.) |
|  | 'solon, Wau. to'lon |
|  | Dus. ton, Moor 'ò, Umar tot, Yer. kó |

Table 4.70: Reflexes of *o in SHWNG.

### 4.2.31 Syncope

Syncope in SHWNG takes the form of the loss of an originally penultimate vowel, resulting in the creation of a new consonant cluster. In some cases, the initial consonant of this new cluster is later lost, as in PMP *banua > *pnu > Kawe nu 'village'. Syncope is lexically conditioned, applying only to certain proto-forms (§3.5).

Syncope is attested in at least one word in all South Halmahera and Raja Ampat languges (see Table 4.71). ${ }^{35}$

In Cenderawasih Bay and Mamberamo, syncope is clearly attested in Biak, Dusner, Umar, Waropen, Yaur, and Yerisiam (see Table 4.72). The altered penultimate vowel of Ansus ane/u, Serui-Laut ane, and Wandamen sane 'belly' is probably also a result of syncope, as are the Ambai and Wandamen reflexes of PEMP *natu 'child'.

In Umar, syncope has gone a step further than in other SHWNG languages, applying to many words that do not show syncope elsewhere (see Table 4.73).

There is no evidence for syncope in Moor. The original vowel is preserved in all attested examples, as in PMP *t-ama > kamá 'grandparent' versus PMP *trinsaqi > siné 'belly'.

The idiosyncratic nature of syncope suggests that it is very unlikely to have occurred independently. It is therefore good evidence for the shared history of the languages that undergo the change. The lack of syncope in Moor could be used to argue that syncope was not a Proto-SHWNG innovation, but rather occurred at the level of a large subgroup-call it Proto-Nuclear SHWNG-containing all SHWNG languages but Moor. However, given that syncope is by nature lexically sporadic, it is difficult to prove that it did not happen in Moor. The Proto-Nuclear SHWNG hypothesis is rather weak without being substantiated by other shared innovations.

[^42]| ```PMP *banua 'inhabited land' > 'village'``` | Biga $p n u$, Kawe $n u$, Lag. $n u$, Mat. $n u^{3}$, Ma'ya 'pnu ${ }^{3}$ |
| :---: | :---: |
| PMP *bulu 'feather, body hair' | Buli plu, Sawai plu |
| PCEMP *malip 'laugh' | Buli -mlif, Gane mlif, Sawai -mlif, Taba -(ha)mlih As -meli/s, Biga -mlef, Gebe -mnif |
| PMP *mata 'eye' | Buli $m t a$, Gane mto, Sawai mto, Taba mto Gebe nta |
| PMP *məñak 'fat, grease' | Buli mna <br> Biga ma'na(o), Fia. mena, Kawe ma'na, Lag. ma'na, Mat. $m n a^{12}$, Ma'ya (S.) $m a^{\prime} n a^{3}$, Wau. ma'na |
| PEMP *natu 'child' | Buli ntu, Gane tu, Taba mtu Gebe ñat 'person' |
| PMP *paniki 'fruit bat' | Buli fni, Gane fnik, Sawai fni |
| PMP *t-ama 'father' | Buli $h m \bar{a}$ |
| PMP *t-ina 'mother' | Buli hñe |
| PMP *tinsaqi 'intestines’ > 'belly’ | Buli hñao, Sawai sno <br> Ambel nyay, Biga nyao, Fia. na, Gebe hñao, hñainora, Kawe a-'nyay(o), Lag. a-'nyay(o), Ma'ya 'na(o), Wau. ka-'nyay(o) |

Table 4.71: Syncope in South Halmahera and Raja Ampat.

| PMP *banua 'inhabited land' $>$ 'village' | Ansus nu 'world', Biak mənu, Dus. munu/ai, Moor manù 'forest', SL $n u$ 'world', Umar nu/ae, Wrp. nu, Yaur núù-ré, Yer. nú <br> Wmb. bunu/pune (?) |
| :---: | :---: |
| PCEMP *malip 'laugh' | Ambai miri, Ansus mari, Biak mbrif, Moor marí/'-a, SL mari, Umar mari, Wan. mari |
| PMP *mata 'eye' | Biak mga, Moor masina'ú (?), Umar mta |
| PMP *məñak 'fat, grease' | Ambai ne-main, Moor mananá, Umar mnai, Wan. mai[n], Wrp. mana, Yaur mnáa-rè, Yer. mì/mná |
| PEMP *natu 'child' | Ambai $a n t u / n$, Dus. mtu, Moor na'ú 'person', Wan. $a[n] t u$, Wrp. ku |
| PMP *t-ama 'father' | Ambai tama-, Biak kzma, Dus. tma, Moor kamá 'grandparent', Wan. tama |
| PMP *t-ina 'mother' | Biak sna-, Wan. sinia |
| PMP *tinsaqi 'intestines' > 'belly' | Ambai ene-, Ansus ane/u, Biak sne-, Moor siné, SL ane, Umar hna, Wan. sane, Yaur hnáa-rè, Yer. hìná |

Table 4.72: Syncope in Cenderawasih Bay and Mamberamo.

```
PMP *kaRaw 'to scratch' Umar krar, cf. Wan. kara
PMP *kuRita 'octopus' Umar kte, cf. Moor arí'-a
    Umar kbae 'neck', cf. Wau. ka'lu 'bay(o)
- Umar kro 'snake', cf. Wan. koro
PMP *manuk 'bird' Umar mna, cf. Biak man
PMP *Ramas 'squeeze' Umar rma/n, cf. Biak ramas
PMP *tanam 'to plant' Umar tnam, cf. Wan. tanam
PMP *tzlu 'three' Umar e-tro, cf. Wan. toru
PMP *tunu 'roast food over a Umar tnu, cf. SL tunu
    fire'
    Umar tpe 'lightning', cf. Fia. tepyep
```

Table 4.73: Syncope in Umar.

### 4.2.32 Final vowel loss

Final vowel loss is regular in South Halmahera and Raja Ampat (see Table 4.74), except in words that have undergone syncope (see §4.2.31 above). Blust (1978a) notes that change applies to words with original final *q, but not original final *k; therefore, vowel loss must have occurred after the loss of $* q$, but prior to the loss of $* k$. Final vowel loss does not apply to the small number of words that have lost final *R, so must have preceded *R loss (see §4.2.16).

In Cenderawasih Bay and Mamberamo, final vowel loss is variable (see Table 4.75). It is completely regular only in Biak and Dusner, though at least one case of final vowel loss is attested in all languages. Instances of final vowel loss following final $* k$ loss are attested at least once in Ambai, Biak, Wandamen, and Yaur.

Final vowel loss is not a cross-linguistically distinctive change, and so does not form a good basis for subgrouping.

| PMP *batu 'stone' | Buli pāt |
| :---: | :---: |
|  | As pa, Biga $k a-$ 'pat, Gebe $k a-p a t$, Kawe $a-$ 'pat, Lag. $a-{ }^{\prime} p a t$, Ma'ya $k a-{ }^{-} p a^{12} t$, Wau. ka-'pat |
| PMP *bunuq 'kill' | Buli pun, Gane pun, Sawai -pun, Taba -pun |
|  | Ambel buni, As -bun, Biga bun, Fia. bun, Gebe -pun, Kawe bun, Lag. bun, Mat. bu ${ }^{3} n$, Ma'ya 'bu³n, Wau. bun, fal/'pun |
| PMP *dəyวR 'hear' | Buli lona, Gane longa, Sawai -lone, Taba -ma/longo |
|  | Biga do'no, Gebe loyว, Kawe 'don[o], Lag. 'don[o], Mat. no ${ }^{41} \mathrm{y}$, Ma'ya 'do ${ }^{12} n$, Wau. 'don[o] |
| PMP *dәpa 'span, fathom' | Buli lof, Sawai lof |
| PMP *kutu 'louse’ | Buli ut, Gane kut, Sawai kit, Taba kut |
|  | Ambel ut, Biga wut, Fia. wut, Gebe ut, Kawe wut, Lag. wut, Mat. wu ${ }^{3} t$, Ma'ya (S.) ' $u^{3} t$, Wau. wut |
| PMP *lima 'five' | Buli lim, Sawai -lim, Taba -lim |
|  | Ambel lim, Biga lim, Kawe lim, Lag. ${ }^{\prime} l^{3} m$, Mat. $l i^{3} m$, Ma'ya 'li'3m, Wau. lim |
| PMP *manuk 'bird' | Buli mani, Gane manik, Sawai mane, Taba manik 'chicken' |
|  | Ambel mani, As mani, Biga mi'ni, Fia. min, Gebe mani, Kawe mani, Lag. 'min[i], Ma'ya (S.) 'mini ${ }^{12}$, Wau. 'min[i] |
| PMP *məñak 'fat, grease' | Buli mna |
|  | Biga ma'na(o), Fia. mena, Kawe ma'na, Lag. ma'na, Mat. $m n a^{12}$, Ma'ya (S.) ma'na ${ }^{3}$, Wau. ma'na |
| PMP *qitəluR 'egg' | Buli tolo, Gane toli |
|  | Ambel talo, As tal,, Biga to'lo, Fia. tol, Kawe 'tol[o], Lag. 'tol[o], Mat. to ${ }^{21} l$, Ma'ya (S.) 'to ${ }^{12} l$, Wau. 'tol[o] |
| PMP *qubi 'yam, Dioscorea' | Buli up 'kind of tuber' |

Table 4.74: Final vowel loss in South Halmahera and Raja Ampat.

| PMP *batu 'stone' | Moor vá'-a, Umar atu, Yer. áakú |
| :---: | :---: |
| PMP *bulu 'feather, body hair' | Ambai na-wa/vuru, Moor vùru, Umar uru, Wrp. vuro, Yer. úurú-gùa |
|  | Wmb. ke-vun-do, Yoke bo |
| PMP *bunuq 'kill' | Ambai mun, Ansus mung, Biak mun, Dus. mun, Moor mun/â, SL mun, Wan. mun, Wrp. mun/a <br> Wmb. muni-ro, Yoke mu |
| PMP *daRaq 'blood' | Moor ràra, Wrp. rara, Yer. rárà |
|  | Wmb. ke-ra-ro |
| PMP *kutu 'louse' | Ansus $u t u$, Biak $u k$, Moor (A.) ú'-a, Moor (H.) kú'-a, SL itu, Umar utu, Wrp. ghui, vui, Yaur óò-jé |
|  | Wmb. ki-ro |
| PMP *lima 'five' | Ambai rin, Ansus ring, Biak rim, Dus. rim/bi, Moor rím-ó, Mun. -rim, SL ri, Wan. rime, Wrp. rim/o, Yer. rûmà |
|  | Wmb. rin/ti, Yoke -rim/si |
| PMP *manuk 'bird' | Ambai man-, Biak man, Moor mànu, Umar mna, Wrp. mani, Yaur mà'-ré |
|  | Wmb. mani-ro, Yoke mani |
| PMP *məñak 'fat, grease' | Ambai ne-main, Moor mananá, Umar mnai, Wan. mai[n], Wrp. mana, Yaur mnáa-rè, Yer. mì/mná |
| PMP *nanaq 'pus' | Ambai nana, Yer. náanáà |
| PMP *punti 'banana' | Moor hút-a, Umar idi, Wrp. ui, Yaur ìdí-e, Yer. píití Wmb. uti-ro, Yoke si |
| PMP *qubi 'yam, Dioscorea' | Ambai uvi, Wan. uwi, Wrp. uvi |
| PMP *Rumaq 'house' | Biak rum, Dus. rum, Moor rùma, Umar ron, Wrp. ruma, Yaur rúùg-ré 'ceremonial house', Yer. rúmà 'ceremonial house' |
| PMP *susu 'female breast' | Ambai ui, Ansus $u$, Biak sus, Moor tút-a, Umar huhu, SL su, Wan. susu, Wrp. susu, Yaur húhì-e, Yer. húuhú-gùa Wmb. ke-tutu-ro |
| PMP *tasik 'saltwater' | Moor àti, Umar tah 'salt', Yaur àah-ré 'salt', Yer. káhì/a 'salt' |
| PMP *tunu 'roast food over a fire' | Biak kun, Dus. un, Moor 'un-î, SL tunu, Yaur 'ún-dè, Yer. kúuná |
|  | Wmb. kuni |

Table 4.75: Final vowel loss in Cenerawasih Bay and Mamberamo.

### 4.3 Summary of reflexes and sound changes

Tables 4.76 and 4.77 summarize the reflexes presented in this chatper.

|  |  | *q | *h | *p | *b | *t | *k | *s, *j | *t /_i | *d | *1 | *z | *R | *m | *n, * ${ }^{\text {n }}$ | * y |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SH | Buli | $\varnothing$ | $\varnothing$ | f | p | t/(c) | $\varnothing$ | S | s | 1 | 1 | 1 | $\varnothing$ | m | n | 1 |
|  | Gane | $\varnothing$ | $\varnothing$ | f | p | t | k/ $\varnothing$ | S |  | 1 | 1 | 1 | $\varnothing$ | m | n | 7 |
|  | Sawai | $\varnothing$ | $\varnothing$ | f | p | t | $\varnothing$ | s | s | 1 | 1 | 1 | $\varnothing$ | m | n | ๆ |
|  | Taba | $\varnothing$ | $\varnothing$ | h | p | t | k/ $\varnothing$ | S |  | 1 | 1 | 1 | $\varnothing$ | m | n | ๆ |
| $R A$ | Ambel | $\varnothing$ | $\varnothing$ | $\mathrm{f} / \Phi / \mathrm{h}$ | b/p | t | $\varnothing$ | S | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | As | $\varnothing$ | $\varnothing$ |  | p | t | $\varnothing$ | S |  | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Biga | $\varnothing$ | $\varnothing$ | f | $\mathrm{b} / \mathrm{p}$ | t | $\varnothing$ | s | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Fiawat | $\varnothing$ | $\varnothing$ | f | $\mathrm{b} / \mathrm{p}$ | t | $\varnothing$ | h | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Gebe | $\varnothing$ | $\varnothing$ | f | p | t | $\varnothing$ | S | h ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Kawe | $\varnothing$ | $\varnothing$ | f | p/b | t | $\varnothing$ | S | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Laganyan | $\varnothing$ | $\varnothing$ | f | p/b | t | $\varnothing$ | h | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Matbat | $\varnothing$ | $\varnothing$ | f | b | t | $\varnothing$ | s |  | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Ma'ya | $\varnothing$ | $\varnothing$ | f | $\mathrm{p} / \mathrm{b}$ | t | $\varnothing$ | s | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
|  | Wauyai | $\varnothing$ | $\varnothing$ | f | $\mathrm{p} / \mathrm{b}$ | t | $\varnothing$ | s | $\varnothing$ ? | 1 | 1 | 1 | $\varnothing$ | m | n | n |
| $C B$ | Ambai | $\varnothing$ |  | $\varnothing$ | $\mathrm{b} / \beta / \mathrm{w}$ | $t / \varnothing$ |  |  |  | r | r |  |  |  |  |  |
|  | Ansus | $\varnothing$ | $\varnothing$ | $\varnothing$ | b/w | $t / \varnothing$ | $\varnothing$ | $\varnothing$ | $\varnothing$ | r | r | r |  | $\mathrm{m} / \mathrm{g}$ | $\mathrm{m} / \mathrm{y}$ |  |
|  | Biak | $\varnothing$ | $\varnothing$ | f | b | k | $\varnothing$ | s | S | r | r |  | r | m | n | n |
|  | Dusner | $\varnothing$ | $\varnothing$ | p | $\beta$ | t | $\varnothing$ | S | S | r | r |  | r | m | n |  |
|  | Moor (H.) | $\varnothing$ | $\varnothing$ | $\varnothing / \mathrm{h}$ | $\beta$ | 3/k | k/? | t | S | r | r | r | r | m | n | n |
|  | Serui-Laut | $\varnothing$ | $\varnothing$ | $\varnothing$ | $\beta / \mathrm{w}$ | t | $\varnothing$ | s | $\varnothing$ | r | r |  | r | m | n |  |
|  | Umar | $\varnothing$ | $\varnothing$ | $\varnothing$ | $\varnothing / \beta$ | t | k/ $\varnothing$ | h | h | r/(d) | r | $\varnothing$ | r | m | n | n |
|  | Wandamen | $\varnothing$ | $\varnothing$ | $\varnothing$ | $b / \beta$ | t | $\varnothing$ | s | s | r | r |  | r | m | n | n |
|  | Waropen | $\varnothing$ | $\varnothing$ | $\varnothing$ | $\beta / b$ | k | $\varnothing$ | s | $\varnothing$ ? | r | r | r | r | m | n | n |
|  | Yaur | $\varnothing$ | $\varnothing$ | $\varnothing$ | $\beta$ | $\varnothing /$ ? | $\varnothing /(2)$ | h | h | r/(d) | r | $\varnothing$ | r | $\mathrm{m} / \mathrm{n} / \mathrm{g}$ | $\mathrm{n} / \mathrm{g} /(\mathrm{P})$ | $\varnothing /(?)$ |
|  | Yerisiam | $\varnothing$ | $\varnothing$ | $\varnothing / \mathrm{p}$ | $\varnothing / \mathrm{b}$ | k | $\varnothing$ | h | h | r | r | $\varnothing$ | r | m | n | $\varnothing$ |
| M | Warembori | $\varnothing$ | $\varnothing$ | $\varnothing$ | b | k | $\varnothing$ | t | t | d | d/(n) |  | r | m | n | n |

Table 4.76: Summary of PMP, PCEMP, and PEMP proto-consonant reflexes in SHWNG languages.

|  |  | *i | *u (penult) | *u (final) | *a (penult) | *a (final) | *ว (penult) | *ว (final) | *e | *0 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SH | Buli | i | u | u | a | a | 0 | a | e | 0 |
|  | Gane | i | u | $\mathrm{u} / \mathrm{i}$ | a/o | a/o | O | a | e | o |
|  | Sawai | i/ $\varepsilon$ | u/(i) | $\mathrm{u} / \varepsilon$ | a/o/ع | a/Ј/غ | O | $\varepsilon$ | $\varepsilon$ | O |
|  | Taba | i | u | $\mathrm{u} / \mathrm{i}$ | a/o | a/o | 0 | e | e | o |
| $R A$ | Ambel | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | a/V | o/V | a? | o? |
|  | As | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | a/V | 3/V | e? | o? |
|  | Biga | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | o/V | o/V | e | $\bigcirc$ |
|  | Fiawat | i | u | $\mathrm{u} / \mathrm{i}$ ? | a | a | o/V | o/V | e | o? |
|  | Kawe | I | u | $\mathrm{u} / \mathrm{i}$ | a | a | o/V | o/V | e? | $\bigcirc$ |
|  | Laganyan | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | o/V | o/V | e? | 0 |
|  | Matbat | i | u | $\mathrm{u} / \mathrm{i}$ ? | a | a | o |  | e | o |
|  | Ma'ya | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | o/V | o/V | e | o |
|  | Wauyai | 1 | u | $\mathrm{u} / \mathrm{i}$ | a | a | o/V | o/V | e | o? |
| $C B$ | Ambai | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | o | a | e | o? |
|  | Ansus | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | o | a | e | o? |
|  | Biak | i/e/ə | u | u/i/e/ə | a | a/e/ə | 0 | e/ə | e | o |
|  | Dusner | i/e | u | $\mathrm{u} / \mathrm{i} / \mathrm{e}$ | a | a | O | e | e | o |
|  | Moor (H.) | i | u | $\mathrm{u} / \mathrm{i}$ ? | a | a | O | a | e | o |
|  | Serui-Laut | . | u/(i) | $\mathrm{u} / \mathrm{i}$ | a | a | o | a | e | o? |
|  | Umar | i | $\mathrm{u} /(\mathrm{i})$ | $\mathrm{u} / \mathrm{i}$ ? | a | a | o | a | e? | o |
|  | Wandamen | i | u | $\mathrm{u} / \mathrm{i}$ | a | a | o | a | e | o |
|  | Waropen | , | u | $\mathrm{u} / \mathrm{i}$ | a | a | 0 | a | e | o |
|  | Yaur | i | u/(i) | $\mathrm{u} / \mathrm{i}$ | a | a | o |  | e? | o? |
|  | Yerisiam | i | u/(i) | $\mathrm{u} / \mathrm{i}$ | a | a | 0 | a | e | 0 |
| M | Warembori | i | u/(i) | $\mathrm{u} / \mathrm{i}$ | a | a | 0 | e?/a? | e? | o? |

Table 4.77: Summary of PMP, PCEMP, and PEMP proto-vowel reflexes in SHWNG languages.

Various individual sound changes are responsible for these reflexes. Most of these changes are summarized below, with relative chronology specified where relevant. ${ }^{36}$ Irregular changes are presented as if they are regular. For example, it is stated below that $* k>(* 2>) \varnothing$ in Moor; in fact, some Moor words undergo the complete change, while others reflect $k$ or ?

The following sound changes occurred in all SHWNG languages at an early stage (Proto-SHWNG or shortly thereafter):

-     * $q>\varnothing$
- *h> $>$
- *j $>{ }^{*} s$
- *n $>{ }^{*} n$
_ *d, *D > *l unless following *n
- *z $>$ *l (except in Umar, Yaur, Yerisiam)
- *k $>(* 2>) \varnothing$ unless following ${ }^{*} \eta$
- *g> (in all languages for which there are data)
_ *t > *ts preceding *i (unless following *n, in Moor)
These changes preceded other changes in all cases for which there is evidence.
The following sound changes occurred involving $* l, * z$, and $* R$ :
- *l $>r$ in Cenderawasih Bay, Mamberamo
- *z $>\varnothing$ Umar, Yaur, Yerisiam (precedes * $a>$ *ya below)
- *R $>$ ( ${ }^{2}$ in South Halmahera, Raja Ampat
- *R $>$ r in Cenderawasih Bay, Mamberamo

The following sound changes occurred involving labial stops:

1. *p $>* f$ in all SHWNG languages except Dusner, after which:

- $* f>h$ in Taba, Ambel
- *f $(>* h)>\varnothing$ in Cenderawasih Bay, Mamberamo, except Biak

2. *b $>p$ unless following *m, in South Halmahera, Raja Ampat, except Matbat
3. *b $>\beta$ in Dusner, Moor, Umar, Wandamen, Waropen, Yaur, Yerisiam, all Yapen languages, Yoke, after which:
[^43]- $\beta>w$ in Ambai, Ansus, Kurudu, Serui-Laut
$-\beta>\varnothing$ in Umar, Yerisiam

The following sound changes occurred involving *t:

- *t $>\varnothing$ finally in Ambai, Ansus, Serui-Laut

1. *t $>{ }^{*} k$ in Biak, Moor, Roon, Warembori, Waropen, Yaur, Yerisiam
2. *k $>{ }^{*}$ ? in Moor, Yaur
3. $*$ ? $>\varnothing$ non-initially in Yaur

The following sound changes occurred involving *s, after the above *t changes:

1. *s $>t$ in Moor
2. *ts $>s$ in all SHWNG languages
3.     * $s>t$ in Warembori
4. *s $>h$ in Fiawat, Laganyan, Ambai, Ansus, Umar, Yaur, Yerisiam
5. $h>\varnothing$ in Ambai, Ansus

The following sound changes occurred involving nasals:

- *m, *n> $\eta$ finally in Ansus
_ *m > $n$ finally in Ambai, Umar
- *m $>$ Ø finally in Serui-Laut, Wandamen, Waropen
- *n $>\varnothing$ finally in Wandamen and Yerisiam
- ${ }^{*} \eta>n$ in Raja Ampat, Cenderawasih Bay, Mamberamo except Yaur, Yerisiam
- ${ }^{*} \eta>\varnothing$ in Yaur, Yerisiam

The following nasal sound changes occured in Yaur, after the above nasal changes:

1. *m, * $n>* \eta$ preceding *r
2. ${ }^{*} \eta>n$ finally
3. ${ }^{*} \eta r>* \eta g r>g r$

The following sound changes occurred involving nasal-stop clusters:

- *NC > C in South Halmahera, Raja Ampat, Moor (follows stop changes above)
- *NC > voiceless $C$ in Yerisiam, voiced $C$ in Umar, Yaur (follows stop changes above)
- *NC > C in Cenderawasih Bay, Mamberamo, except Moor, Umar, Yaur (precedes stop changes above)

The following sound changes occurred involving glides:

- ** $w>g^{w}$ in Moor, Yaur, Yerisiam
-     * $w>\beta, \gamma$ in Waropen

The following sound changes occurred involving vowels:

1.     * $a>$ *ya initially in South Halmahera, Raja Ampat, sporadically in Cenderawasih Bay (follows *z > $\varnothing$ above), after which:

- *y $>d z$ initially in Moor, Umar, Yaur, Yerisiam
- *y > l initially in Raja Ampat except As, Gebe, Matbat

2.     * $u>{ }^{*} i$ in final syllables, in Sawai
3.     * $a>o$ in Gane, Taba, $\jmath$ in Sawai (conditioning unclear)
4.     * $\partial>o$ in penultimate syllables, $a$ in final syllables, in South Halmahera, Cenderawasih Bay except Biak, Dusner
5. *z > preceding or following vowel, in Raja Ampat
6. *i, *u, *a, *z > e in final closed syllables of polysyllabic words, in Biak, Dusner
7. *i> $\boldsymbol{\varepsilon}$ in final unstressed syllables of polysyllabic words, in Sawai
8. *a> $\boldsymbol{\varepsilon}$ in Sawai
9. $z>o$ in Raja Ampat

See $\S 4.2 .31$ for syncope and $\S 4.2 .32$ for final vowel loss.

### 4.4 Reassessment of Proto-SHWNG sound changes

At this point, it is worth briefly taking stock of the status of proposed Proto-SHWNG innovations, in light of the data presented in this chapter. I will use the same change numbering as in chapter 3 .

Change $1(* p>* f)$ is posited by Ross. I showed in $\S 4.2 .3$ that it is not attested in Dusner, and not regularly attested in Yerisiam.

Changes 2 (merger of *z with *o in penultimate syllables) and 9 (merger of *z with *a in final syllables) are posited by Blust and Ross as highly distinctive SHWNG innovations. I showed in $\S 4.2 .28$ that they are problematic in Raja Ampat languages.

Change 3 (*a-> *ya-) is posited by Ross. I showed in $\S 4.2 .27$ that it is not regularly found in all SHWNG languages.

Change $4 \mathrm{a}\left({ }^{*} t>{ }^{*} /_{-}{ }^{*} i\right.$ ) is posited by Ross. I showed in $\S 4.2 .6$ that it is found in all SHWNG languages, with the possible exception of Warembori.

Change $4 \mathrm{~b}(* s, * j, * c>* s)$ is posited by Blust and Ross. I showed in $\S 4.2 .10$ that *s and ${ }^{j} j$ merge in all SHWNG languages. There is no evidence for * $c(\S 4.2 .7)$.

Change 5a (*q, *h> ${ }^{*}$ ) is posited by Blust and Ross. I showed in $\S 4.2 .1$ and $\S 4.2 .2$ that it is found in all SHWNG languages.

Change 5b $\left({ }^{*}-k->\varnothing\right)$ is posited by Blust and Ross. I showed in $\S 4.2 .8$ that it is found in all SHWNG languages, with a small number of lexical exceptions.

Change 5c ( $* k-$, ${ }^{*}-k>\varnothing$ ) is posited by Ross. I showed in $\S 4.2 .8$ that it is not regularly found in all SHWNG languages.

Change 6 (merger of $* d, * D$, ${ }^{*} l, * r$, and $* z$ ) is posited by Blust and Ross as one of the more persuasive arguments for SHWNG. However, the irregularities noted in $\S 4.2 .11$ and $\S 4.2 .14$ cast some doubt on this merger's validity. It is difficult to explain these irregularities if we assume that the merger was complete by the time of Proto-SHWNG.

Change 7 (merger of $* n$ and $* \tilde{n}$ as $* n$ ) is posited by Ross. I showed in $\S 4.2 .18$ that it is found in all SHWNG languages.

Change 12 (syncope) is posited by Blust. I showed in $\S 4.2 .31$ that it is found in all SHWNG languages except Moor.

It is clear from the preceding evaluation that Blust's version of Proto-SHWNG is better supported than Ross's. Changes 1, 3, and 5c, included in Proto-SHWNG by Ross but not Blust, are not shared by all SHWNG languages. Change 12, included by Blust but not Ross, is problematic in Moor, but otherwise well-attested.

I have shown that there may be significant problems with three changes that Blust and Ross hold to be essential to the integrity of Proto-SHWNG: changes 2, 6, and 9. For now, this evidence is not strong enough to overturn the the validity of Proto-SHWNG. It may still be possible to resolve the discrepancies by reinterpreting either the Proto-SHWNG sound changes or the problematic data from the daughter languages. A full re-evaluation of the status of Proto-SHWNG is, in any case, beyond the scope of this work.

Nonetheless, it is clear from the evidence presented here that the time for such a re-evaluation has come. The logical next step is to do a fine-grained phonological comparison of SHWNG languages with their closest Austronesian neighbors to the west: the languages of the Bomberai peninsula and the Southern Moluccas. This could bring significant clarification to the status of SHWNG and its boundaries.

### 4.5 Implications for subgrouping

I have shown that, in the main, phonological innovations are not probative for subgrouping within SHWNG. Several shared innovations were identified that possess subgrouping value:

1. *a> *ya > la initially in Ambel, Biga, Fiawat, and Ma'ya
2. ${ }^{*} \eta>\varnothing$ in Yaur and Yerisiam
3. ${ }^{*} z>\varnothing$ in Umar, Yaur, and Yerisiam
4. irregular * $u>i$ in PMP *punti 'banana' in Umar, Yaur, and Yerisiam
5. *u, *i, *z >e $\sim$ a in final closed syllables of polysyllabic words, in Biak and Dusner
6. *z assimilates to vowel of preceding or following syllable, in Raja Ampat
7. ${ }^{*} R>\varnothing$ in South Halmahera and Raja Ampat
8. lexically conditioned syncope (Blust's change 12) in all SHWNG languages but Moor

As noted in §4.2.26, * $a>o$ in Gane, Maba, Patani, Sawai, and Taba was most likely spread by diffusion, and is therefore not included here.

Innovation 1 supports the establishment of what I will (somewhat arbitrarily) term Proto-Ma'yaic, containing Ambel, Biga, Fiawat (and perhaps other dialects of Maden), and Ma'ya.

Innovation 2 supports the establishment of Proto-Yaur-Yerisiam, containing Yaur and Yerisiam.

Innovations 3 and 4 support the establishment of Proto-Southwest Cenderawasih Bay, containing Umar and Proto-Yaur-Yerisiam.

Innovation 5 most likely occurred at the stage of Proto-Biakic, and therefore provides additional support for it. With data from Meoswar and Roon, it would be possible to determine if all Biakic languages share the change.

Innovation 6 supports the establishment of Proto-Raja Ampat, containing Proto-Ma'yaic and the other Raja Ampat languages.

Innovation 7 supports Proto-RASH, containing Proto-Central-Eastern South Halmahera, Proto-Southern South Halmahera, and Proto-Raja Ampat.

Innovation 8 supports the establishment Proto-Nuclear SHWNG, containing all SHWNG languages except Moor.

None of the proto-languages newly established on the basis of these innovations is fully convincing. The most plausible, because of its wide geographic extent, is ProtoRASH. For the others, it is difficult to rule out diffusion as a possibility. Proto-Nuclear SHWNG is particularly weakly founded due to the sporadic nature of the syncope change. I combine these subgroups with those proposed in other chapters in chapter 7 .

## Chapter 5

## SHWNG historical phonology II: Tonal phonology

### 5.1 Introduction

This chapter summarizes what is known about tonal systems and tonogenesis in the five SHWNG languages that are known to have lexical tone and whose tone systems have been described: Ma'ya, Magey Matbat, Moor, Yerisiam, and Yaur. ${ }^{1}$ The Moor, Yerisiam, and Yaur tone systems are analyzed here for the first time.

Tone is rare in Austronesian languages, and has not been reconstructed for any highlevel branches. ${ }^{2}$ Most tonal Austronesian languages are found in the SHWNG and Oceanic subgroups. Within SHWNG, tone is found in the Raja Ampat languages Ma'ya and Matbat and the Cenderawasih Bay languages Moor, Yerisiam, and Yaur. Within Oceanic, tone is found in five languages of New Caledonia (Rivierre 1993, 2001); the North Huon Gulf languages Yabem and Bukawa (Ross 1993); Awad Bing (Cahill 2003); and Kara, Barok, and Patpatar of New Ireland (Hajek 1995).

Outside of SHWNG and Oceanic, tone is found only in the Chamic languages Eastern Cham (Edmondson and Gregerson 1993b) and Tsat (Maddieson and Pang 1993). Its presence there has been attributed to the influence of neighboring Chinese languages.

[^44]
### 5.2 Raja Ampat languages

### 5.2.1 Ma'ya

There are five dialects of Ma'ya, of which the Salawati, Misool, and Laganyan dialects are tonal, while the Kawe and Wauyai dialects are not (Remijsen 2001b: 71). This section covers the Salawati and Misool dialects, since they are the tonal dialects for which adequate lexical data are available. All Ma'ya data are from Remijsen (2001b).

Remijsen (2001b: 50, 70) analyzes Ma'ya as having three tonemes: Rise/Low ( $/{ }^{12} /$ ), Fall $\left(/^{21} /\right)$, and High $\left(/^{3} /\right)$. Tones are restricted to word-final syllables. In addition to tone, Ma'ya has contrastive lexical stress (///), which is restricted to penultimate and final syllables.

Stress placement correlates with both tone and vowel quality (Remijsen 2001b: 105ff). With very few exceptions, penultimately stressed words are restricted to a single toneme on the final syllable: the High toneme in the Salawati dialect (e.g., 'tala 'banana'), and the Low toneme in the Misool dialect (e.g., 'tala ${ }^{12}$ 'banana'). Both dialects also permit toneless final syllables on penultimately stressed words (e.g., 'siri(o) 'juice'). Most penultimately stressed words have matching vowels in their penultimate and final syllables (see preceding examples). Finally stressed polysyllabic words always have the vowel $a$ in the penultimate syllable (e.g., ga' $\mathrm{il}^{3}$ 'sago (food)', sa'po ${ }^{12}$ 'no', $k a^{\prime} l u n(o)$ 'leaf, feather'). In some cases, loan words violate these constraints; in others, they are adapted to conform to them.

The primary acoustic correlate of stress is length. However, there is an important relationship between the Fall toneme and stress (Remijsen 2001b: 70):

> The Fall plays a pivotal role in the word prosodic system of Ma'ya, because it is involved in both the lexical stress and the lexical tone contrasts. On the one hand, the Fall can be interpreted as lexical stress without High or Rise toneme ..., and therefore it will be transcribed as lexical stress. On the other hand, however, the Fall is a toneme in the sense that it contrasts with the Rise and the High in minimal sets. The Fall also stands out from the other two tonemes in that words carrying the Fall get an epenthetic final vowel /o/ when they occur sentence-finally.

As an illustration, the minimal triplet ' $s a^{12}$ 'to sweep', ' $s a^{3}$ 'to climb', and ' $s a$ 'one' contains the tonemes Rise, High, and Fall, respectively. Remijsen analyzes 'sa 'one' as underlyingly toneless. All three words are stressed.

There are some acoustic differences in the realization of tones between the Salawati and Misool dialects (Remijsen 2001b: 80). The Rise toneme in the Salawati dialect (realized as low rising sentence-medially and low level sentence-finally) corresponds to the Low toneme in the Misool dialect (realized as low level in all contexts). Both are transcribed as $/^{12} /$ by Remijsen. The Fall toneme in the Misool dialect starts and ends at a higher pitch than in the Salawati dialect. Remijsen (2001b: 84) hypothesizes that proto-

Ma'ya had a tone system like the Salawati dialect, with the Misool system the result of a push chain, whereby the change from Rise to Low triggered a higher-pitch Fall toneme.

I have identified Austronesian etymologies for 53 of the 237 Salawati Ma'ya words found in Remijsen (2001b). These are listed in Tables 5.1-5.3, arranged according to the resulting tone. There are 32 words with high tone, 15 with rising tone, and 6 with falling tone.

In most cases, stress falls on the penultimate syllable of the proto-root; stress was evidently penultimate in proto-Ma'ya. The sole apparent exception ${ }^{3}$ is PMP *mañak 'fat, grease' > ma'na ${ }^{3}$. Most penultimately stressed words have high tone. The sole exception is PMP *i-kahu 'you (sg.)' > 'aw/a, which also has an unexplained final $a$. However, it is not very surprising that a pronoun should show irregular developments such as this.

There are no very convincing segmental predictors of tone. The strongest candidates I have found are uvular consonants in the proto-form. Onset * $q$ correlates with Rise (four examples, one exception, which is *trin $a q i$ 'intestines' > 'na(o) 'belly'). As first noted by Remijsen (2001b: 120), word-final $* R$ (most likely a voiced uvular trill) correlates with Rise (three examples, no exceptions, although *niuR 'coconut' > 'nu ${ }^{12}$ has a variant ' $n u^{3}$ ). The phonetic motivation for these putative correlations is not obvious.

The Misool dialect shows only minor differences in comparison to the Salawati dialect. As expected, most penultimately stressed words have low tone instead of high tone. There is one exception: - $\mathrm{ini}^{3}{ }^{3}$ 'drink'. Two finally stressed words have low tone where Salawati has high tone: ' $i^{12} n$ 'fish' and ma'na ${ }^{12}$ 'fat, grease'.

The prosodic innovations of Ma'ya can be summarized as follows: (1) a single tonal pattern on the final syllable of penultimately stressed words; (2) the tendency of onset $* q$ and word-final $* R$ to produce rising tone; (3) epenthetic final $o$ on words with falling tone sentence-finally. ${ }^{4}$

[^45]| PMP *ba-b<in>ahi 'woman' | ${ }^{\prime} \mathrm{pi}^{3} n$ |
| :---: | :---: |
| PMP *banua 'inhabited area' | 'pnu ${ }^{3}$ 'village' |
| PMP *baRək 'pig' | ${ }^{\prime} \mathrm{bo}^{3}$ |
| PMP *bunuq 'kill' | ${ }^{\prime} b u^{3} n$ |
| PMP *duha 'two' | ${ }^{\prime} 1 u^{3}$ |
| PMP *ənam 'six' | ${ }^{\text {' }}$ Wono ${ }^{3} \mathrm{~m}$ |
| PMP *hikan 'fish' | ${ }^{1} d / o^{3} n$ |
| PMP *inum 'drink' | - ${ }^{\text {in }}{ }^{\text {a }}$ m $m$ |
| PMP *kutu 'head louse' | ${ }^{\prime} u^{3} t$ |
| PMP *lima 'five' | ${ }^{\prime} i^{3} m$ |
| PMP *ma-hiaq, PCEMP *mayaq 'ashamed' | -'ma ${ }^{\text {a }}$ |
| PMP *manuk 'bird' | 'mini ${ }^{3}$ |
| PCEMP *ma-pia 'good' | ${ }^{\prime} \mathrm{fi}^{3}$ |
| PMP *ma-qitzm, PCEMP *ma-qetzm 'black' | mat/'mete ${ }^{3} \mathrm{~m}$ |
| PMP *məñak 'fat, grease' | $m a^{\prime} n a^{3}$ |
| PMP *miqmiq 'urine' | $t a / ' m i^{3}$ |
| PMP *niuR 'coconut' | ${ }^{\prime} n u^{3}$ |
| PMP * $\quad$ ajan 'name' | 'nasa'n |
| PMP *paRih 'sting' | 'fas 'stingray' |
| PMP *pəñu 'turtle' | ${ }^{\prime} f e^{3} n$ |
| PMP *qatay 'liver' | 'lati ${ }^{3}$ |
| PMP *qinzp, PCEMP *qenəp 'lie down to sleep' | -'ene ${ }^{3} f$ |
| PMP *Rambia 'sago' | ${ }^{\prime} i^{3}$ |
| PMP *Rabak 'to fly' | $-{ }^{-1}{ }^{\text {copo }}$ |
| PMP *Rumaq 'house' | ${ }^{\prime} u^{3} m$ |
| PMP *sakat 'to rise' | ${ }^{\prime} s a^{3}$ |
| PMP *salaq 'wrong' | ${ }^{1} a^{3}{ }^{\prime}$ |
| PMP *susu 'female breast' | $s u^{3} s$ |
| PMP *talu 'three' | ${ }^{1} t^{3} l$ |
| PCEMP *todan 'sit' | ${ }^{1}$ solo ${ }^{3} n$ |
| PMP *wahiR 'fresh water' | 'waya ${ }^{3}$ |
| PMP *zalan 'path' | ${ }^{\prime} 1 i l i{ }^{3} n$ |

Table 5.1: Sources of Ma'ya (S.) high tone.

| PMP *babaq 'low' | ${ }^{\prime} p a^{12} p$ |
| :---: | :---: |
| PMP *batu 'stone' | ka-'pa ${ }^{12} t$ |
| PMP *dəクวR 'hear' | ${ }^{1} \mathrm{do}^{12} n$ |
| PMP *zpat 'four' | ${ }^{\prime} \mathrm{fa}^{12} t$ |
| PMP *hapuy, PEMP *api 'fire' | ${ }^{\prime} a^{12} p$ |
| PMP *ma-pənuq 'full' | ${ }^{\prime} \mathrm{fo}^{12} \mathrm{n}$ |
| PMP *ma-Ruqanay 'man' | ${ }^{6} m a^{12} n$ |
| PMP *matay 'die’ | ${ }^{\prime} \mathrm{ma}^{12} t$ |
| PMP *niuR 'coconut' | 'nu ${ }^{12}$ |
| PMP *pajay 'rice plant' | ${ }^{\prime} \mathrm{fa}^{12} \mathrm{~s}$ 'rice' |
| PMP *panaq 'to shoot' | ${ }^{\prime} \mathrm{fa}^{12} n$ |
| PMP *qabu 'ashes' | $g a /^{\prime} l a^{12} p$ |
| PMP *qasu 'smoke' | ${ }^{\prime} a^{12}$ s |
| PMP *qitaluR 'egg' | 'tol ${ }^{12}$ |
| PCEMP *sajan 'branch' | $k a-\int a^{12} n$ |

Table 5.2: Sources of Ma'ya (S.) rising tone.

| PMP *boRay 'give' | 'be(o) |
| :--- | :--- |
| PMP *dahun 'leaf' | ka-'lun(o) 'leaf, feather' |
| PMP *i-kahu 'you (sg.)' | 'aw/a |
| PMP *kahiw, PCEMP *kayu 'wood' | 'ai(o) |
| PMP *lipən 'tooth' | $k a-$ 'lif(o) |
| PMP *tinsaqi 'intestines' | 'na(o) 'belly' |

Table 5.3: Sources of Ma'ya (S.) falling tone (stress with no underlying toneme).

### 5.2.2 Magey Matbat

There are two dialects of Matbat, Magey and Tomolol, both of which are tonal (Remijsen 2007). Only the Magey dialect's tonal system has been described.

Remijsen (2007: 13) analyzes Magey Matbat as having six tonemes: High Level (/3/), Low Fall ( $/ /^{21} /$ ), Low Rise ( $/{ }^{12} /$ ), Low Level ( $/{ }^{1} /$ ), Extra High Fall ( $/ /^{41} /$ ), and Rise-Fall ( $/{ }^{121} /$ ). Tones are associated with syllables, as in Ma'ya. Much of the Magey Matbat lexicon consists of monosyllabic words, but monomorphemic words of up to three syllables are attested. All monosyllabic words have tone. All polysyllabic words contain at least one tonal syllable, with the presence and location of the toneless syllables unpredictable.

Remijsen (2007: 14) observes that "words with the Low Fall toneme on the final syllable often have an epenthetic final /o/ in phrase-final context". This is very similar to Ma'ya, where words with the Fall toneme always have epenthetic final $o$ in sentencefinal position (§5.2.1). Magey Matbat Low Fall and Ma'ya Fall are acoustically identical
(Remijsen 2007: 25). I discuss the implications of epenthetic final o for subgrouping in §5.4.

I have identified Austronesian etymologies for 33 of the 182 Magey Matbat words found in Remijsen (2001b). These are listed in Tables 5.4-5.6, arranged according to the resulting tone. The most common tonal outcomes are high level ( 12 words) and low falling ( 11 words). Aside from this general bias, I have found only one consistent predictor: words with onset ${ }^{*} p$ acquire high level tone (five examples, no exceptions). This is consistent with the widely observed pattern in tonogenesis of voiceless stop onsets producing high tone (Hombert et al. 1979). However, no other onset shows a consistent outcome, and the small number of examples may not be enough to be significant.

Overall, the most striking fact about Magey Matbat tonogenesis is the lack of predictability of tonal outcomes. The development of onset * $p$ and the epenthetic $o$ on low falling phrase-final syllables are the only clearly identifiable innovations.

| PMP *banua 'inhabited area' | $n u^{3}$ 'village' |
| :--- | :--- |
| PMP *bunuq 'kill' | $b u^{3} n$ |
| PMP *duha 'two' | $l u^{3}$ |
| PMP *zpat 'four' | $f a^{3} t$ |
| PMP *hapuy, PEMP *api 'fire' | $y a^{3} p$ |
| PMP *kutu 'head louse' | $w u^{3} t$ |
| PMP *lima 'five' | $l i^{3} m$ |
| PCEMP *ma-pia 'good' | $\mathrm{fi}^{3}$ |
| PMP *ma-panuq 'full' | $\mathrm{fo}^{3} n$ |
| PMP *pəñu 'turtle' | $f e^{3} n$ |
| PMP *susu 'female breast' | $s u^{3}$ |
| PMP *tolu 'three' | $t o^{3} l$ |

Table 5.4: Sources of Magey Matbat high level tone.

| PMP *boRay 'give' | $b e^{21}$ |
| :--- | :--- |
| PMP *bulu 'feather' | $n a / p o^{21} l$ |
| PMP *dahun 'leaf' | $d a^{21} n$ |
| PMP *i-aku 'I' | $y a^{21} k$ |
| PMP *i-kahu 'you (sg.)' | $y a^{21} w(a)$ |
| PMP *inum 'drink' | $-a n i^{21} m$ |
| PMP *ma-Ruqanay 'man', | $w a^{3} y / m a^{21} n$ |
| PMP * $n a j a n ~ ' n a m e ' ~$ | $n a^{21} n$ |
| PMP *qatay 'liver' | $t a^{21} y$ |
| PMP *qitaluR 'egg', | $t o^{21} l$ |
| PMP *wakaR 'root' | $w a^{21} / p o$ |

Table 5.5: Sources of Magey Matbat low falling tone.

| PMP *batu 'stone' | $p a^{12} t$ |
| :--- | :--- |
| PMP *anəm 'six' | $n o^{12} m$ |
| PMP *matay 'die' | $m a^{12} t$ |
| PMP *mañak 'fat, grease' | $m n a^{12}$ |
| PMP *hikan 'fish' | $y i^{1} n$ |
| PMP *niuR 'coconut' | $n u^{1}$ |
| PMP *zaRum 'needle' | $l a^{1} m$ |
| PMP *dəクəR 'hear' | $n o^{41} \eta$ |
| PMP *qinəp, PCEMP *qenəp 'lie down to sleep' | $-e^{41} n$ |
| PCEMP *todan 'sit' | $h o^{121} l$ |

Table 5.6: Sources Magey Matbat low rising, low level, extra high falling, and rising falling tones.

### 5.3 Cenderawasih Bay languages

### 5.3.1 Moor

Moor exhibits a word-tone system, with four basic tonal patterns. ${ }^{5}$ Since these patterns' realization is somewhat complex and variable, I refer to them here simply as tones 1 to 4. Variation arises from context, word length, and whether a word is underlyingly vowel- or consonant-final. Consonant-final words receive an optional epentheticfinal $a$ (obligatory if the consonant is $j$ or $g w) .{ }^{6}$ Epenthetic final $a$ is low in pitch. Table 5.7 summarizes the basic Moor tonal patterns. ${ }^{7}$

Tone 1, transcribed with an acute accent on the first vowel of the final syllable, is realized as high pitch on initial syllables, with a fall on the final syllable ( $\mathrm{H}^{*}$ F). The fall co-occurs with lengthening of the vowel on which it is realized. On consonant-final words, the fall may be shortened, being realized as high pitch with only a slight fall, if any.

Tone 2, transcribed with a grave accent on the first vowel of the final syllable, is realized as low pitch on initial syllables, with a rise on the final syllable ( $\mathrm{L} * \mathrm{R}$ ). The rise co-occurs with lengthening of the vowel on which it is realized. Tone 2 is not found on consonant-final words. It mostly appears on verbs and adjectives and is rare on nouns.

[^46]|  | vowel-final | consonant-final | main word classes |
| :---: | :---: | :---: | :---: |
| Tone 1 ( $\mathrm{H}^{*} \mathrm{~F}$ ) | iná [ínáà] 'mother' | nút-a [nú(ù)t(à)] 'island' | all |
| Tone 2 ( $\mathrm{L} * \mathrm{R}$ ) | inà [ìnàá] 'pour' | - | verbs, adjectives |
| Tone 3 ( $\mathrm{L} * \mathrm{RM}$ ) | ìna [iínā] 'ear' | vùrin- $a[\beta$ ùúrīn(à)] 'moon' | nouns |
| Tone 4 ( ${ }^{*} \mathrm{LH}$ ) | munâ [múùná] 'kill' | - | verbs, adjectives |

Table 5.7: Summary of the four basic Moor tonal patterns.

|  | noun in isolation | with suffixed article |
| :--- | :--- | :--- |
| Tone $1(\mathrm{H} * \mathrm{~F})$ | u'áu [ú?áù] 'taro sp.' | u'áu-ró [ú?áu-rō] |
| Tone $2(\mathrm{~L} * \mathrm{R})$ | manù [mànùú] 'forest' | manù-ó [mànù-ō] |
| Tone $3(\mathrm{~L} * \mathrm{RM})$ | àju [àád3̄ū] 'wing' | àju-ró [àád3ū-rō] |
| Tone $4\left(\mathrm{H}^{*} \mathrm{LH}\right)$ | rousû [róùsú] 'k.o. arrow' | rousû-ró [róusù-ró] |

Table 5.8: Moor tonal developments with suffixed nominal article.

Tone 3, transcribed with a grave accent on the first vowel of the penultimate syllable, is realized as low pitch on initial syllables, with a rise on the penultimate syllable and mid pitch on the final syllable ( $\mathrm{L} * \mathrm{RM}$ ). It mostly appears on nouns and is rare on verbs and adjectives.

Tone 4, transcribed with a circumflex on the first vowel of the final syllable, is realized as high pitch on initial syllables, with low pitch on the penultimate syllable and high pitch on the final syllable ( $\mathrm{H}^{*} \mathrm{LH}$ ). On disyllables, the pattern is compressed so that the first syllable contains a fall on a lengthened vowel (FH). On monosyllables, the pattern is truncated so that only the high pitch is realized (H). ${ }^{8}$ Tone 4 is not found on consonantfinal words. It mostly appears on verbs and adjectives and is rare on nouns.

It is evident from the above descriptions that the primary locus of contrast among tones $1-4$ is the final two syllables. In fact, the contrast is even more restricted than this: tones are realized only on phrase-final words. As a result, the functional load of tone is quite low in discourse.

The neutralization of tone in all contexts but phrase-final position limits the domain of possible tonal interactions. Most affixes and clitics have no effect on tone. For example, the 1 SG proclitic $i=$ receives high pitch in $i=v e r a ́ ~ ' I ~ g o ' ~ a n d ~ l o w ~ p i t c h ~ i n ~ i=v o r a ̀ ~ ' I ~ s p l i t ' . ~ . ~$ The only clear case of a morphological form bearing tone is the suffixed article -ó/-ró/-jó, which is generally realized with a mid level pitch. Examples are shown in Table 5.8. The phonological analysis of this phenomenon is not clear.

In addition to contrastive tone, Moor contains a marginal vowel length contrast. Long vowels (transcribed by repeating the vowel letter) are restricted to a handful of pronom-

[^47]inal forms. A minimal pair is arú [árúù] 'small white crab' versus aarú [áarúù] 'we (du. incl.)'.

I have identified clear Austronesian etymologies for 92 of the 1680 words found in my Moor lexicon (disregarding cases with evidence of borrowing). These are listed in Tables 5.9-5.12, arranged according to the resulting tone. There are 39 words with tone 1, 9 with tone 2 , 28 with tone 3 , and 16 with tone 4.

The most robust generalization that emerges from these data is that words that become (or remain) monosyllablic receive tone 1 . Among the many examples are *kutu 'louse' > $k u ́ '-a$ and *niuR 'coconut' > nér-a. ${ }^{9}$ The sole exceptions are *todan 'sit' > 'ò and *ia 'he, she' $>\hat{\imath}$.

There is a related (but weaker) generalization between tone 3 and words that become (or remain) disyllabic. Among the various examples are *bulan 'moon' > vùrin-a, *tanis 'cry' > 'ànit- a, and *tasik 'saltwater' > àti. Among the counterexamples are two kinship terms that receive tone 1 instead ( *ina 'mother' > iná, *t-ama 'father' > kamá 'grandparent'); *banua 'inhabited area' > manù 'forest'; and *qenəp 'lie down to sleep' > enâ.

The various verbs and adjectives that have acquired the $-i$ intransitivizing suffix regularly have tone 4. These are counterexamples to the above generalizations in some cases (e.g., *tunu 'roast over a fire' > 'un-î).

I have not been able to identify any generalization for words that receive tone 2 .
It is not straightforward to employ the above generalizations to derive phonological innovations that would give rise to the Moor tonal system. There is some evidence to support the hypothesis that tone 3 is the reflex of a formerly regular penultimate stress system. The rising pitch of tone 3 falls on the historically penultimate syllable in most cases. Tone 3 is the most common outcome if some other process (reduction to a monosyllable, affixation of $-i$, etc.) does not interfere. Finally, recent borrowings, most of which come from penultimately stressed words in local Malay, generally receive tone 3 (e.g., bìsa 'to be able' from bisa, udàra 'airplane' from udara 'air').

The penultimate stress hypothesis deserves further consideration, but it only partially explains the development of tone in Moor. The phonetic conditioning of tones 2 and 4, in particular, is rather mysterious. It is striking that so little can be said about the historical processes that produced such a system.

[^48]| PMP *babsinsahi 'woman' | vavín-a |
| :---: | :---: |
| PMP *baRa 'arm' | veréa |
| PMP *batu 'stone' | vá'-a |
| PMP *boRsay 'paddle' | vór-a |
| PMP *buaq 'fruit' | vó |
| PMP *buku 'node, knot' | vú'-a |
| PMP *danaw 'lake' | rán-a |
| PMP *duyuy 'dugong' | rún-a |
| PMP *duha 'two' | rú-ró |
| PMP *apat 'four' | a'-ó |
| PMP *asa 'one' | ta-tá |
| PMP *ina 'mother' | iná |
| PMP *kahiw, PCEMP *kayu 'wood' | ka/'úat-a |
| PMP *kami 'we (excl.)' | ám-a |
| PMP *kasuaRi 'cassowary' | atúar-a |
| PMP *kita 'we (incl.)' | $i^{\prime}-a$ |
| PMP *kuRita 'octopus' | arí'a |
| PMP *kutu 'head louse' | kư'-a |
| PMP *lahud 'sea' | rú |
| PMP *lakaw 'go' | rá |
| PMP *lima 'five' | rím-ó |
| PCEMP *malip 'laugh' | marí/'-a |
| PMP *mañak 'fat, grease' | mana/ná |
| PCEMP *mipi 'to dream' | ena-mí/'-a |
| PCEMP *mutaq 'to vomit' | ma/múa'-a |
| PEMP *natu 'child' | na'ú 'person' |
| PMP *niuR 'coconut' | nér-a |
| PMP *nusa 'island' | nút-a |
| PMP *punti 'banana' | hút-a |
| PMP *qapuR 'lime, calcium' | ár-a |
| PMP *qənay 'sand' | áen-a |
| PCEMP *sei 'who?' | na'u-sé |
| PMP *susu 'female breast' | tút-a |
| PMP *t-ama 'father' | kamá 'grandparent' |
| PMP *tzbuh 'sugarcane' | kóh-a |
| PMP *tzlu 'three' | ó-ró |
| PMP *tinsaqi 'intestines' | siné 'belly' |
| PMP *utaña 'ask' | u'uná |
| PCEMP *wayka 'canoe' | gwá'-a |

Table 5.9: Sources of Moor tone 1.

| PMP *banua 'inhabited area' | manù 'forest' |
| :--- | :--- |
| PMP *barəq 'swollen' | va/varà |
| PMP *balaq 'split' | vorà |
| PMP *buruk 'rotten' | va/varù |
| PMP *kamu 'you (pl.)' | amù |
| PCEMP *madar 'overripe' | marar/ù 'withered' |
| PMP *ma-tuqah, PEMP *matu 'dry (coconut)' | ma'ù |
| PMP *Ramas ‘squeeze' | $a m a t-a ̀ ~$ |
| PCEMP *todan 'sit' | 'ò |

Table 5.10: Sources of Moor tone 2.

| PMP *bulan 'moon', | vùrin-a |
| :--- | :--- |
| PMP *bulu 'body hair' | vùru |
| PMP *buRbuR 'rice porridge' | vùvur-a 'sago porridge' |
| PMP *dahun 'leaf' | rànu |
| PMP *danum 'fresh water' | ràrum-a |
| PMP *daRaq 'blood' | ràra |
| PMP *hikan 'fish' | ìjan-a |
| PMP *ka-wiri 'left side' | sa/gwìri |
| PCEMP *kazupay 'rat' | arùha |
| PCEMP *kera(ny) 'hawksbill turtle' | èran-a |
| PMP *manuk 'bird' | mànu |
| PEMP *(n)iwi 'nest' | nìgwi |
| PMP *pajan 'name' | nàtan-a |
| PMP *qaninu 'shadow' | anìno |
| PMP *qatay 'liver' | à'a |
| PMP *qutin 'penis' | ùsi |
| PMP *Rumaq 'house' | rùma |
| PMP *sa-puluq 'ten' | tàura |
| PMP *tabuRi 'conch shell' | avùr/a |
| PMP *talina 'ear' | ìna |
| PMP *tanis 'cry' | 'ànit- $a$ |
| PMP *tasik 'saltwater' | àti |
| PMP *tawan 'Pometia pinnata' | kàgwan-a |
| PMP *tubuq 'branch' | ùvu |
| PMP *tuqalay 'bone' | òro |
| PMP *wahiR 'river' | gwàjar-a |
| PMP *zalan 'path' | ràrin-a |
| PCEMP *waRaj 'vine, creeper' | gwàri/'-a |

Table 5.11: Sources of Moor tone 3.

| PMP *babaq 'short, low' | ku/vava/'-î 'short' |
| :---: | :---: |
| PMP *bunuq 'kill' | munâ |
| PMP *dəyวR 'hear' | oran-ı̂ |
| PMP *ia 'he, she' | ̂̂ |
| PMP *inum 'drink' | anum-î |
| PMP *lawaq 'spider' | ragwa/'̂̀ |
| PMP *ma-iRaq 'red' | mara/r-̂̂ |
| PMP *mataq 'green, raw' | $m a^{\prime}-\hat{\imath}$ 'raw', ma'a-ma'-î 'green' |
| PMP *ma-panas 'hot' | na/nat-î |
| PMP *qabaRa 'carry on shoulder' | ovar-ı̂ |
| PCEMP *qenap 'lie down to sleep' | enâ |
| PMP *tanzm 'to plant' | 'anam-ı̂ |
| PMP *tzlan 'swallow' | 'oran-î |
| PMP *tunu 'roast over a fire' | 'un-î |

Table 5.12: Sources of Moor tone 4.

### 5.3.2 Yerisiam

Yerisiam has both contrastive tone and vowel length. ${ }^{10}$ The tone-bearing unit is the mora, with short vowels counted as a single mora, long vowels counted as two moras, and diphthongs variably counted as one or two moras (see below). Two underlying tones may be associated with moras: high (H) and low (L). It follows that contour tones may be realized only as the sequences HL and LH on long vowels and bimoraic diphthongs. Table 5.13 summarizes the most common Yerisiam tonal patterns in words of up to three syllables. H is transcribed with an acute accent, L with a grave accent.

Three groups of common tonal patterns can be identified. Pattern 1 consists of high tone throughout the word (H). Pattern 2 consists of initial high tone followed by a shift to low on some mora (HL). Pattern 3 consists of initial low tone, with a shift to high on the final syllable ( $\mathrm{L} * \mathrm{H}$ ). Synchronic alternations show that monomoraic words with high tone belong to pattern 3, not pattern 1. For example, pronominal prefixes typically receive the same tone as the first root syllable, but combining 1sG ne- with pú 'go home' produces nè-pú 'I go home', not **né-pú.

These three patterns are by far the most frequent in the Yerisiam lexicon. As an illustration, my Yerisiam lexicon contains 526 disyllables (out of 1802 total items). Of these, pattern 1 accounts for 200 words, pattern 2 for 230 , and pattern 3 for 75 . All other patterns are represented by only 21 words, about $4 \%$.

Patterns 1-3 are not the only possible tone patterns, and there is diversity within pattern 2 with respect to the mora on which the shift to low tone occurs. I therefore assume that surface tone assignment on roots generally reflects underlying tone assignment in Ye-

[^49]risiam (but see below for my analysis of pattern 3). Table 5.14 shows the other attested tonal patterns in words of up to three syllables. It contains a significant proportion of the available examples.

| $\sigma$ | (1) | H | $\mu \mu$ | áau 'betel lime', róoi 'night' |
| :---: | :---: | :---: | :---: | :---: |
|  | (2) | HL | $\mu \mu$ | gwáà 'canoe', áli 'tree' |
|  | (3) | H | $\mu$ | bú 'blister', gwái 'duck sp.', rói 'song' |
| $\sigma \sigma$ | (1) | $\mathrm{H}-\mathrm{H}$ | $\mu-\mu$ | róhé 'nit', óría 'broth', báohé 'turtle flipper' |
|  |  |  | $\mu \mu-\mu$ | háarú 'coral', péeréi 'bed' |
|  | (2) | H-L | $\mu-\mu$ | búnè 'bamboo stem', krádìa 'flesh' |
|  |  |  | $\mu \mu-\mu$ | áakà 'four', búumbùi 'bottle' |
|  |  | H-HL | $\mu-\mu \mu$ | dálı̂ 'father', bábráù 'land', káoníà 'small sago midrib' |
|  |  |  | $\mu \mu-\mu \mu$ | máanáà 'bird', ráaníà 'sheet (of paper)' |
|  |  | HL-L | $\mu \mu-\mu$ | áàkà 'sago midrib', káèpà 'sago chopsticks', ráànìa 'leaf' |
|  | (3) | L-H | $\mu-\mu$ | àká 'ball sago', diorì 'top shell', diarúa 'sago stirrer' |
| $\sigma \sigma \sigma$ | (1) | $\mathrm{H}-\mathrm{H}-\mathrm{H}$ | $\mu-\mu-\mu$ | kájáké 'bad', húmbiái 'loose' |
|  |  |  | $\mu-\mu-\mu \mu$ | híróráai 'tree sp.', kákikóoi 'multicolored' |
|  |  |  | $\mu-\mu \mu-\mu$ | báróopé 'finger', níaméené 'tongue', bárúaahí 'share' |
|  |  |  | $\mu \mu-\mu-\mu$ | kóorîhé 'three', mieetáré 'light (n.)' |
|  | (2) | H-H-L | $\mu-\mu-\mu$ | jávútù 'flint', bábúgùa 'elbow', ádíakà 'shellfish sp.' |
|  |  |  | $\mu-\mu \mu-\mu$ | háráakvè 'book', pémáanùa 'slow' |
|  |  |  | $\mu \mu-\mu-\mu$ | díjánà 'fish', húuhúgùa 'breast' |
|  |  | H-L-L | $\mu-\mu-\mu$ | hábàkù 'cigarette', tónùrè 'ant nest' |
|  |  |  | $\mu-\mu \mu-\mu$ | nájòorè 'horn', úbiikì 'lift' |
|  |  |  | $\mu \mu-\mu-\mu$ | bóokànì 'axe', híaamàtù 'fish sp.', róodìatè 'tonight' |
|  |  | H-H-HL | $\mu-\mu-\mu \mu$ | káurieráà 'k.o. arrow', kábágwéà 'squash sp.' |
|  |  |  | $\mu-\mu \mu-\mu \mu$ | róniijáà 'gecko sp.', áráadiáa 'smoking platform' |
|  |  | H-HL-L | $\mu-\mu \mu-\mu$ | hánéèrà 'mosquito', kárúàrà 'friend', áráàhìa 'day' |
|  |  |  | $\mu \mu-\mu \mu-\mu$ | gwáapíàtè 'freshwater eel' |
|  | (3) | L-L-H | $\mu-\mu-\mu$ | bàhàbé 'fast', nàkùnía 'knife', hìbìabí 'bent' |

Table 5.13: Common Yerisiam tonal patterns in words of up to three syllables.

Several constraints restrict the distribution of long vowels: (i) there may be no more than one long vowel per word, except on the final two syllables when their tone pattern is H-HL (thus, róníijáà 'gecko sp.' but not, for example, *róonîjià); (ii) long vowels do not occur in diphthongs, except in VVG diphthongs (long vowel with an off-glide $i$ or $u$ ) in final level syllables (thus, róoi 'night' but not *róoimé or *áaì); (iii) long vowels are not permitted on final level syllables unless they are part of a VVG diphthong (there is no word of the form *róo) ${ }^{11}$; (iv) long vowels do not occur in words with tone pattern 3

[^50]| $\sigma$ | L | $\mu$ | bà 'still', poò 'in order to' |
| :---: | :---: | :---: | :---: |
| $\sigma \sigma$ | L-L | $\mu-\mu$ | dòrò 'also', dihì 'from' |
|  | H-LH | $\mu-\mu \mu$ | mígwàì 'duck sp.' |
|  | L-LH | $\mu-\mu \mu$ | kànàó 'talk freely' |
|  | HL-H | $\mu \mu-\mu$ | áihá 'above', áòró 'catfish sp.' |
|  | LH-L | $\mu \mu-\mu$ | nùúsì 'great-grandparent', gwòókà 'crow sp.' |
| $\sigma \sigma \sigma$ | H-L-H | $\mu-\mu-\mu$ | mónìhá 'all', rúmùhúa 'house post' |
|  | L-L-L | $\mu-\mu-\mu$ | kàpùhè 'ancestor', jàrìmòi 'agarwood tree' |
|  | H-L-HL | $\mu-\mu-\mu \mu$ | móhàdáà 'oven', óvàée 'duck sp.' |
|  | H-L-LH | $\mu-\mu-\mu \mu$ | móhòràù 'colored sky' |
|  | L-L-LH | $\mu-\mu-\mu \mu$ | mèmìmùà 'feature', kàimàà 'swan sp.' |
|  | H-HL-H | $\mu-\mu \mu-\mu$ | máhéèbá 'firefly cluster', távéèhé 'that's right' |
|  | H-LH-L | $\mu-\mu \mu-\mu$ | ímbàérì 'tree sp.' |
|  | LH-L-L | $\mu \mu-\mu-\mu$ | kàágwàtè 'wire' |
|  | HL-H-L | $\mu \mu-\mu \mu-\mu$ | îdíoodì 'bird sp.' |

Table 5.14: Uncommon Yerisiam tonal patterns in words of up to three syllables.
(thus, àká 'ball sago' but not *àaká or *àkóoi).
As noted above, diphthongs can count for one or two moras. They are bimoraic if they contain a contour tone or occur in a VVG diphthong (e.g., áì 'wood', róoi 'night'); otherwise they are monomoraic (e.g., dìarúa 'sago stirrer'). ${ }^{12}$ This analysis is based on the impressionistic length of diphthongs in these contexts. An analysis that did not stipulate variable moraicity would be preferable, but I have not found a viable alternative. One obvious option would be to treat the contrast between róoi 'night' and rói 'song' as one between a disyllable and a monosyllable (/rói/ versus /rój/). However, this analysis is actually less parsimonious: glides are insufficient to capture the full range of attested diphthongs (e.g., báohé 'turtle flipper', in which the initial syllable is as short as rói), and there is no corresponding explanatory benefit that would shed light on the restricted distrbution of long vowels.

Tone pattern 3 is exceptional. Unlike other patterns, words with pattern 3 undergo an alternation when the enclitic demonstrative = tà is added, receiving high tone throughout. Thus, hùpé 'bottom' becomes húpéà = tà, whereas áakú 'stone' (pattern 1) becomes áakúà = tà and búubù 'water' (pattern 2) becomes búubùa $=$ tà. ${ }^{13}$ I interpret this to mean that pattern 3 is the default tonal melody, and such words are underlyingly toneless.

[^51]The demonstrative = tà then imposes its own tonal melody if no underlying melody is present. This analysis does not, however, straightforwardly account for the prohibition on long vowels in pattern 3 words noted above. An additional stipulation is required that long vowels are only permitted on underlyingly tonal syllables.

I have identified clear Austronesian etymologies for 85 of the 1802 words found in my Yerisiam lexicon (disregarding cases with evidence of borrowing). These are listed in Tables 5.16-5.18, arranged according to the resulting tone pattern. There are 31 words with pattern 1, 39 with pattern 2, and 15 with pattern 3 . No other tonal patterns are attested in these data.

The origin of vowel length is relatively straightforward. Of the 70 words with patterns 1 and 2, 46 have a long vowel on the historically penultimate syllable. ${ }^{14}$ The most plausible explanation for this is that Yerisiam descends from a proto-language that had penultimate stress, with former stress surviving as vowel length. Though 24 words do not conform, not all are truly exceptions. Two do not allow long vowels for phonotactic reasons (áà 'wood', núí 'coconut'; see constraint (ii) above). Seven are likely candidates for contamination: kinship terms (gwápúù 'grandmother', bábà ‘older sibling'); î̀nà 'woman’ (cf. máànà 'man'); pronouns (néemé 'we (excl.)', néeké 'we (incl.)', íníhi' 'they'); and a numeral (áakà 'four'). This leaves a residue of 15 words which lack the expected long vowels, or contain them where not expected. I have considered various predictors (e.g., the presence of final * $q$ and the loss of intervocalic consonants) but have not found any convincing correlations.

Turning now to the origin of tone, inspection of Tables $5.16-5.18$ shows that there is a striking correlation between a Yerisiam word's tone pattern and the presence or absence of final $a$. In pattern 1, 2 of 31 words end in $a$ ( $6 \%$ ); in pattern 2,35 of $39(90 \%)$; and in pattern 3, 5 of 15 (33\%). This correlation also holds for the Yerisiam lexicon at large. Table 5.15 shows the prevelance of final $a$ among attested disyllables and trisyllables in patterns 1, 2, and 3. Final $a$ is rare in pattern 1, very common in pattern 2, and quite common in pattern 3 .

This leads straightforwardly to the inference that final $a$ triggered a tonal change. The default tonal outcome was evidently pattern 1 . If a word came to end in $a$, whether as a result of sound change or suffixation, the outcome was pattern 2 . The origin of pattern 3 is unclear, except that in several cases it derives from monosyllables that would have had pattern 1 but are too short (e.g., nú 'village', ú 'fruit').

The unexplained residue in these data is relatively minor (leaving aside pattern 3, which as mentioned is not well understood): two words in Table 5.16 end in $a$ and four words in Table 5.17 do not end in $a$. Of these cases, the only one for which there is a ready explanation is gwápúù 'grandmother', which may have been contaminated by other kinship terms such as átù 'mother' and áúù 'father's younger brother'. ${ }^{15}$

[^52]The mora on which the change from H to L falls in pattern 2 words is largely predictable. There were apparently two separate stages in which changes occurred. During the first stage, all words had tone pattern 1, with a lengthened vowel in the penultimate syllable in most cases (but not all, as discussed above). Possibly tone was not yet contrastive at this stage. Then, if the word ended in $a$, the tone shifted from H to L on the second mora of the penult if it was long ( $* \mathrm{HH}-\mathrm{H}>\mathrm{HL}-\mathrm{L}$ ), otherwise on the final syllable (*H-H > H-L). Examples are *úurá 'moon' > úùrà and *rúmá 'ceremonial house' > rúmà. During the second stage, some words that were not $a$-final in the first stage acquired lowtone $a$-final suffixes. This introduced a shift to L on the final syllable (* $\mathrm{HH}-\mathrm{H}>\mathrm{HH}-\mathrm{H}-\mathrm{L}$ ). Examples are *díiján 'fish' > díiján-à and *úurú 'body hair' > úurú-gùa. ${ }^{16}$

The phonetic basis on which final a triggers low tone is of significant interest for the theory of tonogensis. There is a well-established cross-linguistic universal that high vowels have an intrinsically higher $F_{0}$ by about $10-15 \mathrm{~Hz}$ (Whalen and Levitt 1995). A low vowel such as $a$ has a lower $F_{0}$, and may plausibly be the phonetic precursor of a phonologized change to low tone.

The effect of vowel height on tone is discussed sparingly in the tonogenesis literature, and not all proposed cases have been accepted. Maddieson (1978: 354) and Hombert et al. (1979: 52) reject it for Lahu and Foochow, the most plausible examples known at the time. Hombert et al. (1979: 52) conclude that these cases "can [rather] be interpreted as an effect of tones on vowels. It would seem that the interaction between tones and vowel height works only in one direction: tone can affect vowel height but not vice-versa."

Since Hombert et al.'s landmark paper, several more persuasive examples of vowel height affecting tone have been observed. Svantesson $(1989,1991)$ describes two independent cases in two Mon-Khmer languages. In Hu, "the high vowels $i$ and $u$ always have high tone, except before $в$ or in open syllables, where both [high and low] tones occur" (Svantesson 1991: 72). In U, "in open syllables..., the high level tone split in two, depending on vowel height, so that high vowels retained the high tone and nonhigh vowels got low tone" (Svantesson 1989: 72). Svantesson cites intrinsic $\mathrm{F}_{0}$ differences as the most likely explanation for both cases.

Rivierre (2001) describes a phenomenon in Cèmuhî, an Oceanic language of New Caledonia, which is strikingly similar to Yerisiam tonogenesis. Cèmuhî has three different word-level tones: high, mid, and low. High tone derives straightforwardly from aspirated initial consonants ( $\left.{ }^{*} C^{h} V>C V ́\right)$, mid tone from unaspirated initial consonants ( ${ }^{*} C V>C \bar{V}$ ). The significant case is low tone. The proto-sequences *aqa, *ao, and *oa are all reflected as $\grave{a} .{ }^{17}$ The result is that most low tone words contain $a .{ }^{18}$

[^53]There is one important difference between tonogesis in Cèmuhî and Yerisiam. Cèmuhî undergoes typical tonogenesis changes involving secondary split: the loss of contrastive aspiration elevates what was formerly a predictable pitch difference to a tonal contrast. Similarly, when the reflexes of *aqa, *ao, and *oa merged, their formerly predictable low pitch became phonologized as low tone. In Yerisiam, however, the conditioning environment for the tone change, namely the final $a$, was never lost. This makes Yerisiam somewhat unusual compared with more well-known cases of tonogenesis.

Taken together, the Hu, U, Cèmuhî, and Yerisiam cases provide convincing evidence that, contra Hombert et al. (1979: 52), vowel height can affect tone. The fact that only these cases are known suggests that this phenomenon is quite rare.

|  | tones | \# words |  | \# with final $a$ |  |
| :--- | :--- | :--- | :--- | :--- | :---: |
| $(1)$ | H-H | 200 | 26 | $(13 \%)$ |  |
| $(2)$ | H-L | 81 | 57 | $(70.4 \%)$ |  |
|  | H-HL | 67 | 39 | $(58.2 \%)$ |  |
|  | HL-L | 82 | 59 | $(72 \%)$ |  |
| $(3)$ | L-H | 75 | 36 | $(48 \%)$ |  |
| $(1)$ | H-H-H | 175 | 11 | $(6.3 \%)$ |  |
| $(2)$ | H-H-L | 164 | 105 | $(64 \%)$ |  |
|  | H-L-L | 17 | 0 | $(0 \%)$ |  |
|  | H-H-HL | 27 | 21 | $(77.8 \%)$ |  |
|  | H-HL-L | 108 | 81 | $(75 \%)$ |  |
| $(3)$ | L-L-H | 35 | 21 | $(60 \%)$ |  |

Table 5.15: Distribution of final $a$ across tone patterns in Yerisiam.

| PMP *añam 'weave' | áamán/é |
| :---: | :---: |
| PMP *batu 'stone' | áakú |
| PMP *duha 'two' | rúu-hí |
| PMP *hapuy, PEMP *api 'fire' | jáai |
| PMP *inum 'drink' | tímán/é |
| PMP *kazn 'eat' | áan-í 'eat (intr.)' |
| PMP *kami 'we (excl.)' | née/mé |
| PMP *kaRaw 'to scratch' | áráa/rí |
| PMP *kita 'we (incl.)' | née/ké |
| PMP *kutu 'head louse' | úukú |
| PMP *laRiw 'run' | ráarú |
| PMP *lasaq 'nit' | róh/é |
| PMP *ma-baRzqat 'heavy' | máak/í |
| PMP *ma-nipis 'thin' | máníl/jáhé |
| PMP *ma-Raqan 'light' | márán/é |
| PMP *ma-takut 'afraid' | ngkák/é |
| PMP *mataq 'raw, green' | máaká 'raw', mák-máaká 'blue' |
| PMP *pañu 'turtle' | éenú |
| PMP *punti 'banana' | pitití |
| PMP *qabaRa 'carry on shoulder' | áar-í |
| PMP *qapuR 'lime, calcium' | áau |
| PCEMP *qenap 'lie down to sleep' | éen/é |
| PMP *qitzluR 'egg' | á/kóor/é |
| PMP *sida 'they' | iníi-hí |
| PMP *tanam 'to plant' | káamán/é |
| PMP *tanis 'cry' | káh/é |
| PMP *tzbuh 'sugarcane' | kóou |
| PMP *tzlan 'swallow' | kóor-í |
| PMP *tzlu 'three' | kóorí-hé |
| PMP *tunu 'roast over a fire' | kúun/á |
| PMP *waRaj 'vine, creeper' | gwáarí 'rope' |

Table 5.16: Sources of Yerisiam tone pattern 1.

| PMP *apu 'grandparent' | gw/ápúù 'grandmother' |
| :---: | :---: |
| PMP *baba 'father' | bábà 'older sibling' |
| PMP *babsinsahi 'woman' | ûnà |
| PMP *bulan 'moon' | úùrà |
| PMP *buku 'knot' | bú-gùa |
| PMP *bulu 'body hair' | úurú-gùa |
| PMP *dahun 'leaf' | ráàn/ìa |
| PMP *danum 'fresh water' | ráarám/à |
| PMP *daRaq 'blood' | rárà |
| PMP *zygam 'hold in mouth' | óom/à |
| PMP *zpat 'four' | áak/à |
| PMP *hasaq 'sharpen' | áhà |
| PMP *hikan 'fish' | d/îján/à |
| PMP *kahiw, PCEMP *kayu 'wood' | áà |
| PCEMP *kandoRa 'cuscus' | átóòrà |
| PMP *lajit 'sky' | ráak/átè |
| PMP *lawaq 'spider' | rá-ráà/rùmà |
| PMP *lima 'five' | rûmà |
| PMP *mamaq 'chew' | námà |
| PMP *manuk 'bird' | máan/áà |
| PMP *ma-Ruqanay 'man' | máànà |
| PMP *m-atay 'die' | máàkà |
| PMP *nanaq 'pus' | náanáà |
| PMP *niuR 'coconut' | núì |
| PMP *nusa 'island' | núùhà |
| PMP *gajan 'name' | áahán/à |
| PMP *paRih 'sting' | pár/éèmà 'stingray' |
| PMP *qalajaw 'sun' | óòrà |
| PMP *qaninu 'shadow' | ánúunú-gùa |
| PMP *qasu 'smoke' | ógw/áahú-gùa |
| PMP *qatay 'liver' | ákéè/nà |
| PMP *quday 'shrimp' | úuráà |
| PMP *Rumaq 'house' | rúmà 'ceremonial house' |
| PMP *susu 'female breast' | húuhú-gùa |
| PMP *tasik 'salt' | káhì/a |
| PMP *taki, *taqi ‘feces' | káà |
| PMP *tuqala(ny) 'bone' | kóo/vá/rà |
| PCEMP *wayka 'canoe' | gwáà |
| PMP *zalan 'path' | jáàrà |

Table 5.17: Sources of Yerisiam tone pattern 2.

| PMP *banua 'inhabited area' | nú 'village' |
| :--- | :--- |
| PMP *baRa 'arm' | bà-kí |
| PMP *buaq 'fruit' | ú |
| PMP *ia 'he, she' | $\grave{l} n i ́$ |
| PMP *i-kahu 'you (sg.)' | à/né |
| PMP *kaan 'eat' | àn/á 'eat (tr.)' |
| PMP *lakaw 'go' | rá |
| PMP *ma-hiaq, PCEMP *mayaq 'ashamed' | mái |
| PMP *ma-tuqah, PEMP *matu 'dry (coconut)' | màkú/i |
| PMP *moñak 'fat, grease' | mì/mná |
| PCEMP *mipi 'to dream' | mí |
| PMP *quma 'to work' | ùmá |
| PMP *Rambia 'sago' | pí |
| PMP *tinvaqi 'intestines' | hìná 'belly' |
| PCEMP *todan 'sit' | kó |

Table 5.18: Sources of Yerisiam tone pattern 3.

### 5.3.3 Yaur

Yaur has both contrastive tone and vowel length. ${ }^{19}$ There is rarely more than one long vowel in a word. The tone-bearing unit is the mora, with short vowels counted as a single mora, and long vowels and diphthongs counted as two moras. Two underlying tones may be associated with moras: high (H) and low (L). It follows that contour tones may be realized only as the sequences HL and LH on long vowels and diphthongs.

Most of my Yaur lexicon of 1342 words consists of disyllables and trisyllables. Although various tone patterns are attested, there are only four common patterns on disyllables and six on trisyllables. Table 5.19 shows these patterns and their distribution. H is transcribed with an acute accent, L with a grave accent. An example of a near-minimal disyllabic quadruplet is hníoojè 'body hair', òojé 'sugarcane', óòjé 'head louse', and 'òórè 'bone'. To this set may be added òjé 'bamboo', illustrating the vowel length contrast.

I have identified clear Austronesian etymologies for only 37 of the words found in my Yaur lexicon (disregarding cases with evidence of borrowing). These are listed in Tables 5.20-5.22, arranged according to the resulting tone pattern. There are 14 words with L-H (or equivalent), 14 with $\mathrm{H}-\mathrm{L}$ (or equivalent), 4 with $\mathrm{HL}-\mathrm{H}$, and 5 with LH-L.

It is difficult to make robust generalizations about such a small number of words. The most convincing patterns I have noted are that pronouns, numerals, and inalienably possessed nouns typically have H-L, and words with LH-L tend to be verbs. The paucity of data means that the origins of tone in Yaur must remain mysterious for now.

[^54]| pattern | \# words |
| :--- | :--- |
| H-L | 202 |
| L-H | 176 |
| HL-H | 42 |
| LH-L | 36 |
| others | 18 |
| total $\sigma \sigma$ | 474 |
| H-H-L | 167 |
| L-L-H | 119 |
| H-L-L | 65 |
| H-L-H | 52 |
| H-HL-H | 41 |
| L-LH-L | 26 |
| others | 20 |
| total $\sigma \sigma \sigma$ | 490 |

Table 5.19: Distribution of attested Yaur tone patterns in disyllables and trisyllables.

| PMP *baRay 'give' | vè-né |
| :--- | :--- |
| PMP *duyun 'dugong' | rì'-ré |
| PMP *haRazan 'ladder', | ròg-ré |
| PMP *kahiw, PCEMP *kayu 'wood' | à-jé |
| PCEMP *mamaq 'chew' | í-jó'-màm-né 'I chew' |
| PMP *manuk 'bird' | mà'-ré |
| PMP *ma-Ruqanay 'man', | jò/màg-ré |
| PMP *punti 'banana' | idí-e |
| PMP *tanam 'to plant' | ì-'àm-né 'I plant' |
| PMP *tasik 'salt, saltwater' | àah-ré 'salt' |
| PMP *tabuh 'sugarcane' | òo-jé |
| PMP *utik 'marine fish with thorny skin', | bàb/ùh-ré 'pufferfish' |
| PMP *wai 'mango' | gwài/h-ré |
| PMP *waRaj 'vine, creeper' | gwàrí-e 'rope' |

Table 5.20: Sources of Yaur L-H tone.

| PMP *buku 'node, knot' | vúu-jè |
| :--- | :--- |
| PMP *duha 'two' | ré-dú-hè |
| PMP *zpat 'four' | ría-hè |
| PMP *ia 'he, she' | í'è |
| PMP *i-kahu 'you (sg.) | á-'è |
| PMP *kamiu 'you (pl.)' | ámú-'è |
| PCEMP *madar 'ripe' | mád-rè |
| PMP *mataq 'green' | máa'/rùrie |
| PMP *məñak 'fat, grease' | mnáa-rè |
| PMP *zajan 'name' | áhg-rè |
| PMP *qaninu 'shadow' | núndì-e |
| PMP *susu 'female breast' | húhì-e |
| PMP *tinıaqi 'intestines' | hnáa-rè |
| PMP *tunu 'roast over a fire' | 'ún-dè |

Table 5.21: Sources of Yaur H-L tone.

| PMP *banua 'inhabited area' | núù-ré 'village' |
| :--- | :--- |
| PMP *kutu 'head louse' | óò-jé |
| PMP *lawaq 'spider' | ráà-jé |
| PMP *Rumaq 'house' | rúùg-ré 'ceremonial house' |
| PMP *lakaw 'go' | ìràá-rè 'I come' |
| PMP *matay 'die' | ìmàà'-rè ‘I die' |
| PMP *tajis 'cry' | ì-'ááh-rè 'I cry' |
| PMP *tasik 'salt, saltwater' | áah-rè ‘sea water' |
| PMP *tuqala(ny) 'bone' | 'òó-rè |

Table 5.22: Sources of Yaur HL-H and LH-L tone.

### 5.4 Implications for subgrouping

Of the five languages covered in this chapter, it is possible to place the origins of tone on a relatively sound basis only in one case: Yerisiam. The innovations that are found in Yerisiam are not, however, found in the other four languages. The only identifiable shared tonal innovation is the epenthetic final $o$ found after the (acoustically identical) Fall in Ma'ya and Low Fall in Matbat. ${ }^{20}$ The origin of this innovation is obscure; there

[^55]are no known synchronic or historical facts explaining why the $o$ is restricted to a words with (low) falling tone, or why the vowel is $o$.

The epenthetic final o innovation provides support for Proto-Ma'ya-Matbat. Since Ma'ya and Matbat are in contact, the innovation could also have diffused, rather than being inherited from a common proto-language. Remijsen (2007: 25) takes this view:

The Matbat Low Fall and the Ma'ya Fall are acoustically identical, so it is likely that one of them has influenced the other. It is more probable that Ma'ya influenced Matbat rather than the [other] way around, since Matbat is only used on Misol, and could not have exerted an influence on the Waigeo and Salawati variants of Ma'ya, which also feature the epenthetic final /o/.

Remijsen apparently does not consider inheritance as an alternative explanation for the common feature.

The fact that tonal developments provide such little support for subgrouping, leading to the conclusion that tone has arisen independently four or five times in SHWNG, is in itself striking. It is implausible that so many languages in a relatively small region should become tonal by chance. It is more likely that the presence of nearby tonal Papuan languages has played a role at some point in the history of SHWNG. ${ }^{21}$ However, of the five tonal SHWNG languages, only Yerisiam is currently in contact with a Papuan language, namely, the Yamor dialect of Kamoro. This dialect is largely undescribed, and it is not known whether it is tonal. ${ }^{22}$ It is therefore not possible at present to identify the tonal Papuan language(s) that may have had an influence on tonal SHWNG languages.

Traces of former penultimate stress were found in Ma'ya, Moor, and Yerisiam. Penultimate stress is cited as the regular or default pattern in most other SHWNG languages for which descriptions are available: the South Halmahera languages Buli (Maan 1951: 16), Sawai (Whisler and Whisler 1995: 660), and Taba (Bowden 2001: 62); the Cenderawasih Bay languages Ambai (Silzer 1983: 40), Wandamen (Henning 1991: xviii), and Waropen (Held 1942b: 28); and the Mamberamo language Warembori (Donohue 1999: 7). The most likely explanation for such a widespread pattern is that stress was penultimate in Proto-SHWNG. The fact that traces of penultimate stress are still readily apparent in Ma'ya, Moor, and Yerisiam further suggests that SHWNG tonogenesis is not particularly ancient.

[^56]
## Chapter 6

## SHWNG historical morphology

### 6.1 Introduction

This chapter evaluates the historical morphology of all SHWNG languages for which data are available. SHWNG languages consistently exhibit morphological paradigms in two areas: subject marking and inalienable possessive marking. The focus in this chapter is therefore on these two paradigms. Other topics which are not relevant or well-described for all languages, but might be discussed in a fuller treatment, include object marking, alienable possessive marking, and demonstratives.

Table 6.1 on the following page lists the sources consulted in compiling this chapter. Sources vary considerably in depth and quality (see \&3.3).

### 6.2 Pronouns

The most readily identifiable sources of SHWNG subject markers are phonologically reduced independent pronouns. This is a well-known grammaticalization pathway, and synchronic comparison of subject markers with independent pronouns in SHWNG languages shows significant overlap. I therefore summarize reconstructed PMP pronouns and current SHWNG pronouns before turning to subject marking.

Ross (2006) tentatively reconstructs six series of personal pronouns for PMP (see Table 6.2). Pronominal series are defined by case, i.e., the morphosyntactic context in which they appear. PAn and PMP reconstructed morphosyntax is complex; see Ross (2002) and Ross (2006) for more details.

SHWNG personal pronouns are generally derived from the PMP NOM1 series (see Tables 6.3 and 6.4). The 1sG pronouns containing $y a-$, ( $y$ ) $e$-, and $i$ - derive from neUt *i-aku.

There are only a few candidates for shared innovations within the pronominal system. The 1 SG and 1PL contain innovative ne (or similar) in various languages, but this does not seem to follow any clear subgrouping pattern. This is a candidate for a Proto-SHWNG

|  | Language | Works consulted |
| :---: | :---: | :---: |
| SH | Buli | Maan (1951); van den Berg (2009) |
|  | Gane | Hamim Al Fatih (p.c., 2013); Greenhill et al. (2008) |
|  | Maba | Adriani and Kruyt (1914) |
|  | Patani | Legaya Jumahir Jamulia (p.c., 2013) |
|  | Sawai | Whisler and Whisler (1995); van den Berg (2009) |
|  | Taba | Bowden (2001) |
| $R A$ | Ambel | Remijsen (2001b); Arnold (2014) |
|  | As | Grace (1955-6); Greenhill et al. (2008) |
|  | Biga | Remijsen (2001b); Grace (1955-6) |
|  | Fiawat | Remijsen (2001b) |
|  | Gebe | Grace (1955-6); Greenhill et al. (2008); Kalu Mata (p.c., 2014) |
|  | Kawe | Remijsen (2001b); Grace (1955-6) |
|  | Matbat | Remijsen (2010); van den Berg (2009) |
|  | Ma'ya (S.) | Remijsen (2001b); van der Leeden (n.d.) |
| CB | Ambai | Silzer (1983); van den Berg (2009) |
|  | Ansus | Silzer (1983); Price and Donohue (2009); Anceaux (1961a) |
|  | Biak | van den Heuvel (2006); van den Berg (2009) |
|  | Busami | Silzer (1983) |
|  | Dusner | Dalrymple and Mofu (2011); Kijne (n.d.[b]) |
|  | Kurudu | Silzer (1983); Anceaux (1961a) |
|  | Meoswar | Anceaux (n.d.); Smits and Voorhoeve (1992b) |
|  | Moor | own field notes |
|  | Munggui | Silzer (1983); Anceaux (1961a) |
|  | Papuma | Silzer (1983); Anceaux (1961a) |
|  | Pom | Silzer (1983); Anceaux (1961a) |
|  | Roon | Gil (2008); Anceaux (n.d.) |
|  | Serui-Laut | Slump (1924-38) |
|  | Tandia | Kijne (n.d.[a]) |
|  | Umar | own field notes |
|  | Wabo | Silzer (1983); Anceaux (1961a) |
|  | Wandamen | Henning (1991); Silzer (1983); Kamma (n.d.); Gasser (2013) |
|  | Waropen | Held (1942a); van den Berg (2009) |
|  | Wooi | Sawaki (2009); Silzer (1983); Anceaux (1961a) |
|  | Yaur | own field notes |
|  | Yerisiam | own field notes |
| M | Warembori | Donohue (1999) |
|  | Yoke | Donohue (1999); Clouse et al. (2002) |

Table 6.1: Sources of morphological data in this chapter.
innovation. It may conceivably derive from PMP *-ni '1PL deixis and spatio-temporal reference: this; here; now'. If so, it is significant that the vowel is consistently lowered.

The Biakic languages (Biak, Dusner, Meoswar, and Roon) contain pronouns deriving from 1PL.IN *to, 1PL.EX *nto, and 2pl *mto. This is clearly a shared innovation: none derive directly from PMP forms, and there is close agreement among the four languages. I therefore assume it occurred at the stage of Proto-Biakic.

In several cases, plural pronouns clearly derive from historical trial and quadral forms. Moor pronouns ending in -'ó and Papuma and Pom pronouns ending in - $(t)$ oru derive from trials (cf. Moor ó-ró, Papuma, Pom toru 'three'). ${ }^{1}$ Kawe and Wauyai pronouns ending in -'fat(a), and possibly Matbat hafo ${ }^{12}$ as well, evidently derive from quadrals (cf. Kawe, Wauyai fat, Matbat $f a^{3} t$ 'four').

As an example of another possible development of the inherited pronouns following the breakup of PEMP, the Proto-Oceanic pronouns are shown in Table 6.5. There are some obvious differences with SHWNG languages. For example, Proto-Oceanic has no reflexes of the first syllable of 3sG NOM1 *sida, whereas these are common in SHWNG. There are also various divergent developments in subject marking (see below).

|  | 1sG | 2sG | 3sG | 1PL.IN | 1PL.EX | 2PL | 3PL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NEUT | i-aku | ikahu | siya | i-kita, ita | i-kami | i-kamu, i-kaihu, kamu-ihu | - |
| NOM1 | aku | (i)kahu | iya | kita, i-ta | kami | kamu, ka-ihu | sida |
| NOM2 | = (h)aku | $=\mathrm{ka}(\mathrm{hu})$ | $=\varnothing$, = ya | $=\mathrm{ta}$ | $=\mathrm{kami}$ | $\begin{aligned} & =\mathrm{kamu},=\mathrm{ka}- \\ & \text { ihu, = kamu-ihu } \end{aligned}$ | $=\mathrm{da}$ |
| GEN1 | = ku | $=\mathrm{mu}$ | = ya | $=\mathrm{ta}$ | $=\mathrm{mi}$ | $=\mathrm{ihu},-\mathrm{mu}$-ihu | $=\mathrm{da}$ |
| GEN2 | = $\mathrm{n}(\mathrm{a}) \mathrm{ku}$ | = nihu | $=$ niya | - | $\begin{aligned} & =\text { mami, } \\ & =\text { nami } \end{aligned}$ | $=$ nihu | $=$ nida |
| PSR | [y]akən | imu, ihu | - | [y]atən | [y]amən | ihu, ini-hu, imu-ihu | - |

Table 6.2: PMP pronouns reconstructed by Ross (2006).

[^57]|  | 1SG | 2SG | 3sG | 1PL.IN | 1PL.EX | 2PL | 3pL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Buli | ya | awe, au | i | ite | ame(k) | meu | si, sil(e) |
| Gane | yak | au | i | kit | am(e) | meu | si |
| Maba | ya | au | i | ite | amek | meu | si(d) |
| Patani | ay(a) | aw(a) | i | it(i) | am(a) | mew(e) | si |
| Sawai | ya | aw(e) | i | it(e) | am(e) | méw(e) | si |
| Taba | yak, lak | au | i | tit | am | meu | si |
| Ambel | yene | awa | iya | isne | amne | mewa | Si |
| As | anc | awa, aure | ia | ti(re) | amne(re) | mou(re) | sire, sia(fere) |
| Biga | in | 'awa | num | itba'na | amba'na | mimbana | aba'na |
| Fiawat | in(e) | aw(a) | ia | atne | ame | mihya | hane |
| Gebe | ane | auya | ia | itne | amne | mevia | sia |
| Kawe | 'yene | 'wawa | 'ia | 'tit(n)e, <br> ta'fat(a) | $\begin{aligned} & \text { 'am(n)e } \\ & \operatorname{am}^{\prime} \text { 'fat(a) } \end{aligned}$ | 'mia | 'si(a), ha'fat(a) |
| Laganyan | 'yene | 'awa | ? | 'itne | 'amne | ? | 'hia |
| Matbat | $y{ }^{21} \mathrm{ka}$ | ya ${ }^{21} \mathrm{wa}$ | $\mathrm{i}^{21}$ | ya ${ }^{21}$ ta | ya ${ }^{21} \mathrm{ma}$ | $\mathrm{mi}^{21} \mathrm{na}$ | hafo ${ }^{12}$ |
| Ma'ya (S.) | 'ene | 'awa | 'ia | 'akne | 'amne | 'mia | 'sia |
| Wauyai | 'yene | 'awa | ? | 'titne | $\begin{aligned} & \text { 'am(n)e, } \\ & \text { am'fat(a) } \end{aligned}$ | ? | ? |

Table 6.3: Personal pronouns in South Halmahera and Raja Ampat.

|  | 1SG | 2SG | 3SG | 1PL.IN | 1PL.EX | 2PL | 3pL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Ambai | yau | wau | i | tata | amea | mea | ea |
| Ansus | yau | au | i | tata | ama | mia | ya |
| Biak | aya | aw | i | ko | inko | mko | si; na |
| Dusner | ya | au, wa | i | to(en) | ndoen | mto(en) | si; na |
| Kurudu | aya | awa(wa) | i | net(a) | nami, name | ame, amia | isi(a) |
| Meoswar | aya | au | i | kon | inggon | mkon | skon |
| Munggui | yau | au | i | ? | antoru | mintori | ? |
| Moor | ígwa | ágwa | ̂̂ | í'a; a'ó | áma; ma'ó | amù, mu'ó | ti'ó |
| Papuma | iau | au | i | tantoru | antoru | mintoru | soru |
| Pom | iau | au | i | tatoru | antoru | mintoru | tioru |
| Roon | ya | aw | (t)i | kon | nggon | mokon | si; na |
| Serui-Laut | yau | wau | i | tata | ama | ma | sa |
| Tandia | yane | auna | i(no)ya | itaya | amiya | mu | sia |
| Umar | ene | ate | ije | ete | emi | amu | ihi |
| Wabo | ayae | awawi | i | nente | ? | amiti | isi |
| Wandamen | ya(u) | au | i | tata | ama(te) | mia(te) | sia(te); si |
| Waropen | ya, ra | auo | i | iko | ako, amo | mu | ki |
| Wooi | ya(u) | au | i | tata | ama | mia | hnia |
| Yaur | jư'è | á’è | náràvè | ó'í'è | ómí’è | ámú'è | óhè |
| Yerisiam | né | àné | ìní | néeké | néemé | ánéemé | íníihí |
| Warembori | iwi | awi | yi | ki | ami | mi | ti |
| Yoke | eßu | aßu | i $\beta$ u | kißu | ? | $\mathrm{mi} \beta \mathrm{u}$ | sißu |

Table 6.4: Personal pronouns in Cenderawasih Bay and Mamberamo.

|  | 1sG | 2sG | 3sG | 1PL.IN | 1PL.EX | 2PL | 3PL |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| independent | [i]au | [i]ko[e] | ia | kita | ka[m]i, kamami | ka[m]u, kamiu | (k)ira |
| subject | $\begin{aligned} & \mathrm{ku}=, \\ & \mathrm{au}= \end{aligned}$ | $\begin{aligned} & \mathrm{mu}=, \\ & \mathrm{ko}= \end{aligned}$ | $\begin{aligned} & \text { (y) } a=, \\ & \tilde{n} a=, i= \end{aligned}$ | $\varnothing, \mathrm{ta}=$ | $\varnothing$ | $\varnothing$ | $\varnothing, \mathrm{ra}=$ |
| object | = au | = ko | = a | $\varnothing$ | $\varnothing$ | $\varnothing$ | $=\mathrm{r}$ |
| possessor | -gu | -mu | -ña | -da | -ma[m]i | -m[i]u | -dra |

Table 6.5: Proto-Oceanic pronouns reconstructed by Lynch et al. (2002).

### 6.3 Subject marking

### 6.3.1 Introduction

This section compares subject marking in 37 SHWNG languages and dialects, evaluating its usefulness as a subgrouping diagnostic.

All SHWNG languages possess verbal subject morphology. Individual languages show differences in its phonological form (prefix, infix, or proclitic) and syntactic status (agreement or pronominal argument). For example, Yerisiam has prefixes and infixes, as in nè-rá 'I go', à-rúua 'you go', ì-ríva '(s)he goes'. The prefix is a pronominal argument, as evidenced by its absence in sentences with a full subject: máànà ríıa 'the man goes'. The preceding example also shows the infix to be an agreement marker.

Subject markers often vary depending on whether the verb stem begins with a vowel or a consonant. I refer to these as 'vocalic' and 'consonantal' conjugations. For example, in Yaur, the 1 SG prefix is igw- on vowel-initial stems (e.g., ígw-éhrè 'I stand'), and $i$ - on consonant-initial stems (e.g., í-ráavúrè 'I go').

Subject marking paradigms have not been reconstructed for PCEMP, PEMP, or ProtoSHWNG. The diversity of attested paradigms in their descendants suggests that these proto-languages did not actually have an established subject marking paradigm. Rather, their descendents independently innovated such paradigms many times, as a result of an existing tendency, contact with nearby Papuan languages, or both.

Infixal subject marking is one of these significant tendencies: it is common in CMP and SHWNG languages, though it cannot be reconstructed for PCEMP. Dyen (1978: 248) notes that it is found in the CMP languages 'Kabhubhaka' (apparently Wejewa, spoken on Sumba), Leti (spoken on Leti, just east of Timor), Fordata, Selaru, and Yamdena (all spoken in the Tanimbar islands). It also occurs in Arguni, spoken on Arguni island off the Bomberai peninsula (Grace 1955-6). According to Dyen, infixation arose when "the originally last vowel of some preverbal pronouns was metathesised to a position after the initial consonant of a following verb". Dyen gives a few non-verbal examples to justify the claim that metathesis was a regular sound change. However, there are only a few such attested examples, and the only CMP or SHWNG language for which there is synchronic evidence of regular metathesis is Leti (Blevins and Garrett 1998; Hume 1997, 1998). I therefore follow a bottom-up approach in evaluating infixal subject marking, assuming each case to be independent unless there is extensive coincidence in form.

### 6.3.2 Comparative morphology

In summarizing subject marking, some abstractions have been made in order to facilitate comparison. The tables show affixes and clitics only, ignoring stem allomorphy. For example, in Patani $y$-an 'I eat', n-on '(s)he eats', only the prefixes are analyzed. This is because Patani's stem allomorphy is difficult to generalize and compare with other languages.

In cases where stem allomorphy clearly derives from historical infixation, the inferred earlier infix stage is given in the tables. For example, when compared with related languages, it is clear that Yaur rèérè '(s)he comes' descends from a form with the 3sG infix «i (cf. ì-ràárè 'I come', which lacks the infix). I therefore give Yaur's 3sG subject marker as <i, glossing over the change to an ablauting system. Likewise, I interpret consonant alternations in certain Raja Ampat languages as derived from an earlier infix $\langle y\rangle$. For example, Kawe cen 'I give' derives from try>en, as comparisons with ten 'they give' and m‘y>at 'I die' make clear (Remijsen 2001b: 160).

Another abstraction is that markers that occur only on certain common stems are listed as if they are regular. For example, in Umar, $2 \mathrm{SG}\langle u$ and 3 SG «i occur only on a small number of (presumably) common verbs: compare i-riza '(s)he goes' with i-mah '(s)he dances'. Following standard models of morphological change, I infer that infixation formerly occurred more widely and was lost on all but the most common verbs. In this case as well, it makes most sense to compare the historically earlier stage.

I diyide the analysis of subject markers into singular and plural forms. ${ }^{2}$ Tables 6.6 and 6.7 show the attested singular forms, divided by geographical region.

The 1SG marker is $k$-, $y$-, or similar in most SHWNG languages. Since both variants are easily derived from PMP NEUT *i-aku or GEN1 * $=k u$, neither is of convincing subgrouping value.

The 2sG marker is $m$ - or $w$ - in most SHWNG languages, deriving from GEN1 $*=m u$. The marker $a$ - may derive either from synchronic pronouns or directly from one of the other PMP 2sG pronouns. Since all of these forms could have arisen independently, none is of convincing subgrouping value.

The 1sG and 2sG infix $\langle y$ s appears in Patani and all Raja Ampat languages except Matbat. ${ }^{3}$ In Kawe and Ma'ya (S.), it occurs in the 3sG as well. It is sufficiently different in form and distribution from the Cenderawasih Bay infixes (see below) that it should be considered historically distinct. The historical origin of this infix is somewhat obscure, making it quite unlikely to have arisen independently. This innovation therefore supports a subgroup containing the languages that show the 1 SG and 2 SG infixation pattern. The 3SG infix is an independent innovation that supports a narrower subgroup.

The 2 SG consonantal conjugation prefix $w a$ - is found in the Biakic languages Biak, Dusner, and Roon. Data from Meoswar are minimal, but it may well occur there as well. This innovation lends support to the Biakic subgroup. Warembori (w)a-is presumably an independent innovation.

The 2sG vocalic conjugation prefix $b(u)$ - is found in the Yapen languages Ambai, Ansus, Kurudu, Wabo, Wandamen, and Wooi. This prefix is not easily derived from any PMP

[^58]pronoun. It is therefore a distinctive innovation and supports a subgroup containing all languages in which it is found.

The 3SG vocalic conjugation prefix $d$ - and similar ( $d i-$, $d y$-, $t$-, ty-, etc.) is found in all Cenderawasih Bay languages except Moor, Umar, Waropen, and Yaur; data are lacking for Tandia. ${ }^{4}$ This prefix is not easily derived from any PMP pronoun. It is therefore a distinctive innovation and supports a subgroup containing all languages in which it is found.

The 2SG infix $« u$ and 3SG infix $<i$ are found in all Cenderawasih Bay languages except Moor, Tandia, and Waropen. These infixes are clearly derived from PMP pronouns, the most likely sources being GEN1 *=mu and *=ya. However, whatever their exact source, the particular form and distribution of the infixes is distinctive, and unlikely to have an independent origin in these languages. This innovation therefore supports a subgroup containing all languages in which it is found.

|  | 1SG |  | 2SG |  | 3sG |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | V | C | V | C | V | C |
| Buli | ik- | i- | m- | m- | n - | n - |
| Gane | [ek-]k- | ek- | [em-]m- | em- | [en-]n- | en- |
| Maba | k- | k- | m- | m- | n - | n - |
| Patani | y-, k- | (i), y(i)-, ki- | $\mathrm{m}(\mathrm{y})$ - | m-( $\mathrm{i}^{\text {\% }}$ ) | n - | n- |
| Sawai | k- | k- | m- | m- | $\varnothing$ | $\varnothing$ |
| Taba | $\mathrm{k}=$ | $\mathrm{k}=$ | $\mathrm{m}=$ | $\mathrm{m}=$ | $\mathrm{n}=$ | $\mathrm{n}=$ |
| Ambel | y- | < y ) | ny- | n - ¢ y ) | n - | n - |
| As | < y ) | (i-) < y > | m - y ) | m - y ) | n - | n - |
| Biga | y - | ya- | m- | ma- | n - | na- |
| Fiawat | y- | ye-< ) $^{\text {¢ }}$ | m- | ? | n - | ? |
| Gebe | y- | < y ) | my- | $\mathrm{m}-$ ¢ y ) | n - | n - |
| Kawe | y- | ( y ) | my- | m - ¢ > | ny- | n - y ) |
| Matbat | k- | k- | m- | m- | n - | n- |
| Ma'ya (S.) | y- | 〈 y , ya- | my- | m-<y), ma- | ny- | n -(<y) ${ }^{\text {a }}$, na- |

Table 6.6: South Halmahera and Raja Ampat singular subject markers, divided into vocalic and consonantal conjugations.

[^59]|  | 1sG |  | 2SG |  | 3SG |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | V | C | V | C | V | C |
| Ambai | i－ | i－ | bu－ | ＜${ }^{\text {c }}$ | di－ | （i） |
| Ansus | ya－ | e－ | bu－ | ＜u） | d－ | （i） |
| Biak | y－ | ya－ | w－ | wa－，«W〉 | d－ | i－，$\langle\mathrm{y}$ 〉 |
| Busami | ya－ | ya－ | W－ | ？ | s－ | （i） |
| Dusner | y－ | ya－，$\varnothing$ | w－ | wa－，〈W〉 | nd－，ndi－ | i－，（i） |
| Kurudu | ay－ | $\mathrm{a}(\mathrm{y})$－ | b－ | ＜u） | d－ | （i） |
| Meoswar | y－ | a－ | W－ | ＜ l ） | d－ | （i） |
| Moor | $\mathrm{i}=\mathrm{gw}$－ | $\mathrm{i}=$ | $\mathrm{a}=(\mathrm{gw}-)$ | $\mathrm{a}=$ | j－ | $\varnothing$ |
| Munggui | y － | e－ | w－ | ＜ u ） | ty－ | ＜ y ＞ |
| Papuma | y－ | e－ | w－ | ＜${ }^{\text {c }}$ | t－ | （i） |
| Pom | y－ | i－ | W－ | ＜ l ） | dy－ | （i） |
| Roon | y－ | ya－，i－ | w－ | wa－ | t－ | i－ |
| Serui－Laut | ya－ | y－ | W－ | ＜u＞ | d－ | （i） |
| Tandia | ？ | ya－ | ？ | $\mathrm{a}(\mathrm{m})$－ | ？ | i－ |
| Umar | e－ | e－ | a（w）－ | $\mathrm{a}-$＜ $\mathbf{~}$ ） | j－ | i－ci ${ }^{\text {，}}$ |
| Wabo | ai－ | a－ | b－ | O－ | d－ | （i） |
| Wandamen | y－ | i－ | bu－ | ＜ u ） | di－ | （i） |
| Waropen | r－，y－ | ra－，ya－ | agh－，a（u）－ | a－ | i（y）－ | $\varnothing$ ，i－ |
| Wooi | y－ | $\varnothing$ ，i－ | bu－ | ＜${ }^{\text {¢ }}$ | ty－ | ＜ y ） |
| Yaur | igw－ | i－ | agw－＜u＞ | a－＜u＞ | （i） | （i） |
| Yerisiam | ne－j－ | ne－ | a－gu－ | a－＜u＞ | i－di－ | i－ci） |
| Warembori | $\varnothing$ | i－，e－，ya－ | w－ | （w）a－ | y － | i－，ya－，$\varnothing$ |

Table 6．7：Cenderawasih Bay and Mamberamo singular subject markers，divided into vocalic and consonantal conjugations．

I turn now to the plural forms（see Tables 6.8 and 6．9）．
The 2Pl prefix derives from ${ }^{*} f$－in the South Halmahera languages and Gebe．This prefix is not easily derived from any PMP pronoun．It is therefore a distinctive innovation and supports a subgroup containing all languages in which it is found．

The 3PL marker derives from NOM1＊sida or GEN1＊$=d a$ in most SHWNG languages． The precise form varies extensively，but can generally be attributed to regular sound changes．The prefix $d$－or $r$－，found in some South Halmahera languages and Gebe，is anomalous but nonetheless probably derives from＊d．

The innovative 3pl prefix $w$－is found in Kawe and Ma＇ya（S．）．This supports a subgroup containing these two dialects．

The Biakic languages（Biak，Dusner，Meoswar，and Roon）contain prefixes deriving from 1PL．IN＊to－，1PL．EX＊nto－，2PL＊mto－，3PL＊si－，and 3PL．NHUM＊na－．Except for the 3PL，
all of these forms show distinctive changes from the PMP pronouns. This paradigmatic innovation is related to the innovation in the pronominal paradigm (see §6.2). It lends additional support to Proto-Biakic.

The vocalic conjugation contains a linking consonant -t- in all plural forms in Ambai, Serui-Laut, Wandamen, and Wooi. Vocalic conjugations are not available for Papuma and Pom, so its absence in Table 6.9 should not be taken as signifcant. The historical origin of this consonant is obscure. Its presence is an innovation that supports a subgroup containing all languages in which it is found.

Other prefixes are in most cases clearly derived from PMP pronouns, with subsequent reduction and regular sound change. For example, the 1PL.IN prefix generally derives from PMP NEUT or NOM1 *ita. Other than the cases discussed above, there are no good candidates for shared innovations.

|  | 1PL.IN | 1PL.EX | 2PL | 3PL |
| :---: | :---: | :---: | :---: | :---: |
| Buli | t- | k- | f- | d- |
| Gane | et- | am- | ef- | i- |
| Maba | t- | k- | f- | d- |
| Patani | t- | k- | f- | r- |
| Sawai | t- | k- | f- | r- |
| Taba | $\mathrm{t}=$ | $\mathrm{a}=$ | $\mathrm{h}=$ | $1=$ |
| Ambel | t- \| $\varnothing$ | am- | m - $\mathrm{mim}^{\text {- }}$ | 1- \| la- |
| As | t- | am- | m- | 1- \| si- |
| Biga | t- | m- | m- | 1- |
| Gebe | t- | k- | f- | d- |
| Fiawat | t- | $1-$ | m- | $1-\mid \varnothing$ |
| Kawe | t- | w- | m- | w- $\mid \varnothing$ |
| Matbat | t- | n- | m- | n- |
| Ma'ya (S.) | t-, ta- | m -, ma- | m-, ma- | w- $\mid \varnothing$; wa- |

Table 6.8: South Halmahera and Raja Ampat plural subject markers. Markers differing in vocalic and consonantal conjugations are listed as vocalic | consonantal.

|  | 1PL.IN | 1PL.EX | 2PL | 3PL | 3PL.NHUM |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Ambai | tat- \| ta- | amet- \| ame- | met- \| me- | et- \| e- |  |
| Biak | kw- \| ko- | nkw- \| nko- | mkw- \| mko- | $s$ - $\mathrm{s}^{\text {(i) }}$ - | n - n (a)- |
| Dusner | t- \| to- | nd- \| ndo- | mt- \| mto- | $s(i)-\mid s(i)-$, so- | n - ${ }^{\text {na- }}$ |
| Kurudu | t- | nam- | mi- $\mid$ min- | si- |  |
| Meoswar | k- \| ko- | ingg- \| inggo- | mk- ${ }^{\text {mko- }}$ | s- \| sko- |  |
| Moor | $\varnothing$ | $\mathrm{n}-\mid \varnothing$ | $\mathrm{n}-\mid \varnothing$ | $\mathrm{ti}=\mathrm{n}-, \mathrm{ti}=\mathrm{j}-\mid \mathrm{ti}=$ | $\mathrm{ti}=\mathrm{j}-\mathrm{ti}=$ |
| Papuma | ta(N)- | anta(N)- | minta(N)- | e(N)- |  |
| Pom | ta(N)- | anta(N)- | minta(N)- | ti(N)- |  |
| Roon | k- \| ko- | ngg- ${ }^{\text {nggo- }}$ | mak- \| moko- | s- \| si-, se- | n- \| na-, ne- |
| Serui-Laut | tat- \| ta- | amet- \| ame- | met- \| me- | et- \| e- |  |
| Tandia | ite- | ami- | $\mathrm{mu}(\mathrm{m})$ - | si- |  |
| Umar | t- | em- | am-cu) | ih-i, |  |
| Wandamen | tat-\| ta(N)- | amat- \| ama(N)- | met- \| me(N)- | set- \\| se(N)- | si- |
| Waropen | (i)k- $\mid \varnothing$, i- | angg- ${ }^{\text {a- }}$ | m [ingg]- $\mathrm{mi}^{\text {m }}$ | ki- |  |
| Wooi | tat-\| ta(N)- | mat- \| ma(N)- | met- \| me(N)- | het- \| he(N)- |  |
| Yaur | o'- | om- | am-cu) | oh-i, | h-is |
| Yerisiam | ne-k- | ne-m- | a-mu- $\mid$ a-m-<u | i-hi- | hi- |
| Warembori | k- \\| kV- | am- \\| amV- | m - $\mid \mathrm{mV}$ - | t- \| tV- |  |

Table 6.9: Cenderawasih Bay and Mamberamo plural subject markers. Markers differing in vocalic and consonantal conjugations are listed as vocalic | consonantal.

### 6.4 Inalienable possessive marking

### 6.4.1 Introduction

This section compares inalienable possessive marking in 28 SHWNG languages and dialects, evaluating its usefulness as a subgrouping diagnostic.

All SHWNG languages except Taba and Gane clearly distinguish the categories of alienable and inalienable possession. ${ }^{5}$ Van den Berg (2009: 230) notes that there are remnants of inalienable possessive marking in the Southeast Makian dialect of Taba. Therefore, he convincingly argues, Taba (and Gane)'s lack of this contrast is an innovation, not a retention.

The distinction between alienable and inalienable nouns in SHWNG is lexically determined, and does not depend on usage context. The inalienable category may include body parts, kinship terms, locative nouns, and the word for 'name'. The inalienable possessor is expressed with a prefix, suffix, or circumfix. The alienable possessor is expressed with a prefix, possessive pronoun, or suffixed possessive ligature (van den Berg 2009).

[^60]Alienable possessive markers typically are transparently related to synchronic pronominal forms, while inalienable possessive markers may not be. For example, Moor áun iigwó 'my dog' contains the first singular possessive pronoun iigwó, clearly related to the first singular subject pronoun ígwa. Inalienably possessed ìna-'a 'my ear' contains the suffix -'a, which is not related to other synchronic forms.

Since inalienable possessive marking represents a potentially independent witness from the pronominal system, it is more likely than alienable possessive marking to provide evidence of morphological innovations, and is therefore more likely to be probative for subgrouping. For these reasons, I have not systematically investigated alienable possessive marking.

The focus in this section is on individual morphological forms and their distribution within paradigms. The semantic boundary between the inalienable and alienable categories is not addressed, for two reasons. First, in many languages this boundary is not adequately known. Second, semantic shifts are less informative than changes in form: there are only a few relevant semantic categories, and shifts could easily occur independently.

For the purposes of this section, I do not make reference to van den Berg (2009)'s reconstruction of Proto-SHWNG possessive marking. The reason is that he assumes an unorthodox SHWNG subgrouping without attempting to justify it. The resulting reconstructions are therefore questionable, because (for example) all languages of Cenderawasih Bay are collapsed into a single witness. It is a better procedure to first argue carefully for a specific subgrouping, as I do here, before attempting reconstruction.

### 6.4.2 Comparative morphology

I divide the analysis of inalienable possessive markers into singular and plural forms. ${ }^{6}$ First, however, I draw some general conclusions. Inspection of the forms in Tables 6.106.13 below shows that suffixation is the most common marking strategy in the singular, while circumfixation is most common in the plural. Suffixes and the suffixal part of circumfixes are generally derived from the corresponding PMP GEN1 or GEN2 series enclitic pronoun (see Table 6.2). Prefixes and the prefixal part of circumfixes are generally derived from synchronic free pronouns (see Tables 6.3-6.4). For example, in Buli 1sG ya-...$k$, the suffix $-k$ clearly derives from PMP GEN1 $*=k u$, while the prefix $y a$ - is transparently related to the Buli free pronoun ya.

I turn now to examine the singular forms in more detail. Tables 6.10 and 6.11 show the attested forms, divided by geographical region. It is immediately apparently that the Central-Eastern South Halmahera languages (Buli, Maba, Patani, and Sawai) share a common system: they are the only languages with circumfixes in the singular, and the forms match almost exactly across languages. Although the arrangement of the morphemes is

[^61]distinctive, they are not innovative in form, except for the voicing of historical $*-k$ to $-g$ in Maba, Patani, and Sawai. This is a minor change, and the fact that is also occurs in the otherwise not particularly similar Biga and Kawe suggests that it should not be used as a subgrouping feature. There is therefore only the main, paradigmatic innovation.

In Raja Ampat, there are no good candidates for shared innovations. The As prefixal forms and Matbat 1sG $-\eta$ are distinctive, but neither is shared with other SHWNG languages. Languages sharing 3SG $\varnothing$ cannot be assumed to share an innovation without a better reconstruction of the Proto-SHWNG paradigm.

The Biakic languages (Biak, Dusner, Meoswar, and Roon) clearly reflect the a single innovative morphological paradigm. For example, they all show 1SG -ri, 2sG -mri, -mi, and 3SG -ri, none of which have clear PMP derivations. This paradigmatic innovation offers strong support for the Biakic subgroup. The alternative suffixes within each person/number combination reflect different subcategories of inalienable possession. For example, in the 2sG Biak distinguishes non-paired body parts ( $-m-r i$ ), paired body parts (-m-si), and kinship terms (-mi). Data from other Biakic languages are not sufficient to be conclusive, but they appear to distinguish the same subcategories.

Among the remaining Cenderawasih Bay and Mamberamo languages, the clearest innovation is 3sg -mpai and similar suffixes in Ansus, Papuma, Serui-Laut, and Wandamen. There are also common 3SG elements -na and ni which permit the inclusion of Ambai and Pom in this group, though this is slightly less convincing given the resemblance to PMP GEN2 * = niya. These innovations offer support for the Western Yapen subgroup.

Prefixation has emerged as a strategy in As, Kurudu, Waropen, Yaur, Yerisiam, and Warembori. In As and Kurudu, the 2SG and 3SG prefixes ultimately derive from PMP GEN1 *=mu and GEN2 *= niya, respectively. This suggests that they were formerly suffixes and have shifted position. In the other languages, prefixes transparently derive from synchronic pronouns. In no case is there evidence for any shared innovation other than the development of prefixation. The lack of shared innovations in form makes this unconvincing as a subgrouping argument: it is a typological shift, likely contact-induced, and so probably happened multiple times independently.

|  | 1SG | 2SG | 3sG |
| :---: | :---: | :---: | :---: |
| Buli | ya-...-k | a-...-m | i- |
| Maba | a-...-g | a-...-m | $1-$ |
| Patani | a-...-g | a-...-m | i- |
| Sawai | [a-]...-g, [ya-]...-g | [a-]...-m | [i-] |
| Ambel | -k | -m | $\varnothing$ |
| As | an- | am- | ni- |
| Biga | -g | -m | -0 |
| Gebe | -k | -m | $\varnothing$ |
| Kawe | -k, -g \| -Vk, -Vg | -m \| -Vm | $\varnothing$ \|-V |
| Matbat | -ŋ | -m | $\varnothing$ |
| Ma'ya (S.) | -k \| -Vk | -m \| -Vm | $\varnothing$ |

Table 6.10: South Halmahera and Raja Ampat inalienable possessive marking (singular forms). If there is a difference with vowel- and consonant-initial or final roots, the markers are listed as vocalic | consonantal.

|  | 1SG | 2SG | 3SG |
| :---: | :---: | :---: | :---: |
| Ambai | -ku | -mu | -n, -na |
| Ansus | -u | -mpi | ne-...-mpai |
| Biak | -ri; -si | -m-ri; -m-si; -mi | -ri; -si |
| Dusner | ? | -meria; -mi | -ri |
| Kurudu | ai- | me- | ne- |
| Meoswar | -ri; -na | -mri; -mna; -mi | -ri; -na |
| Moor | -'a | -ma | -ra |
| Papuma | -u | -mu | -[ne]mpae |
| Pom | -ni | -mu | -nani |
| Roon | -ri; -na; -etia | -meri; -mena; -mi | -ri; -na |
| Serui-Laut | -u | -mu | $\varnothing$, ne-, -ne[mpoi] |
| Umar | -vie | -vua | -vre |
| Wandamen | -ne[i] | -mu[i] | -pai; -ni |
| Waropen | ra- | a- | $\varnothing$ |
| Yaur | igw- \| i- | agw- \| a- | $\varnothing$ |
| Yerisiam | ne-ni- \| ne- | a-ni- ${ }^{\text {a- }}$ | i-ni- \| i- |
| Warembori | e- | a- | i- |

Table 6.11: Cenderawasih Bay and Mamberamo inalienable possessive marking (singular forms). If there is a difference with vowel- and consonant-initial or final roots, the markers are listed as vocalic | consonantal.

|  | 1PL.IN | 1PL.EX | 2PL | 3pL |
| :---: | :---: | :---: | :---: | :---: |
| Buli | ite-...-r | ame-...-mam | meu-...-meu | si[le]-...-ri |
| Maba | ite-...-r | a-...-am | meu-...-meu | si-...-ri |
| Patani | ite-...-r | ama-...-mam | me-...-me | si-...-re |
| Sawai | [ite-]...-r | [a-]...-mam | [me-]...-mi | [si-]...-ri |
| Ambel | -n | am-...-n | mim-...-n | -n |
| As | ti(N)- | ami(N)- | $\mathrm{mi}(\mathrm{N})$ - | si(N)- |
| Biga | -no | -no | -no | -no |
| Gebe | -d | -man | -mo | -ri |
| Kawe | -n \| -Vn | -m \| -Vm | -m \| -Vm | -n \| -Vn |
| Matbat | -n | -m | -m | $\varnothing$ |
| Ma'ya (S.) | -n \| -Vn | -m \| -Vm | -m \| -Vm | -n \| -Vn |

Table 6.12: South Halmahera and Raja Ampat inalienable possessive marking (plural forms). If there is a difference with vowel- and consonant-initial or final roots, the markers are listed as vocalic | consonantal.

I turn now to the plural forms (see Tables 6.12 and 6.13). In the Central-Eastern South Halmahera languages, the suffixal part of the 1PL.IN marker contains the innovative form $-r$. The same suffix evidently appears as Gebe $-d$. This suffix possibly derives from the GEN1 pronoun * $=t a$, but if so, it has undergone irregular phonological developments. ${ }^{7}$ In fact, no known regular sound change produces South Halmahera $r$ or Gebe $d$ (see chapter 4). The Gebe 1Pl.Ex and 2Pl suffixes also show some resemblance to the suffixal part of the South Halmahera markers. The distinctiveness of these innovations argues for a subgroup containing Central-Eastern South Halmahera and Gebe.

In Raja Ampat, the best candidate for a shared innovation is 1PL.IN -n, found in Kawe, Matbat, and Ma'ya (S.). ${ }^{8}$ This innovation provides support for grouping these three together in a subgroup. Ambel -n, in contrast, appears in all plural forms, thus most likely has a different history. It may derive from a reduction of GEN2 2PL * = nihu and 3PL $*=$ nida, which would then have been extended to other plural forms. ${ }^{9}$ Biga -no appears to share the same history, with an unexplained mutation in form. There is therefore evidence for subgrouping Ambel and Biga on this basis.

The Biakic languages (Biak, Dusner, Meoswar, and Roon) show a clear paradigmatic innovation in the plural, as in the singular. Most convincingly, the suffixes -sna and -sesia,

[^62]-etia are each found in multiple languages and lack clear PMP derivations. This innovation provides additional strong support for the Biakic subgroup.

The Cenderawasih Bay languages Ambai, Ansus, Papuma, Pom, and Wandamen all contain a plural suffix $-m i$ or $-m u$. This most plausibly derives from GEN1 1PL.EX * $=m i$ or $2 \mathrm{PL} *-m u-i h u$, which would then have been extended to other plural forms. This innovation provides additional support for the Western Yapen subgroup.

The remaining languages have mainly developed prefixal markers that transparently derive from synchronic pronouns, and so are not probative for subgrouping.

|  | 1PL.IN | 1PL.EX | 2PL | 3PL |
| :--- | :--- | :--- | :--- | :--- |
| Ambai | ta-...-mi | ame-...-mi | me-...-mi | e-...-mi |
| Ansus | ta(N)-...- | ama-...-mine | me(N)-...- | e(N)-...- |
|  | minekuira |  | mipakuira | miwanekuira |
| Biak | ko-...-s-na | nko-...-s-na | mko-...-s-na | si-...-s-na |
| Dusner | to-...-sesia | ? | mto-..-sesia | si-...-sesia |
| Kurudu | ta- | na- | mi- | si- |
| Meoswar | ko-...-sna; | inggo-...-sna; | mko-...-sna; | sko-...-sna; |
|  | ko-...-sri | inggo-...-sri | mko-..-sri | sko-...-sri |
| Moor | -ta | -ma | -mu, -ma | -ta |
| Papuma | tas-...-mu | antas-...-mu | mintas-...-mu | es-...-mu |
| Pom | ta(N)-...-mi | -n | minda(N)-...-mi | ti(N)-...-mi |
| Roon | ko-...-sena; | nggo-...-sena; | moko-...-sena; | si-...-sena; |
|  | -kesia | -nggetia | -meketia | -setia |
| Serui-Laut | ta-...-mi | ame-...-mi | me-...-mi | e-...-mi |
| Umar | -ve | -viemi | - -vuamu | -hien |
| Wandamen | ta(N)-...-mi | ama(N)-...-mi | me(N)-...-mi | se(N)-...-mi |
| Waropen | $\varnothing$ | a(N)- | mi(N)- | ki- |
| Yaur | o'- | om- | am- | oh- |
| Yerisiam | nek- | nem- | am- | ih- |
| Warembori | ki-, ke- | ami $V$ | mi-, me- | ti-, te- |

Table 6.13: Cenderawasih Bay and Mamberamo inalienable possessive marking (plural forms).

### 6.5 Implications for subgrouping

I have shown that there is evidence for the following innovations ( $\mathrm{S}=$ subject marker, I = inalienable possessive marker):

1. S: 2PL prefix $f$ - in all South Halmahera languages and Gebe
2. I: 1PL.IN $-r /-d$ in the Central-Eastern South Halmahera languages and Gebe
3. I: paradigmatic innovation in the Central-Eastern South Halmahera languages
4. I: loss of inalienable possessive marking in Gane and Taba
5. S: 1SG and 2SG infix $(y$ s in Patani and all Raja Ampat languages except Matbat
6. S: 3SG infix $\langle y$ 〉 and 3PL prefix $w$ - in Kawe and Ma'ya (S.)
7. I: plural -n/-no in Ambel and Biga
8. I: 1PL.IN -n in Kawe, Matbat, and Ma'ya (S.)
9. S: 2SG infix $\langle\omega$ and 3 SG infix $\rangle$ in all Cenderawasih Bay languages except Moor, Tandia, and Waropen
10. S: 3sG vocalic conjugation prefix $d$ - and similiar in all Cenderawasih Bay languages except Moor, Umar, Waropen, and Yaur (no data for Tandia)
11. S and I: paradigmatic innovations in the Biakic languages (Biak, Dusner, Meoswar, and Roon)
12. S: 2SG vocalic conjugation prefix $b(u)$ - in Ambai, Ansus, Kurudu, Wabo, Wandamen, and Wooi
13. I: 3SG -mpai, 3SG -na/-ni, and plural -mi/-mu in the Western Yapen languages
14. S: plural vocalic conjugation linking consonant -t- in Ambai, Serui-Laut, Wandamen, and Wooi

Innovations 3, 4, 6, 11, and 13 provide further support for established subgroups. (Kawe and Ma'ya (S.) are dialects of a single language.)

Innovation 1 supports the establishment of Proto-South Halmahera, containing the languages spoken on South Halmahera proper and Gebe.

Innovation 2 narrowly supports a subgroup containing Gebe and the Central-Eastern South Halmahera languages. It is also consistent with Proto-South Halmahera. Since Gebe does not undergo other Central-Eastern South Halmahera shared innovations (such as innovation 3), it cannot simply be included in Central-Eastern South Halmahera.

Innovation 5 narrowly supports a subgroup containing Patani and all Raja Ampat languages except Matbat. However, this subgroup conflicts with Patani and Gebe's descent from Proto-South Halmahera (newly established by innovation 1) and Patani's descent from Proto-Central-Eastern South Halmahera. The best way to reconcile this conflict is to posit innovation 5 at the level of Proto-RASH. The infix would then have been lost in most South Halmahera_languages and Matbat. One alternative to this proposal would be to reassign innovation 1 to Proto-RASH. However, this would entail loss of 2pl $f$ - in most Raja Ampat languages, and its replacement with a prefix straighforwardly derived from synchronic or PMP pronouns. While such a history is possible, there is no evidence for it.

Innovation 7 supports the establishment of Proto-Ambel-Biga, containing Ambel and Biga.

Innovation 8 can be used to establish Proto-Ma'ya-Matbat, containing at least Ma'ya and Matbat. It may also contain other languages for which inalienable possessive data are
lacking. If there were other innovations to support it, one could include Proto-Ambel-Biga as well: its innovation 7 would have eliminated the evidence for innovation 8 .

Innovations 9 and 10 have almost the same distrbution. Only Umar and Yaur undergo one innovation and not the other. Given this, it makes most sense to posit a single protolanguage for innovations 9 and 10 . The only strong counter-argument would be if there were evidence that the other Cenderawasih Bay languages share distinctive innovations lacking in Umar and Yaur; however, I am not aware of any such innovations. I therefore posit Proto-Cenderawasih Bay, containing all Cenderawasih Bay languages except Moor, Waropen, and (barring future data) Tandia. This entails that Umar and Yaur formerly had the 3sG vocalic $d$ - prefix, then lost it.

Innovation 12 supports the establishment of Proto-Yapen, containing all Yapen languages. Any other proposal would conflict with the well-established Western Yapen subgroup. The Proto-Yapen 2sG vocalic prefix was most likely *bu-, as it is much easier to explain a change from *bu- to $b$ - than the reverse. Kurudu and Wabo thus changed *buto $b$-. This minor innovation justifies the tentative establishment of Proto-East Yapen.

Meanwhile, five Yapen languages do not show innovation 12: Busami, Munggui, Papuma, Pom, and Serui-Laut, which show $w$ - instead of expected $b u$-. This entails positing that these five languages, in turn, descend from Proto-Central Yapen, a daughter of ProtoWestern Yapen, in which inherited *bu-became * $w$-. Otherwise, it would be necessary to suppose that *bu-became $w$ - five times independently, which is very implausible.

Innovation 14 narrowly supports a subgroup containing Ambai, Serui-Laut, Wandamen, and Wooi. However, there are no data for other Western Yapen languages, so it is more likely to be a Proto-Western Yapen innovation.

I combine these subgroups with those proposed in other chapters in chapter 7 .

## Chapter 7

## SHWNG subgrouping: A new proposal

### 7.1 Introduction

This chapter combines the different subgrouping proposals in chapters $4-6$ into a single proposal that accounts for the entire range of data. The sections below are organized according to the primary branches of Proto-SHWNG. For each subgroup, I summarize the shared innovations that define it and its primary branches. I also list subgroups that were rejected in the final subgrouping and explain why they were not included.

The chapter concludes with a discussion of the most likely homelands of Proto-SHWNG and its subgroups (\$7.7).

### 7.2 Proto-RASH

Proto-RASH is defined by two innovations: (1) $* R>\varnothing$ (§4.5, 7), (2) the 1 sG and 2 sG subject infix ${ }^{*}<y>(\$ 6.5,5)$. The second innovation is particularly distinctive and places the subgroup on a solid foundation.

The primary branches of Proto-RASH are Proto-South Halmahera, Proto-Ambel-Biga, Proto-Ma'ya-Matbat, As, and Fiawat. ${ }^{1}$ The infix ${ }^{*} y$ y was lost in Proto-Southern South Halmahera, all descendants of Proto-Central-Eastern South Halmahera except Patani, and Matbat.

### 7.2.1 Proto-South Halmahera

Proto-South Halmahera is defined by two innovations: (1) the 2PL subject prefix $\star_{f}$ - ( $\S 6.5$, 1), (2) the 1Pl.IN inalienable possessive suffix *-d ( $\$ 6.5$, 2). The first innovation is very distinctive, and the second is not found elsewhere in SHWNG (the change that produced

[^63]the Proto-Oceanic 1PL.IN possessive *-da may be an independent example). Taken together, these innovations place the subgroup on a solid foundation.

The primary branches of Proto-South Halmahera are Proto-Central-Eastern South Halmahera, Proto-Southern South Halmahera, and Gebe. The 1PL.In inalienable suffix became *-r in Proto-Central Eastern South Halmahera.

### 7.2.2 Proto-Central-Eastern South Halmahera

Proto-Central-Eastern South Halmahera is defined by a paradigmatic innovation in inalienable possessive marking ( $\S 6.5$, 3), placing it on a firm basis. Blust (1978a), who originally proposed this subgroup, noted other distinctive phonological and lexical innovations that define it (see §3.8).

The primary branches of Proto-Central-Eastern South Halmahera are Buli, Maba, Patani, and Sawai.

### 7.2.3 Proto-Southern South Halmahera

Proto-Southern South Halmahera is defined by the loss of inalienable possessive marking ( $\S 6.5$, 4). There are no positive morphological features that define it. Blust (1978a), who originally proposed this subgroup, noted other distinctive phonological and lexical innovations that define it (see §3.8).

The primary branches of Proto-Southern South Halmahera are Gane and Taba.

### 7.2.4 Proto-Ambel-Biga

Proto-Ambel-Biga is defined by the innovation of the inalienable possessive plural suffix $-n /-n o(\S 6.5,7)$. The unexplained variation in form ( $-n$ in Ambel, -no in Biga) makes this subgroup less convincing than some of the others proposed here. Nonetheless, it is more plausible to assume that this specific innovation happened once rather than twice independently.

The primary branches of Proto-Ambel-Biga are Ambel and Biga. See $\$ 7.7$ for more on the social and linguistic history of Biga.

### 7.2.5 Proto-Ma'ya-Matbat

Proto-Ma'ya-Matbat is defined by two innovations: (1) epenthetic final o on words with Fall or Low Fall tone (§5.4), (2) the 1PL.IN inalienable possessive suffix -n (§6.5, 8). Together, these innovations place it on a relatively solid foundation.

The primary branches of Proto-Ma'ya-Matbat are Ma'ya and Matbat. Fiawat and other dialects of Maden are reportedly similar to Ma'ya, but no data are available on their tonal system or inalienable possessive paradigms, so it is not possible to determine if they share the above two innovations.

### 7.3 Proto-Cenderawasih Bay

Proto-Cenderawasih Bay is defined by two innovations: (1) the 2 SG subject infix * $u$ ) and 3sG subject infix *i> ( $\$ 6.5,9)$, and (2) the 3 SG vocalic conjugation subject prefix *dy( $\$ 6.5,10$ ). These innovations provide a very convincing subgrouping argument. ${ }^{2}$

The primary branches of Proto-Cenderawasih Bay are Proto-Biakic, Proto-Yapen, and Proto-Southwest Cenderawasih Bay. The 3sg prefix *dy- was lost in Umar and Yaur, and underwent minor changes in various other languages (see §6.3.2). ${ }^{3}$

### 7.3.1 Proto-Biakic

Proto-Biakic is defined by three innovations: (1) * $u$, *i, *z > $e \sim$ in final closed syllables of polysyllabic words (§4.5, 5), (2) a paradigmatic innovation in subject marking (§6.5, 11), (3) a paradigmatic innovation in inalienable possessive marking ( 86.5, 11). These innovations provide a very convincing subgrouping argument.

The primary branches of Proto-Biakic are Biak, Dusner, Meoswar, and Roon.

### 7.3.2 Proto-Yapen

Proto-Yapen is defined by the innovation of the 2 SG vocalic conjugation subject prefix *bu- (§6.5, 12). Though only a single innovation, it is quite distinctive, leaving little doubt about the validity of the subgroup.

The primary branches of Proto-Yapen are Proto-Western Yapen and Proto-Eastern Yapen. The 2sG prefix *bu-became * $w$ - in Proto-Central Yapen and *b- in Proto-Eastern Yapen.

### 7.3.3 Proto-Western Yapen

Proto-Western Yapen is defined by several innoyations in inalienable possessive marking (3sG -mpai, 3SG -na/-ni, plural -mi/-mu: §6.5, 13) and the innovation of the plural vocalic conjugation linking consonant $*-t-(\$ 6.5,14)$. Silzer (1983: 232-243), who first proposed this subgroup, enumerates several additional morphological innovations shared between Ambai and Wandamen (detailed data are lacking for the other languages).

The primary branches of Proto-Western Yapen are Proto-Central Yapen, Ambai, Ansus, Marau, Wandamen, and Wooi.

[^64]
### 7.3.4 Proto-Central Yapen

Proto-Central Yapen is defined by the change of the Proto-Western Yapen 2sG vocalic conjugation subject prefix *bu- to ${ }^{*} w$ - (§6.5). Although a relatively minor change, it is more parsimonous to suppose that the change happened once rather than several times independently. Since the affected languages are found in a geographically contiguous area, diffusion of the change (rather than inheritance) is another possibility. However, other evidence for diffusion is lacking-for example, the reflexes of $3 \mathrm{SG} * d y$ - are quite varied, which one would not expect under such a scenario. It is therefore more likely that * $w$ - was inherited.

The primary branches of Proto-Central Yapen are Busami, Munggui, Papuma, Pom, and Serui-Laut.

### 7.3.5 Proto-Eastern Yapen

Proto-Eastern Yapen is defined by the change of the Proto-Yapen 2SG vocalic conjugation subject prefix *bu- to *b- (§6.5). This is a relatively minor change, and could have occurred independently or spread via diffusion. Sufficient data are not available to settle the question. The validity of this subgroup should be considered tentative until more data are collected.

The primary branches of Proto-Eastern Yapen are Kurudu, Wabo.

### 7.3.6 Proto-Southwest Cenderawasih Bay

Proto-Southwest Cenderawasih Bay is defined by two phonological innovations: (1) *z $>\varnothing$ ( $\$ 4.5,3)$, (2) irregular * $u>i$ in PMP *punti 'banana' (§4.5, 4). These innovations, though fairly distinctive, are not especially convincing given the possibility of diffusion. The validity of this subgroup should be considered tentative barring further evidence.

The primary branches of Proto-Southwest Cenderawasih Bay are Proto-Yaur-Yerisiam and Umar.

### 7.3.7 Proto-Yaur-Yerisiam

Proto-Yaur-Yerisiam is defined by a single innovation, ${ }^{*} \eta>\varnothing$ ( 84.5, 2). The loss of a nasal in all positions is rather unusual. However, a single phonological innovation, no matter how distinctive, is not sufficient to incontrovertibly establish a subgroup. The validity of this subgroup should therefore be considered tentative for now.

The primary branches of Proto-Yaur-Yerisiam are Yaur and Yerisiam.

### 7.4 Other primary branches of Proto-SHWNG

Five languages share no known innovations with each other or other SHWNG languages, and therefore must be posited as primary branches of Proto-SHWNG. These are the Cenderawasih Bay languages Moor, Tandia, and Waropen, and the Mamberamo languages Warembori and Yoke. Future evidence may show that some of them subgroup together or belong in one of the above subgroups.

### 7.5 Rejected subgroups

### 7.5.1 Proto-Raja Ampat

This subgroup would be defined by a single innovation: *z assimilates to the vowel of the preceding or following syllable ( $\$ 4.5,6$ ). It would contain the primary branches Proto-Ambel-Biga, Proto-Ma'ya-Matbat, As, Fiawat, and Gebe. The inclusion of Gebe under Proto-Raja Ampat would conflict with its inclusion in Proto-South Halmahera on the basis of a very convincing morphological innovation. I therefore reject Proto-Raja Ampat, and assume that this sound change spread by diffusion.

An additional reason for rejecting Proto-Raja Ampat is that the sound change that would define it, though fairly distinctive, is posited on the basis of only a small number of words. More data from Raja Ampat languages would make it possible to better understand the nature of the change, and whether the evidence best supports inheritance or diffusion.

### 7.5.2 Proto-Ma'yaic

This subgroup would be defined by a single innovation: * $a>* y a>l a$ initially (§4.5, 1). It would contain the primary branches Proto-Ambel-Biga, Fiawat, and Ma'ya. The absence of Matbat would conflict with the establishment of Proto-Ma'ya-Matbat, which is justified by more distinctive innovations. I therefore reject Proto-Ma'yaic, and assume that this sound change spread by diffusion.

### 7.5.3 Proto-Nuclear SHWNG

This subgroup would be defined by a single innovation: lexically conditioned syncope ( $\S 4.5$, 8). It would contain all SHWNG languages except Moor. Although it does not conflict with other proposed subgroups, I nonetheless reject it. The inherently sporadic nature of syncope in SHWNG languages makes it very difficult to definitively show that syncope did not occur in a given language. The sporadic distribution of syncope, in turn, is more easily explained by diffusion rather than inheritance.

### 7.6 Summary

Figure 7.1 contains a family tree summarizing the subgroups proposed in this chapter.


Figure 7.1: New proposed subgrouping of SHWNG languages.

### 7.7 The homelands of Proto-SHWNG and its subgroups

The new subgrouping of SHWNG languages presented above makes it possible to more carefully consider the location of the homelands of Proto-SHWNG and its subgroups. This leads to plausible hypotheses about how speakers of SHWNG languages may have spread geographically.

The most widely applicable criterion for locating the homeland of a proto-language is that speakers tend not to move very far, all else being equal. Therefore, the homeland typically contains representatives of more primary branches than other areas, and these languages have had more time to differentiate. I rely mainly on this criterion here. Other criteria require detailed knowledge of the proto-environment and proto-culture (derived from archaeology, reconstructed vocabulary, etc.), which is currently lacking for ProtoSHWNG.

Blust (1978: 211) places the Proto-SHWNGhomeland in Cenderawasih Bay on the basis of its greater general linguistic diversity (\$3.5). He does not explicitly address the important question of whether this diversity is found among the primary branches of Proto-SHWNG or at some lower level.

Examination of Figure 7.1 shows that, indeed, four of the seven primary branches of Proto-SHWNG contain languages spoken only in Cenderawasih Bay (Moor, Tandia, Waropen, and Proto-Cenderawasih Bay). This strongly suggests that the Proto-SHWNG homeland was located in Cenderawasih Bay, confirming Blust's hypothesis. More specifically, the most plausible location is southern Cenderawasih Bay, the location of three primary branches of Proto-SHWNG (Moor, Tandia, and some Waropen villages) and one of the primary branches of Proto-Cenderawasih Bay (Proto-Southwest Cenderawasih Bay).

Locating the Proto-SHWNG homeland in southern Cenderawasih Bay neatly accounts for the spread of the three primary branches of Proto-SHWNG that are not found in Cenderawasih Bay. Speakers of two branches (Warembori and Yoke) went eastward along the coast, leaving Cenderawasih Bay and settling near the mouth of the Mamberamo river. Speakers of the third branch (Proto-RASH) went westward along the coast, leaving Cenderawasih Bay and going around the Bird's Head peninsula.

The homeland of Proto-RASH was most likely in the Raja Ampat archipelago, as three of its five primary branches are found there (Fiawat, Proto-Ambel-Biga, and Proto-Ma'yaMatbat). Of the remaining two primary branches, As would have spread eastward to the Bird's Head, while Proto-South Halmahera would have spread westward to Halmahera.

Among the branches of Proto-RASH, Fiawat and other dialects of Maden are spoken only on Salawati, so that is presumably their homeland. Proto-Ma'ya-Matbat contains two languages, Ma'ya and Matbat; its most plausible homeland is Misool, where both languages are spoken, and from which Ma'ya would have spread. ${ }^{4}$

[^65]Proto-Ambel-Biga contains two languages: Ambel, spoken in several villages on Waigeo, and Biga, spoken in a single village on Misool. Biga appears to have an unusual linguistic and social history. Remijsen (2001b: 24) makes several interesting observations in this regard:

A considerable portion of the Biga vocabulary is similar to that of Ma'ya. This similarity is consistent with the Biga people's claim that they migrated to Misool from Waigeo, just as the Ma'ya on Misool did. ... Surprisingly, however, the words which do not bear resemblance to a word in Misool Ma'ya in their phonological form, do not have a cognate in any of the Waigeo dialects of Ma'ya. Instead, they are similar to words of the languages of land-oriented groups of Salawati and Waigeo [i.e. Fiawat and Ambel]. And with them, the Biga share a number of features defining the interiororiented social type: (a) they are important sago producers in their local area; and (b) they did not embrace Islam.

Remijsen's observations are consistent with a Waigeo homeland for Proto-Ambel-Biga. The Biga would have then migrated to their present location on Misool. The Biga language appears to have undergone substantial contact influence from Ma'ya, which is most evident in the lexicon. ${ }^{5}$

The above conclusions unfortunately do not shed any light on precisely where the homeland of Proto-RASH may have been located in the Raja Ampat archipelago. Misool, Waigeo, and Salawati would appear to be equally likely possibilities.

The homeland of Proto-South Halmahera was most likely along the central-eastern coast of Halmahera (perhaps near the present location of Patani and Gebe), as two of its three primary branches are found there (Gebe and Proto-Central-Eastern South Halmahera). The Proto-Central-Eastern South Halmahera homeland must have been in approximately the same location. Speakers of Proto-Southern South Halmahera would have first spread south, settling where Gane is now spoken, then northwest to Taba. Available data do not make it possible to more precisely locate the Proto-Southern South Halmahera homeland.

The internal subgrouping of Proto-Biakic is not known. However, the fact that three of the four Biakic languages (Dusner, Meoswar, and Roon) are spoken in or near Wandamen Bay in western Cenderawasih Bay suggests Wandamen Bay as a plausible homeland. Speakers of Biak, the remaining Biakic language, would have spread northeast from Wandamen Bay, settling first on the islands of Numfor, Biak, and Supiori.

The homelands of Proto-Yapen, Proto-Western Yapen, Proto-Central Yapen, ProtoEastern Yapen, and Proto-Southwest Cenderawasih Bay must have been in approximately the locations suggested by their designations. The sole outlier language is Wandamen, whose speakers would have spread westward, reaching the west coast of Cenderawasih Bay and entering Wandamen Bay.

[^66]The homeland of Proto-Cenderawasih Bay was probably close to the Proto-SHWNG homeland in southern Cenderawasih Bay. As just discussed, the homeland of ProtoBiakic was in Wandamen Bay in western Cenderawasih Bay, while the homeland of Proto-Southwest Cenderawasih Bay was in southwest Cenderawasih Bay. The ProtoCenderawasih Bay homeland was most plausibly along this stretch of coastline, perhaps slightly west of the Proto-SHWNG homeland. Speakers of Proto-Yapen would have spread to the northeast, settling on Yapen island.

## Chapter 8

## Conclusion

I have examined phonological and morphological change in SHWNG, identified shared innovations that possess subgrouping value, produced a new subgrouping of SHWNG languages on this basis, and identified the most likely homelands for the resulting subgroups. Our knowledge of the internal history of SHWNG languages is significantly improved as a result. It is now also possible for the first time to locate the Proto-SHWNG homeland, in southern Cenderawasih Bay.

Morphological innovations prove to be significantly more informative than phonological innovations for inferring family-tree-like splits in the history of SHWNG. This is because they are much less likely than phonological changes to arise independently or to diffuse ( $\$ 1.3$ ). Special care was taken in chapter 6 to maximize the diagnostic substance of morphological innovations by excluding features that could have been retentions or parallel developments.

Some innovations that were dismissed as parallel developments perhaps might not have been. For example, there is variation in how PMP pronouns are reduced to become subject prefixes (e.g., whether the initial or final syllable of 3pl *sida is preserved). A well-developed theory of phonological reduction might be able to assess the likelihood of different outcomes, and assign some more subgrouping value than others.

The study of phonological change in SHWNG supports the hypothesis that such changes readily diffuse. This is observed in several cases, such as the outcome of the merger of PMP * $d, * z$, and $* l$ as $l$ in South Halmahara and Raja Ampat and as $r$ in Cenderawasih Bay and Mamberamo; *a>oin several South Halmahera languages (\$4.2.26); initial *a>ya in various languages ( $\$ 4.2 .27$ ); and the outcome of *z in Raja Ampat (§4.2.28). None of these groups of languages are subgroups. In each case they are geographically contiguous, strongly suggesting that these innovations diffused rather than arising independently.

The evident diffusability of phonological changes raises important questions about the early history of Proto-SHWNG, which is justified largely on the basis of phonological change (see chapter 3). Some of the proposed Proto-SHWNG changes are not found in all languages, suggesting that they may have diffused (\$4.4). Other changes evidently did occur in Proto-SHWNG. In general, the issue of diffusion versus inheritance in SHWNG is
ripe for future research.
The diagnostic substance scale proposed in $\S 1.3$ holds up well. Since it works for a hard case like SHWNG, it may be worth testing on other subgrouping cases and applying to computational phylogenetic algorithms. The development of a better theory of diagnostic substance can make a major contribution to our ability to infer subgrouping histories, and should be a priority for historical linguists.

Language contact was not systematically examined. Now that the tree-like splits in the history of SHWNG have been identified, it should be much easier to detect borrowings among SHWNG languages. However, the precise role of Papuan language contact is still largely unknown. The occurrence of tonogenesis as many as five times independently (see chapter 5) suggests that this contact was not just with a single language, or with a single type of tonal system.

Reconstructing Proto-SHWNG is the logical next step in unraveling the history of the SHWNG languages. The cognate sets in the Appendix can form the basis of an initial reconstruction of Proto-SHWNG. Unfortunately, high quality descriptive data are still lacking for many SHWNG languages, and speakers of many languages are now in the process of shifting to Indonesian. It is thus important that these languages be documented soon, before it is too late.

The reconstruction of Proto-SHWNG is significant for several reasons. It may help elucidate the history of the problematic Bomberai languages (Irarutu, Kuri, Bedoanas, and Erokwanas) and the boundary between SHWNG and CMP (\$3.7). It will enable reconstruction of Proto-SHWNG speakers' culture and environment. Perhaps most significantly, it will make it possible to compare Proto-SHWNG with Proto-Oceanic, and thereby to reconstruct PEMP.

Reconstruction of PEMP is key to understanding the spread of Austronesian languages across New Guinea. This spread did not necessarily proceed only in one direction. I have already shown that the Raja Ampat and South Halmahera languages are the result of a back-migration from the Proto-SHWNG homeland in southern Cenderawasih Bay ( $\$ 7.7$ ). The PEMP homeland remains to be determined. If it was east of Cenderawasih Bay, the formation of Proto-SHWNG must also have involved a back-migration. The reconstruction of PEMP speakers' culture and environment, together with archaeological evidence, may ultimately resolve the question.

In many ways, the "field" of SHWNG is in its infancy. It is my hope that others will soon be inspired to take up research in this fascinating corner of the Austronesian world, so that the many unresolved questions can begin to be answered.

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## Appendix: Cognate sets

This Appendix contains the complete database of cognate sets used in chapters 4 and 5. It is a snapshot, current at the time of publication, of the online database available at http://lexifier.lautgesetz.com. The online database contains more data on individual forms (part of speech, notes, etc.) and should be consulted in preference to this version when possible.

Cognate sets matched with a reconstructed form are listed first, followed by sets lacking one. The cognate forms in each set are arranged into five groupings: proto-languages, South Halmahera languages, Raja Ampat languages, Cenderawasih Bay languages, Mamberamo languages, and other languages. The latter includes the Bomberai languages Arguni, Irarutu, Kowiai, Onin, and Sekar; of these, only Irarutu has been included in SHWNG by some authors.

The source for each form is given in parentheses, often in abbreviated form (see Table A. 1 for the list of abbreviations). There is sometimes a brief comment in square brackets after the source. The most common comment is [?], indicating uncertainty as to whether the word belongs in the set.

Unlike in the remainder of the work, original source orthography is preserved without exception. Thus, I write PAn and PMP *e rather than *o, Waropen $w$ rather than $v$, etc.

| ABVD | Greenhill et al. (2008) |
| :--- | :--- |
| ACD | Blust (2014) |
| D\&M | Dalrymple and Mofu (2011) |
| G | Gasser (2013) |
| H | van Hasselt and van Hasselt (1947) |
| K | Kamholz (2013) |
| M | Matsumura (1991) |
| P\&D | Price and Donohue (2009) |
| R | Remijsen (2001b) |
| Slm | Slump (1924-38) |
| Slz | Silzer (1983) |

Table A.1: Source abbreviations.

PMP *akaR 'root' (ACD); PMP *wakaR 'root' (Blust 1999); PCEMP *wakaR 'root' (Blust 1993); PCEMP *wakir 'kind of root' (ACD); PEMP *wakaR-i 'root' (ACD)
SH: Buli $w \bar{a}$ 'root' (ACD)
RA: Matbat $w a^{21} p o$ 'root' (R)
CB: Ambai newa 'root' (ABVD); Ambai ne-wa(sa) 'root' (Slz); Pom wa-wari 'root' (ACD); SeruiLaut rewa 'root' (Slm); Wandamen war 'root' (ACD); Waropen ghai, wai 'root' (ACD); Waropen wai 'root' (ABVD); Wooi wari 'root' (ACD)
Other: Irarutu kwakare 'root' (ABVD); Irarutu warkrikre 'root' (ABVD); Onin wakir 'root' (ACD)
PAN *aku '1sg nominative; I' (ACD); PMP *aku '1S NOM1' (Ross 2006); PMP *i-aku 'I' (Blust 1999); PCEMP *i-aku 'I' (Blust 1993)

SH: Buli ya '1sg. nominative pronoun: I' (ACD); Gane yak 'I' (ABVD); Sawai ya 'I' (CAD); Taba yak 'I' (ABVD)
RA: Matbat $y a^{21} k{ }^{\prime} \mathrm{I}$ ' (R); Matbat $y a^{21} k a{ }^{\prime} \mathrm{I}$ ' (R)
CB: Ambai yau ‘I’ (ABVD); Ansus yau 'I, me’ (P\&D); Biak ya ‘I' (H); Dusner ya ‘PRO.1SG' (D\&M); Dusner ya- '1SG' (D\&M); Moor -i '1sg' (K); Moor í- '1sg' (K); Moor ígwa '1sg' (K) [?]; SeruiLaut yau 'I' (Slm); Umar $e$ - ' 1 sg ' (K) [?]; Wandamen yau 'I ; 1sg pronoun' (G); Waropen ra 'I' (ABVD); Waropen ya 'I' (ABVD); Yaur i- '1sg.R' (K); Yaur ìgwá '1sg' (K); Yaur ja- '1sg.I' (K); Yerisiam j- '1sg' (K) [?]
Mamberamo: Warembori iwi 'I' (Donohue 1999) [?]
Other: Irarutu ia ‘I’ (ABVD); Irarutu já ‘I' (M); Kowiai lap ‘1sg. nominative pronoun: I' (ACD); Sekar yai ‘I' (ABVD)

PAN *ama 'father' (ACD); PAN *ta-ama 'father (ref.)' (ACD); PMP *t-ama 'father' (Blust 1999); PCEMP *t-ama 'father' (Blust 1993)
SH: Buli $h m \bar{a}$ 'father, FB' (ACD)
RA: Biga mai 'father' (ABVD); Gebe mam 'father' (ABVD)
CB: Ambai tama- 'father' (Slz); Biak kĕma 'father (ref.)' (H); Biak mami 'father' (H); Dusner tma 'father' (D\&M); Moor kamá 'grandparent' (K); Wandamen tama 'father' (ACD); Waropen imai 'father' (ABVD)
Other: Sekar yama-n 'father' (ABVD)
PMP *ampu 'grandparent/ grandchild (reciprocal)' (ACD); PMP *empu 'grandparent/ grandchild (recipr.); ancestor; lord, master, owner' (ACD)
SH: Buli bu 'grandparent/grandchild' (ACD)
CB: Biak $k$-ĕpu 'grandparent/grandchild; totemic animal or plant (may not be eaten out of a kind of piety)' (H)
PMP *añam 'plait (mats, baskets, etc.)' (ACD)
SH: Buli yanam 'to plait, weave (as mats)' (ACD); Sawai n-yonem 'to weave, plait' (CAD)
CB: Ambai $\operatorname{anu}(m)$ 'weave/plait' (Slz); Ansus anuM 'weave' (P\&D); Biak yanĕm 'to plait, weave' (H); Serui-Laut anu ‘weave’ (Slm); Yerisiam áamáné ‘weave’ (K)

PAN *aNay 'insect of the order Isoptera: termite, white ant' (ACD)

CB: Ambai anana 'ant' (Slz) [?]; Ansus anaana 'red_ant' (P\&D); Serui-Laut anana 'ant' (Slm); Umar nine 'ant' (K) [?]; Wandamen anana 'ant' (G); Yerisiam áníiní 'ant' (K) [?]
PMP *apa 'what?' (Blust 1999); PMP *apa ${ }_{1}$ 'what?' (ACD); PMP *apa-i 'what? which?' (ACD); PCEMP *apa 'what?' (Blust 1993); PCEMP *sapa 'what?' (Blust 1993)
SH: Buli ahai 'what?' (ABVD)
RA: Ambel letalapa 'what' (R) [?]; Fiawat nahapa 'what' (R) [?]
Other: Kowiai lafé 'what?' (ABVD); Sekar safa 'what?' (ABVD)

## PAN *apu 'grandparent/ grandchild (reciprocal)' (ACD)

CB: Ambai tafui 'grandparent’ (Slz); Ansus apus muampi 'grandfather' (P\&D); Ansus apus wawimpi 'grandmother' (P\&D); Ansus tapu 'grandchild’ (P\&D); Dusner apui 'grandfather' (D\&M);
Wandamen apusi 'grandparent' (G); Wandamen tapu 'grandparent ; grandchild' (G); Yerisiam gwápúù 'grandmother' (K)
PMP *aRuhu 'a shore tree: Casuarina equisetifolia' (ACD); PMP *qaRuhu 'a shore tree: Casuarina equisetifolia' (ACD)
CB: Ambai ai-yaru 'casuarina' (Slz); Biak yār 'a tree: Casuarina equisetifolia' (H); Moor jàrura 'tree sp.' (K); Umar jaru 'tree sp.' (K); Wandamen ai yaru 'k.o. tree' (G); Wandamen yaru 'a tree: Casuarina equisetifolia' (ACD); Yaur jàrmùríe 'tree sp.' (K)
PAN *asa 'one’ (ACD); PAN *esa 'one' (ACD); PAN *isa $\boldsymbol{1}^{\text {'one’ (ACD); PMP *esa 'one' (Blust }}$ 1999); PMP *isa 'one' (Blust 1999); PCEMP *asa 'one (of humans)' (ACD); PCEMP *isa 'one' (Blust 1993); PCEMP *asa ‘one’ (Blust 1993)
SH: Buli asa ‘one’ (ACD); Buli [a] sa/[i]sa ‘One’ (ABVD); Buli isa ‘one’ (ACD); Buli sa- ‘one’ (ACD); Gane pso ‘One’ (ABVD); Sawai pu-so ‘one’ (CAD); Taba p-so ‘One’ (ABVD); Taba -so ‘one’ RA: As sa ‘One' (ABVD); Gebe pi-sa ‘One’ (ABVD); Ma'ya (S.) 'aksa ‘one' (R); Ma'ya (S.) 'sa ‘one’ (R)

CB: Biak saï 'one’ (H); Moor tatá ‘one’ (K); Wandamen esa ‘One’ (ABVD)
Other: Arguni sia ‘One' (ABVD) [?]; Irarutu eso 'One' (ABVD); Irarutu esuéma ‘one’ (M); Kowiai isamós ‘One' (ABVD); Sekar isa 'One’ (ABVD)
PAN *aya ${ }_{2}$ 'father's sister, father's sister's husband' (ACD)
CB: Biak yài 'father' (H); Wandamen yai 'father' (G)
Mamberamo: Warembori ai ‘F' (Donohue 1999)
Other: Arguni yai 'mother' (ACD); Kowiai yai 'father' (ABVD)
PMP *ba 'under, below' (ACD); PMP *babaq, 'lower surface, bottom; short, low; below, beneath, under' (ACD); PMP *i-babaq 'below' (Blust 1999); PCEMP *i babaq 'below' (Blust 1993)

SH: Buli pāp ‘beneath, under' (ACD); Gane poli ‘below’ (ABVD)
RA: Biga paps ‘below’ (ABVD); Gebe la-pa 'below' (ABVD); Ma'ya (S.) 'pa ${ }^{12} p$ 'lower, low' (R)
CB: Ambai dombau 'below' (Slz); Ambai -weu 'below' (Slz); Ansus umbau 'below' (P\&D); Biak babni 'below, under' (H); Biak wabni 'below, under' (H); Dusner vav 'below' (D\&M); Moor kuvava'ı̂ 'short' (K); Serui-Laut umbau 'below' (Slm); Wandamen vav[a] 'below' (ABVD)
Other: Irarutu $e$-va 'below' (ABVD) [?]; Sekar ami-boban 'below' (ABVD)
 pick-a-back; ride pick-a-back' (ACD)
CB: Waropen wawa 'sit on the back, carry on the back (as a child)' (ACD)
Other: Kowiai na-fafa 'carry on the back' (ACD)
PMP *baba ${ }_{2}$ 'father' (ACD)
SH: Taba baba(si) 'father' (ABVD)
CB: Moor babá 'friend' (K); Wandamen babai 'older sibling' (G); Wandamen baba vasia 'parents' (G); Yerisiam bábà ‘older sibling' (K)

Other: Arguni baba 'father' (ABVD)
PAN *babaw ${ }_{3}$ 'upper surface, top; highlands; on, upon, over, above' (ACD); PMP *bawbaw 'upper surface, top, above' (ACD); PCEMP *bobo ${ }_{2}$ 'upper surface, top, above' (ACD)
SH: Buli popô 'above' (ACD); Gane payau 'above' (ABVD)
RA: Biga papəwз 'above' (ABVD)
CB: Biak bo ‘above’ (H); Moor ravúana ‘above’ (K) [?]; Serui-Laut babo ‘above’ (Slm); SeruiLaut vavoyai 'above' (Slm); Wandamen vavo 'on top (of); above' (G); Waropen [ru]bo 'above’ (ABVD)
Other: Arguni apo 'above' (ABVD); Kowiai [-na] féfa 'above' (ABVD)
PCEMP *bai ${ }_{1}$ 'do, make' (ACD)
SH: Sawai n-pe 'to do, make' (CAD)
CB: Moor venî 'do' ( K ) [?]
PMP *bak ${ }_{2}$ 'negative marker' (ACD) [?]
SH: Buli pa 'no, not, nothing, no one' (ACD)
RA: Ambel po 'no' (R); Biga sa'po 'no' (R); Fiawat hanpo 'no' (R); Gebe $\varepsilon n p a$ 'no, not' (ABVD); Kawe po 'no' (R); Laganyan ha'po 'no' (R); Matbat do ${ }^{21} p o$ 'no' (R); Ma'ya (M.) sa'po ${ }^{12}$ 'no' (R); Ma'ya (S.) sa'po ${ }^{12}$ 'no' (R); Wauyai po 'no' (R)
CB: Ansus wa 'not' (P\&D); Biak ba 'no, not' (H); Dusner va 'not' (D\&M); Moor và 'Neg' (K); Wandamen va 'no ; not' (G); Waropen wo 'no, not' (Held 1942); Waropen womo 'no, not' (Held 1942); Yerisiam béebà 'not yet' (K); Yerisiam mábè 'no' (K); Yerisiam vé 'Neg' (K)

PMP *baliji 'grass' (Blust 1999); PMP *balizi ‘kind of grass' (ACD); PCEMP *baliji 'grass' (Blust 1993)

SH: Gane bibisá 'grass' (ABVD)
RA: Ambel abris 'grass' (R)
CB: Biak abris 'grass' (H)
PAN *baliw 'buy, sell' (ACD); PMP *beli 'buy' (Blust 1999); PCEMP *bali ‘buy' (Blust 1993)
CB: Serui-Laut bori 'to buy' (Slm); Serui-Laut wori 'to buy' (Slm); Wandamen bori 'buy' (ACD)
PMP *banua 'inhabited land, territory supporting the life of a community' (ACD)
SH: Buli pnu 'village' (ACD)

RA: Biga pnu 'village' (R); Fiawat penuw 'village' (R); Kawe $n u$ 'village' (R); Laganyan 'nu ${ }^{3}$ 'village' (R); Matbat $n u^{3}$ 'village' (R); Ma'ya (M.) 'pnu ${ }^{3}$ 'village' (R); Ma'ya (S.) 'pnu ${ }^{3}$ 'village' (R)

CB: Ambai munue 'village' (Slz); Ansus nu 'world’ (P\&D); Biak mènu ‘village' (H); Biak mĕnu 'village' (H); Dusner munuai 'village' (D\&M); Moor manù 'forest' (K); Serui-Laut nu 'the earth' (Slm); Umar nuae 'village' (K); Waropen nu 'village' (Held 1942); Yaur núùré 'village' (K); Yerisiam nú 'village’ (K)
Mamberamo: Warembori bunupune 'Village' (Donohue 1999)
PAN *baqeRuh 'new; bachelor' (ACD); PMP *baqeRu 'new, fresh; recent(ly); youth, bachelor; beautiful, in one's prime' (ACD); PMP *ma-baqeRu 'new' (Blust 1999); PCEMP *baqəRu 'new' (Blust 1993)
SH: Buli po 'new; recently' (ACD); Gane pou 'new' (ABVD); Taba powo 'new' (ABVD)
RA: Ambel ambabo 'new' (R)
CB: Ambai vevoru 'new' (ABVD); Ambai waworu 'new' (Slz); Ansus waworu 'new' (P\&D); Biak babo 'new' (H); Dusner vavo 'young' (D\&M); Kurudu woru 'new' (ACD); Serui-Laut vavoru 'new' (Slm); Wandamen awori 'new' (G); Wandamen ba-boru 'new' (ACD); Wandamen vavoru 'fresh ; young' (G); Waropen boa 'new' (ABVD); Waropen woa 'new' (ABVD)
Mamberamo: Warembori uvo-ro 'New' (Donohue 1999) [?]
Other: Arguni popwaro 'new' (ABVD); Kowiai fówa 'new' (ABVD)
PMP *baRa, 'hand, arm' (ACD)
CB: Ambai wara- 'arm' (Slz); Ambai waray 'hand' (ABVD); Ansus warau 'arm' (P\&D); Biak bra 'hand, arm' (Soeparno 1977); Biak rwa 'hand' (H); Dusner vra 'arm' (D\&M); Moor veréa 'arm' (K); Munggui bara 'hand' (ACD); Serui-Laut wara 'arm, hand' (Slm); Wandamen vara 'hand' (G); Waropen baha 'hand' (ABVD); Waropen waha 'hand' (ABVD); Yaur vráùgwájè ‘arm' (K); Yerisiam bàkí 'arm' (K)
Mamberamo: Warembori ke-vera-ro 'Arm' (Donohue 1999); Yoke ßura- 'arm' (Donohue 1999) Other: Irarutu frá 'arm, hand' (M)
PAN *baReq 'abscess, boil, swelling on the body' (ACD); PMP *baReq 'swell' (Blust 1999)
RA: Biga saba 'to swell' (ABVD) [?]
CB: Ambai bebara 'to swell' (ABVD); Ansus bebara 'swollen' (P\&D); Biak biar 'to swell' (H); Moor vavarà ‘swollen' (K); Wandamen barbara 'to swell' (ABVD); Yaur névíorè 'swollen' (K)
Other: Irarutu -nəbərbara 'to swell' (ABVD); Sekar abara 'to swell' (ABVD)
PMP *baseq $\boldsymbol{q}_{2}$ 'wet; wash clothes' (ACD); PMP *besaq 'wet, wash' (ACD); PMP *biseq 'wet; wash the anus after defecating' (ACD); PMP *ma-baseq 'wet' (Blust 1999); PCEMP *ma-basaq 'wet' (Blust 1993)
CB: Ambai vevasa 'wet' (ABVD); Ambai wawasa 'wet (cloth)' (Slz); Ansus wawa 'wet' (P\&D); Serui-Laut vavaa 'wet' (Slm); Wandamen vabasa 'wet' (G); Wandamen vavasa 'wet' (ABVD)
PMP *batay 'tree trunk, fallen tree, log; stem of a plant; body; corpse; self; bridge of the nose; most important or preeminent thing; main course of a river; mushroom or bracket fungus that grows on tree trunks or decaying logs' (ACD)

SH: Buli paty-o 'piece of wood or a tree that is lying on the ground' (ACD); Buli pat-patay 'lie fallen, of a tree' (ACD)
RA: Fiawat batan 'tree' (R)
PAN *batu ${ }_{4}$ 'stone; testicle' (ACD); PMP *batu 'stone' (Blust 1999); PCEMP *batu 'stone' (Blust 1993)

SH: Buli pāt 'stone’ (ACD)
RA: As pa 'stone' (ABVD); Biga ka'pat 'stone' (R); Biga kapat 'stone' (ABVD); Fiawat epat 'stone’ (R); Gebe kapat 'stone' (ABVD); Kawe a'pat ‘stone' (R); Laganyan a'pat 'stone' (R); Matbat pa ${ }^{12} t$ ‘stone’ (R); Ma'ya (M.) ka'pa ${ }^{12} t$ 'stone’ (R); Ma'ya (S.) $k a^{\prime} p a^{12} t$ ‘stone’ (R); Wauyai ka'pat ‘stone’ (R)

CB: Moor vá’a 'stone' (K); Umar atu ‘stone’ (K); Yerisiam áakú 'stone' (K)
Other: Arguni puat 'stone' (ABVD) [?]; Sekar bati ‘stone' (ABVD)
PAN *beRay ${ }_{1}$ 'give' (ACD); PMP *beRay ${ }_{2}$ 'give, present gifts to; gift' (ACD); PEMP *boRe 'give' (ACD)
SH: Buli po 'give, hand over, surrender' (ACD); Sawai $n$-po 'give' (CAD)
RA: Ambel la-bi ‘give' (R); Fiawat bi ‘give’ (R); Laganyan 'bi(o) 'give' (R); Matbat be ${ }^{21}$ ‘give' (R); Ma'ya (M.) 'be(o) 'give' (R); Ma'ya (S.) 'be(o) 'give' (R); Wauyai bi(o) 'give' (R)
CB : Dusner ve 'give' (D\&M); Umar ve 'give' (K); Yaur vèné 'give' (K)
PAN *beRek 'domesticated pig' (ACD)
SH: Sawai bow 'pig' (CAD)
RA: Fiawat bu 'pig' (R); Laganyan bo 'pig' (R); Ma'ya (M.) 'bo ${ }^{3}$ 'pig' (R); Ma'ya (S.) 'bo 'pig' (R); Wauyai bo 'pig' (R)
CB: Umar bue 'pig' (K); Waropen fo 'pig' (Held 1942)
Mamberamo: Warembori pue-ro 'Pig' (Donohue 1999) [?]; Yoke pua 'pig' (Donohue 1999) [?]
PMP *beRsay 'canoe paddle; paddle a canoe' (ACD); PEMP *boRse 'canoe paddle, paddle a canoe' (ACD)
CB: Ambai bo 'oar' (Slz); Ambai wo 'paddle (v.)' (Slz); Ansus bo 'paddle' (P\&D); Ansus wo 'paddle' (P\&D); Biak borĕs 'paddle, oar' (H); Biak borĕs 'to paddle, row in native fashion (with scooping motion)' (H); Dusner vors 'paddle' (D\&M); Moor vóa 'paddle' (K); Moor vóra 'paddle' (K); Serui-Laut bo 'oar, paddle' (ACD); Wandamen bo 'paddle’ (ACD); Wandamen vo 'paddle’ (G); Wandamen vo 'paddle' (G); Wandamen wo 'row ; paddle' (G); Waropen wo 'to row' (Held 1942)

Other: Arguni pores ‘oar, paddle’ (ACD); Kowiai fosa ‘oar, paddle’ (ACD); Onin pesa ‘oar, paddle’ (ACD)
PAN *binıahi ‘[woman, wife]' (ACD); PMP *ba-b-in-ahi ‘woman' (Blust 1999); PMP *b-in-ahi 'woman' (Blust 1999); PCEMP *ba-b-in-ay 'woman' (Blust 1993); PCEMP *bcin ai '[woman, female]' (ACD); PCEMP *b-in-ay 'woman' (Blust 1993)
SH: Buli ma-piy 'woman; female’ (ACD); Gane mapín 'woman/female’ (ABVD); Sawai mepin 'female' (CAD); Taba mapin 'wife' (ABVD); Taba mapin 'woman/female' (ABVD)

RA: Ambel bin 'woman' (R); As -bin ‘wife' (ABVD); Biga wa'bin 'woman' (R); Fiawat bin 'woman' $(\mathrm{R})$; Gebe mapin 'woman/female' (ABVD); Gebe mapin 'wife' (ABVD); Kawe pin 'woman' (R); Laganyan pin ‘woman' (R); Ma'ya (M.) 'pin ‘woman' (R); Ma'ya (S.) 'pin ‘woman' (R); Wauyai pin 'woman' (R)
CB: Ambai vivi ‘wife’ (ABVD); Ambai vivin ‘woman’ (Slz); Ambai viviy ‘woman/female’ (ABVD); Ansus wawing 'woman' (P\&D); Ansus wawini 'wife' (P\&D); Biak bin 'woman; female' (H); Moor vavína 'woman' (K); Serui-Laut vavin 'woman' (Slm); Serui-Laut vinempi ‘wife' (Slm); Umar inggo 'woman' (K); Wandamen babi 'woman/female' (ABVD); Wandamen babin 'woman; female' (ACD); Wandamen vavi 'woman ; female' (G); Wandamen vavi[n] 'woman/female’ (ABVD); Wandamen vinie 'wife' (G); Waropen bino 'woman/female' (ABVD); Waropen bino 'wife' (ABVD); Yerisiam înà 'woman' (K)
Mamberamo: Warembori bin-do 'Woman' (Donohue 1999)
Other: Arguni bimbine 'woman/female’ (ABVD); Arguni popin 'wife' (ABVD); Irarutu bafína 'woman' (M); Irarutu bevine 'woman/female' (ABVD); Kowiai mafína 'woman/female' (ABVD)
PSHWNG *bisik ${ }_{2}$ 'sick; illness' (ACD)
SH: Buli pisi ‘sick, be sick’ (ACD); Buli pisi kaci 'rheumatism’ (ACD); Buli pis-pisi 'illness' (ACD); Sawai -pise 'hurt' (CAD)
RA: Gebe -pisi 'painful, sick' (ABVD); Ma'ya (S.) 'pisi ${ }^{3}$ 'to hurt' (R)
CB: Biak bis ‘sick; illness, particularly fever' (H)
PMP *bitil 'hungry; starve' (ACD)
CB: Ambai wawisi ‘hungry’ (Slz); Ansus wawi ‘hungry’ (P\&D); Biak bisĕr 'hungry' (H); Dusner mbuser 'be.hungry' (D\&M); Wandamen vawisi 'hungry' (G) [?]

PAN *bituqen ‘star’ (ACD); PMP *bituqen ‘star’ (Blust 1999); PCEMP *bituqən ‘star' (Blust 1993)
RA: As taun 'star' (ABVD); Fiawat tun 'star' (R); Kawe tun 'star' (R); Ma'ya (M.) to'i ${ }^{12} n$ 'star' (R); Ma'ya (S.) tu'i ${ }^{3} n$ 'star' (R); Wauyai tun 'star' (R)
POC *boto 'short' (ACD)
SH: Buli kokopē 'short' (ABVD); Gane gapópai 'short' (ABVD)
RA: As kabu 'short' (ABVD); Biga kup 'short' (ABVD); Gebe kapoto 'short' (ABVD)
CB: Umar avu 'short' (K); Umar gavu 'short' (K); Waropen kamuto 'short' (ABVD) [?]
Other: Irarutu kafútz 'short' (M)
PAN *buaq, 'fruit' (ACD); PMP *buaq 'fruit' (Blust 1999); PMP *buaq $\boldsymbol{q}_{\mathbf{z}}$ 'fruit; areca palm and nut; grain; berry; seed; nut; endosperm of a sprouting coconut; kidney; heart; finger; calf of the leg; testicle; various insects; scar tissue; roe; bud; flower; blossom; bear fruit; words, speech, or songs; meaning, contents of discussion; numeral classifier for roundish objects; buttock; Adam's apple; nipple of the breast; button; marble; tattooing' (ACD); PCEMP *buaq 'fruit' (Blust 1993)
SH: Buli [ai] pio 'fruit' (ABVD); Gane bobu 'fruit' (ABVD); Taba sapo 'fruit' (ABVD)
RA: As nupu- 'fruit' (ABVD); Biga puo 'fruit' (ABVD); Gebe kapio 'fruit' (ABVD)

CB: Ambai bo 'fruit' (ABVD); Ambai bon 'fruit' (Slz); Ansus aibong 'fruit' (P\&D); Biak aibòn 'fruit' (H); Moor vó 'fruit' (K); Serui-Laut aibon 'fruit' (Slm); Serui-Laut bo 'fruit' (Slm); Wandamen buo 'fruit' (ABVD); Waropen -bo 'fruit' (ABVD); Waropen wo 'fruit' (ABVD); Yerisiam ú 'fruit' (K)

Mamberamo: Warembori bo 'fruit' (Donohue 1999); Warembori bua 'fruit' (Donohue 1999); Yoke $\beta$ ua 'fruit' (Donohue 1999)
Other: Irarutu fo 'fruit' (ABVD); Irarutu fu 'fruit' (ABVD); Irarutu fúu 'fruit' (M); Sekar bua-n 'fruit' (ABVD)
PMP *buku 'node (as in bamboo or sugarcane); joint; knuckle; knot in wood; knot in string or rope' (ACD); PCEMP *buku 'node (as in bamboo or sugarcane); joint; knuckle; knot in wood; knot in string or rope; Mons veneris' (ACD)
CB: Moor vú’a 'knot' (K); Umar vu 'knot' (K); Yaur gávúujè 'knot' (K); Yaur vúujè ‘node’ (K); Yerisiam búgùa 'knot' (K)
PAN *bulaN 'moon, month; menstruation' (ACD); PMP *bulan 'moon' (Blust 1999); PMP *bulan ${ }_{3}$ 'moon, month; menstruation; shell disk collar piece' (ACD); PCEMP *bulan 'moon' (Blust 1993)
SH: Taba bulan 'moon' (ABVD)
CB : Moor vùrina 'moon' (K); Yerisiam úùrà 'moon' (K)
Other: Arguni purin 'moon' (ABVD); Kowiai furan 'moon' (ACD)
PMP *bulan ${ }_{2}$ 'unnaturally white, albino' (ACD); PEMP *budan 'white' (Blust 1978)
SH: Buli bubulán ‘white’ (ABVD); Gane bulang ‘white’ (ABVD); Taba bulang ‘white’ (ABVD)

## PAN "bulaw-an 'gold' (ACD)

CB: Biak brawĕn 'gold' (H); Roon barawan 'gold' (ACD); Serui-Laut barawan 'gold' (Slm)
PMP *bulu 'feather' (Blust 1999); PMP *bulu ${ }_{1}$ 'body hair; fur; feather; down; floss on plant stems; color; type, kind' (ACD); PCEMP *bulu 'feather' (Blust 1993); PCEMP *bulu 'body hair; fur; feather; down; antenna of insect or crustacean; spikes of sea urchin; floss on plant skins, color; type, kind' (ACD)
SH: Buli [mani] plu 'feather' (ABVD); Buli plu 'body hair, feather' (ACD); Sawai plu 'feather' (CAD)
RA: Matbat napo ${ }^{21}$ l 'feather' (R) [?]
CB: Ambai na-wavuru 'body hair' (Slz); Biak bur 'feather; body hair' (Soeparno 1977); Moor vùru 'hair' (K); Umar uru 'body hair' (K); Waropen wuro 'feather' (ABVD); Yerisiam úurúgùa 'hair' (K)

Mamberamo: Warembori ke-vun-do ‘Body hair’ (Donohue 1999); Yoke bo 'body hair’ (Donohue 1999)

Other: Arguni pupure 'feather' (ABVD); Sekar bunibunim 'feather' (ABVD)
PAN *buluq ${ }_{2}$ 'type of slender bamboo; Schizostachyum spp.' (ACD)
CB: Biak bures 'bamboo (thick)' (Soeparno 1977); Moor burasìni 'bamboo sp.' (K)
PMP *buy ‘deep resounding sound’ (ACD)
SH: Buli puy 'heart (perhaps an onomatopoetic word)' (ACD); Sawai puy 'heart' (CAD)

PAN *buya 'flower, blossom' (ACD); PMP *buya 'flower' (Blust 1999); PMP *bupa ${ }_{a}$ 'flower, blossom; to flower, bear flowers; yield a benefit (as interest on a loan); first-born child; cotton; vulva (refined or evasive), skin rash, prickly heat; speckled (of fish); kidneys' (ACD); PCEMP *buya 'flower' (Blust 1993)
SH: Gane bungan 'flower' (ABVD); Taba bungan 'flower' (ABVD)
RA: Biga buya 'flower' (ABVD)
CB: Ambai ne-bu 'flower' (Slz); Waropen bunga 'flower' (ABVD)
Other: Kowiai búnga 'flower' (ABVD)
PAN *buNuq 'throw at, hit with a projectile' (ACD); PMP *bunuq 'kill' (Blust 1999); PMP *bunuq ${ }_{2}$ 'throw at, hit, strike with a sharp object; kill; extinguish (a fire)' (ACD); PCEMP *bunuq 'kill' (Blust 1993)
SH: Buli fa-pun 'to kill (intr.)' (ACD); Buli fa-pun-pun 'kill each other; kill together, kill jointly' (ACD); Buli ma-fa-pun 'killer, murderer' (ACD); Buli pun 'strike, beat; kill' (ACD); Buli puni yap 'extinguish a fire (term used while at sea - not on land)' (ACD); Buli pun-pun 'hit repeatedly, ill-treat' (ACD); Gane pun 'to kill' (ABVD); Sawai $n$-pun 'to kill' (CAD); Sawai n-pun 'to strike' (CAD); Taba -pun 'to kill' (ABVD)
RA: Ambel buni 'kill' (R); As -bun 'to kill' (ABVD); Biga bun 'kill' (R); Fiawat bun 'kill' (R); Gebe -pun 'to kill' (ABVD); Kawe bun 'kill' (R); Laganyan 'bu'n 'kill' (R); Matbat bu'n 'kill' (R); Ma'ya (M.) 'bun 'kill' (R); Ma'ya (S.) 'bu³n 'kill' (R); Wauyai bun 'kill' (R); Wauyai fal'pun 'kill' (R)

CB: Ambai i-muni 'to kill' (ABVD); Ambai mun 'kill' (Slz); Ansus mung 'kill' (P\&D); Biak mun 'to kill' (H); Dusner mun 'kill' (D\&M); Moor munâ 'kill' (K); Serui-Laut mun 'to kill' (Slm); Wandamen mun 'kill' (G); Waropen muna 'to kill' (ABVD); Waropen muna 'to hit' (ABVD)
Mamberamo: Warembori muni-ro 'Kill' (Donohue 1999); Yoke mu 'kill' (Donohue 1999)
Other: Irarutu -buna 'to kill' (ABVD); Kowiai -fun 'to hit' (ABVD); Kowiai -fun i namáta 'to kill' (ABVD)
PMP *buRbuR ${ }_{1}$ 'rice porridge, rice gruel' (ACD)
CB: Moor vùvura 'sago porridge' (K); Waropen wiwiro 'sago porridge' (Held 1942)
Mamberamo: Warembori boro-ro ‘Sago porridge' (Donohue 1999); Warembori bu-ro ‘Sago porridge' (Donohue 1999)
PMP *buRuk 'rotten meat; addled eggs; bad character' (ACD); PCEMP *buRuk 'rotten' (Blust 1993)

SH: Gane puík 'rotten' (ABVD)
CB: Moor vavarù 'rotten' (K); Waropen bu 'rotten' (ABVD)
PAN *Caki 'feces, excreta’ (ACD); PAN *Caqi 'feces, excrement' (ACD); PMP *taki 'feces, excreta' (ACD); PMP *taqi 'feces, excrement' (ACD)
CB: Yerisiam káà 'feces' (K)
Other: Irarutu tá 'feces' (M)
PAN *Canem 'grave; to bury' (ACD); PMP *tanem 'to plant' (Blust 1999); PCEMP *tanam 'to plant' (Blust 1993)

SH: Gane tonam 'to plant' (ABVD); Sawai tonem 'to plant' (CAD)
RA: Gebe fatanam 'to plant' (ABVD)
CB: Ambai i-tanamp 'to plant' (ABVD); Ambai tana(m) 'plant (v.)' (Slz); Ansus tanami 'plant' (P\&D); Moor 'anamî 'grow' (K); Serui-Laut tana 'plant' (Slm); Umar tnam 'plant' (K); Wandamen tanam 'to plant' (ABVD); Waropen anako 'to plant' (ABVD); Yaur 'èmné 'plant' (K); Yerisiam káamáné 'plant' (K)
Other: Arguni -tanem 'to plant' (ABVD); Irarutu -mata-na 'to plant' (ABVD); Kowiai tanom 'land, soil' (ACD)
PAN *CawiN ‘year' (ACD); PMP *taqun 'year' (Blust 1999); PCEMP *taqun 'year' (Blust 1993)
SH: Buli taun 'year' (ABVD); Gane taun 'year' (ABVD); Taba taun 'year' (ABVD)
RA: As tahun 'year' (ABVD); Biga tahun 'year' (ABVD)
CB: Dusner tahun 'year' (D\&M); Moor táuna 'year' (K); Wandamen taune 'year' (G)
Other: Irarutu taun 'year' (ABVD)
PAN *CebuS ‘sugarcane: Saccharum officinarum' (ACD); PAN *tebuS ‘sugarcane: Saccharum officinarum' (ACD); PMP *tebuh ${ }_{1}$ 'sugarcane: Saccharum officinarum' (ACD); PMP *tebuh ${ }_{2}$ 'sugarcane: Saccharum officinarum' (ACD)
SH: Buli top ‘sugarcane’ (Blust1978); Sawai tep ‘sugarcane’ (CAD)
CB: Ambai tovu ‘sugarcane' (Slz); Ansus towu 'sugarcane’ (P\&D); Biak kòb ‘sugarcane’ (H); Moor kóha 'sugarcane' (K); Serui-Laut tovu 'sugarcane' (Slm); Umar to 'sugarcane' (K); Waropen kowu ‘sugarcane’ (Held 1942); Yaur òojé ‘sugarcane’ (K); Yerisiam kóou ‘sugarcane’ (K)
Other: Irarutu túfz 'sugarcane' (M)
PAN *Cinıaqi ‘small intestine’ (ACD); PMP *tinaqi 'guts’ (Blust 1999); PCEMP *tinaqi ‘guts' (Blust 1993)
SH: Buli hñai walwalo 'intestines' (ABVD); Buli hñao 'belly' (ABVD); Sawai sno 'stomach' (CAD)
RA: Ambel nyay 'belly' (R); Biga nia- 'belly' (ABVD); Biga nya(o) 'belly' (R); Fiawat na 'belly’ (R); Gebe hñainora 'intestines' (ABVD); Gebe hñao 'belly' (ABVD); Kawe a'nyay(o) 'belly' (R); Laganyan a'nyay(o) 'belly' (R); Ma'ya (M.) 'na(o) 'belly' (R); Ma'ya (S.) 'na(o) 'belly' (R); Wauyai ka'nyay(o) 'belly' (R)
CB: Ambai ene- ‘abdomen’ (Slz); Ansus aneu ‘stomach’ (P\&D); Biak snèwar- 'intestines’ (H); Moor siné 'stomach' (K); Serui-Laut ane 'belly' (Slm); Serui-Laut anewai 'intestines' (Slm); Umar hna 'belly' (K); Wandamen sane 'belly' (ABVD); Wandamen sanèwai 'intestines' (ABVD); Waropen nina 'belly' (ABVD); Yaur hnáarè 'intestines' (K); Yerisiam hìná 'belly' (K)
Other: Irarutu -fta- teni 'intestines’ (ABVD) [?]
PAN *CuNuh 'roast food over a fire' (ACD); PMP *tunu 'burn' (Blust 1999); PMP *tunu 'roast food over a fire' (ACD); PCEMP *tunu 'burn' (Blust 1993)
CB: Ambai i-nunu 'to cook' (ABVD); Ambai nunun 'burn (tr.)' (Slz); Ansus nunung 'burn, cook (tr)' (P\&D); Biak kun 'burn, fry, roast; ignite a fire or lamp; fire a gun' (H); Dusner un 'roast' (D\&M); Moor 'unî 'burn' (K); Serui-Laut nunu 'to cook' (ACD); Serui-Laut tunu 'to burn' (Slm); Umar tnu 'cook' (K); Wandamen nunu 'grill ; cook' (G); Wandamen nunu[m] 'to cook' (ABVD); Yaur 'úndáe 'cook' (K); Yaur 'úndè ‘burn' (K); Yerisiam kúuná 'burn' (K)

Mamberamo: Warembori akuni-ro 'Burn (intr)' (Donohue 1999); Warembori kuni 'Burn'
(Donohue 1999); Warembori kuni ‘Cook' (Donohue 1999)
Other: Irarutu -matune 'to cook' (ABVD); Irarutu túna 'to cook' (M); Kowiai -tun 'to shoot' (ABVD)
PAN *CuSuR 'string together, as beads' (ACD); PMP *tuhuR 'string' (ACD)
CB: Biak kur 'to string (as beads)' (H); Umar kuru 'beads' (K)
PMP *dahun 'leaf' (Blust 1999); PCEMP *daun 'leaf' (Blust 1993)
SH: Buli ulú 'leaf' (ABVD) [?]; Sawai ay wlu 'leaf' (CAD) [?]; Taba llu 'leaf' (ABVD) [?]
RA: As alaun 'leaf' (ABVD); Kawe a'lun 'leaf' (R); Laganyan a'lun 'leaf' (R); Matbat da ${ }^{21} n$ 'leaf' (R); Ma'ya (M.) ka'lun(o) 'leaf' (R); Ma'ya (S.) ka'lun(o) 'leaf' (R); Wauyai ka'lun 'leaf' (R) CB: Ambai rerau 'leaf' (ABVD); Ambai reraun 'leaf' (Slz); Moor rànu 'leaf' (K); Serui-Laut re-rau 'leaf' (ACD); Wandamen rau 'edible leaf ; vegetable ; greens' (G); Waropen rana 'leaf' (ABVD); Yerisiam ráánìa 'leaf' (K)
Mamberamo: Warembori andan-do 'Leaf' (Donohue 1999); Yoke tandu 'leaf' (Donohue 1999)
Other: Irarutu ró 'leaf' (M); Kowiai rówce 'leaf' (ABVD)
PAN *dalem ${ }_{1}$ 'in, inside; deep' (ACD); PMP *dalem ${ }_{2}$ 'ins, area within, inner part of something; between; below, under; deep; mind, feelings' (ACD); PMP *i-dalem 'in, inside' (Blust 1999)
SH: Buli loló 'in, inside' (ABVD)
RA: Gebe i-lalo 'in, inside' (ABVD)
CB: Ambai rorompu 'in, inside' (ABVD); Ambai roron 'inside’ (Slz); Ansus rarong 'inside’ (P\&D); Serui-Laut raron 'in, inside' (Slm); Wandamen raro 'inside' (G)
Other: Sekar ami-nanam 'in, inside' (ABVD)
PAN *danaw 'lake' (ACD); PMP *danaw 'lake' (Blust 1999); PCEMP *danaw 'lake' (Blust 1993)
SH: Buli lanlan ‘lake’ (ABVD)
CB: Moor rána 'lake' (K)
Mamberamo: Warembori don-do 'Lake’ (Donohue 1999); Yoke dumb- 'lake' (Donohue 1999)
PAN *daNum 'fresh water' (ACD); PMP *danum 'water (fresh)' (Blust 1999); PCEMP *danum 'water (fresh)' (Blust 1993)
CB: Moor ràruma 'water' (K); Umar iran 'water' (K); Waropen rauno 'water' (ABVD); Yerisiam ráarámà 'water’ (K)
Mamberamo: Warembori dan-do 'Water' (Donohue 1999)
PAN *daRaq, 'blood; to bleed; menstruate’ (ACD); PMP *daRaq 'blood’ (Blust 1999); PCEMP *daRaq 'blood' (Blust 1993)
SH: Buli la 'coagulated blood; blood clot' (ACD); Sawai lعlo 'blood' (CAD); Taba llo 'blood' (ABVD)
RA: Gebe la 'blood' (ABVD)
CB: Moor ràra 'blood' (K); Umar nuhra 'blood' (K); Waropen rara 'blood' (ACD); Yerisiam rárà 'blood' (K)
Mamberamo: Warembori ke-ra-ro 'Blood' (Donohue 1999)

Other: Arguni rare 'blood' (ABVD); Kowiai rara 'blood' (ACD); Sekar rara 'blood' (ABVD)
PMP *de(m)pul ‘dull, blunt' (ACD); PMP *dumpul ‘dull, blunt' (ACD); PMP *tumpel ‘dull, blunt’ (ACD); PMP *tumpul 'dull, blunt' (ACD)
CB: Umar tvu 'blunt' (K) [?]
Other: Arguni tumbie 'dull, blunt' (ABVD)
PAN *deneR 'to hear; sound' (ACD); PMP *deyeR 'hear' (Blust 1999); PMP *deye $\boldsymbol{R}_{a}$ 'to hear, listen; obey; hear about; news; fame, famous; to feel, perceive through any sense other than sight' (ACD); PCEMP *dəgəR 'hear' (Blust 1993)
SH: Buli loya 'to hear' (ABVD); Gane longa 'to hear' (ABVD); Sawai n-loye 'hear' (CAD); Taba malongo 'to hear' (ABVD)
RA: As -fıləŋว 'to hear' (ABVD); Biga do'no 'hear' (R); Gebe lכŋว 'to hear' (ABVD); Kawe 'don[o] 'hear' (R); Laganyan 'don[o] 'hear' (R); Matbat no ${ }^{41} \eta$ 'hear' (R); Ma'ya (M.) 'do ${ }^{12} n$ 'hear' (R); Ma'ya (S.) 'do ${ }^{12} n$ 'hear' (R); Wauyai 'don[o] 'hear' (R)
CB: Moor oran̂̂ 'hear' (K) [?]; Yerisiam nó 'hear' (K) [?]
Other: Kowiai banonggar 'to hear' (ABVD) [?]; Kowiai -fanonggar 'to hear' (ABVD) [?]
PMP *depa 'fathom' (ACD)
SH: Buli lof 'fathom' (ACD); Buli lof-sa 'one fathom' (ACD); Sawai lof 'fathom' (CAD)
CB: Biak ròf 'fathom' (H); Serui-Laut rowa 'fathom' (Slm) [?]
Other: Kowiai ref 'armspan, fathom' (ACD)
PMP *di ‘at' (Blust 1999); PCEMP *di 'at' (Blust 1993)
SH: Buli mali 'at' (ABVD); Gane li 'in, inside' (ABVD); Gane li ‘at' (ABVD); Gane liló 'in, inside’ (ABVD); Taba li ‘at' (ABVD); Taba li ‘in, inside’ (ABVD)

PAN *diRi 'to stand' (ACD); PMP *diRi 'stand' (Blust 1999); PCEMP *diRi 'stand' (Blust 1993)
Other: Irarutu marire 'to stand' (ABVD); Kowiai -marír 'to stand' (ABVD); Sekar mriri 'to stand' (ABVD)
PMP *duRi ${ }_{2}$ 'thorn, splinter, fish bone' (ACD); PCEMP *zuRi 'bone' (Blust 1993)
Other: Irarutu rúrz 'bone' (M); Kowiai rur 'bone' (ABVD); Sekar rurir 'bone' (ABVD)
PAN *duSa 'two' (ACD); PMP *duha 'two' (Blust 1999); PCEMP *dua 'two' (Blust 1993)
SH: Buli [si] lu 'Two' (ABVD); Gane plu 'Two' (ABVD); Sawai pe-lu 'two' (CAD); Taba -lu 'two'; Taba p-lu 'Two' (ABVD)
RA: Ambel low 'two' (R); As lu 'Two' (ABVD); Biga lo 'Two' (ABVD); Biga lu 'two' (R); Fiawat lu 'two' (R); Gebe pi-lu 'Two' (ABVD); Kawe lu 'two' (R); Laganyan 'lu 'two' (R); Matbat lu 'two' (R); Ma'ya (M.) 'lu 'two' (R); Ma'ya (S.) 'lu 'two' (R); Wauyai lu 'two' (R)

CB: Ambai bo-ru 'two' (Slz); Biak duï 'two' (H); Dusner nuru 'two' (D\&M); Moor rúró 'two' (K); Serui-Laut boru 'two' (Slm); Umar edih 'two' (K); Wandamen muandu 'Two' (ABVD); Waropen woru 'Two' (ABVD); Yaur rédúhè 'two' (K); Yerisiam rúuhí 'two' (K)
Other: Arguni ru 'Two' (ABVD); Irarutu rifo 'Two' (ABVD); Irarutu rú 'two' (M); Kowiai [ru]wet 'Two' (ABVD); Sekar nua 'Two’ (ABVD)
PMP *duyuy ‘dugong’ (Blust 1999); PMP *duyū ${ }_{2}$ 'dugong' (ACD)

CB: Biak rowin ‘sea cow, dugong' (H); Moor rúna ‘dugong' (K); Waropen rui ‘sea cow, dugong' (ACD); Yaur rì'ré 'dugong' (K)
PAN *enem 'six' (ACD); PEMP *onam 'six' (ACD)
SH: Buli wonam ‘six' (ACD); Sawai pe-wonem ‘six' (CAD); Taba -wonam 'six’
RA: Ambel wanom 'six' (R); Biga wo'nom 'six' (R); Fiawat wonom 'six' (R); Kawe wo'nom 'six' (R); Laganyan wo'nom ‘six' (R); Matbat no ${ }^{12} m$ 'six' (R); Ma'ya (M.) 'wono ${ }^{12}$ m 'six’ (R); Ma'ya (S.) 'wono ${ }^{3}$ m 'six' ( R ); Wauyai wo'nom 'six' ( R )
CB : Ambai wonan ‘six' (Slz); Ambai wona( $\eta$ ) 'Six' (ABVD); Ansus wonang 'six' (P\&D); Biak wònĕm ‘six' (H); Waropen ghono ‘six' (ACD)
PAN *gaCel 'itch, feel itchy' (ACD); PMP *ma-gatel 'itch' (ACD)
CB: Ambai maitata 'itch' (Slz); Ansus matata 'itch' (P\&D); Biak makèr 'to itch' (H); Moor matatiarì 'itch’ (K); Yerisiam mákmáakáré ‘itch’ (K)
PMP *gekgek 'animal sound' (ACD)
SH: Buli gokgok 'crow' (ACD); Sawai gok?gok 'crow' (CAD)
PMP *hapen 'fishing line' (ACD); PEMP *apen 'fishing line' (ACD)
SH: Buli yafan 'line used in harpooning sea turtles' (ACD)
CB: Biak yàfĕn 'harpoon for spearing fish and turtles' (H)
PMP *haRezan 'notched log ladder' (ACD); PEMP *aRezan 'notched log ladder' (ACD)
SH: Buli olan 'ladder' (ACD); Sawai lon 'ladder' (CAD)
RA: Ma'ya (M.) 'lo ${ }^{12} n$ 'ladder' (R); Ma'ya (S.) 'lo ${ }^{12} n$ 'ladder' (R)
CB: Yaur rògré 'ladder' ( K )
Other: Kowiai roran 'ladder, stairs' (ACD)
PMP *hasay 'gills' (ACD)
SH: Sawai yosen 'gill' (CAD)
CB: Ambai ne-wasa 'gills' (Slz); Ansus newa 'gill' (P\&D); Biak àsĕn 'gills' (H); Serui-Laut waa 'gills' (Slm)
PMP *hiup 'to blow' (Blust 1999); PMP *tiup 'blow' (ACD); PCEMP *hiup 'to blow' (Blust 1993); PCEMP *upi 'to blow' (ACD)
SH: Buli uf 'to blow (person or wind)' (ACD); Buli uf[o] 'to blow' (ABVD); Gane ufu 'to blow' (ABVD); Taba -uho 'to blow' (ABVD)
RA: Biga -auf 'to blow' (ABVD)
CB: Biak uf 'to blow' (H); Biak wuf 'to blow' (H); Waropen ufa 'to blow' (ABVD)
Other: Irarutu nufa 'to blow' (ABVD)
PMP *h-um-ipi ‘dream' (Blust 1999); PCEMP *mipi ‘dream’ (Blust 1993)
CB: Ambai -miai 'to dream' (ABVD); Moor enamí’a ‘dream' (K); Serui-Laut enami ‘dream' (Slm); Wandamen ena-mia 'dream' (ACD); Wandamen ena miya 'dream' (G); Wandamen miya 'dream' (G); Yerisiam mí 'dream' (K)

Other: Sekar nifi 'to dream' (ABVD)

PAN *huRaC 'artery, blood vessel, blood vein; muscle; nerve; sinew; tendon' (ACD); PMP *uRat 'root' (Blust 1999)
CB: Biak urěk 'vein, vessel' (H)
Other: Kowiai urat 'vein; tendon' (ACD)
PAN *ia ${ }_{1}$ '3sg. personal pronoun: he, she; him, her, it' (ACD); PAN *si ia ${ }_{1}$ '3sg. personal pronoun: he, she, it' (ACD); PCEMP *s-ia 'he/she' (Blust 1993)
SH: Buli $i$ '3sg.' (ACD); Gane $i$ 'he/she' (ABVD); Sawai $i$ 'he/she' (CAD); Taba $i$ 'he/she' (ABVD)
RA: As ia 'he/she' (ABVD); Gebe ia 'he/she' (ABVD)
CB: Ambai $i$ 'he’ (Slz); Ansus $i$ 'she, her' (P\&D); Ansus $i$ 'he, him’ (P\&D); Biak $i$ 'he/she’ (H); Dusner i ‘PRO.3SG' (D\&M); Dusner i- ‘3SG’ (D\&M); Moor î ‘3sg' (K); Serui-Laut $i$ 'he/she’ (Slm); Wandamen $i$ 'he/she' (ABVD); Waropen $i$ 'he/she' (ABVD)
Mamberamo: Warembori yi 'He/she’ (Donohue 1999)
Other: Arguni $i$ 'he/she' (ABVD); Irarutu í 'he/she' (M); Irarutu ia 'he/she' (ABVD); Kowiai $i$ '3sg.' (ACD); Sekar ia 'he/she' (ABVD)
PMP *i $a_{2}$ 'demonstrative pronoun and adverb: this, here; that, there' (ACD)
SH: Taba dia 'that' (ABVD)
RA: Kawe ga 'that' (R); Laganyan gi(a) 'that' (R); Ma'ya (M.) 'gia 'that' (R); Ma'ya (S.) 'gia 'that' (R); Wauyai gi(a) 'that' (R)

PSHWNG *iap 'kind of brown fish' (ACD)
SH: Buli iaf 'brown fish' (ACD)
CB: Waropen ia 'brown fish' (ACD)
PMP *ihap 'count' (Blust 1999); PCEMP *ihap 'count' (Blust 1993)
SH: Taba -yohan 'to count' (ABVD)
Other: Onin iaf 'count' (ACD); Sekar yaf 'to count' (ABVD)
PAN *ijan 'when?' (ACD); PMP *p-ijan 'when?' (Blust 1999); PCEMP *p-ijan 'when?' (Blust 1993)

SH: Buli ma-fis ‘when?’ (ABVD); Gane hafisak ‘when?’ (ABVD)
PAN *i-kaSu '2sg nom., you/thou' (ACD); PMP *i-kahu 'you' (Blust 1999); PCEMP *i-kau 'you' (Blust 1993)
SH: Buli $a u$ 'thou' (ABVD); Gane $a u$ 'thou' (ABVD); Sawai $a w$ 'you (sg.)' (CAD); Taba au 'thou' (ABVD)
RA: Ambel awa 'you (sg.)' (R); As awa 'thou' (ABVD); Biga 'awa 'you (sg.)' (R); Fiawat aw 'you (sg.)' (R); Gebe auya 'thou' (ABVD); Kawe 'wawa 'you (sg.)' (R); Laganyan 'awa 'you (sg.)' (R); Matbat $y a^{21} w$ 'you (sg.)' (R); Matbat $y a^{21} w a$ 'you (sg.)’ (R); Ma'ya (M.) 'awa 'you (sg.)' (R); Ma'ya (S.) 'awa 'you (sg.)' (R); Wauyai 'awa 'you (sg.)' (R)

CB: Ambai wau 'you' (ABVD); Ambai wau 'thou' (ABVD); Ansus au 'you' (P\&D); Biak au 'thou' (H); Dusner au ‘PRO.2SG' (D\&M); Moor -a '2sg' (K); Moor á- '2sg' (K); Moor ágwa ‘2sg' (K); Serui-Laut wau 'you (sg.)' (Slm); Umar $a$ - '2sg' (K); Umar ate '2sg' (K); Wandamen au 'you ; $2 s g$ pronoun' (G); Waropen auo 'thou' (ABVD); Yaur $a$ - '2sg' (K); Yaur á'è '2sg' (K); Yerisiam $a-$ ' 2 sg ' (K); Yerisiam àné '2sg' (K); Yerisiam g- '2sg' (K)
Mamberamo: Warembori awi 'You' (Donohue 1999)
Other: Irarutu ó 'you (s.g.)' (M); Kowiai au 'thou' (ABVD); Kowiai o 'you' (ABVD); Sekar o 'thou' (ABVD)

PMP *i-na 'that' (Blust 1999); PCEMP *ina 'that' (Blust 1993)
RA: Matbat into 'that' (R); Matbat inyo 'that' (R)
CB : Ambai manana 'that' (ABVD); Moor nána 'yonder' (K); Wandamen nina 'that' (ABVD);
Wandamen yana 'that' (ABVD)
Other: Sekar ine 'that' (ABVD)
PAN *ina ${ }_{1}$ 'mother, mother's sister' (ACD); PMP *ina ${ }_{2}$ 'mother, mother's sister; female animal' (ACD); PMP *iná-i 'mother, mother's sister (address, vocative)' (ACD); PCEMP *ina ${ }_{3}$ 'mother, mother's sister; female animal; largest member of a set' (ACD)
RA: Matbat $n e^{3} n$ 'mother' (R)
CB: Ambai ina- 'mother' (Slz); Ansus inani 'mother' (P\&D); Biak ina 'M (obsolescent term)' (H); Dusner mini 'mother' (D\&M) [?]; Moor iná 'mother' (K); Serui-Laut ina- 'M' (ACD); Serui-Laut inani 'mother' (Slm); Waropen inai 'mother' (ABVD); Waropen mini 'mother' (ABVD)
Mamberamo: Warembori nai 'M' (Donohue 1999)
Other: Irarutu dena 'mother' (ABVD); Kowiai néna 'mother' (ABVD); Kowiai nína 'mother' (ABVD); Sekar nini-n 'mother' (ABVD) [?]
PAN *i-ni 'this, here' (ACD); PMP *i-ni 'this' (Blust 1999); PCEMP *ani 'this' (Blust 1993); PCEMP *ini 'this' (Blust 1993)
SH: Gane tajini 'this' (ABVD); Taba ne 'this' (ABVD)
RA: As incre 'this' (ABVD); Biga titane 'that' (ABVD); Biga tine 'this' (ABVD); Gebe tenc 'this' (ABVD); Kawe 'gine 'this' (R); Laganyan 'gine 'this' (R); Matbat ino 'this' (R) [?]; Ma'ya (M.) 'gine 'this' (R); Ma'ya (S.) 'gine 'this' (R); Wauyai 'gine 'this' (R)
CB: Ambai nini 'this' (ABVD); Ansus nini 'this' (P\&D); Biak inè 'this' (H); Dusner ne 'DEM.PROX' (D\&M); Moor néna 'this' (K); Serui-Laut nina 'this' (Slm); Serui-Laut nini 'this' (Slm); Umar vne 'this' (K); Wandamen nini 'this' (G); Wandamen yani 'this' (ABVD)
Mamberamo: Warembori na-ni ‘This’ (Donohue 1999); Yoke -ani 'this’ (Donohue 1999)
Other: Irarutu notini 'this' (ABVD); Irarutu ntini 'this' (M); Kowiai ina 'this' (ACD)
PMP *inum 'drink' (Blust 1999); PMP *um-inum 'to drink' (ACD); PCEMP *inum 'drink' (Blust 1993); PCEMP *unum 'drink' (ACD)

SH: Gane imin 'to drink' (ABVD); Sawai -inem 'to drink' (CAD); Taba -imin 'to drink' (ABVD)
RA: Ambel l-anum 'drink' (R); As -nim 'to drink' (ABVD); Biga -inim 'to drink' (ABVD); Biga l-
i'nim ‘drink' (R); Fiawat l-enim ‘drink' (R); Laganyan 'w-inim ‘drink' (R); Matbat n-ani ${ }^{21} m$ 'drink' (R); Ma'ya (M.) 'w-ini³m ‘drink’ (R); Ma'ya (S.) 'w-ini³m ‘drink’ (R)

CB: Ambai i-unu 'to drink’ (ABVD); Ambai unumi ‘drink’ (Slz); Ambai unun ‘drink’ (Slz); Ansus unung ‘drink' (P\&D); Biak inĕm 'to drink' (H); Dusner inem ‘drink' (D\&M); Moor anumî ‘drink' (K); Serui-Laut unu 'to drink' (Slm); Serui-Laut unuy 'to drink' (ACD); Umar umen 'drink' (K); Wandamen unu 'drink' (G); Wandamen unum 'to drink' (ACD); Waropen una 'to drink' (ABVD) [?]; Yerisiam ímáné ‘drink’ (K) [?]
Mamberamo: Warembori mini-ro 'Drink' (Donohue 1999); Yoke min 'drink' (Donohue 1999)
Other: Arguni -umun 'to drink' (ABVD); Irarutu -gin[e] 'to drink' (ABVD) [?]; Kowiai -in 'to drink' (ABVD); Sekar nim 'to drink' (ABVD)
PMP *i-sai ‘who?' (Blust 1999); PCEMP *sai ‘who?' (Blust 1993); PCEMP *sei ‘who?' (Blust 1993)

SH: Buli ise 'who?' (ABVD)
RA: Gebe siei 'who?' (ABVD); Gebe site 'what?' (ABVD)
CB: Biak iseï 'who?' (H); Biak ròseï 'what?' (H); Dusner rosai ‘what' (D\&M); Moor rosé 'what?' (K)

Mamberamo: Warembori iti ‘Who?' (Donohue 1999)
Other: Kowiai se 'who?' (ABVD); Sekar ose 'who?' (ABVD)
PEMP *ka(d,R)a 'cockatoo, parrot' (Blust 1978)
CB: Ansus kara 'Sulphur-crested Cockatoo' (P\&D); Serui-Laut karai ‘cockatoo’ (Slm)
PAN *kaen 'eat' (ACD); PMP *kaen 'eat' (Blust 1999); PCEMP *kan 'eat' (Blust 1993)
SH: Buli ān 'to eat' (ABVD)
RA: Ambel l-anan 'eat (intr.)' (R); Gebe -anan 'to eat' (ABVD)
CB: Ambai an 'eat (tr.)' (Slz); Ambai i-ampi 'to eat' (ABVD); Ansus ang 'eat_(transitive)' (P\&D); Biak ān 'to eat' (H); Dusner an 'eat' (D\&M); Moor anî 'eat' (K); Serui-Laut an 'to eat' (Slm); Umar anna 'eat' (K); Wandamen ane 'to eat' (ABVD); Waropen ano 'to eat' (ABVD); Yaur jènáe 'eat' (K); Yerisiam áaní 'eat' (K); Yerisiam àná 'eat' (K)
Mamberamo: Warembori an 'Eat' (Donohue 1999); Warembori ane 'Eat' (Donohue 1999); Yoke aan 'eat' (Donohue 1999)

PMP *kalati ‘earthworm’ (Blust 1999); PCEMP *kalati ‘earthworm’ (Blust 1993)
SH: Buli gugulat 'worm (earthworm)' (ABVD); Gane galét 'worm (earthworm)' (ABVD); Sawai gelat 'worm' (CAD)
RA: Gebe galawai ‘worm (earthworm)' (ABVD) [?]; Kawe gala'tol[o] 'worm' (R); Laganyan ga'lah 'tol[o] 'worm' (R); Ma'ya (M.) a'gla ${ }^{12} t$ 'worm' (R); Ma'ya (S.) gara'to ${ }^{12}$ l 'worm (parasite in human)' (R) [?]; Wauyai ga'lat 'lol[o] 'worm' (R)
PAN *kalih 'a hole in the ground; to dig up, excavate, as tubers' (ACD); PMP *kali 'dig' (Blust 1999); PMP *kali ${ }_{2}$ 'a hole in the ground; to dig up, excavate, as tubers' (ACD); PCEMP *kali ‘dig’ (Blust 1993); PCEMP *keli ‘dig’ (Blust 1993)
RA: Biga -kele 'to dig' (ABVD)
Mamberamo: Warembori ka-yo 'Dig’ (Donohue 1999)
Other: Irarutu magara 'to dig' (ABVD); Kowiai -'ári' 'to dig' (ABVD); Sekar kani 'to dig' (ABVD)

PMP *kami 'we (incl./excl.)' (Blust 1999); PCEMP *kami 'we (incl./excl.)' (Blust 1993)
SH: Buli ame 'we’ (ABVD); Gane am 'we’ (ABVD); Gane ame 'we' (ABVD); Sawai am ‘we (excl.)’ (CAD); Taba am 'we’ (ABVD)
RA: Ambel amne 'we (excl.)' (R); As amne 'we' (ABVD); Biga ambana 'we' (ABVD); Biga amon 'we' (ABVD); Gebe amne 'we' (ABVD)
CB: Ambai amea 'we’ (ABVD); Ansus ama 'we, not you' (P\&D); Moor áma '1pl.ex' (K); SeruiLaut ama 'we (excl.)' (Slm); Umar em- '1pl.ex’ (K); Umar emi ‘1pl.ex' (K); Umar -vte '1pl.in’ (K); Wandamen ama(te) 'we ; 1pl excl pronoun' (G); Wandamen amat 'we' (ABVD); Waropen ami 'we' (ABVD); Waropen amo 'we' (ABVD); Yaur om- '1pl.ex.R' (K); Yaur ómíè '1pl.ex' (K); Yerisiam néemé '1pl.ex' (K); Yerisiam nem- '1pl.ex' (K)
Mamberamo: Warembori ami ‘We (EXCL)’ (Donohue 1999)
Other: Arguni ambami ‘we’ (ABVD); Irarutu am 'we’ (ABVD); Kowiai am 'we’ (ABVD); Sekar yami 'we' (ABVD)
PMP *kamiu 'you (pl.)' (Blust 1999); PMP *kamu '2P NOM1' (Ross 2006); PCEMP *kamiu 'you (pl.)’ (Blust 1993)
SH: Buli meu ‘you' (ABVD); Gane meu ‘you' (ABVD); Sawai mew ‘you (pl.)’ (CAD); Taba meu 'you' (ABVD)
RA: As mou 'you' (ABVD); Gebe mevia 'you' (ABVD)
CB: Ambai mea 'ye' (Slz); Ansus mia 'you lot' (P\&D); Moor amù '2pl' (K); Moor mu'ó '2pl' (K); Serui-Laut ma 'you (pl.)' (Slm); Umar am- '2pl' (K); Umar amu '2pl' (K); Wandamen mia(te) 'y'all ; 2pl pronoun' (G); Wandamen miat 'you' (ABVD); Waropen mu 'you' (ABVD); Yaur am‘2pl’ (K); Yaur ámú’è '2pl’ (K); Yerisiam am- ‘2pl' (K); Yerisiam ánéemé ‘2pl’ (K)
Mamberamo: Warembori mi 'You (PL)’ (Donohue 1999)
Other: Arguni mbuamu 'you' (ABVD)
PCEMP *kandoRa 'cuscus, phalanger' (ACD)
SH: Buli do 'kind of small marsupial' (ACD)
CB: Yerisiam átóòrà 'cuscus' (K)
PEMP *kanus 'spittle; to spit (intr.)' (ACD)
CB: Serui-Laut kunui 'saliva' (ACD); Wandamen kanisu 'saliva' (ACD)
PCEMP *kanzupay 'rat' (Blust 1993); PCEMP *kazupay 'rat' (ACD)
SH: Buli luf 'rat' (ACD); Gane luf 'rat' (ABVD); Sawai luf 'mouse, rat' (CAD)
RA: Biga kalof 'rat' (ABVD); Ma'ya keluf 'rat' (ACD)
CB: Ambai karu 'rat' (Slz); Moor arùha 'rat' (K); Serui-Laut karu 'rat' (Slm)
PAN *kaRaw 'to scratch an itch' (ACD); PMP *kaRaw 'scratch (an itch)' (Blust 1999); PCEMP *kaRaw 'scratch (an itch)' (Blust 1993)
RA: As -ka? 'to scratch' (ABVD); Biga -kai 'to scratch' (ABVD)
CB: Biak rār 'to scratch' (H); Umar krar 'scratch' (K); Wandamen arar 'to scratch' (ABVD);
Wandamen kara 'to scratch' (ABVD); Yerisiam áráarí 'scratch' (K)
Other: Kowiai -áru' 'to scratch' (ABVD)

PMP *kasaw ${ }_{1}$ 'rafter, diagonal bamboo poles to which thatch panels are lashed' (ACD)
SH: Buli as 'rafter, to which the roof thatch is bound' (ACD)
Other: Kowiai asa 'rafter' (ACD)
PAN *kaSiw 'wood; tree' (ACD); PMP *kahiw 'wood' (Blust 1999); PCEMP *kayu 'wood' (Blust 1993); PCEMP *kayu 'wood; tree' (ACD)

SH: Buli ai 'tree; wood' (ACD); Sawai ay 'tree/wood' (CAD); Taba ai ‘stick/wood' (ABVD)
RA: Ambel ay 'tree' (R); As a 'stick/wood' (ABVD); Biga ai ‘stick/wood’ (ABVD); Biga ay(o) 'tree’ (R); Gebe kai ‘stick/wood' (ABVD); Kawe way(o) 'tree' (R); Laganyan way(o) 'tree' (R); Ma'ya (M.) 'ai(o) 'tree' (R); Ma'ya (S.) 'ai(o) 'tree' (R); Wauyai (ga) way(o) 'tree' (R)

CB: Ambai ai 'tree' (Slz); Ansus ai 'tree' (P\&D); Biak a(i) 'wood; tree' (H); Dusner ai 'wood' (D\&M); Moor ka'úata 'wood' (K); Serui-Laut ai 'wood' (Slm); Umar ae 'wood' (K); Wandamen ai 'wood; tree' (G); Waropen a 'wood; tree (in combination forms)' (ACD); Waropen ai ‘stick/wood’ (ABVD); Yaur àjé ‘wood’ (K); Yerisiam áì ‘wood’ (K)
Mamberamo: Warembori ayo-ro 'Tree' (Donohue 1999); Yoke a 'tree' (Donohue 1999)
Other: Arguni $a$ 'stick/wood' (ABVD); Irarutu é 'tree, wood' (M); Kowiai ai 'tree’ (ACD); Sekar kai ‘stick/wood' (ABVD)
PMP *kasuaRi 'cassowary'
CB: Ambai man-soari 'cassowary’ (Slz); Biak mansuwar 'cassowary' (H); Moor atúara 'cassowary’ (K); Waropen saro 'cassowary' (Held 1942)

Mamberamo: Warembori suan-do ‘Cassowary’ (Donohue 1999); Yoke sua(b) 'cassowary’ (Donohue 1999)

PAN *kawill 'fishhook' (ACD)
SH: Buli awil 'fish-hook' (Blust1978)
CB: Biak awir 'fish-hook' (H)
PMP *kepit 'narrow' (Blust 1999)
SH: Gane nakota 'narrow' (ABVD) [?]
CB: Ambai katui 'narrow' (ABVD); Ambai kota 'narrow' (Slz); Wandamen kotar 'narrow' (ABVD)
PAN *kita ${ }_{1}$ 'we (incl.)' (ACD); PMP *kita '1IP NOM1' (Ross 2006); PCEMP *k-ita 'we (incl./excl.)' (Blust 1993)
SH: Buli ite 'we (plural incl.)' (ACD); Gane kit 'we' (ABVD); Sawai it 'we (incl.)' (CAD); Taba tit 'we' (ABVD)
RA: Ambel isne 'we (incl.)' (R); Biga itba'na 'we (incl.)' (R); Gebe itne 'we' (ABVD); Kawe ta'fat(a) 'we (incl.)' (R); Kawe 'tit(n)e 'we (incl.)' (R); Laganyan 'itne 'we (incl.)' (R); Wauyai 'titne 'we (incl.)' (R)
CB: Ambai tata 'we (incl.)' (Slz); Ansus tata 'we, all of us' (P\&D); Biak ko 'we (excl.)' (H); Biak nggo 'we (excl.)' (H); Moor -i'a '1pl.in' (K); Moor í'a '1pl.in' (K); Serui-Laut tata 'we (incl.)' (Slm); Umar ete '1pl.in' (K); Umar t- '1pl.in' (K); Wandamen tata 'we ; 1 pl incl pronoun' (G); Wandamen tata 'we' (ABVD); Waropen iko 'we' (ABVD); Yaur o'- '1pl.in.R' (K); Yaur ó'í'è '1pl.in' (K); Yerisiam néeké ‘1pl.in' (K); Yerisiam nek- '1pl.in' (K)
Mamberamo: Warembori ki ‘We (INCL)’ (Donohue 1999)

Other: Arguni ite ‘we' (ABVD); Irarutu it 'we' (ABVD); Kowiai íta 'we' (ABVD); Sekar ita 'we' (ABVD)
PAN *kuCu 'head louse' (ACD); PMP *kutu 'head louse' (Blust 1999); PCEMP *kutu 'head louse' (Blust 1993)
SH: Buli fune ni ut 'dog louse, flea' (ACD); Buli ut 'head louse' (ACD); Gane kut 'louse' (ABVD); Sawai kit ‘louse' (CAD); Taba kut 'louse' (ABVD)
RA: Ambel ut 'louse' (R); As u 'louse’ (ABVD); Biga wut 'louse' (R); Fiawat wut 'louse' (R); Gebe ut 'louse' (ABVD); Kawe wut 'louse' (R); Laganyan wut 'louse' (R); Matbat wu ${ }^{3} t$ 'louse' (R); Ma'ya (M.) ' $u^{3} t$ 'louse' (R); Ma'ya (S.) ' $u^{3} t$ 'louse' (R); Wauyai wut 'louse' (R)
CB: Ambai uutu 'louse' (ABVD); Ansus utu 'louse' (P\&D); Biak uk 'louse' (H); Biak uk nàf 'dog louse, flea' (H); Moor kú’a 'louse' (K); Serui-Laut itu 'louse’ (Slm); Umar utu 'louse’ (K); Wandamen [r]utu 'louse' (ABVD); Waropen ghui 'louse' (ABVD) [?]; Waropen wui 'louse’ (ABVD) [?]; Yaur óòjé 'louse' (K) [?]; Yerisiam úukú ‘louse' (K)
Mamberamo: Warembori ki-ro 'Louse' (Donohue 1999); Yoke ningi ‘louse' (Donohue 1999)
Other: Arguni ut 'louse' (ABVD); Irarutu utz 'louse' (ABVD); Kowiai ut 'louse' (ACD); Sekar kuti 'louse' (ABVD)
PAN *kuden 'clay cooking pot' (ACD)
SH: Buli ulan 'pot, pan' (ACD); Buli ulan besi 'iron pan' (ACD)
CB: Biak urĕn 'earthenware cooking pot; clay used to make pots' (H)
PMP *kudug 'thunder' (Blust 1999) [??]; PCEMP *kudug 'thunder' (Blust 1993)
CB: Moor kururú'a 'thunder' (K); Wandamen kruya 'thunder' (G); Wandamen kuruya 'thunder' (ABVD)
Other: Irarutu kəlú 'thunder' (M); Irarutu kərəru 'thunder' (ABVD)
PAN *kuliC 'rind, peeling of fruits or tubers' (ACD); PMP *kulit 'skin' (Blust 1999); PMP *kulit $\boldsymbol{1}_{1}$ ‘skin; hide; rind; bark’ (ACD); PCEMP *kulit ‘skin' (Blust 1993)
SH: Gane kulit 'skin' (ABVD); Taba kulit 'skin' (ABVD)
Other: Arguni urut ‘skin' (ABVD) [?]; Irarutu rít ‘skin' (M); Kowiai urit ‘skin' (ACD); Sekar kunit ‘skin’ (ABVD)
PMP *kuluR 'breadfruit' (ACD)
CB: Biak ur 'breadfruit tree and fruit, Artocarpus communis; the fruit is prepared for eating in various ways; the young leaves are eaten as vegetables, and the trunk is hollowed out as a canoe hull' (H); Moor ùrina 'breadfruit' (K); Umar mur 'breadfruit' (K)
PMP *kuRita 'octopus' (ACD)
CB: Moor arí'a 'octopus' (K); Umar kte 'octopus' (K)
Other: Kowiai urita 'octopus' (ACD)
PMP *kutana 'ask' (ACD); PMP *kutaña 'ask, inquire about' (ACD); PMP *utaña 'ask, inquire' (ACD)
SH: Buli fa-utan 'ask about something' (ACD); Buli utan 'to ask' (ACD)
CB: Ambai utan 'ask' (Slz); Biak f-ukĕn ‘ask' (H); Dusner putna 'ask' (D\&M); Moor u'uná 'ask for’ (K); Serui-Laut utana 'to ask' (Slm); Wandamen uta ‘ask' (G); Wandamen uta 'ask’ (G)

PMP *labeR 'wide' (ACD); PMP *ma-labeR 'wide’ (Blust 1999)
RA: As malaps 'wide' (ABVD)
Other: Kowiai garáfar 'wide' (ABVD)
PAN *lahud 'downstream, toward the sea' (ACD)
SH: Buli la-lau 'toward the sea and away from the speaker' (ACD); Buli lau 'sea-side' (ACD); Buli ma-lau 'toward the sea and toward the speaker' (ACD); Buli po-lau 'on the sea-side' (ACD)
RA: Ma'ya (M.) ' $l o^{3} l$ 'sea’ (R); Ma'ya (S.) 'lo ${ }^{3} l$ 'sea' (R)
CB: Ambai ai-rau 'sea' (Slz); Ambai ravana 'sea' (ABVD); Ambai rawanan 'sea' (Slz); Ansus rawanang 'sea' (P\&D); Moor rú 'sea' (K); Serui-Laut sairau 'sea' (Slm); Wandamen rau 'sea' (ABVD); Wandamen rawanam 'sea' (ABVD); Waropen rau 'sea' (ABVD)
PMP *lakaj 'to stride, take a step' (ACD); PMP *lakaw 'walk, go' (Blust 1999); PCEMP *lakaw 'walk, go' (Blust 1993)
RA: Ambel la-dok 'come' (R)
CB: Ambai i-ra 'to walk' (ABVD); Ambai $r a$ 'walk' (Slz); Ansus ra 'go' (P\&D); Biak rā 'to go, walk' (H); Moor rá 'go' (K); Serui-Laut ra 'to go’ (Slm); Umar ra 'go’ (K); Umar ra ga 'walk' (K); Wandamen $r a$ 'thence' (G); Wandamen $r a$ 'go' (G); Waropen ra 'go on foot, go into the bush, walk' (ACD); Yaur rèérè 'come' (K); Yerisiam rá 'go' (K)
Mamberamo: Warembori da ‘Go’ (Donohue 1999); Warembori da-yo ‘Walk’ (Donohue 1999);
Yoke da 'go' (Donohue 1999)
Other: Arguni -ra 'to walk' (ABVD)
PCEMP *laman ${ }_{1}$ 'deep’ (ACD); PEMP *laman(a) 'deep sea’ (Blust 1978)
SH: Buli m-laman 'deep (of bay, hole, sea)’ (ACD)
CB: Biak ramĕn 'very deep' (H)
PAN *layaw ${ }_{1}$ 'housefly' (ACD); PMP *layaw ${ }_{2}$ 'bluebottle, blowfly, horsefly' (ACD)
SH: Buli laŋ 'a fly' (ACD); Buli laŋ pipilaw 'bluebottle, horsefly' (ACD)
CB: Biak ran 'kind of small fly' (H)
PMP *layit 'sky' (Blust 1999); PCEMP *lanit 'sky' (Blust 1993)
SH: Buli lanit ‘sky, heaven' (ACD); Gane langit 'sky' (ABVD); Sawai lanct 'sky’ (CAD); Taba langit 'sky' (ABVD)
RA: As lanit 'sky' (ABVD)
CB : Biak nanēk ‘sky' (H); Biak nàngè ‘sky' (H); Moor ará’á ‘sky' (K) [?]; Waropen naningi ‘sky’ (ABVD) [?]; Yerisiam ráakátè 'sky' (K)
Other: Arguni ragit ‘sky' (ABVD); Irarutu ragata 'sky' (ABVD); Kowiai ránggit ‘sky' (ABVD); Sekar lagit 'sky' (ABVD)
PAN *laRiw 'run, run away, flee, escape' (ACD)
CB: Biak f-rār 'run, run away, flee' (H); Dusner prar 'run' (D\&M); Yerisiam ráarú 'run' (K)
PAN *lawaq ${ }_{2}$ 'spider; spider web' (ACD); PMP *lawaq 'spider' (Blust 1999); PMP *lawaq ${ }_{2 a}$ 'spider; spider web' (ACD); PCEMP *lawaq 'spider’ (Blust 1993)

SH: Buli kopolaw 'spider' (ABVD); Gane tapilou ‘spider' (ABVD); Sawai lawalawa 'spiderweb' (CAD)
RA: Gebe plaw 'spider' (ABVD)
CB: Moor ragwa'ı̂ 'spiderweb' (K); Umar bravun 'spider' (K); Yaur ráàjé 'spider' (K); Yerisiam ráráàrùmà 'spider' (K)
Other: Irarutu rara 'spider' (ABVD); Kowiai ráwar-ráwar 'spider' (ABVD)
PMP *leseq 'nit, egg of a louse' (ACD)
SH: Buli loas 'nit, egg of a louse' (ACD); Sawai lowes 'nit' (CAD)
CB: Yerisiam róhé 'nit' (K)
PAN *lima 'five' (ACD); PCEMP *lima 'hand' (Blust 1993)
SH: Buli fai-lim 'five times; the fifth' (ACD); Buli lim 'five' (ACD); Buli lim-lim 'five by five; all five' (ACD); Sawai pe-lim 'five’ (CAD); Taba -lim 'five’
RA: Ambel lim 'five' (R); Biga lim 'five' (R); Fiawat lim 'five' (R); Kawe lim 'five' (R); Laganyan ' $l i^{3} m$ 'five' (R); Matbat $l i^{3} m$ 'five' (R); Ma'ya (M.) ' $l i^{3} m$ 'five' (R); Ma'ya (S.) ' $l i^{3} m$ 'five' (R); Wauyai lim 'five' (R)
CB: Ambai rin 'five' (Slz); Ambai rin ‘Five' (ABVD); Ansus ring 'five' (P\&D); Biak rim 'five' (H); Dusner rimbi 'five' (D\&M); Moor rímó 'five' (K); Munggui bo-rim 'five' (ACD); Serui-Laut ri 'five’ (Slm); Serui-Laut riy 'five' (ACD); Wandamen rime 'Five' (ABVD); Waropen rimo 'Five' (ABVD); Yerisiam rûmà 'five' (K)
Mamberamo: Warembori rinti 'Five’ (Donohue 1999); Yoke -rimsi 'five’ (Donohue 1999)
Other: Arguni ruma- 'hand' (ABVD) [?]; Kowiai nima 'hand' (ABVD)
PAN *lipen 'tooth' (ACD); PAN *nipen 'tooth' (ACD); PMP *ipen 'tooth' (Blust 1999); PMP *nipen 'tooth' (Blust 1999); PCEMP *ipən 'tooth' (Blust 1993); PCEMP *nipan 'tooth' (Blust 1993)

SH: Taba lalho 'tooth' (ABVD)
RA: Biga lifo- 'tooth' (ABVD); Biga li'fo(o) 'tooth' (R); Kawe a'lif(o) 'tooth' (R); Laganyan a'lif(o) 'tooth' (R); Ma'ya (M.) ka'li'3f 'tooth' (R); Ma'ya (S.) ka'lif(o) 'tooth' (R); Wauyai ka'lif 'tooth' (R)

Other: Irarutu -refo- 'tooth' (ABVD) [?]; Irarutu rafú 'tooth' (M); Kowiai rifut 'tooth' (ABVD) [?]; Sekar nifa-n 'tooth' (ABVD)
PMP *liteq 'sap of a tree or plant' (ACD)
SH: Buli lit 'stick, adhere; glue, paste' (ACD)
CB: Biak rik 'sap of trees' (H)
PMP *lumut 'moss, algae, seaweed' (ACD)
SH: Buli lu-lumit 'kind of water plant, duckweed' (ACD)
CB: Biak màndumèk 'green' (H); Biak rumèk 'moss' (H)
PMP *ma 'and' (Blust 1999); PCEMP *ma 'and' (Blust 1993)
CB: Biak ma 'and' (H); Dusner me 'then' (D\&M); Serui-Laut ma 'and' (Slm); Wandamen ma 'and' (G); Waropen ma 'and' (ABVD)

PAN *ma-aCay ‘die; dead; eclipse of sun or moon' (ACD); PMP *matay ‘die’ (Blust 1999); PCEMP *matay ‘die’ (Blust 1993); PCEMP *matay ${ }_{1}$ ‘die; dead’ (ACD)
SH: Buli fa-mat 'kill' (ACD); Buli mat 'dead; die, also said of a light going out, and of a wound, ulcer, or boil that has healed' (ACD); Buli mat-mat 'dead body; corpse' (ACD); Gane mot 'to die, be dead' (ABVD); Taba -mot 'to die, be dead' (ABVD)
RA: Ambel la-mat 'die' (R); As ma-1 'to die, be dead' (ABVD); Biga mat 'die' (R); Fiawat mat 'die' (R); Gebe -mat 'to die, be dead' (ABVD); Kawe mat 'die' (R); Laganyan mat 'die' (R); Matbat $m a^{12} t$ ‘die' (R); Ma'ya (M.) 'ma ${ }^{12} t$ ‘die' (R); Ma'ya (S.) 'ma ${ }^{12} t$ ‘die' (R); Wauyai mat ‘die' (R)
CB: Biak mār 'to die, be dead' (H); Moor má’a 'die' (K); Umar mat 'die' (K); Yaur mèè'rè ‘die' (K); Yerisiam máàkè ‘die’ (K)
Other: Arguni -mat 'to die, be dead' (ABVD); Irarutu máta 'to die' (M); Kowiai -máta 'to die, be dead' (ABVD)
PMP *ma-beReqat 'heavy' (Blust 1999); PCEMP *ma-bəRat 'heavy' (Blust 1993)
SH: Taba mapot 'heavy' (ABVD)
RA: Gebe kapiatan 'heavy' (ABVD); Kawe apya'tan 'heavy' (R); Laganyan mpa'tan 'heavy' (R); Ma'ya (M.) 'mpata ${ }^{12} n$ 'heavy' (R); Ma'ya (S.) 'pata ${ }^{3} n$ 'heavy' (R)
CB: Ambai maraba 'heavy' (Slz); Ambai miraba 'heavy' (ABVD); Ansus mamba 'heavy' (P\&D); Ansus memba 'heavy' (P\&D); Umar mat 'heavy' (K); Wandamen marabat 'heavy' (ABVD); Yerisiam máakí 'heavy' (K)
Mamberamo: Warembori mambayo 'Heavy' (Donohue 1999)
Other: Sekar maberat 'heavy' (ABVD)
PCEMP *madar 'ripe, overripe' (ACD); PEMP *mada 'ripe, soft' (Blust 1978)
SH: Buli mara 'ripe, cooked' (ACD)
CB: Ambai mirai ‘ripe’ (Slz); Moor mararù ‘withered’ (K); Serui-Laut marai ‘ripe’ (Slm); Yaur mádrè 'ripe' ( K )
PMP *ma-diydiy ‘cold' (Blust 1999); PCEMP *ma-dindiy ‘cold’ (Blust 1993)
SH: Buli mairiy 'cold' (ABVD)
RA: Gebe mijirin 'cold' (ABVD); Kawe mari'rin 'cold' (R); Laganyan mari'rin 'cold' (R); Wauyai mari'rin 'cold' (R)
CB: Umar drin 'cold' (K)
Other: Irarutu ridəna ‘cold’ (ABVD); Kowiai rídin 'cold' (ABVD); Sekar madirig ‘cold’ (ABVD)
PMP *ma-iRaq 'red' (Blust 1999); PCEMP *meRaq 'red' (Blust 1993)
RA: Biga ma'me ‘red’ (R); Fiawat meme 'red’ (R); Kawe me 'red’ (R); Ma'ya (M.) ma'me ${ }^{12}$ 'red’ (R); Ma'ya (S.) ma'me ${ }^{3}$ 'red' ( R ); Wauyai me 'red' ( R )
CB: Ansus merai 'red' (P\&D); Moor mararî 'red' (K); Serui-Laut merai 'red' (Slm); Umar miar 'red' (K); Wandamen mirai 'red’ (ABVD)

Mamberamo: Warembori meme-o 'Red' (Donohue 1999)
PMP *ma-kapal 'thick' (Blust 1999); PCEMP *ma-kapal 'thick' (Blust 1993)
CB: Biak kpor 'thick' (H)
Other: Sekar makafan 'thick' (ABVD)

PMP *ma-kunij 'yellow' (Blust 1999) [?]; PCEMP *ma-kunij 'yellow' (Blust 1993) [?]
SH: Taba makninis 'yellow' (ABVD)
RA: Ambel amani ‘yellow' (R); Biga kamaninis ‘yellow' (ABVD); Biga kameni'nis 'yellow' (R);
Fiawat menenih ‘yellow' (R); Kawe mageni'ni ‘yellow’ (R); Laganyan ami'ni ‘yellow’ (R); Ma'ya (M.) kame'nini's 'yellow' (R); Ma'ya (S.) ka'minis's 'yellow' (R); Wauyai kami'ni ‘yellow' (R)

CB: Ambai byomini 'yellow' (ABVD); Moor veranggunâ 'yellow' (K)
Other: Arguni kuniy ‘yellow’ (ABVD) [loan]; Kowiai ’úning ‘yellow' (ABVD) [loan]; Sekar kunip 'yellow' (ABVD) [loan]

PCEMP *malaw 'paper mulberry tree: Brousonnetia papyrifera, used to make bark cloth; men's loincloth made from this material' (ACD)
SH: Buli māl 'pounded tree bark; clothing of same' (ACD)
CB: Biak mār 'loincloth (originally of pounded tree bark)' (H)
PCEMP *malip 'laugh’ (Blust 1993)
SH: Buli a-mlif 'laugh' (ACD); Gane mlif 'to laugh' (ABVD); Sawai $n-\varepsilon$-mlif 'to laugh' (CAD); Taba -(ha)mlih 'laugh'
RA: As -melis 'to laugh' (ABVD); Biga -mlef 'to laugh' (ABVD); Gebe -mnif 'to laugh' (ABVD)
CB: Ambai i-miri 'to laugh' (ABVD); Ambai miri ‘laugh’ (Slz); Ansus mari ‘laugh’ (P\&D); Biak mbrif 'to laugh' (H); Moor marí’a 'laugh' (K); Serui-Laut mari 'to laugh' (Slm); Umar mari 'laugh' (K); Wandamen mari 'laugh' (G)
Other: Arguni -marif 'to laugh' (ABVD); Irarutu -berrife 'to laugh' (ABVD) [?]; Kowiai -marif 'to laugh' (ABVD); Sekar manif 'to laugh' (ABVD)

PEMP *maluRu 'shade’ (Blust 1978)
SH: Buli ma-malu 'dark, black clouds; shadow of objects (but not of people)' (ACD)
CB: Moor marùvana 'shade' (K) [?]
PMP *mamaq ‘chew' (Blust 1999); PCEMP *mamaq 'chew' (Blust 1993)
SH: Gane hamóm 'to chew' (ABVD) [??]
CB: Ambai mama 'chew' (Slz); Biak màm 'to chew' (H); Umar mnam 'chew' (K) [?]; Wandamen mam 'to chew' (ABVD); Waropen mama 'to chew' (ABVD); Yaur jú'mèmné 'chew' (K); Yerisiam námà 'chew' (K) [?]
Other: Kowiai -mama 'to chew' (ABVD)
PMP *mamin 'a fish: wrasse spp.' (ACD)
SH: Buli mamin 'kind of fish' (ACD)
CB: Biak in mamin 'kind of fish (can reach large size)' (H)
PMP *ma-ñawa 'breathe' (Blust 1999); PCEMP *ma-ñawa 'breathe' (Blust 1993); PCEMP *ñawa 'breath, breath soul' (ACD)
SH: Gane manou 'to breathe' (ABVD); Taba -manowo 'to breathe' (ABVD)
RA: Gebe -fañawaya 'to breathe' (ABVD)
CB: Biak mnasu 'to breathe' (H)

PMP *ma-nipis 'thin (materials)' (Blust 1999); PCEMP *ma-nipis 'thin (materials)' (Blust 1993)
SH: Buli mlifis 'thin' (ABVD); Gane manifis 'thin' (ABVD); Sawai n-menifes 'thin' (CAD); Taba mnihis 'thin' (ABVD)
CB : Umar mnieh 'thin' (K); Wandamen minis 'thin' (ABVD); Yaur némníhè 'thin' (K); Yerisiam máníjáhé 'thin' (K)
Other: Irarutu banənifəne 'thin' (ABVD); Kowiai manifin 'thin' (ABVD); Sekar manipis 'thin' (ABVD)
PAN *manuk ${ }_{1}$ ‘chicken' (ACD); PMP *manuk 'bird’ (Blust 1999); PMP *manuk ${ }_{2}$ 'chicken’ (ACD); PCEMP *manuk 'bird' (Blust 1993)
SH: Buli mani ‘bird’ (ACD); Buli mani-mani ‘all sorts of birds' (ACD); Gane manik ‘bird’ (ABVD); Sawai mane 'bird' (CAD); Taba manik 'chicken'
RA: Ambel mani ‘bird’ (R); As mani ‘bird' (ABVD); Biga mi'ni ‘bird' (R); Fiawat min ‘bird' (R); Gebe mani ‘bird’ (ABVD); Laganyan 'min[i] ‘bird’ (R); Ma'ya (M.) 'mini ${ }^{12}$ ‘bird’ (R); Ma'ya (S.) 'mini ${ }^{3}$ 'bird' (R); Wauyai 'min[i] 'bird' (R)
CB: Ambai man- ‘bird’ (Slz); Biak man ‘bird' (H); Moor mànu ‘bird' (K); Umar mna 'bird' (K); Waropen mani ‘bird, chicken' (ACD); Yaur mà'ré ‘bird' (K); Yerisiam máanáà ‘bird' (K)
Mamberamo: Warembori mani-ro 'Bird' (Donohue 1999); Yoke mani 'bird' (Donohue 1999)
Other: Arguni mani ‘bird’ (ABVD); Irarutu mánə ‘bird’ (M); Kowiai manu? ‘bird’ (ACD); Sekar manik 'bird’ (ABVD)
PMP *ma-panas 'warm, hot' (Blust 1999); PMP *panas ${ }_{1}$ 'warm, hot' (ACD); PCEMP *ma-panas 'warm, hot' (Blust 1993)
SH: Buli fànas 'warm, hot' (ACD); Buli m-fànas 'warm, hot, burning; sentiment' (ACD); Gane psan 'warm' (ABVD); Sawai n-mafyanes 'hot' (CAD)
CB: Moor nanatî ‘hot' (K); Wandamen mas 'warm' (ABVD) [?]
Other: Arguni bamba... 'warm' (ABVD) [?]
PMP *ma-pia 'good' (Blust 1999); PCEMP *ma-pia 'good' (Blust 1993)
SH: Buli mafia ‘good' (ABVD); Gane fia 'good' (ABVD); Taba hia ‘good' (ABVD)
RA: As fi ‘good' (ABVD); Biga fi 'good' (R); Fiawat fiy 'good' (R); Kawe fi 'good' (R); Laganyan fi 'good' (R); Matbat $f i^{3}$ 'good' (R); Ma'ya (M.) ' $f i^{3}$ 'good' (R); Ma'ya (S.) ' $f i^{3}$ 'good' (R); Wauyai $f i$ 'good' (R)
CB: Serui-Laut fiboki ‘good’ (Slm)
PMP *ma-putiq 'white’ (Blust 1999); PCEMP *ma-putiq 'white' (Blust 1993)
SH: Sawai $n-\varepsilon$-mfus 'white' (CAD)
CB: Moor vehúta 'white' (K)
Other: Irarutu bafútz 'white’ (M); Irarutu bəvutz 'white’ (ABVD)
PAN *ma-qetaq ${ }_{1}$ 'raw, unripe, green (fruit), uncooked’ (ACD); PMP *mataq ‘green’ (Blust 1999); PCEMP *ma-qetaq ${ }_{2}$ 'raw, unripe, green (fruit), uncooked' (ACD); PCEMP *mataq 'green' (Blust 1993)

CB: Moor ma'ama'ı̂ 'green' (K); Moor ma'î 'raw' (K); Yaur máa'rùriè 'green' (K); Yaur némàa'è 'raw' (K); Yerisiam ahir mákmáaká ‘green' (K); Yerisiam máaká ‘raw' (K); Yerisiam mákmáaká 'blue’ (K)
Other: Irarutu məmatz ‘green’ (ABVD); Kowiai mamáta 'green’ (ABVD); Sekar matmatak ‘green’ (ABVD)

PMP *ma-qeti 'low, of the tide’ (ACD)
CB : Moor móta 'tide' ( K ); Yaur némòohè 'low tide' ( K )
PMP *ma-qitem 'black' (Blust 1999); PCEMP *ma-qetzm 'black' (Blust 1993); PCEMP *maqitom, ma-qétom 'black; dirty' (ACD)
RA: Ambel amatem 'black' (R); As matzm 'black' (ABVD); Laganyan matme'tem 'black' (R); Ma'ya (M.) mat'mete ${ }^{12} m$ 'black' (R); Ma'ya (S.) mat'mete ${ }^{3} m$ 'black' (R); Wauyai matme'tem 'black' (R) CB: Ambai numetan 'black' (Slz); Ambai numeta 'black' (ABVD); Ansus metang 'black' (P\&D); Biak paisĕm ‘zwaart' (H); Serui-Laut numeta 'black' (Slm); Wandamen meta 'black' (G); Wandamen meta[n] 'black' (ABVD)
Other: Irarutu gramútzna ‘black' (M); Irarutu grmutzne ‘black' (ABVD); Kowiai ma-etan 'black’ (ACD)

PAN *ma-quzaN 'rain' (ACD); PAN *quzaN 'rain' (ACD); PMP *quzan 'rain' (Blust 1999); PCEMP *quzan 'rain' (Blust 1993)
SH: Buli ulan 'rain' (ACD); Gane ulan 'rain' (ABVD); Taba ulan 'rain' (ABVD)
PMP *ma-Rayaw ‘dry' (Blust 1999); PCEMP *ma-Rayaw ‘dry’ (Blust 1993); PCEMP *ma-Rayu? 'dry' (ACD)
SH: Buli mān ‘dry’ (ABVD); Sawai n-man ‘dry’ (CAD)
RA: Gebe may 'dry’ (ABVD)
Other: Arguni mer... ‘dry' (ABVD)
PMP *ma-Raqan, ma-Raqen 'light in weight' (ACD)
CB: Umar mbran ‘light’ (K); Yerisiam máráné ‘light’ (K)
PAN *ma-Sasak ‘ripe; cooked’ (ACD); PMP *ma-esak 'cooked, ripe’ (ACD); PEMP *ma-qosak 'ripe; cooked; ready to eat' (ACD)
SH: Buli masa 'cooked, ripe, complete' (ACD)
RA: Matbat $m a^{12}$ 'cooked' (R) [?]
CB: Umar mah 'cooked' (K)
PAN *ma-Suab 'to yawn, yawning' (ACD); PMP *ma-huab 'yawn' (Blust 1999); PMP *ma-huab 'to yawn, yawning' (ACD); PCEMP *ma-mawab 'to yawn' (ACD); PCEMP *mawab 'to yawn, yawning' (ACD); PCEMP *mawap 'yawn' (Blust 1993)
SH: Buli ma-ma-ip 'gape, yawn]' (ACD)
CB: Biak mabab 'yawn; in general, open the mouth' (H); Biak mawab 'yawn; in general, open the mouth' (H); Moor máha 'yawn' (K); Wandamen mavav 'to yawn' (ABVD)

PMP *mata ‘eye’ (Blust 1999); PCEMP *mata 'eye’ (Blust 1993)

SH: Buli mta 'eye' (ABVD); Gane mto 'eye' (ABVD); Sawai mto 'eye' (CAD); Taba mto 'eye' (ABVD)
RA: Gebe nta 'eye' (ABVD)
CB: Biak mga 'eye’ (H); Moor masina'ú 'eye’ (K); Umar mta 'eye' (K)
Other: Irarutu matíe 'eye' (M); Kowiai matafut 'eye' (ABVD)
PAN *ma-takut 'fear' (ACD); PMP *ma-takut 'afraid' (Blust 1999); PCEMP *ma-takut 'afraid' (Blust 1993)
SH: Buli am-cait 'to fear' (ABVD)
RA: Biga -mtat 'to fear' (ABVD); Gebe -mtait 'to fear' (ABVD)
CB: Ambai i-matai 'to fear' (ABVD); Ambai matai 'fear' (Slz); Ansus matai 'afraid' (P\&D); Biak $m k a ̄ k$ 'to fear, be afraid' (H); Dusner mtat 'afraid' (D\&M); Moor muká’a 'afraid' (K); Serui-Laut maitai 'afraid' (Slm); Umar mtat 'afraid' (K); Wandamen matai 'afraid' (G); Wandamen matai(t) 'to fear' (ABVD); Waropen akako 'to fear' (ABVD) [?]; Yerisiam ngkáké 'afraid' (K)
Other: Irarutu -mta-te 'to fear' (ABVD); Kowiai -matatu' 'to fear' (ABVD)
PMP *ma-taqu 'right side' (Blust 1999) [?]; PCEMP *mataqu 'right side' (Blust 1993) [?]
CB: Umar mamdu 'right' (K); Yerisiam bákíkú ‘right' (K)
Other: Irarutu tu 'right' (ABVD)
PMP *ma-tazem ‘sharp' (Blust 1999); PMP *ma-tazim 'sharp' (Blust 1999); PMP *tazem 'sharp' (ACD); PCEMP *ma-tazim 'sharp' (Blust 1993)
SH: Buli mdalim 'sharp' (ABVD)
RA: As talim 'sharp' (ABVD)
CB: Umar mtan 'sharp' (K)
Other: Irarutu matadane 'sharp' (ABVD) [?]
PMP *ma-tuqah ‘old (people)' (Blust 1999); PCEMP *ma-tuqa 'old (people)' (Blust 1993); PEMP *matu 'dry coconut' (Blust 1978)
SH: Gane tua ‘old’ (ABVD); Taba matuo ‘old’ (ABVD)
CB: Dusner tua 'old’ (D\&M); Dusner tuar 'old’ (D\&M); Moor ma'ù ‘old’ (K); Yerisiam màkúi 'tough' (K) [?]
Other: Kowiai tuárin ‘old’ (ABVD)
PMP *ma-zauq 'far' (Blust 1999); PMP *zauq 'far' (ACD); PCEMP *zauq 'far' (Blust 1993)
SH: Buli lau 'far' (ABVD); Gane lou 'far' (ABVD); Sawai low 'far' (CAD); Taba nalou 'far' (ABVD)
RA: As ilao 'far' (ABVD); Gebe lau 'far' (ABVD)
Other: Irarutu néro 'far' (M)
PMP *meñak 'fat, oil' (Blust 1999); PMP *miñak 'fat, oil' (Blust 1999); PCEMP *meñak 'fat, oil' (Blust 1993); PCEMP *miñak 'fat, oil' (Blust 1993)
SH: Buli mna 'tasty, delicious, sweet; fat of animals' (ACD)
RA: Biga ma'na(o) 'animal fat' (R); Fiawat mena 'animal fat' (R); Kawe ma'na 'animal fat' (R); Laganyan ma'na 'animal fat' (R); Matbat mna ${ }^{12}$ 'animal fat' (R); Ma'ya (M.) ma'na ${ }^{12}$ 'animal fat' (R); Ma'ya (S.) ma'na 'animal fat' (R); Wauyai ma'na 'animal fat' (R)

CB: Ambai ne-main 'fat (n.)' (Slz); Ansus mai 'fat' (P\&D); Moor mananá 'fat' (K); Serui-Laut maien 'fat (n.)' (Slm); Umar mnai 'fat' (K); Wandamen mai[n] 'fat/grease' (ABVD); Wandamen vemai 'fat' (G); Waropen mana 'fat/grease' (ABVD); Yaur mnáarè 'fat' (K); Yerisiam mìmná 'fat' (K) Other: Sekar minminak 'fat/grease' (ABVD)

PMP *miqmiq 'urine, urinate' (ACD)
RA: Ma'ya (S.) ta'mi ${ }^{3}$ 'urine' (R)
Mamberamo: Warembori mimi-ro 'Urine' (Donohue 1999)
PCEMP *mutaq 'vomit' (Blust 1993)
SH: Buli muta 'to vomit' (ABVD)
CB: Ambai i-mamuta 'to vomit' (ABVD); Ambai mamuta 'vomit' (Slz); Ansus mamuta 'vomit' (P\&D); Moor mamuá’a 'vomit' (K); Umar mut 'vomit' (K); Wandamen mamuta 'vomit' (G); Yerisiam mámúugwáké 'vomit' (K)
Other: Sekar muta 'to vomit' (ABVD)
PAN *naNaq 'pus' (ACD); PMP *nanaq 'pus' (ACD)
SH: Buli nan 'pus' (Blust1978)
CB: Ambai nana 'pus' (Slz); Biak nān 'pus' (H); Yerisiam náanáà 'pus' (K)

## PEMP *natu 'child' (Blust 1978)

SH: Buli ntu 'child' (ABVD); Gane mtuna 'child' (ABVD); Gane tu 'child' (ABVD); Taba mtu 'child' (ABVD)
RA: Gebe ñat 'person/human being' (ABVD)
CB: Ambai antun 'child' (Slz); Dusner mtu 'baby' (D\&M); Moor na'ú 'person' (K); Moor nà'una ‘child' (K); Serui-Laut antum 'child’ (Slm); Wandamen a[n]tu 'child’ (ABVD); Waropen tu[tu] 'child' (ABVD)
Other: Arguni natu 'small' (ABVD); Irarutu ntú 'small' (M); Kowiai net 'small' (ABVD)
PAN *Ney 'look, see' (ACD)
SH: Buli niya 'to see' (ABVD)
Other: Sekar niga 'to see' (ABVD)
PAN * $\boldsymbol{g a j a n}_{2}$ 'name’ (ACD); PMP *ajan 'name' (ACD); PMP *gajan 'name' (Blust 1999); PMP "tajan ' 'name' (ACD); PCEMP *tajan 'name’ (Blust 1993)
SH: Buli pasan 'name; rank; occupation; function' (ACD); Sawai ๆวsen 'name’ (CAD)
RA: As gasen 'name’ (ABVD); Biga nan 'name’ (R); Biga -nans 'name’ (ABVD) [?]; Fiawat nahan 'name' (R); Gebe yasno- 'name’ (ABVD); Kawe nan 'name' (R); Laganyan na'han 'name’ (R); Matbat $n a^{21} n$ 'name' (R); Ma'ya (M.) 'nasa ${ }^{12} n$ 'name' (R); Ma'ya (S.) 'nasa ${ }^{3} n$ 'name' (R); Wauyai nan 'name' (R)
CB: Biak nasàn 'title; office' (H); Moor nàtana 'name' (K); Umar han 'name' (K); Wandamen sano 'name' (G); Waropen nasano ‘name’ (ACD); Yaur áhgrè ‘name’ (K); Yerisiam áahánà ‘name' (K)
Mamberamo: Warembori nan-do 'Name' (Donohue 1999); Yoke nand 'name' (Donohue 1999)
Other: Kowiai nésa 'name’ (ABVD) [?]
PMP *niuR 'coconut' (ACD)

SH: Sawai niwe 'coconut' (CAD); Taba niwi 'coconut'
RA: Biga ni ‘coconut (tree)' (R); Fiawat nyuw 'coconut (tree)' (R); Kawe nu 'coconut' (R); Laganyan $n u$ 'coconut' (R); Matbat $n u^{1}$ 'coconut (tree)' (R); Ma'ya (M.) 'nu ${ }^{12}$ 'coconut (tree)' (R); Ma'ya (S.) 'nu 12 'coconut (tree)' (R); Ma'ya (S.) 'nu ${ }^{3}$ 'coconut (tree)' (R)

CB: Moor néra 'coconut' (K); Waropen niwaro 'coconut' (ACD); Yerisiam núí 'coconut' (K)
Mamberamo: Warembori nuan-do ‘Coconut' (Donohue 1999) [?]; Yoke nia 'coconut' (Donohue 1999) [?]

Other: Kowiai niu(r) 'coconut' (ACD)
PMP *nusa ${ }_{1}$ 'island' (ACD)
SH: Buli nus 'island' (ACD)
CB: Ambai $n u$ 'island' (Slz); Ansus nu 'island' (P\&D); Biak $n u$ 'island, only used in compounds, as Nu-mfor, Nus Mapi, etc.' (H); Moor núta 'island' (K); Serui-Laut nu 'island’ (Slm); Umar nuhman 'island' (K); Wandamen nu 'island' (G); Waropen nusa 'island' (ACD); Yaur nùhré 'island' (K); Yerisiam núùhà 'island' (K)
Other: Irarutu nú 'island' (M)
PAN *pajay 'rice in the field; rice plant' (ACD); PMP *pajey 'rice plant' (Blust 1999)
SH: Sawai fas 'rice’ (CAD)
RA: Ma'ya (S.) 'fa ${ }^{12}$ s 'rice' (R)
CB: Ambai pa 'rice' (Slz); Ansus pa 'rice' (P\&D); Biak fas 'rice (in general)' (H); Dusner pas 'rice’ (ACD); Moor pása 'rice' (K) [North Moluccan loan]; Serui-Laut fa 'rice' (Slm); Umar pah 'rice’ (K) [North Moluccan loan]; Wandamen fas 'rice (in general)' (ACD); Wandamen pase 'rice' (G); Yaur pàahré 'rice' (K) [North Moluccan loan]; Yerisiam páhréevè 'rice' (K) [North Moluccan loan]
Mamberamo: Warembori pasa-ro 'Rice’ (Donohue 1999)
Other: Irarutu fása 'rice' (M); Kowiai fasa 'cooked rice, husked rice' (ACD)
PAN *panaq 'throw something at a target; shoot with bow and arrow' (ACD); PMP *panaq 'shoot (arrow)' (Blust 1999); PCEMP *panaq 'shoot (arrow)' (Blust 1993)
RA: As fantanus 'to shoot' (ABVD) [?]; Biga -fan 'to shoot' (ABVD); Gebe -fan 'to shoot' (ABVD); Ma'ya (S.) 'fa ${ }^{12} n$ 'to shoot (with bow and arrow)' (R)
CB: Ambai i-ana 'to shoot' (ABVD); Ansus ana 'shoot' (P\&D); Moor hinà 'shoot' (K) [?];
Wandamen ana 'to shoot' (ABVD); Waropen ana 'to shoot' (ABVD)
Other: Sekar fanak 'to shoot' (ABVD)
PAN *paNaw 'go, walk away, depart' (ACD); PMP *panaw 'walk, go' (Blust 1999); PMP *panaw ${ }_{2}$ 'go, walk away, depart' (ACD); PCEMP *panaw 'walk, go' (Blust 1993)
SH: Buli fān 'depart; go, walk' (ACD); Gane han 'to walk' (ABVD)
Other: Irarutu fá 'to go' (M); Irarutu -fana 'to walk' (ABVD); Sekar pana 'to walk' (ABVD)
PMP *paniki 'fruit bat, flying fox: Pteropus spp.' (ACD)
SH: Buli fni ‘flying fox' (ACD); Gane fnik 'flying fox' (ACD); Sawai fni 'bat' (CAD)
PMP *pa(n)tar ${ }_{2}$ 'shelf; bed frame of wooden or bamboo laths' (ACD)

CB: Ambai fata 'bed' (Slz); Biak fakĕr 'foundation of stones, wood, etc.' (H); Wandamen ai pata 'bed' (G); Wandamen patar 'bed, sleeping place' (ACD)
PMP *papan 'plank, board; floor boards of house' (ACD)
SH: Buli fafan 'plank' (Blust1978); Sawai fofen ‘board’ (CAD)
CB: Biak àm-bafĕn 'plank' (H)
PMP *paqa 'stalk or stem of a plant' (ACD)
CB: Ambai -fan 'palm/sole' (Slz); Biak fa 'sheath of a palm blossom' (H)
PAN *paRiS ‘sting' (ACD); PMP *paRih ‘sting' (ACD); PCEMP *paRi 'sting' (ACD)
SH: Buli fā ‘stingray' (ACD); Sawai fa 'stingray' (CAD)
CB: Yerisiam ari máanáà ‘ray sp.' (K); Yerisiam páréèmà 'ray’ (K)
PAN *peñu $u_{1}$ 'sea turtle' (ACD); PMP *peñu $u_{2}$ 'the green turtle, Chelonia mydas' (ACD)
SH: Sawai $f \varepsilon n$ 'sea turtle' (CAD)
RA: Ambel фen 'sea turtle' (R); Biga fin 'sea turtle' (R); Fiawat fin 'sea turtle' (R); Kawe fin 'sea turtle' (R); Laganyan fin 'sea turtle' (R); Matbat $f e^{31} n$ 'sea turtle' (R); Ma'ya (M.) ' $f e^{3} n$ 'sea turtle' (R); Ma'ya (S.) ' $f e^{3} n$ 'sea turtle' (R)
CB: Umar ono 'turtle' (K); Yerisiam éenú 'turtle' (K)
PAN *penuq 'full, of a container' (ACD); PMP *ma-penuq 'full' (ACD)
RA: Ambel anhon 'full' (R); Biga fon 'full' (R); Fiawat fon 'full' (R); Kawe fon 'full' (R); Laganyan fon 'full' (R); Matbat $f o^{3} n$ 'full' (R); Ma'ya (M.) ' $f o^{12} n$ 'full' (R); Ma'ya (S.) ' $f 0^{12} n$ 'full' (R)
PAN *piliq 'to choose, to select; to pick out' (ACD); PMP *piliq 'choose' (Blust 1999); PCEMP *piliq ‘choose’ (Blust 1993)
CB: Ambai iri 'choose' (Slz); Ambai yi-riri 'to choose' (ABVD) [?]; Moor irà 'choose' (K) [?];
Serui-Laut iria 'to choose' (Slm); Umar nin ariri 'choose' (K) [?]; Wandamen iri 'choose' (G)
Other: Arguni -pili 'to choose' (ABVD); Kowiai -pil 'to choose' (ABVD); Sekar fini 'to choose'
(ABVD)
PMP *pitu 'seven'
SH: Buli fit ‘seven' (Blust1978); Sawai pe-fit ‘seven' (CAD); Taba -hit 'seven’
CB: Ambai itu ‘seven’ (Slz); Ansus itu ‘seven’ (P\&D); Biak fik ‘seven' (H)
PMP *pula $\boldsymbol{1}_{1}$ 'red' (ACD); PMP *pulaq 'red' (ACD)
CB: Wandamen urar 'red' (ABVD); Wandamen urara 'red' (G); Waropen ura 'red color' (ACD)
PAN *puluq $\boldsymbol{1}_{1}$ 'group of ten' (ACD); PAN *sa-puluq 'ten' (ACD)
CB: Ambai sura 'ten' (Slz); Ansus ura 'ten' (P\&D); Biak sà-m-fur 'ten' (H); Dusner sampur 'ten' (D\&M); Moor tàura 'ten' (K); Serui-Laut sura 'ten' (Slm); Wandamen surai 'ten' (G); Waropen sauro 'Ten' (ABVD)
PAN *punti, 'banana' (ACD); PMP *punti 'banana' (Blust 1999)
CB: Moor húta ‘banana’ (K); Umar idi ‘banana’ (K); Waropen ui ‘banana’ (ACD); Yaur ìdíe 'banana' (K); Yerisiam píití 'banana' (K)

Mamberamo: Warembori uti-ro 'Banana' (Donohue 1999); Yoke si 'banana' (Donohue 1999)
Other: Irarutu fúdz 'banana' (M); Kowiai fun 'banana' (ACD)
PAN *qabaRa ${ }_{1}$ 'shoulder' (ACD); PMP *qabaRa 'shoulder' (Blust 1999); PMP *qabaRa ${ }_{3}$ 'shoulder; carry on the shoulder' (ACD); PCEMP *qabaRa 'shoulder' (Blust 1993)
RA: Gebe kafalo 'shoulder' (ABVD)
CB: Biak wer 'carry on the shoulders' (H); Moor ovarî 'carry on shoulder' (K); Waropen awaro 'carry on the shoulder' (ACD); Yerisiam áarí 'carry on shoulder' (K) [?]
Other: Irarutu fravo 'shoulder' (ABVD) [metathesis?]; Kowiai fafalan ‘shoulder' (ABVD); Sekar barar ‘shoulder’ (ABVD)
 hearth, cinder, powder, dust; gray' (ACD); PCEMP *qabu 'ash' (Blust 1993)
SH: Buli gigiáp ‘ash' (ABVD) [?]; Gane tapin ‘ash’ (ABVD) [??]; Gane yipyáp ‘dust’ (ABVD); Sawai geyap 'ashes' (CAD); Taba yapyap 'dust' (ABVD); Taba yapyap ‘ash' (ABVD)
RA: Ambel lagalap 'ashes' (R); As yap-apin 'ash' (ABVD); Biga ka'lap 'ashes' (R); Fiawat alap 'ashes' (R); Gebe bayap ‘dust' (ABVD); Gebe bayap 'ash' (ABVD); Laganyan ga'lap 'ashes' (R); Ma'ya (M.) ga'la ${ }^{12} p$ 'ashes’ (R); Ma'ya (S.) ga'la ${ }^{12} p$ 'ashes’ (R); Wauyai ga'lap ‘ashes’ (R)
CB: Ansus wawu 'ashes' (P\&D); Moor áha 'ashes' (K) [??]; Serui-Laut wabu 'ash' (Slm); Serui-Laut wawu 'ash' (ACD); Umar au 'ashes' (K); Wandamen wabu 'dust' (ABVD); Wandamen wabu 'ash' (ABVD) [?]; Waropen awu 'hearth, ash' (ACD)
Mamberamo: Warembori aivu-ro 'Ashes' (Donohue 1999)
Other: Arguni avuvune 'dust' (ABVD); Arguni avune 'ash' (ABVD); Irarutu $\supset b$ 'smoke' (ABVD); Irarutu $\jmath b$ 'dust' (ABVD); Kowiai abuba ‘dust' (ABVD); Sekar afiruk ‘ash’ (ABVD) [?]; Sekar afruk ‘dust’ (ABVD) [?]

PAN *qaCay 'liver’ (ACD); PMP *qatay 'liver’ (Blust 1999); PCEMP *qatay 'liver’ (Blust 1993)
SH: Buli yatay 'liver’ (ACD); Gane yocu 'liver' (ABVD); Sawai yวtعy 'liver' (CAD); Taba yoco 'heart'
RA: Ambel latey 'liver' (R); Gebe atai ‘liver' (ABVD); Kawe la'te(y) 'liver' (R); Laganyan 'lati 'liver' (R); Matbat $t a^{21} y$ 'liver' (R); Ma'ya (M.) 'lati ${ }^{12}$ 'liver' (R); Ma'ya (S.) 'lati ${ }^{3}$ 'liver' (R)
CB: Ambai anteni ‘liver' (ABVD); Biak kèn 'liver' (H); Kurudu ate 'liver' (ACD); Moor à’a 'liver' (K); Moor siné a'ára 'liver' (K); Wandamen ateni 'liver' (ABVD); Yerisiam ákéènà 'liver' (K)

Other: Arguni atane 'liver' (ABVD); Irarutu -te 'liver' (ABVD) [?]; Kowiai lata 'liver' (ACD); Sekar yata-n 'liver' (ABVD)

PMP *qalejaw ‘day’ (Blust 1999); PCEMP *qalajaw ‘day’ (Blust 1993)
CB: Moor oro'á 'sun' (K); Yerisiam óòrà 'sun' (K)
Mamberamo: Warembori oro-ro 'Sun' (Donohue 1999)
Other: Kowiai óra ‘day’ (ABVD)
PAN *qalu-Sipan ‘centipede’ (ACD); PCEMP *qalipan 'centipede’ (ACD)
SH: Buli lif-lifay 'centipede’ (ACD); Sawai lelifen 'centipede' (CAD)
PAN *qaNipu 's shadow, reflection' (ACD); PMP *qaninu 'shadow, reflection' (ACD); PMP *qaninu, qaninup 'reflect, reflection' (ACD); PMP *qanunu $\boldsymbol{1}_{1}$ 'shadow' (ACD)

CB: Ambai nuaninu 'shadow' (Slz); Biak nin 'ghost, shadow' (H); Biak ninima(n) 'ghost, shadow' (H); Moor anìno ‘shadow' (K); Yaur núndìe ‘shadow' (K); Yerisiam ánúunúgùa ‘shadow' (K) [?]

PAN *qapuR 'lime, calcium' (ACD)
SH: Buli yafi 'lime, calcium' (ACD)
RA: Ambel ahar 'lime (for betel)' (R)
CB: Biak afĕr 'lime, calcium' (H); Dusner aper 'lime' (ACD); Moor ára 'lime' (K); Umar au 'lime’ (K); Yerisiam áau 'lime’ (K)

PMP *qasawa 'wife' (Blust 1999); PMP *qasawa 'husband' (Blust 1999); PCEMP *qasawa 'wife' (Blust 1993); PCEMP *qasawa 'husband' (Blust 1993)
CB: Ansus awani 'husband' (P\&D); Biak swa- 'spouse' (H); Wandamen sawa 'husband (or 'man'?)' (ACD); Wandamen sawan 'husband' (G)
Other: Kowiai soa 'spouse' (ACD); Kowiai sóa mafíne 'wife' (ABVD); Kowiai sóa muáne 'husband' (ABVD); Sekar isawa-n 'husband' (ABVD); Sekar isawa-n 'wife' (ABVD)
PAN *qasiN 'saltiness, salty taste' (ACD); PMP *ma-qasin 'salty' (ACD); PCEMP *maqasin 'salty, brackish' (ACD)
SH: Gane myasing 'salt' (ABVD); Taba yasin 'salt' (ABVD)
RA: As masin ‘sea' (ABVD); Biga lesen 'salt' (ABVD); Ma'ya (S.) 'lisin 'salt' (R)
CB: Ambai ai ‘salt' (Slz); Ansus ai ‘salt' (P\&D); Biak màsĕn 'salt; saltwater, sea' (H); Dusner masen 'seawater' (D\&M); Serui-Laut sai ‘seawater' (Slm); Wandamen sasi 'salt' (G) [?]; Wandamen sasi-tarai 'salt' (ABVD) [?]
PAN *qasiRa 'salt' (ACD); PMP *qasiRa 'salt' (Blust 1999); PCEMP *qasiRa 'salt' (Blust 1993)
Other: Arguni sirer 'salt' (ABVD); Kowiai sira 'salt' (ACD); Sekar sira 'salt' (ABVD)
PMP *qasu 'smoke' (Blust 1999); PMP *qasu 'smoke, fumes, steam; to smoke (as a fire)' (ACD); PCEMP *qasu 'smoke' (Blust 1993)
SH: Buli mamayás ‘smoke' (ABVD); Gane nyas 'smoke' (ABVD); Sawai mcyas ‘smoke' (CAD); Taba yaso 'smoke’ (ABVD)
RA: As kapyas ‘smoke’ (ABVD); Biga ka'plas ‘smoke’ (R); Biga kaplass ‘smoke’ (ABVD); Gebe mayas ‘smoke' (ABVD); Ma'ya (M.) ' $l a^{12} s$ 'smoke' (R); Ma'ya (S.) 'la ${ }^{12}$ s 'smoke' (R)
CB: Biak $\bar{a} s$ 'to smoke (of a fire)' (H); Waropen asi 'smoke, fumes, steam' (ACD); Waropen [awu]asi 'smoke' (ABVD); Yerisiam ógwáahúgùa 'smoke' (K)
Mamberamo: Warembori kati-ro 'Smoke' (Donohue 1999)
Other: Arguni evas 'smoke' (ABVD); Sekar masi ‘smoke' (ABVD)
PMP *qateluR ‘egg' (Blust 1999); PMP *qiteluR ‘egg' (Blust 1999); PCEMP *qatzluR 'egg' (Blust 1993)

SH: Buli tāl 'egg' (ABVD); Buli tolo 'egg' (ACD); Gane toli 'egg' (ABVD); Taba tolo 'egg' (ABVD)
RA: Ambel talo ‘egg' (R); As tals ‘egg' (ABVD); Biga to'lo ‘egg’ (R); Fiawat tol ‘egg' (R); Kawe 'tol[o] ‘egg' (R); Laganyan 'tol[o] 'egg’ (R); Matbat to ${ }^{21} l$ 'egg’ (R); Ma'ya (M.) 'tol(o) 'egg' (R); Ma'ya (M.) 'tolo ${ }^{12}$ 'egg' (R); Ma'ya (S.) 'to ${ }^{12}$ ' 'egg' (R); Wauyai 'tol[o] 'egg' (R)
CB : Umar tor 'egg' (K); Yaur òó'rè 'egg' (K); Yerisiam ákóoré 'egg' (K)
Other: Irarutu trru ‘egg’ (ABVD); Irarutu trú ‘egg’ (M); Kowiai tóron ‘egg’ (ABVD)

## PMP *qatep 'thatch' (Blust 1999)

SH: Buli fa-yatf-o 'cover with thatch' (ACD); Buli yataf 'thatch; roof' (ACD); Gane yotaf 'thatch/roof' (ABVD); Sawai yotef 'roof' (CAD)
RA: Gebe yataf 'thatch/roof' (ABVD)
CB: Ambai antarau 'thatch/roof' (ABVD); Ambai antaraun 'roof' (Slz); Moor rà’a 'roof' (K); SeruiLaut ratarau 'roof' (Slm); Waropen aka 'thatch' (ACD); Yerisiam ákáráanía 'roof' (K)
Other: Irarutu atiffro 'roof' (M); Irarutu ativrs 'thatch/roof' (ABVD)
PMP *qatimun 'cucumber: Cucumis sativa L.' (ACD)
SH: Buli ti-timin 'kind of cucumber' (ACD)
CB: Dusner tinem 'gherkin' (ACD)
Other: Kowiai atumin 'melon, watermelon' (ACD)
PAN *qayam ${ }_{1}$ 'bird' (ACD); PMP *qayam 'bird’ (Blust 1999)
CB: Ansus aya ‘bird' (P\&D); Serui-Laut aya 'bird' (Slm); Wandamen aya ‘bird’ (G)
PEMP *qayawan 'banyan, strangler fig' (ACD)
SH: Buli yawan 'banyan tree’ (ACD); Sawai ay yวwen 'banyan' (CAD)
PAN *qenay ‘sand’ (ACD); PMP *qenay ‘sand’ (Blust 1999); PCEMP *qənay ‘sand’ (Blust 1993)
RA: As in 'sand' (ABVD) [?]
CB: Biak kayěn ‘white sand' (H); Biak yèn 'white sandy beach' (H); Moor áena ‘sand’ (K)
Other: Arguni ain 'sand' (ABVD); Kowiai ena 'sand' (ACD)
PMP *qe(n)sem 'sour' (ACD)
CB: Ambai sisasa 'sour' (Slz); Serui-Laut sisaa 'sour' (Slm)
PAN *qinep 'lie down to sleep' (ACD); PMP *qinep 'lie down' (Blust 1999); PCEMP *qenap ‘lie down to sleep' (ACD); PCEMP *qenəp 'lie down' (Blust 1993); PCEMP *qinəp 'lie down' (Blust 1993)

SH: Sawai $n$-y $\varepsilon n \varepsilon f$ 'to sleep' (CAD)
RA: Ambel l-ane ‘sleep' (R); As -nc-k 'to sleep' (ABVD); Biga -enef 'to sleep' (ABVD); Biga l-e'nef 'sleep' (R); Fiawat l-ene 'sleep' (R); Gebe yencf 'to lie down' (ABVD); Gebe yencf 'to sleep' (ABVD); Kawe 'w-e'nef 'sleep' (R); Laganyan ' $w$-enef ‘sleep' (R); Matbat $n-e^{41} n$ 'sleep' (R); Ma'ya (M.) 'w-ene ${ }^{12} f$ 'sleep' (R); Ma'ya (S.) 'w-ene ${ }^{3} f$ 'sleep' (R); Wauyai 'w-enef ‘sleep' (R)

CB: Ambai ena 'sleep' (Slz); Ambai i-ena 'to sleep' (ABVD); Ansus ena 'sleep' (P\&D); Biak enĕf 'to sleep' (H); Dusner enep 'sleep' (D\&M); Moor enâ 'lie' (K); Serui-Laut ena 'to sleep’ (Slm); Umar ne 'sleep’ (K); Wandamen ena 'sleep' (G); Waropen ena-ko ‘sleep' (ACD); Yerisiam éené 'lie' (K)
Mamberamo: Warembori nan-do 'Sleep' (Donohue 1999); Yoke na 'sleep' (Donohue 1999)
Other: Arguni -re?enef 'to sleep' (ABVD); Irarutu gína 'to sleep' (M); Irarutu gin gerevivare- 'to lie down' (ABVD) [?]; Kowiai ena-n 'sleep, lie down' (ACD)
PAN *quay 'rattan, Calamus sp.' (ACD)
Other: Irarutu ú 'rattan' (M); Kowiai ua 'rattan' (ACD)

PMP *qubi 'yam: Dioscorea alata Linn.' (ACD)
SH: Buli up 'kind of tuber' (ACD)
CB: Ambai uvi 'yam' (Slz); Wandamen uwi 'sweet potato ; yam' (G); Waropen uwi 'tuberous plant, yam' (ACD)
Other: Kowiai uf 'wild roots' (ACD)
PAN *quday ‘shrimp, crayfish, lobster' (ACD)
SH: Buli ulay 'shrimp' (ACD)
CB: Umar ure 'shrimp' (K); Yerisiam úuráà 'shrimp' (K)
PAN *qulej ${ }_{1}$ 'type of small worm' (ACD); PMP *qulej ${ }_{2}$ 'maggot, caterpillar, larva of a metamorphosing insect' (ACD)
CB: Biak urò 'caterpillar, seaworm' (H); Moor óra 'snake' (K)
PAN *qulu 'head' (ACD); PMP *qulu 'head' (Blust 1999); PMP *qulu 'head; top part; leader, chief; headwaters; handle of a bladed implement; prow of a boat; first, first-born' (ACD); PMP *qulu-an 'head-end, upper part' (ACD); PCEMP *qulu 'head' (Blust 1993); PCEMP *qulu ${ }_{3}$ 'head; top part; leader, chief; headwaters; handle of a bladed implement; prow of a boat; first, first-born; hair of the head' (ACD)
SH: Buli olo-an 'village head; owner of something' (ACD); Buli ulu 'beginning, origin' (ACD); Buli waya ulu 'source of a river' (ACD)
Other: Kowiai ur 'handle' (ACD); Sekar uni-n 'head' (ABVD)
PAN *qumah 'swidden, work a swidden' (ACD); PMP *quma 'work (in garden)' (Blust 1999); PCEMP *quma 'work (in garden)' (Blust 1993)
CB: Yerisiam ùmá ‘do’ (K)
Other: Kowiai um 'garden, plot' (ACD)
PAN *quSeNap 'fish scale' (ACD); PCEMP *qunap ${ }_{1}$ 'scale of fish, turtle shell' (ACD); PCEMP *qunep '" $>$ scales of fish or snake' (ACD)
SH: Buli unaf 'to scale fish' (ACD); Buli un-unaf 'scales of a fish' (ACD); Sawai wen-wunef 'fishscale' (CAD)
CB: Ambai ne-una 'scales' (Slz); Biak unèf 'fish scale' (H)
PMP *qutan 'small, wild herbaceous plants; scrub-land, bush' (ACD)
SH: Taba uat 'woods/forest' (ABVD)
CB: Wandamen uta[n] 'woods/forest' (ABVD)
PAN *qutiN 'penis' (ACD); PMP *qutin 'penis' (ACD)
SH: Sawai fsi 'penis' (CAD)
CB: Ambai $i-$ 'penis' (Slz); Biak si- 'penis' (H); Moor ùsi 'penis' (K)
Other: Kowiai ut 'penis' (ACD)
PAN *RabuC 'uproot, pull out by the roots' (ACD)
CB: Ambai rabi(t) 'pull' (Slz); Serui-Laut rabiti 'to pull' (Slm)
PMP *Rambia 'sago palm' (ACD)

RA: Ambel bey 'sago tree' (R); Biga bi 'sago tree' (R); Fiawat bi ‘sago tree' (R); Kawe bi ‘sago tree'
(R); Laganyan 'bi ${ }^{3}$ sago tree' (R); Ma'ya (M.) 'bi 'sago tree' (R); Ma'ya (S.) 'bi ${ }^{3}$ 'sago tree' (R)

CB: Umar abi ‘sago' (K); Umar biae 'small sago ribs' (K); Wandamen abis 'sago grub’ (G); Waropen fi 'sago, baked sago' (Held 1942); Yerisiam pí 'sago palm' (K)

PAN *Rames ‘squeeze, knead’ (ACD); PMP *Rames ‘squeeze’ (Blust 1999); PCEMP *Ramas 'squeeze' (Blust 1993)
SH: Buli amas 'sift, squeeze out or wash sago' (ACD)
CB: Ambai rami ‘squeeze’ (Slz); Ansus rami ‘rinse_(sago)' (P\&D); Ansus rang 'rinse, rub’ (P\&D); Biak òmĕs 'to squeeze' (H); Biak ramĕs 'press out with both hands' (H); Dusner ramas 'press' (D\&M); Moor amatà ‘squeeze' (K) [?]; Umar rman 'squeeze' (K)
PMP *Rebek 'to fly' (Blust 1999); PCEMP *Rabak 'to fly' (Blust 1993)
SH: Buli opa 'to fly' (ACD); Gane opa 'to fly' (ABVD); Sawai n-ope 'to fly' (CAD); Taba -opa 'to fly' (ABVD)
RA: Ambel l-apo 'fly (v.)' (R); As naps 'to fly' (ABVD) [?]; Biga l-o'bo 'fly (v.)' (R); Biga -obo 'to fly' (ABVD); Fiawat l-op 'fly (v.)' (R); Gebe -opo 'to fly' (ABVD); Kawe 'w-op[o] 'fly (v.)' (R); Laganyan 'w-op[o] 'fly (v.)' (R); Ma'ya (M.) 'w-opo ${ }^{12}$ 'fly (v.)' (R); Ma'ya (S.) 'w-opo ${ }^{3}$ 'fly (v.)' (R); Wauyai 'w-op[o] 'fly (v.)' (R)

CB: Biak ròb 'to fly' (H); Waropen roko 'to fly' (ABVD) [?]; Waropen rorako 'to fly' (ABVD) [?]
Mamberamo: Warembori dove 'Fly' (Donohue 1999)
PAN *Rumaq 'house’ (ACD); PMP *Rumaq 'house' (Blust 1999); PCEMP *Rumaq 'house’ (Blust 1993)

SH: Gane um 'house' (ABVD); Sawai um 'house' (CAD)
RA: Biga um 'house' (R); Biga [w]um 'house' (ABVD); Gebe um 'house' (ABVD); Kawe um 'house' (R); Laganyan wum 'house' (R); Ma'ya (M.) ' $u^{3} m$ 'house' (R); Ma'ya (S.) ' $u^{3} m$ 'house' (R); Wauyai wum 'house' (R)
CB: Biak rum 'house' (H); Dusner rum 'house' (D\&M); Moor rùma 'house' (K); Umar ron 'house' (K); Waropen ruma 'house; shop; branch of a family' (ACD); Yaur rúùgré 'ceremonial house' (K); Yerisiam rúmà 'ceremonial house’ (K)

Other: Arguni rume 'house' (ABVD); Sekar ruma 'house' (ABVD)
PAN *RuqaNay 'male' (ACD); PMP *ma-Ruqanay 'male/man' (Blust 1999); PCEMP *maRuqanay 'male/man' (Blust 1993)
SH: Buli mān ‘man/male’ (ABVD); Gane maón 'man/male' (ABVD); Sawai mon 'male’ (CAD); Taba mon 'husband' (ABVD); Taba mon 'man/male' (ABVD)
RA: Ambel man 'man' (R); As -man 'husband' (ABVD); As -man 'father' (ABVD); As -man 'man/male' (ABVD); Biga wa'man 'man' (R); Fiawat man 'man' (R); Gebe man 'man/male' (ABVD); Gebe man 'husband' (ABVD); Kawe 'man[a] 'man' (R); Laganyan 'man[a] 'man' (R); Matbat $w a^{3} y m a^{21} n$ 'man' (R); Ma'ya (M.) 'ma ${ }^{12} n$ 'man' (R); Ma'ya (S.) 'ma $a^{12} n$ 'man' (R); Wauyai 'man[a] 'man' (R)

CB: Ambai man 'man/male' (Slz); Ambai muan 'man/male' (ABVD); Ambai muan 'husband' (ABVD); Ambai ne-man 'husband' (Slz); Ansus muang 'man' (P\&D); Biak man 'man/male' (H); Dusner snoman 'male’ (D\&M); Moor vurána 'man' (K); Serui-Laut man 'male’ (Slm); Umar mambo 'husband' (K); Umar noman 'man' (K); Wandamen mua 'man ; male' (G); Wandamen mua[n] 'man/male' (ABVD); Waropen mano 'husband' (ABVD); Waropen mano 'man/male' (ABVD); Yaur jòmàgré 'man' (K); Yerisiam híomáané ‘husband' (K); Yerisiam máànà 'man’ (K) Mamberamo: Warembori man-do 'Man' (Donohue 1999); Yoke mamb- 'man' (Donohue 1999)
Other: Arguni [i]maran 'husband' (ABVD); Arguni mañañane 'man/male' (ABVD); Irarutu marane 'man/male' (ABVD); Irarutu mərane 'husband' (ABVD); Kowiai mu[ru]ána 'man/male' (ABVD); Sekar murarara 'man/male' (ABVD)
PAN *SabaRat 'south wind (?)' (ACD); PMP *habaRat 'south' (ACD)
SH: Buli pāt 'west, west wind' (ACD)
CB: Biak barěk 'west' (H); Biak wām-barek 'west wind, west monsoon' (H)
PAN *SadiRi 'house' (ACD)
SH: Buli li 'post, pillar, corner post' (ACD); Buli li pupuy-an 'main post, center post' (ACD)
CB: Ambai diri 'post' (Slz); Ansus riri ‘pole’ (P\&D); Ansus riri amang 'short house post' (P\&D); Ansus riri au 'long house post' (P\&D); Biak rir 'post, pile, pillar' (H); Serui-Laut iri 'post' (Slm); Umar ae dri 'wood post' (K); Waropen ri 'pile, post under a house' (ACD)
PAN *sakay 'walk' (ACD); PMP *sakay 'climb’ (Blust 1999); PCEMP *sakay 'climb’ (Blust 1993)
SH: Gane sapák 'to climb’ (ABVD)
RA: Biga -sa 'to climb' (ABVD); Gebe -sa 'to climb' (ABVD); Laganyan 'sak 'to make a step' (R); Ma'ya (M.) 'sak 'to make a step' (R); Ma'ya (S.) 'sak 'to make a step' (R)
CB: Wandamen sa 'climb' (G)
Other: Kowiai -sa'a 'to climb' (ABVD); Sekar sa 'to climb' (ABVD)
PMP *salaq 'wrong, in error (of behavior); miss (a target); mistake, error, fault' (ACD)
RA: Ma'ya (M.) ' $s a^{3} l$ 'wrong, error' (R); Ma'ya (S.) ' $s a^{3} l$ 'error' (R)
CB: Ambai sarawai 'wrong' (Slz); Wandamen sasara 'err; make a mistake; wrong' (G)

## PCEMP *sayan 'branch' (Blust 1993)

SH: Sawai seysoy 'branch' (CAD)
Other: Kowiai sang ai ‘branch' (ABVD); Sekar saga-n 'branch' (ABVD)
PAN *Sapuy 'fire' (ACD); PMP *hapuy 'fire' (Blust 1999); PCEMP *hapuy 'fire’ (Blust 1993); PEMP *api ${ }_{1}$ 'fire' (ACD)
SH: Buli yap 'fire' (ACD)
RA: Ambel lap 'fire' (R); As yap 'fire' (ABVD); Biga lap 'fire' (R); Fiawat lap 'fire' (R); Gebe yap 'fire' (ABVD); Kawe lap 'fire' (R); Laganyan lap 'fire' (R); Matbat ya³p 'fire' (R); Ma'ya (M.) 'la ${ }^{12} p$ 'fire' (R); Ma'ya (S.) 'la ${ }^{12} p$ 'fire' (R); Wauyai lap 'fire’ (R)
CB: Yerisiam jáai 'fire' (K)
Other: Arguni yaf 'fire' (ACD); Kowiai laf 'fire' (ABVD); Sekar yafi 'fire' (ABVD)

PAN *Sasaq 'whet, sharpen' (ACD); PMP *hasaq 'whet, sharpen' (ACD); PEMP *asaq 'sharpen, rub, grate' (ACD)
CB: Ansus asasumi ‘sharpen_(with_wood)' (P\&D); Biak yās ‘whet, sharpen' (H); Serui-Laut aa 'sharpen' (Slm); Yerisiam áhà ‘sharpen' (K)

PAN *Sepat 'four' (ACD); PMP *epat 'four' (Blust 1999); PCEMP *pati 'four' (Blust 1993); PCEMP *(ə)pat 'four' (Blust 1993); PEMP *pat 'four' (ACD)
SH: Buli fat 'four' (ACD); Buli [si] fat 'Four' (ABVD); Gane pfot 'Four' (ABVD); Sawai p $\varepsilon$-fot 'four' (CAD); Taba -hot 'four'; Taba p-hot 'Four' (ABVD)
RA: Ambel фat 'four' (R); As fat 'Four' (ABVD); Biga fat 'four' (R); Fiawat fat 'four' (R); Gebe pi-fat 'Four' (ABVD); Kawe fat 'four' (R); Laganyan fat 'four' (R); Matbat $f a^{3} t$ 'four' (R); Ma'ya (M.) 'fa ${ }^{12} t$ 'four' (R); Ma'ya (S.) 'fa ${ }^{12} t$ 'four' (R); Wauyai fat 'four' (R)

CB: Ambai bo-a 'Four' (ABVD); Biak fiàk 'four' (H); Dusner ata 'four' (D\&M); Dusner pati 'four' (D\&M); Marau att 'four' (ACD); Moor á’ó 'four' (K); Serui-Laut boa 'four' (Slm); Umar eat 'four' (K); Wandamen ate 'four' (G); Waropen ako 'Four' (ABVD); Yaur ríahè 'four' (K); Yerisiam áakà 'four' (K)
Other: Arguni fat 'four' (ACD); Kowiai fat 'four' (ACD); Sekar fat 'Four' (ABVD)
PAN *sepsep ‘sip, suck' (ACD); PAN *supsup ‘sip, suck' (ACD); PMP *sepsep ‘suck' (Blust 1999); PCEMP *sasəp 'suck' (Blust 1993)
SH: Buli sus 'to suck' (ABVD)
CB: Ambai i-sufi 'to suck' (ABVD); Ambai su(f) 'suck' (Slz); Biak syòsĕf 'to suck' (H)
Other: Arguni sus 'to suck' (ABVD); Sekar susi 'to suck' (ABVD)
PAN *Seyaq ‘shyness, embarrassment; shame' (ACD); PMP *ma-hiaq ‘shy; ashamed' (Blust 1999); PCEMP *mayaq 'shy; ashamed' (Blust 1993)

SH: Buli mai 'ashamed; shame, disgrace' (ACD); Gane moi ‘shy, ashamed' (ABVD)
RA: Ma'ya (S.) -'ma ${ }^{3}$ 'to be ashamed' (R)
CB: Biak ma 'ashamed, embarrassed' (H); Serui-Laut mamaya 'ashamed' (Slm); Umar mae 'ashamed' (K); Wandamen mamaya ‘shy, ashamed' (ABVD); Yerisiam mái ‘ashamed' (K)
Other: Kowiai -mála ‘shy, ashamed' (ABVD); Kowiai ma-mala 'shy, ashamed' (ACD)
PMP *sida ‘3P NOM1' (Ross 2006); PMP *si-ida 'they' (Blust 1999); PCEMP *sida 'they' (Blust 1993)

SH: Buli sil(e) 'they, them' (ACD); Gane si 'they' (ABVD); Sawai si 'they' (CAD); Taba si 'they' (ABVD)
RA: As sia 'they' (ABVD); As sire 'they' (ABVD); Gebe sia 'they' (ABVD); Kawe 'si(a) 'they' (R); Laganyan 'hia 'they' (R); Ma'ya (M.) 'sia 'they' (R); Ma'ya (S.) 'sia 'they' (R)
CB: Ambai ea 'they (pl.)' (Slz); Ansus ya 'they' (P\&D); Biak si 'they' (H); Dusner si 'PRO.3PL' (D\&M); Dusner si- ‘3PL’ (D\&M); Dusner si- ‘3PL’ (D\&M); Moor -ti ‘3pl’ (K); Moor -ti ‘pl' (K); Moor ti- ‘3pl' (K); Moor ti’ó ‘3pl’ (K); Serui-Laut sa 'they’ (Slm); Umar -hi ‘3pl’ (K); Umar -hiem '3pl' (K); Umar ih- '3pl' (K); Umar ihi ‘3pl' (K); Wandamen sia(te) 'they ; 3pl pronoun' (G); Wandamen si[at] 'they' (ABVD); Waropen ki 'they' (ABVD); Yaur éhè '3pl' (K); Yaur -he 'Pl' (K); Yaur óhè '3pl' (K); Yerisiam -he 'Pl' (K); Yerisiam ih- '3pl' (K); Yerisiam íniihí '3pl' (K)
Mamberamo: Warembori ti 'They’ (Donohue 1999)

Other: Arguni sire 'they' (ABVD); Irarutu írs 'they' (M); Kowiai si 'they' (ABVD); Sekar sina 'they' (ABVD)
PAN *Sikan 'fish' (ACD); PMP *hikan 'fish' (Blust 1999); PCEMP *hikan 'fish' (Blust 1993); PEMP *ikan 'fish' (ACD)
SH: Buli ian 'fish' (ACD); Gane ian 'fish' (ABVD); Sawai in 'fish' (CAD)
RA: Ambel dun 'fish' (R); As dun 'fish' (ABVD); Biga don 'fish' (R); Gebe in 'fish' (ABVD); Kawe 'in[i] 'fish' (R); Laganyan dun 'fish' (R); Matbat it $^{1} n$ 'fish' (R); Ma'ya (M.) ' $i^{12} n$ 'fish' (R); Ma'ya (S.) 'don 'fish' (R); Wauyai dun 'fish' (R)

CB: Ambai dia 'fish' (ABVD); Ambai dian 'fish (n.)' (Slz); Ansus diang 'fish' (P\&D); Biak in 'fish' (H); Dusner in 'fish' (D\&M); Moor ìjana 'fish' (K); Serui-Laut dian 'fish' (Slm); Wandamen dia 'fish' (G); Wandamen dia[n] 'fish' (ABVD); Yerisiam díijánà 'fish' (K)
Other: Kowiai don 'fish' (ABVD)
PMP *siwa 'nine’
SH: Taba -sio 'nine'
CB: Waropen sighiro 'Nine' (ABVD)

## PEMP *suda 'comb’ (Blust 1978); PEMP *sura 'comb’ (ACD)

CB: Ambai su 'comb (v.)' (Slz); Moor isúra 'comb' (K); Umar hurtu 'comb' (K); Waropen sura 'comb' (ACD)
PAN *SuRas 'wash body parts, cooking or eating utensils (but not clothes)' (ACD); PEMP *uRas 'wash body parts, cooking or eating utensils (but not clothes)' (ACD)
SH: Buli uas 'wash oneself, wash the face, dishes, pans, etc.' (ACD); Sawai $n$-عus 'to wash' (CAD)
PAN *susu ${ }_{1}$ 'female breast; udder' (ACD); PMP *susu 'breast' (Blust 1999); PCEMP *susu 'breast' (Blust 1993)
SH: Buli $f a$-sus 'to nurse, give the breast to' (ACD); Buli sus 'breast, udder, mammary gland; to suck' (ACD); Gane susu 'breast' (ABVD); Sawai sus 'breast' (CAD); Taba susu 'breast' (ABVD)
RA: Ambel su 'breast' (R); As sus 'breast' (ABVD); Biga sus 'breast' (R); Fiawat suh 'breast' (R); Gebe sus 'breast' (ABVD); Kawe su 'breast' (R); Laganyan 'tut[u] 'breast' (R) [?]; Matbat su ${ }^{3}$ 'breast' (R); Ma'ya (M.) 'suss 'breast' (R); Ma'ya (S.) 'su's 'breast' (R); Wauyai su 'breast' (R)
CB: Ambai ui 'breast' (Slz); Ansus $u$ 'breast' (P\&D); Biak sus 'milk; breast' (H); Moor túta 'breast' (K); Serui-Laut su 'breast' (Slm); Umar huhu 'breast' (K); Wandamen susu 'breast' (ABVD); Waropen susi 'female breast; suckling' (ACD); Yaur húhìe 'breast' (K); Yerisiam húuhúgùa 'breast' (K)
Mamberamo: Warembori ke-tutu-ro 'Breast' (Donohue 1999)
Other: Arguni sus 'breast' (ABVD); Irarutu -susu 'breast' (ABVD); Kowiai sus 'female breast' (ACD); Sekar susi 'breast’ (ABVD)
PCMP *ta 'negative marker: no, not' (ACD)
SH: Gane tes 'no, not' (ABVD); Gane tesin 'no, not' (ABVD); Taba te 'no, not' (ABVD)
CB: Dusner te ‘Ques' (D\&M); Wandamen te 'question particle; right? ; eh?' (G)
Other: Kowiai tei 'no, not' (ABVD); Sekar -ta 'no, not' (ABVD)
PMP *tabuRi 'conch shell trumpet' (ACD); PMP *tabuRiq 'conch shell trumpet' (ACD)

CB: Ambai tabura 'conch' (Slz); Biak kubur 'triton/conch shell' (H); Moor avùra 'shellfish sp.' (K); Wandamen tabura 'conch' (G)
PMP *talina 'ear' (Blust 1999); PMP *taliya 'ear' (ACD); PCEMP *taliya 'ear' (Blust 1993)
SH: Gane tinge 'ear' (ABVD) [?]; Gane tingena 'ear' (ABVD)
RA: Ambel talamtum 'ear' (R); As tana 'ear' (ABVD); Biga nans 'ear' (ABVD); Biga na(o) 'ear' (R); Fiawat tena 'ear' (R); Kawe ta'na(o) 'ear' (R); Laganyan ta'na(o) 'ear' (R); Ma'ya (M.) ta'na(o) 'ear' (R); Ma'ya (S.) ta'na(o) 'ear' (R); Wauyai ta'na(o) 'ear' (R)
CB: Ambai tara- 'ear' (Slz); Biak kna 'ear' (H); Moor ìna 'ear' (K); Serui-Laut tara 'ear' (Slm)
Other: Arguni etiga- ‘ear’ (ABVD); Irarutu təgrá 'ear’ (M); Kowiai teriga ‘ear’ (ABVD); Sekar taniga-n 'ear' (ABVD)

PMP *tajis 'cry' (Blust 1999); PCEMP *tajis 'cry' (Blust 1993)
SH: Buli tapis 'to weep, cry; howl' (ACD); Gane tangis 'to cry' (ABVD)
RA: As -tanis 'to cry' (ABVD); Biga -tinis 'to cry' (ABVD); Gebe -tenis 'to cry' (ABVD)
CB: Biak kanĕs 'to weep, cry; howl' (H); Moor 'ànita 'cry' (K); Waropen anisa 'to cry' (ABVD); Waropen [k]aniko 'to cry' (ABVD); Yaur 'èéhrè 'cry' (K); Yerisiam káhé 'cry' (K) [?]
Other: Arguni -tagis 'to cry' (ABVD); Irarutu -metage 'to cry' (ABVD); Irarutu tága 'to cry' (M); Kowiai -tagis 'to cry' (ABVD); Sekar tagis 'to cry' (ABVD)

PCEMP *taqe ni lapit ‘cloud' (Blust 1993)
Other: Arguni ta... 'cloud' (ABVD); Irarutu tajé 'cloud' (M); Irarutu taye 'cloud' (ABVD)
PMP *taqu 'know' (Blust 1999); PMP *taqu ${ }_{2}$ 'to know how, be able to, be skilled at' (ACD); PCEMP *taqu 'know' (Blust 1993)
SH: Buli tō 'to know, be knowledgeable' (ABVD)
CB: Ambai tawana 'to know, be knowledgeable' (ABVD)
PMP *taRaq 'cut (wood)' (Blust 1999); PCEMP *taRaq 'cut (wood)' (Blust 1993)
CB: Umar tarto 'cut' (K); Wandamen tara 'to cut, hack' (ABVD)
PMP *tasik 'sea, saltwater' (Blust 1999); PCEMP *tasik ‘salt' (Blust 1993); PCEMP *tasik 'sea, saltwater' (Blust 1993)
SH: Buli gasi ‘salt' (ABVD); Gane gasi ‘salt' (ABVD)
RA: As gasi ‘salt' (ABVD); Gebe gasi 'salt' (ABVD)
CB: Moor àti ‘saltwater' (K); Umar tah 'salt' (K); Yaur àahré 'salt' (K); Yaur àáhrè ‘sea water' (K); Yerisiam káhìa 'salt' (K)
Other: Irarutu té 'saltwater' (M); Sekar sasik 'sea' (ABVD)
PMP *tata ${ }_{1}$ 'elder male relative’ (ACD)
CB: Biak kaka- 'mother's brother' (H); Dusner atai 'father' (D\&M); Dusner tetei 'grandfather' (D\&M); Umar tatai 'father’ (K); Yaur táati ‘grandfather’ (K)

PEMP *tatu 'true' (Blust 1978)
SH: Gane hatú 'correct, true' (ABVD); Taba tuo 'correct, true' (ABVD)
RA: Gebe $c u$ 'correct, true' (ABVD)

CB: Dusner tatu 'correct' (D\&M); Yerisiam mìtikú 'true' (K)
Other: Irarutu vitue 'correct, true' (ABVD); Sekar tutu 'correct, true' (ABVD)
PMP *tawan ‘kind of fruit tree: Pometia pinnata' (ACD); PEMP *tawan ‘a tree: Pommetia pinnata’ (Blust 1978)
CB: Ambai tawa 'a tree: Pometia spp.' (ACD); Ambai tawan 'Pometia sp.' (Slz); Ansus tawan 'a tree: Pometia spp.' (ACD); Moor kagwahéta 'tree sp.' (K); Moor kàgwana 'tree sp.' (K); Wandamen tawa 'matoa' (G); Wandamen tawa 'matoa fruit' (G); Waropen kawano 'a tree: Pometia spp.' (ACD)

PAN *tebek 'pierce, stab' (ACD)
SH: Buli tepa 'tusks of a boar or elephant; pierce or wound with a tusk' (ACD); Gane tapa 'to stab, pierce' (ABVD); Sawai $n$-etspes 'to stab' (CAD)
RA: Biga -ete 'to stab, pierce' (ABVD); Gebe -te 'to stab, pierce' (ABVD)
Other: Kowiai -ta' 'to stab, pierce' (ABVD)
PMP *telen 'to swallow' (Blust 1999)
CB: Ambai ton ‘swallow (v.)' (Slz); Biak òrĕn 'swallow' (H); Moor 'oran̂̂ 'swallow' (K); Serui-Laut tooni 'to swallow' (Slm); Umar dor 'swallow' (K); Yerisiam kóorí ‘swallow' (K)
PAN *telu 'three' (ACD); PMP *telu 'three' (Blust 1999); PCEMP *talu 'three' (Blust 1993); PEMP *tolu 'three' (ACD)
SH: Sawai pe-tel 'three' (CAD); Taba -tol 'three'
RA: Biga tol 'three' (R); Fiawat tol 'three' (R); Matbat to ${ }^{3} l$ 'three' (R); Ma'ya (M.) 'to ${ }^{3}$ l 'three' (R); Ma'ya (S.) 'to ${ }^{3} l$ 'three' (R)
CB: Ambai bo-toru 'three' (Slz); Ansus toru 'three’ (P\&D); Dusner tori 'three' (D\&M); Moor óró 'three' (K); Serui-Laut botoru 'three’ (Slm); Umar etro 'three' (K); Wandamen toru 'three' (G); Waropen oro 'Three’ (ABVD); Yerisiam kóoríhé 'three' (K)
Other: Arguni taor 'Three' (ABVD); Irarutu túrə 'three' (M); Kowiai tor 'Three' (ABVD); Sekar teni 'Three' (ABVD)
PCEMP *trlu 'thick' (ACD)
RA: As mtals 'thick' (ABVD); Biga matols 'thick' (ABVD)
PMP *temu 'all surround, surrounding' (ACD)
CB: Biak kàm 'all' (H); Umar tam 'all' (K)
Other: Irarutu temebe 'all' (ABVD)
PCMP *tibal 'small drum' (ACD)
CB: Moor tivara 'drum' (K)
Other: Kowiai tifar 'drum' (ACD)
PAN *timu $\boldsymbol{R}_{1}$ 'south or east wind' (ACD); PMP *timu $\boldsymbol{R}_{2}$ 'south' (ACD)
SH: Buli simi 'south, south wind' (ACD); Sawai timel 'east' (CAD)
PMP *t-ina 'mother' (Blust 1999); PCEMP *t-ina 'mother' (Blust 1993)
SH: Buli hñe 'M (ref.)’ (ACD)

CB: Biak sna- 'mother' (H); Dusner snari 'mother-3SG.POSS' (D\&M); Wandamen sinia 'mother' (ABVD)
PMP *tubuq 'grow, germinate, sprout' (ACD); PMP *tu(m)buq 'grow' (Blust 1999); PCEMP *tumbuq 'grow' (Blust 1993)
SH: Buli tub 'to live, be alive' (ABVD); Buli tub 'to grow' (ABVD); Gane tub 'to grow' (ABVD); Sawai $n$-tub 'grow' (CAD); Taba -antub 'to live, be alive' (ABVD)
RA: Gebe -tub 'to live, be alive' (ABVD)
CB: Ambai tifu ‘grow' (Slz); Moor ùvu ‘branch' (K) [?]
PMP *tudan 'sit' (Blust 1999); PMP *tu(n)day 'to sit' (ACD); PCEMP *todan ‘sit' (Blust 1993)
SH: Buli to-tolay ‘sit' (ACD); Sawai $n$-tolen 'sit' (CAD); Taba battalón 'to sit' (ABVD)
RA: Gebe tolon 'to sit' (ABVD); Kawe to'lon 'sit' (R); Laganyan to'lon 'sit' (R); Matbat ho ${ }^{121}$ l 'sit'
(R) [?]; Ma'ya (M.) 'solo ${ }^{12} n$ 'sit' (R); Ma'ya (S.) 'solo³n 'sit' (R); Wauyai to'lon 'sit' (R)

CB: Dusner ton 'sit' (D\&M); Moor 'ò 'sit' (K); Umar tot 'sit' (K); Yerisiam kó 'sit' (K)
Other: Arguni -mdagen 'to sit' (ABVD); Irarutu matora 'to sit' (ABVD) [?]; Kowiai -matóran 'to sit' (ABVD); Sekar mtonag 'to sit' (ABVD)
PMP *tuktuk 'to pound' (Blust 1999); PMP *tutu 'to pound' (Blust 1999); PCEMP *tutuk 'to pound' (Blust 1993)
SH: Buli tok 'to pound, beat' (ABVD)
Other: Irarutu -matu-ta 'to pound, beat' (ABVD); Kowiai -tu' 'to pound, beat' (ABVD); Sekar tuti 'to pound, beat' (ABVD)

PAN *tuqed 'tree stump; stubble' (ACD)
SH: Sawai tusl 'tree stump' (CAD)
Other: Irarutu túra 'stump' (M)
PMP *tuqelan 'condylous bone; bone of fauna exclusive of fish' (ACD); PMP *tuqela( $n, \boldsymbol{\eta}$ ) 'bone’ (Blust 1999)
SH: Buli loy 'bone' (ABVD) [?]
RA: Gebe kalวy 'bone’ (ABVD) [?]
CB: Biak kor 'bone' (H); Moor òro 'bone' (K); Umar tor 'bone' (K); Waropen kori 'bone' (ABVD); Yaur 'òórè 'bone' (K); Yerisiam kóovárà ‘bone' (K)
Other: Arguni tor 'bone' (ABVD)
PCEMP *tusi 'draw, make marks or designs' (ACD)
CB: Moor 'otî 'sharpen' (K) [?]; Serui-Laut toi 'to write' (Slm)
PAN *um-ai 'to come’ (ACD); PAN *um-aRi 'to come’ (ACD); PMP *maRi ‘come’ (Blust 1999); PCEMP *mai 'come’ (Blust 1993); PCEMP *maRi 'come’ (Blust 1993)
SH: Buli ma 'hither, toward the speaker' (ACD)
RA: As -ma 'to come' (ABVD); Biga mata 'to come' (ABVD)

CB: Ambai -ma 'to come' (ABVD); Ambai ra-ma 'come' (Slz); Ansus ma 'hither, in this direction' (P\&D); Ansus rama 'come' (P\&D); Biak ma 'toward the speaker' (H); Biak rā-ma 'come hither' (H); Dusner ma 'towards.here' (D\&M); Moor ráma 'come’ (K); Serui-Laut ra-ma 'to come’ (Slm); Umar rma 'come' (K); Wandamen ma 'hither ; to here' (G); Wandamen rama 'come’ (G); Wandamen rama 'to come' (ABVD); Waropen aede ma 'come here' (ACD); Waropen ma 'hither, toward the speaker' (ACD); Waropen rama 'to come' (ABVD)
Mamberamo: Warembori da-mo 'Come' (Donohue 1999)
Other: Arguni -ma 'to come' (ABVD); Irarutu má 'come, arrive' (M); Sekar ma 'to come' (ABVD)
PMP *utik 'marine fish with thorny skin' (ACD)
CB: Biak us 'pufferfish (both spiny and spineless types)' (H); Yaur bàbùhré 'puffer' (K)
PMP *wahiR 'water (fresh)' (Blust 1999); PCEMP *waiR ‘water (fresh)' (Blust 1993); PCEMP *wai ${ }_{1}$ 'fresh water' (ACD)
SH: Buli wai, waya 'water; river' (ACD); Buli waya 'water' (ABVD); Gane waya 'water' (ABVD); Sawai woe 'water' (CAD); Taba woya 'water' (ABVD)
RA: Ambel we 'water' (R); As we? 'water' (ABVD); Biga $v \varepsilon i$ ‘water’ (ABVD); Biga wey 'water' (R); Fiawat wey 'water' (R); Gebe wa 'water' (ABVD); Kawe 'way[a] 'water' (R); Laganyan 'way[a] 'water' (R); Ma'ya (M.) 'waya ${ }^{12}$ 'water' (R); Ma'ya (S.) 'waya ${ }^{3}$ 'water' (R); Wauyai 'way[a] 'water' (R)
CB: Ambai waya 'river' (Slz); Biak wār 'river, fresh water' (H); Dusner war 'water' (D\&M); Kurudu way ‘river’ (ACD); Moor gwàjara 'river' (K); Serui-Laut waya 'river' (Slm); Waropen ghai 'water' (ABVD)
Mamberamo: Warembori waren-do 'River' (Donohue 1999) [?]
Other: Arguni wir 'water' (ABVD); Irarutu wérz 'water' (M); Kowiai wálar 'water' (ABVD); Sekar wer 'water' (ABVD)

PMP *wai 'mango sp.' (ACD)
CB: Biak awa 'mango' (H); Moor gwarìto 'mango' (K); Moor igwá 'mango' (K); Yaur gwàihré 'mango' (K); Yerisiam kúgúài 'mango' (K)
Other: Kowiai i-wai 'mango' (ACD)
PMP *wakat 'mangrove root' (ACD)
SH: Buli wat 'a tree: Rhizophore' (ACD)
Other: Kowiai wa2at 'mangrove tree' (ACD)
PAN *walu 'eight (of non-humans)' (ACD)
SH: Sawai pe-wal ‘eight’ (CAD); Taba -wal 'eight’
RA: Ma'ya (M.) 'wa³l 'eight' (R); Ma'ya (S.) 'wa3l 'eight' (R)
CB: Biak wār ‘eight' (H)
PCEMP *wayka 'canoe' (ACD); PEMP *wayka 'outrigger canoe with dugout hull' (ACD)
RA: Ma'ya (S.) 'wa ${ }^{12} k$ 'canoe’ (R)

CB: Ambai wa 'canoe’ (Slz); Ansus wa 'canoe’ (P\&D); Biak wa(i) 'single or double outrigger canoe (used only of canoes with dugout hulls)' (H); Dusner wak 'boat' (D\&M); Moor gwá'a 'canoe' (K); Serui-Laut wa 'canoe' (Slm); Wandamen wa 'boat ; canoe' (G); Waropen gha 'boat, canoe' (ACD); Yerisiam gwáà 'canoe’ (K)
Mamberamo: Warembori wa-ro 'Canoe' (Donohue 1999); Yoke wapi 'canoe’ (Donohue 1999)
PAN *waqay 'foot, leg' (ACD); PCEMP *waqay 'leg, foot' (Blust 1993)
SH: Gane we 'leg/foot' (ABVD); Taba we 'leg/foot' (ABVD)
CB: Ambai we 'leg/foot' (ABVD); Ansus aeu 'leg' (P\&D); Biak we- 'foot, leg' (H); Dusner we 'foot, leg' (ACD); Serui-Laut ae 'foot' (ACD); Serui-Laut aen 'leg' (Slm); Wandamen ae 'foot' (ACD); Wandamen ai ‘leg' (G); Waropen $e$ 'foot' (ACD)
Other: Kowiai ai-m 'leg/foot' (ABVD)
PMP *waRej ‘vine, creeper' (ACD); PCEMP *waRaj 'rope' (Blust 1993)
SH: Buli wala 'rope’ (ABVD); Sawai wole 'rope' (CAD); Taba wola 'rope' (ABVD)
RA: As wali 'rope' (ABVD); Biga wili 'rope' (ABVD); Gebe wala 'rope' (ABVD)
CB: Ambai wai 'rope' (Slz); Ansus wai 'rope’ (P\&D); Moor gwàri'a 'rope’ (K); Serui-Laut wai 'rope’ (Slm) [?]; Umar wari 'rope' (K); Wandamen wai 'rope' (G) [?]; Yaur gwàríe 'rope' (K); Yerisiam gwáarí 'rope' (K)
Other: Arguni warir 'rope’ (ABVD); Irarutu wará 'rope’ (M); Kowiai wáras 'rope’ (ABVD); Sekar warwaras 'rope’ (ABVD)

PAN *waRi, 'day; sun; dry in the sun' (ACD)
CB: Ambai wo ‘sun' (Slz); Ansus wo ‘sun' (P\&D); Serui-Laut woo ‘sun' (Slm); Wandamen wor 'sun' (G)

Mamberamo: Warembori wau-ro ‘Dry in sun’ (Donohue 1999); Yoke weru ‘dry in sun’ (Donohue 1999)

PAN *wiRi ‘left side or direction’ (ACD); PMP *ka-wiRi 'left side’ (Blust 1999); PCEMP *ka-wiRi 'left side’ (Blust 1993)
CB: Moor sagwìri ‘left (side)' (K); Yaur vráagwìrìe 'left' (K); Yerisiam bágírú ‘left' (K)
PAN *zalan ${ }_{1}$ 'path, made by a human as opposed to an animal; way or means to do something' (ACD); PMP *zalan 'road' (Blust 1999); PMP *zalan 'path, made by a human as opposed to an animal; way or means to do something; wake of a boat; the Milky Way' (ACD); PCEMP *zalan 'road' (Blust 1993)
SH: Buli lalin 'road/path' (ABVD); Gane lolan 'road/path' (ABVD); Taba lolan 'road/path' (ABVD)
RA: As alin 'road/path' (ABVD); Biga li'lin 'road' (R); Fiawat lelin 'road' (R); Kawe li'lin 'road' (R); Laganyan li'lin 'road' (R); Ma'ya (M.) 'lili¹2n 'road' (R); Ma'ya (S.) 'lili ${ }^{3} n$ 'road' (R)
CB: Ambai ran 'road/path' (Slz); Ambai ran 'road/path' (ABVD); Ansus rang 'path' (P\&D); Dusner ran 'way' (D\&M); Dusner rando 'road' (D\&M); Moor ràrina 'path' (K); Serui-Laut ran 'path, road' (Slm); Umar jar 'path/road' (K); Wandamen ra 'road' (G); Wandamen ran 'road/path' (ABVD); Waropen rarado 'road/path' (ABVD) [?]; Yerisiam jáàrà 'path/road' (K) Other: Arguni rarin 'road/path' (ABVD); Irarutu radeni 'road/path' (ABVD) [?]; Kowiai raran 'path, road' (ACD)

PAN *zaRum 'needle' (ACD); PMP *zaRum 'needle' (Blust 1999); PCEMP *zaRum 'needle’ (Blust 1993)
SH: Gane laim 'needle' (ABVD)
RA: Matbat $l a^{1} m$ 'needle' (R)
Other: Kowiai láin 'needle’ (ABVD) [?]
CB: Moor a'à 'roast' (K); Umar ta ‘smoke' (K); Yerisiam ákáai ‘smoke’ (K)
CB: Yaur áá̀ré ‘sitting platform' (K); Yerisiam áatárà 'wood platform' (K)
CB: Biak abru 'bean' (H); Umar kvaru 'bean' (K); Wandamen kavaru 'bean' (G); Yaur óvárùuré 'bean' (K); Yerisiam kávárúùrà 'bean' (K)

CB: Ambai adai 'tall’ (Slz); Ansus tedai 'tall' (P\&D)
CB: Ansus adia 'fire' (P\&D); Serui-Laut adia 'fire' (Slm)
CB: Ambai adia 'fire' (Slz); Wandamen adia 'fire' (G)
CB: Ambai $\operatorname{adiwa(r)~'hide~(intr.)'~(Slz);~Wandamen~aniwa(ri)~'hide~;~conceal~;~keep'~(G)~}$
CB: Umar ae 'wing' (K); Yaur àájè ‘wing' (K)
CB: Ambai afai 'sail (v.)' (Slz); Serui-Laut afai 'to sail' (Slm)
CB: Ambai afai 'bow (n.)' (Slz); Ansus apai 'bow' (P\&D)
CB: Ambai afuran 'pigeon' (Slz); Moor kapurán 'large hawk' (K); Umar kapuran 'pigeon sp.' (K); Yerisiam kápúurámpì 'pigeon sp.' (K)
CB: Ambai ai 'mother' (Slz); Serui-Laut ai 'mother' (Slm)
CB: Ansus ai 'cry' (P\&D); Serui-Laut sai 'to cry' (Slm); Wandamen sais 'cry' (G); Wandamen sai[se] 'to cry' (ABVD)
SH: Buli aibobay 'butterfly' (Blust1978); Sawai kaleboben 'butterfly' (CAD)
RA: Biga kalabu'bun 'butterfly' (R); Kawe abyo'bon 'butterfly' (R); Kawe labyo'bon 'butterfly' (R); Laganyan abyo'bon 'butterfly' (R); Ma'ya (M.) kala'byobo ${ }^{12} n$ 'butterfly' (R); Ma'ya (S.) kala'byobo ${ }^{3} n$ 'butterfly' (R)
CB: Ansus apopa 'butterfly' (P\&D); Biak àpòp 'butterfly' (H); Wandamen apopi 'butterfly' (G)
Other: Irarutu apápro 'butterfly' (M)
CB: Biak aikor 'massoi' (H); Moor aikòri 'massoi tree' (K); Umar aikori 'massoi tree' (K)
SH: Buli ailoló 'woods/forest' (ABVD)
RA: Biga ailo 'woods/forest' (ABVD)
CB: Moor aimúa 'fruit sp.' (K); Umar ai 'tree sp.' (K)
CB: Ansus ai mungkang 'langsat' (P\&D); Serui-Laut aimungkai 'langsat' (Slm)
CB: Ambai airai 'gourd' (Slz); Ansus airaing 'pumpkin' (P\&D); Serui-Laut airay ‘squash, gourd’ (Slm); Umar ariain ‘squash sp.' (K); Wandamen arie 'squash' (G); Yaur áráipîré 'squash' (K)
CB: Ambai ai-rape 'beam' (Slz); Ansus ai rape 'beam_(wood)' (P\&D)

CB: Serui-Laut airaron 'forest, jungle' (Slm); Wandamen ai raro 'forest' (G)
CB: Ambai ai-rerawa 'bark (n.)' (Slz); Ansus ai rerawa 'bark' (P\&D)
CB: Ambai ai-ron 'ironwood' (Slz); Ansus rong 'ironwood' (P\&D); Wandamen ron 'ironwood' (G)
CB: Serui-Laut airua 'pillow' (Slm); Yerisiam árúùrà 'pillow' (K)
RA: Kawe a'it 'skin' (R); Laganyan a'it 'skin' (R); Wauyai ka'it 'skin' (R)
CB: Umar ajuki ‘water scoop' (K); Yaur àjù’ìvré 'water scoop' (K); Yerisiam ájúùkì 'water scoop’ (K)

RA: Biga amba'na 'we (excl.)' (R); Fiawat ame 'we (excl.)' (R); Kawe am'fata 'we (excl.)' (R); Kawe 'am(n)e 'we (excl.)' (R); Laganyan 'amne 'we (excl.)' (R); Matbat ya ${ }^{21} m$ 'we (excl.)' (R); Matbat $y a^{21} m a$ 'we (excl.)' (R); Ma'ya (M.) 'amne 'we (excl.)’ (R); Ma'ya (S.) 'amne 'we (excl.)' (R); Wauyai am'fat(a) 'we (excl.)' (R); Wauyai 'am(n)e 'we (excl.)' (R)

CB: Biak àmber 'foreigner' (H); Moor andéra 'foreign' (K); Serui-Laut ambé 'foreign' (Slm); Umar amber 'foreigner' (K); Yerisiam ámbéèr 'foreign' (K)

RA: Ambel ambu 'white' (R); As bus 'white’ (ABVD); Biga mabos 'white’ (ABVD); Biga ma'bus 'white' (R); Fiawat mehbuh 'white' (R); Kawe bu 'white' (R); Kawe bu'su 'white' (R); Laganyan buh 'white' (R); Matbat bu ${ }^{3}$ 'white’ (R); Ma'ya (M.) 'bu ${ }^{3}$ ' 'white' (R); Ma'ya (S.) 'bu ${ }^{3}$ s 'white' (R); Wauyai bu 'white' (R)
CB: Ambai bua 'white' (ABVD); Ansus bua 'white’ (P\&D); Serui-Laut bua 'white’ (Slm);
Wandamen busa[r] 'white' (ABVD); Wandamen vusa 'white' (G) [?]
RA: Ambel ambyau 'green/blue' (R) [?]; Biga ba'la 'green/blue' (R); Fiawat melaw 'green/blue'
(R); Kawe ma'la(o) 'green/blue' (R); Laganyan ma'la 'green/blue' (R); Matbat $\mathrm{bla}^{12} w$ 'green/blue' (R); Ma'ya (M.) ma'la3 'green/blue' (R); Ma'ya (S.) ma'la ${ }^{3}$ 'green/blue' (R); Wauyai ma'la 'green/blue' ( R )

RA: Ambel ame 'dry' (R); As $m \varepsilon$ ‘dry' (ABVD)
CB: Dusner amo ‘aunt' (D\&M); Moor amói ‘aunt’ (K); Wandamen amoi ‘aunt’ (G)
Mamberamo: Warembori amo 'FZ' (Donohue 1999)
CB: Biak amò 'armband used to guard against the snap of a bowstring' (H); Serui-Laut ampa 'armband' (Slm) [?]
CB: Ambai amo 'tree kangaroo' (Slz); Dusner amor 'tree.kangaroo' (D\&M); Yerisiam áóorè 'tree kangaroo' (K)

RA: Ambel amon 'heavy' (R); Matbat mo $^{1} n$ 'heavy' (R)
CB: Ambai ampi ‘eat (intr.)' (Slz); Ansus ampi 'eat' (P\&D); Wandamen api 'eat' (G)
CB: Moor amuà 'hide' (K); Waropen ame 'to hide' (ABVD)
CB: Ambai an 'scabies' (Slz); Ansus ang 'scabies' (P\&D)
CB: Moor 'anáma 'anchor' (K); Umar neman 'float' (K); Yerisiam knáàmè 'float' (K)
RA: Ambel anan 'burn (intr. 3S)' (R); Matbat pan 'burn (intr. 3S)' (R) [?]

CB: Umar an 'burn' (K); Yaur àágrè ‘driftwood’ (K); Yerisiam íaané 'burn' (K)
CB: Ambai andari 'mango' (Slz); Ansus andani 'mango' (P\&D); Serui-Laut anda 'mango' (Slm)
CB: Ambai andau 'breadfruit' (Slz); Ansus andaung 'breadfruit' (P\&D); Wandamen andau 'wild breadfruit' (G)
CB: Ambai andaun 'mat' (Slz); Ansus andaung 'mat' (P\&D); Serui-Laut andau 'mat' (Slm)
CB: Ambai andi-doni ‘where?' (ABVD); Ambai na-doni ‘where' (Slz); Serui-Laut nadonie 'where?' (Slm)
Mamberamo: Warembori an-do 'Laugh' (Donohue 1999); Yoke aambi 'laugh' (Donohue 1999)
CB: Serui-Laut andori 'fruit sp.' (Slm); Wandamen andori ‘guava' (G)
RA: Biga ane 'what?' (ABVD); Biga ma'ne 'what' (R); Matbat pane ${ }^{21} n$ 'what' (R)
Other: Arguni sanane 'what?' (ABVD)
CB : Umar anggana 'bait' (K); Yaur nánggánàivré 'bait' (K); Yerisiam ánggánáavè 'bait' (K)
RA: Ambel aykapupur 'round' (R); Fiawat popohul 'round' (R); Matbat sapu ${ }^{41}{ }^{12}$ ² ' 'round' (R); $^{2}$ ) Ma'ya (S.) kas'pupu ${ }^{3}$ l 'round' (R)

RA: As -ani ‘skin' (ABVD); Biga ka'in(o) 'skin' (R); Gebe kaini ‘skin' (ABVD); Ma'ya (M.) ka'ini ${ }^{3}$ 'skin (human)' (R); Ma'ya (M.) ka'in(o) ‘skin (animal)' (R); Ma'ya (S.) ka'ini ${ }^{3}$ 'skin (human)' (R); Ma'ya (S.) ka'in(o) 'skin (animal)' (R)

CB: Ambai aniai 'needle' (Slz); Moor anígwa 'needle' (K)
CB: Ambai anita 'breadfruit' (Slz); Ansus andita 'breadfruit' (P\&D); Serui-Laut anita 'breadfruit' (Slm); Wandamen andita 'k.o. fruit' (G); Wandamen andita buo 'breadfruit' (G)

CB: Ambai aniwa 'bee' (Slz); Ansus andiwa 'bee' (P\&D); Wandamen anibar 'bee' (G)
CB: Ambai ankadi ‘coconut’ (Slz); Ansus anggadi ‘coconut’ (P\&D); Serui-Laut angkari ‘coconut' (Slm); Wandamen anggadi 'coconut' (G)
CB: Ambai ankadi kuru 'coconut juice' (Slz); Wandamen anggadi karu 'coconut water' (G)
RA: Fiawat anlaw 'seed' (R); Kawe la(o) 'seed' (R); Laganyan la(o) 'seed' (R); Matbat ya ${ }^{21}$ w 'seed' (R) [?]; Wauyai la(o) 'seed' (R)

CB: Ambai anonai ‘wait' (Slz); Wandamen anota 'wait' (G)
CB: Ansus anou 'name' (P\&D); Serui-Laut anoma 'name' (Slm)
RA: Kawe (an) sa'gi ‘what' (R); Laganyan (an) sa'gya 'what' (R); Ma'ya (M.) fi'sa-gia 'what' (R); Ma'ya (S.) 'fisa 'what' (R); Wauyai (an) sa'gya 'what' (R)
CB: Ambai a(nsa)wai-bon 'papaya' (Slz); Ansus aiyawai 'papaya' (P\&D); Biak asàwa 'papaya' (H); Serui-Laut ansowai 'papaya' (Slm)

Mamberamo: Warembori anta-ro 'Fish’ (Donohue 1999); Yoke anta 'fish' (Donohue 1999)
CB: Ambai anten 'good' (Slz); Wandamen ate 'good' (G); Wandamen aten 'good' (ABVD)

CB: Ambai anumari 'fly (n.)' (Slz); Ansus amoma 'fly' (P\&D); Serui-Laut amandori marea 'fly (n.)' (Slm); Umar nanumen 'fly' (K); Wandamen amumar 'fly' (G)
Mamberamo: Warembori namamba-ro 'Fly’ (Donohue 1999)
CB: Ambai aparandin 'praise' (Slz); Ansus paranding 'praise' (P\&D)
CB: Wandamen aparapiri 'gnat' (G); Yaur párápìrìivré 'sandfly' (K)
CB: Wandamen apor 'catfish' (G); Yerisiam ápóòrà 'fish sp.' (K)
CB: Umar apre 'coconut husk' (K); Yaur àpré 'coconut husk' (K)
CB: Ansus ara 'bait' (P\&D); Biak ara 'fishing bait' (H)
CB: Moor àra'a 'garden fence' (K); Umar rar 'fence' (K); Yaur àrré 'fence' (K); Yerisiam áàrà 'garden fence’ (K)

CB: Ambai arahiai ‘dry (cloth)' (Slz); Moor araria'ı̂ ‘dry’ (K)
CB: Moor arái ‘sibling-in-law’ (K); Yaur árài ‘sibling-in-law’ (K)
CB: Moor aráná 'tree canopy' (K); Yerisiam áránà 'tree branch’ (K)
CB: Moor ararè 'untie' (K); Wandamen rera 'untie’ (G)
CB: Moor aráta 'coconut husk’ (K); Yerisiam ráàhà 'coconut husk’ (K)
CB: Ambai arawan 'branch’ (Slz); Serui-Laut arawai ‘branch' (Slm); Wandamen rawan(e) 'branch' (ABVD)

CB: Ambai arawin 'sail (n.)' (Slz); Ansus arawi ‘sail' (P\&D); Serui-Laut arawa 'sail' (Slm); Umar harawin 'sail' (K); Wandamen sarawi 'sail' (G); Yerisiam hárágwûrà 'sail' (K)

RA: As -are 'tongue' (ABVD); Ma'ya (M.) 'ar(o) 'tongue' (R); Ma'ya (S.) 'ara(o) 'tongue' (R)
CB: Wandamen arepa ‘cloud' (G); Waropen arepa 'cloud’ (ABVD)
CB: Dusner ari ‘week' (D\&M); Moor àri ‘worship' (K); Umar ari ‘worship' (K); Wandamen ari 'week' (G); Wandamen ari 'church’ (G)
CB: Biak ari ‘Sunday' (H); Moor marasína àri ‘Sunday' (K); Umar ire ari 'Sunday' (K); Yaur ojoh àaríe 'Sunday' (K)

CB: Umar arian 'hot water' (K); Yerisiam ríà 'hot water' (K)
CB: Moor aríara 'coral sp.' (K); Wandamen riar 'coral' (G)
CB: Moor arikâ 'look at' (K); Yerisiam áréekí 'see' (K)
CB: Ambai arikan ‘child’ (Slz); Ambai arikay 'child’ (ABVD); Serui-Laut ariang ‘child’ (Slm); Umar ariatun 'child' (K)
CB: Ansus aro ‘sago_patch’ (P\&D); Waropen aro ‘sago palm’ (Held 1942)
RA: Biga -asa 'to open, uncover' (ABVD); Gebe -ausa 'to open, uncover' (ABVD)
CB: Ansus Asua ‘Ansus' (P\&D); Yerisiam áhúuhvè 'Ansus' (K)
RA: Kawe at'big 'land turtle’ (R); Laganyan big 'land turtle' (R)

CB: Moor atíata 'bandicoot' (K); Waropen sisa 'bandicoot' (Held 1942); Yerisiam ásísìa 'bandicoot' (K)
RA: Fiawat atne 'we (incl.)' (R); Matbat $y a^{21} t$ 'we (incl.)' (R); Matbat $y a^{21} t a$ 'we (incl.)' (R); Ma'ya (M.) 'akne 'we (incl.)' (R); Ma'ya (S.) 'akne 'we (incl.)' (R)

CB: Ambai ato ‘arrow' (Slz); Ansus ato ‘arrow' (P\&D); Ansus atowini ‘arrow for birds, barbed arrow' (P\&D); Serui-Laut ato ‘arrow' (Slm); Serui-Laut atovin 'arrow' (Slm); Yaur àtòoré 'arrow' (K)

CB: Ambai ator 'count' (Slz); Ambai i-eto 'to count' (ABVD); Ansus tora 'count' (P\&D); Biak kor 'to count' (H); Serui-Laut dato 'to count' (Slm); Umar tor 'count' (K); Yaur túurnè 'count' (K)

CB: Serui-Laut atora 'to read' (Slm); Serui-Laut tori 'to read' (Slm); Yaur túurnáe 'read' (K)
CB: Ansus aturei ‘door’ (P\&D); Wandamen ature 'door’ (G)
CB: Serui-Laut au 'to call' (Slm); Wandamen sau 'call' (G); Wandamen sawi 'call' (G)
CB: Ansus aumarini ‘Mangrove snake’ (P\&D); Moor sasimarìni ‘sea snake sp.' (K)
CB: Ambai aunai ‘areca nut' (Slz); Ansus awu 'betel nut' (P\&D); Serui-Laut anoai ‘areca’ (Slm); Yerisiam háù 'areca' (K)

CB: Ambai avaha ‘star' (ABVD); Ambai awaka ‘star’ (Slz); Serui-Laut avaa ‘star' (Slm)
CB: Moor avarî ‘disappear’ (K); Yerisiam bábárà ‘disappear’ (K)
SH: Gane awá 'to vomit' (ABVD); Sawai we?we 'vomit' (CAD); Taba -wak 'to vomit' (ABVD)
CB: Biak $a w u$ 'to vomit' (H)
Other: Kowiai -arwe' 'to vomit' (ABVD)
CB: Ansus awa 'village' (P\&D); Serui-Laut awa 'village' (Slm)
CB: Ambai awa ‘sew' (Slz); Ambai i-awa 'to sew' (ABVD); Serui-Laut daawa 'to sew' (Slm); Umar wawar 'sew' (K); Wandamen aware 'sew' (G)

CB: Ansus awai ‘coral' (P\&D); Serui-Laut avai ‘coral’ (Slm); Wandamen awair ‘dead coral’ (G)
CB: Ansus awaku 'tobacco' (P\&D); Moor sambà’u 'tobacco' (K); Serui-Laut awaku 'tobacco' (Slm); Umar baku 'tobacco' (K); Wandamen sambaku 'tobacco' (G); Yaur hámbá'úùré 'tobacco’ (K); Yerisiam hábàkù 'tobacco' (K)

CB: Ambai awe-buka 'knee’ (Slz); Moor verevú’a ‘elbow' (K); Umar mavu ‘elbow’ (K); Yaur vrávúujè ‘elbow' (K); Yerisiam bábúgùa 'elbow' (K)
Mamberamo: Warembori ke-vera-bua-ro 'Elbow' (Donohue 1999)
CB: Ansus awi ‘sago_grub’ (P\&D); Moor avá’a ‘sago grub’ (K)
CB: Ambai awi(t) 'tie' (Slz); Moor aragwì 'tie' (K)
SH: Gane awoyan 'right' (ABVD); Sawai woncy 'right (side)' (CAD); Taba woyan 'right' (ABVD)
CB: Ambai moya 'right' (ABVD) [?]

RA: Biga -awut 'to bite' (ABVD); Biga l-a'ut 'bite' (R); Fiawat l-ewot 'bite' (R); Kawe a'ot[o] 'bite' (R); Laganyan $a^{\prime} o t[o]$ 'bite' (R); Ma'ya (M.) w-aka'o ${ }^{12} t$ 'bite' (R); Ma'ya (S.) w-aka'o ${ }^{12} t$ 'bite' (R); Wauyai $a^{\prime} o t[o]$ 'bite’ (R)
CB: Ansus aya 'tree grub’ (P\&D); Moor ái'a 'canoe worm' (K); Wandamen ayas ‘sago grub?' (G)
CB: Ambai aya-diru 'bat' (Slz); Ansus ayadiru 'bat' (P\&D)
RA: Laganyan $a^{\prime}$ yah(o) ‘seed' (R); Ma'ya (S.) ka'yas(o) 'seed’ (R)
RA: Biga ay ka'in(o) 'bark' (R); Kawe ga a'in(o) 'bark' (R); Laganyan ga a'in(o) 'bark' (R); Ma'ya (M.) 'ga3 ka'in(o) ‘bark’ (R); Ma'ya (S.) 'ga³ ka'in(o) ‘bark’ (R); Wauyai ga ka'in(o) ‘bark' (R)

RA: Ambel ay lo(y) 'forest' (R); Biga ay lo 'forest' (R); Fiawat ay lo 'forest' (R); Gebe kamun-alo 'woods/forest' (ABVD); Kawe a're lo 'forest' (R); Kawe ga lo 'forest' (R); Laganyan ga lol(o) 'forest' (R); Matbat ha ${ }^{3}$ y lamo ${ }^{3}{ }^{\prime}$ 'forest' (R); Ma'ya (M.) ' $g a^{3}$ 'lol(o) 'forest' (R); Ma'ya (S.) 'ga ${ }^{3}$ 'lol(o) 'forest' (R); Wauyai ga lol(o) 'forest' (R)

RA: Biga ay pu(o) 'heart' (R); Fiawat ay pu 'heart' (R); Kawe ta'pyuw 'heart' (R); Laganyan malam'pyu ‘heart' (R); Ma'ya (M.) pa'pyo 'heart' (R); Ma'ya (S.) 'ga ka'pyo 'heart' (R); Wauyai ga ka'pyu(o) 'heart' (R)
CB: Ambai ai-bon 'heart' (Slz); Ansus aiboi 'heart' (P\&D); Wandamen aibuo 'heart' (G)
RA: Kawe ba ‘say' (R); Laganyan ba ‘say' (R); Ma'ya (M.) 'bas(o) ‘say' (R); Ma'ya (S.) 'bas(o) ‘say' (R); Wauyai ba(o) 'say' (R)

RA: As -ba 'to sit' (ABVD); Biga -abai 'to sit' (ABVD); Biga l-a'bay ‘sit' (R); Fiawat l-ebay ‘sit' (R)
CB: Biak babĕr ‘naked’ (H); Umar va ‘naked’ (K); Yerisiam hìbàbá ‘naked’ (K)
CB: Yaur bàgwé ‘Bawei’ (K); Yerisiam bágwéi ‘Bawei’ (K)
CB: Ambai bai(t) 'pay' (Slz); Serui-Laut bait 'to pay' (Slm)
SH: Taba bakan 'big' (ABVD)
CB: Ambai baba 'big' (Slz); Ansus beba 'big' (P\&D); Biak ba 'big' (H); Biak baba ‘small' (H);
Wandamen baba 'big ; large ; parents’ (G); Waropen ba[wa] 'big’ (ABVD); Yaur nébátúe 'big’ (K) [?]

Other: Irarutu nabade 'big' (ABVD) [?]
CB: Ambai baki 'carry on back' (Slz); Wandamen bai 'carry' (G)
SH: Taba bale 'to turn' (ABVD)
RA: As -balck 'to turn' (ABVD)
CB : Ambai bera 'to turn' (ABVD); Biak kaběr 'to turn' (H); Biak kawĕr 'to turn' (H); Wandamen sobera 'to turn' (ABVD)
SH: Buli balit 'left' (ABVD); Gane abalit 'left' (ABVD); Sawai balet 'left (side)' (CAD); Taba balit 'left' (ABVD)
SH: Gane baloám 'wet' (ABVD); Sawai $n$-melom 'wet' (CAD)

RA: As malom ‘wet' (ABVD); Fiawat melom 'wet' (R); Kawe ba'lom[o] 'wet' (R); Laganyan ba'lom[o] ‘wet’ (R); Ma'ya (M.) ma'lo ${ }^{12} m$ 'wet' (R); Ma'ya (M.) ma'lomo ${ }^{12}$ 'wet' (R); Ma'ya (S.) ma'lo ${ }^{12} m$ 'wet' (R)
CB: Umar brom 'wet' (K); Yaur némárò 'wet' (K)
RA: Biga balyaban 'lightning' (ABVD); Kawe malya'man 'lightning' (R); Ma'ya (M.) ma'lyama ${ }^{12} n$ ‘lightning’ (R); Ma'ya (S.) ma'lyaban 'lightning’ (R)

RA: Biga ba'ni 'fly (insect)' (R); Fiawat benyuw 'fly (insect)' (R)
CB: Umar bar 'ball' (K); Wandamen bar 'ball' (G); Yaur bàárè 'ball' (K); Yerisiam báaré 'ball' (K)
CB: Umar bara 'young unmarried man' (K); Yerisiam báráavè 'young unmarried man' (K)
CB: Ambai barimu 'taro' (Slz); Ansus barimu 'taro' (P\&D); Moor barìmu 'taro' (K); Wandamen barimu 'k.o. taro root' (G)

RA: Biga ba'fef ‘all' (R); Fiawat besih ‘all' (R); Kawe be'sef 'all' (R); Laganyan ba'sef 'all' (R); Matbat batu ${ }^{12} p$ 'all' (R); Ma'ya (M.) ba'se ${ }^{3} f$ 'all' (R); Ma'ya (S.) ba'fe ${ }^{3} f$ 'all' (R); Wauyai ba'sef 'all' (R)
CB: Umar batem 'sibling-in-law' (K); Yerisiam báàtia ‘sibling-in-law' (K)
SH: Gane batól 'star' (ABVD); Taba battól 'star’ (ABVD)
SH: Gane bau 'snake' (ABVD)
RA: Gebe bai 'snake’ (ABVD)
CB: Ambai bau(r) 'split' (Slz); Ansus bau 'split (wood)' (P\&D)
CB: Ambai baya 'basket’ (Slz); Ansus bayai 'basket' (P\&D)
RA: Biga baybu'lu 'round' (R); Kawe awu'li ‘round' (R); Ma'ya (M.) bal'buli 'round’ (R); Wauyai kawu'li 'round' (R)
Mamberamo: Warembori boworo 'round' (Donohue 1999); Yoke boßua 'round' (Donohue 1999)
CB: Ambai be 'good' (ABVD); Biak bye 'good' (H); Serui-Laut ben 'good' (Slm); Wandamen besyen 'good' (ABVD)
Mamberamo: Warembori berasu-ro 'Left' (Donohue 1999); Yoke berasia 'left' (Donohue 1999)
CB: Ambai berika 'red' (ABVD); Biak rik 'red' (H)
SH: Sawai bst-bst 'earth = ground, soil' (CAD)
RA: Ambel bat 'ground' (R); Gebe batbat 'earth/soil' (ABVD); Kawe a'bat 'ground' (R); Laganyan $a^{\prime}$ bat 'ground' (R); Matbat ba3t 'ground' (R); Ma'ya (M.) 'ba²t 'ground' (R); Ma'ya (S.) 'ba²t 'ground' (R); Wauyai ka'bat 'ground' (R)
RA: Biga -bi 'to live, be alive' (ABVD); Ma'ya (S.) wa'bi ${ }^{12}$ 'to be alive' (R)
CB: Serui-Laut been 'to live' (Slm)
RA: Ambel bi ‘smoke’ (R); Kawe la'bi ‘smoke’ (R); Laganyan a'bli ‘smoke’ (R); Wauyai ka'bli 'smoke' (R)
SH: Gane bi 'to say' (ABVD); Gane bing 'to say' (ABVD)

RA: As -bin 'to say' (ABVD); Biga 'bitin(o) 'say' (R)
Other: Irarutu -biere 'to say' (ABVD)
RA: As -biap 'to cook' (ABVD); Biga -blap 'to cook' (ABVD)
CB: Serui-Laut biatoya 'thick' (Slm); Wandamen batoyar 'thick' (G); Yerisiam átátóorí 'thick' (K)
RA: Biga bi'nis 'hot' (R); Fiawat benih 'hot' (R); Kawe bi'ni ‘hot' (R); Laganyan bi'ni 'hot' (R); Ma'ya (M.) 'bini ${ }^{12} s$ 'hot' (R); Ma'ya (S.) 'bini ${ }^{3}$ s 'hot' (R); Wauyai bi'ni 'hot' (R)
CB: Ambai bireri 'no' (Slz); Ansus wereria 'no' (P\&D)
SH: Buli bisbis 'green' (ABVD); Sawai $n$-besbis 'green/blue' (CAD)
SH: Buli boboko 'head' (ABVD); Sawai bsbok-o 'head' (CAD)
CB: Umar bogre 'hat' (K); Yaur bòhgré 'hat' (K)
CB: Ambai boi ‘hit' (Slz); Serui-Laut boi 'to hit' (Slm)
CB: Moor bòku 'puffer sp.' (K); Yaur bó'úgwàavré 'puffer' (K); Yerisiam bókúugwà 'puffer sp.' (K)
CB: Biak bòpi 'father's sister' (H); Biak pòpi 'father's sister' (H); Umar bovai 'father's sister' (K); Yerisiam bóó 'father's sister' (K)

CB: Ambai boro-rawa 'lip' (Slz); Ansus woreu arawa 'lip' (P\&D)
CB: Moor bororóa 'fire starter' (K); Umar boha 'fire starter' (K); Yaur bòròròovré 'lighter' (K); Yerisiam bóróróovè 'bamboo sp.' (K)

SH: Buli bos 'to swell' (ABVD); Taba -bos 'to swell' (ABVD)
RA: Biga bot 'come' (R); Fiawat but 'come' (R); Kawe but 'come' (R); Laganyan but 'come' (R); Matbat bo ${ }^{3} t$ 'come' (R); Ma'ya (M.) 'bo ${ }^{3} t$ 'come' (R); Ma'ya (S.) 'bo ${ }^{3} t$ 'come' (R); Wauyai but 'come' (R)

CB: Ambai botenan 'bird of paradise' (Slz); Serui-Laut botena 'bird of paradise' (Slm)
CB: Ambai bo-yari ‘one’ (Slz); Ambai bo-yori ‘One’ (ABVD) [?]; Ansus koiri ‘one’ (P\&D); SeruiLaut boiri 'one’ (Slm); Wandamen siri 'one’ (G)
CB: Ambai bui ‘blow (flute)' (Slz); Ansus burari 'blow' (P\&D); Serui-Laut bui 'to blow' (Slm); Wandamen bub[u] 'to blow' (ABVD)

CB: Biak buk ‘marry' (H); Dusner parvut 'marry’ (D\&M)
SH: Sawai čalen-čว 'thousand' (CAD); Taba calan 'thousand'
SH: Buli cut 'to pound, beat' (ABVD); Gane tut 'to pound, beat' (ABVD)
RA: Biga -tut 'to pound, beat' (ABVD); Gebe katut 'to pound, beat' (ABVD)
CB: Ambai i-tutahi 'to pound, beat' (ABVD); Biak nuk 'to pound, beat' (H)
RA: Biga dagim 'meat/flesh' (ABVD)
Other: Arguni dagim 'meat/flesh' (ABVD)
CB: Ambai dai 'father' (Slz); Moor dài 'father' (K); Waropen daidai 'father' (ABVD); Yaur dáì 'father' (K); Yaur dáìdà 'father' (K); Yerisiam dáûl 'father' (K)

Mamberamo: Warembori dapen-do 'Fall' (Donohue 1999) [?]; Yoke sapa 'fall' (Donohue 1999) [?]
CB: Serui-Laut darefi 'to lick' (Slm); Wandamen repi 'lick' (G)
CB: Ambai daru 'sago stirrer' (Slz); Ansus duaru 'sago stirring spoon' (P\&D); Serui-Laut daru 'sago stirrer' (Slm); Yerisiam dìarúa 'sago stirrer' (K)
CB: Ambai dauroi ‘long’ (ABVD); Ambai dewaroi ‘long' (Slz); Serui-Laut doroi ‘long' (Slm);
Wandamen aroi ‘long' (ABVD); Waropen doro 'long' (ABVD)
SH: Gane dekin 'near' (ABVD); Sawai raken 'near' (CAD); Taba dakin 'near' (ABVD)
RA: Kawe de'le 'fly (insect)' (R); Laganyan la'le 'fly (insect)' (R); Ma'ya (M.) wara'le ${ }^{12}$ 'fly (insect)' (R); Ma'ya (S.) wara'le 'fly (insect)' (R)

RA: Fiawat deli ‘neck' (R)
Other: Irarutu darbuna 'neck' (ABVD); Irarutu drabúna 'neck, throat' (M)
CB: Ambai dere- 'tooth' (Slz); Ambai dore- 'tooth' (Slz); Ansus dereu 'tooth' (P\&D); Serui-Laut doreng 'tooth' (Slm); Wandamen dire 'tooth' (G)
CB: Ambai dereun ‘edge’ (Slz); Wandamen dere 'edge’ (G)
CB: Umar diet 'hit target' (K); Yerisiam ditía 'be hit' (K)
SH: Gane dimdím 'thunder' (ABVD)
Other: Arguni dudum 'thunder' (ABVD); Kowiai dúdun 'thunder' (ABVD); Sekar dudim 'thunder' (ABVD)
SH: Buli diy 'to sew' (ABVD); Gane badidíng 'to sew' (ABVD)
RA: Biga -fadin 'to sew' (ABVD)
CB: Ansus dira 'current_(ocean)' (P\&D); Umar dirar 'current' (K)
CB: Ambai diru 'night' (Slz); Ansus diru 'night' (P\&D); Serui-Laut diru 'night' (Slm); Wandamen diru 'night' (G)

CB: Ambai do 'inside' (Slz); Biak do 'in, inside' (H)
CB: Ambai dodoku 'bridge' (Slz); Ansus doudou 'bridge' (P\&D)
CB: Yaur dòivré 'money' (K); Yerisiam dóoi 'money' (K)
RA: Biga doloha'ya 'worm (sea worm)' (R); Ma'ya (M.) dulu'hai 'worm (sea worm)' (R)
SH: Gane dom 'woods/forest' (ABVD)
RA: As dam 'woods/forest' (ABVD)
SH: Buli dom 'to drink' (ABVD)
RA: Gebe -dom 'to drink' (ABVD); Kawe dum 'drink' (R); Wauyai dum 'drink' (R)
CB: Yaur rùmné 'drink' (K)
CB: Waropen dora 'rain' (ABVD)
Mamberamo: Warembori doro-ro ‘Rain’ (Donohue 1999)

CB: Waropen dora-ruru 'thunder' (ABVD)
Mamberamo: Warembori doroba-ro 'Thunder' (Donohue 1999)
CB: Biak dòsun ‘saltwater eel' (H); Yaur dìohùuvré 'eel sp.' (K)
Mamberamo: Warembori dote-ro 'Flower' (Donohue 1999); Yoke dot-ia 'flower' (Donohue 1999)
CB: Ambai dotu 'sound (v.)' (Slz); Moor vorò'u 'sound' (K); Wandamen rotu 'sound' (G)
CB: Ansus dowatang 'right' (P\&D); Wandamen vata 'right ; correct' (G); Wandamen vata 'right (side)' (G); Wandamen watan 'right' (ABVD)
CB: Umar dran 'leaf k.o.' (K); Yaur dràagré 'leaf used to relieve pain' (K)
CB: Umar drin 'wind' (K)
Other: Sekar diri 'wind' (ABVD)
RA: Kawe $d u$ 'lie down' (R); Wauyai du 'lie down' (R)
CB: Umar du 'bathe' (K); Yaur dùpìrè̀ 'bathe' (K)
CB: Umar dum 'suck' (K); Yaur dúmbrù'né 'suck' (K)
SH: Buli dumi ‘all' (ABVD); Buli fa-rumi 'all' (ABVD); Gane hadumik 'all' (ABVD)
CB: Dusner dunia 'earth' (D\&M); Wandamen dunia 'world' (G)
CB: Ansus duwira 'spring' (P\&D); Biak (i)ryuwĕr 'spring (source from a river)' (H)
RA: Fiawat alep 'hole' (R); Kawe lop 'hole' (R); Laganyan a'lep[e] 'hole' (R); Ma'ya (M.) ka'le ${ }^{12} p$ 'hole’ (R); Ma'ya (S.) ka'le ${ }^{12} p$ 'hole’ (R); Wauyai ka'lep[e] 'hole’ (R)
SH: Buli ēm 'to see' (ABVD); Gane am 'to see' (ABVD); Taba -am 'to see' (ABVD)
RA: Ambel l-em ‘see' (R); Biga -em 'to see' (ABVD); Biga l-em 'see' (R); Fiawat l-em 'see' (R); Gebe -em 'to see' (ABVD); Kawe w-em 'see' (R); Laganyan w-em 'see' (R); Ma'ya (M.) ' $w-e^{12} m$ 'see' (R); Ma'ya (S.) ' $w-e^{12} m$ 'see' (R); Wauyai $w$-em 'see' (R)
CB: Biak màm 'to see' (H); Dusner man 'see' (D\&M)
RA: Fiawat eme lih 'hand' (R); Ma'ya (M.) ka'ne 'le ${ }^{3}$ s 'hand' (R); Ma'ya (S.) ka'ne 'le ${ }^{3} \mathrm{~s}$ 'hand' (R)
RA: Fiawat eme pap 'foot' (R); Gebe kame pap 'leg/foot' (ABVD); Kawe kam 'foot' (R); Ma'ya (M.) ka'ne $p a^{12} p$ 'foot' (R); Ma'ya (S.) ka'ne 'pa ${ }^{12} p$ 'foot' (R); Wauyai 'kam[a] 'foot' (R)
CB : Umar e nakrih 'crazy' (K); Umar nakrih 'crazy person' (K); Yaur énà'rìihré 'crazy' (K)
RA: Fiawat enyat 'land turtle' (R); Ma'ya (M.) ka'nya ${ }^{12} t$ 'land turtle' (R)
RA: Fiawat e'pa ri ‘shoulder' (R); Kawe a'pya a'pli(o) ‘shoulder' (R); Laganyan a'pya pop(o) ‘shoulder' (R); Ma'ya (M.) ka'pya ka'ri(o) ‘shoulder' (R); Ma'ya (S.) ka'pya ka'ri(o) ‘shoulder' (R); Wauyai ka'pya pop(o) 'shoulder' (R)

CB: Serui-Laut warabon 'shoulder' (Slm); Wandamen varabo 'shoulder' (ABVD)
Other: Arguni aru 'shoulder' (ABVD)
CB: Biak èr 'to dig' (H); Yerisiam éerá ‘dig' (K)

CB: Ambai eran 'fishnet' (Slz); Ansus erang 'net' (P\&D); Umar heran 'fishnet' (K); Wandamen sera 'net' (G)
CB: Ambai -eria 'to swim' (ABVD); Ambai eriai ‘swim' (Slz); Ansus eiwai ‘swim' (P\&D)
CB: Moor etâ 'stand' (K)
Mamberamo: Warembori etan-do 'Stand' (Donohue 1999); Yoke enta 'stand' (Donohue 1999)
RA: Fiawat ewyal 'frog' (R) [?]; Laganyan kata'yal[a] 'frog' (R); Ma'ya (M.) kal'wya¹2l 'frog' (R)
RA: Gebe -fafon 'to cook' (ABVD)
CB: Biak (fa)fnap 'to cook' (H)
CB: Biak fararur 'to work' (H); Dusner parareur 'work' (D\&M)
CB: Biak fas 'to write' (H); Moor at̂̂ 'write' (K); Yerisiam àhía 'write' (K)
SH: Buli fatan 'to sniff, smell' (ABVD); Gane fotan 'to sniff, smell' (ABVD); Taba -hotan 'to sniff, smell' (ABVD)
RA: As -fsten 'to sniff, smell' (ABVD); Biga -fatam 'to sniff, smell' (ABVD); Gebe fiatan 'to sniff, smell' (ABVD)

CB: Ambai fau 'many' (Slz); Ansus tampau 'many' (P\&D); Dusner pau 'many' (D\&M); Wandamen pau 'a lot ; many' (G)

CB: Ambai feran 'cut (grass)' (Slz); Ansus pera 'cut' (P\&D); Wandamen pera 'cut' (G)
CB: Ambai fi-rotu ‘drum' (Slz); Ansus pindotu ‘drum' (P\&D); Wandamen pandotu 'traditional drum' (G); Wandamen piverotu 'traditional drum' (G)
SH: Buli fisan 'to choose' (ABVD)
RA: Biga -fihi 'to choose' (ABVD); Gebe fisa 'to choose' (ABVD)
CB: Biak fòki-fòki ‘eggplant’ (H); Moor papòki ‘eggplant’ (K); Umar popoki ‘eggplant’ (K); Wandamen popoki 'eggplant' (G); Yaur pópó'îvré 'eggplant' (K)
CB: Ambai fon 'front' (Slz); Ansus repong 'in front' (P\&D); Dusner pon 'front' (D\&M); Wandamen dopo 'in front of' (G)
SH: Gane fon 'to eat' (ABVD); Taba -ahon 'to eat' (ABVD); Taba -on 'to eat' (ABVD)
RA: Biga -apon 'to eat' (ABVD); Biga l-a'pon 'eat (intr.)' (R); Kawe a'pon 'eat (intr.)' (R); Laganyan $w$ - $a$ 'pon 'eat (intr.)' (R); Matbat $n$ - $a^{21}$ pon 'eat (intr.)' (R); Ma'ya (M.) $w$ - $a^{\prime} p o^{12} n$ 'eat (intr.)' (R); Ma'ya (S.) w-a'po ${ }^{12} n$ 'eat (intr.)' (R); Wauyai $a^{\prime}$ pon 'eat (intr.)' (R)
CB: Biak for 'fire' (H); Dusner por 'fire' (D\&M)
SH: Buli forār 'to squeeze' (ABVD)
RA: Biga -fogll 'to squeeze' (ABVD); Gebe kaforol 'to squeeze' (ABVD)
Other: Irarutu frífra 'wing' (M); Irarutu -frivre 'wing' (ABVD); Kowiai furifur 'wing' (ABVD)
SH: Buli fun 'dog’ (ABVD)

CB: Ambai wona ‘dog' (Slz); Ansus wona ‘dog' (P\&D); Biak nàf ‘dog' (H); Dusner nap ‘dog' (D\&M); Moor áuna ‘dog' (K); Umar vaen ‘dog' (K); Wandamen wona ‘dog' (G); Waropen una 'dog' (ABVD); Yerisiam náá ‘dog' (K)
Mamberamo: Warembori mena-ro ‘Dog’ (Donohue 1999); Yoke naaß ‘dog’ (Donohue 1999)
Other: Arguni afun 'dog' (ABVD); Irarutu fúna ‘dog' (M); Kowiai -afúna ‘dog' (ABVD)
Other: Arguni gadin 'name' (ABVD); Sekar garā̄ 'name' (ABVD)
SH: Buli gāg 'to scratch' (ABVD); Gane agág 'to scratch' (ABVD); Taba -gak 'to scratch' (ABVD)
RA: Gebe -agag 'to scratch' (ABVD)
SH: Gane gaji 'fat/grease’ (ABVD); Taba gaji 'fat/grease' (ABVD)
RA: Kawe gal a'it(o) 'lip’ (R); Laganyan gal a'it(o) ‘lip’ (R); Ma'ya (M.) 'gal ka'in(o) ‘lip’ (R); Ma'ya (S.) 'gal ka'in(o) 'lip' (R); Wauyai gal ka'it(o) 'lip’ (R)
RA: Biga ga'len ka'bay(o) 'neck' (R); Biga geli- kabayo ‘neck' (ABVD); Kawe a'lu 'lay(o) 'neck’ (R); Laganyan a'lu a'bay(o) ‘neck’ (R); Ma'ya (M.) ga'le ka'ri(o) ‘neck’ (R); Ma'ya (S.) 'kolo³ ka'ba(o) 'neck’ (R); Wauyai ka'lu 'bay(o) 'neck' (R)
CB: Umar kbae 'neck' (K); Yerisiam káaré 'neck' (K)
RA: Ambel gam 'night' (R); Matbat $k a^{1} m$ 'night' (R)
SH: Gane gamós ‘dry’ (ABVD); Taba gamós 'dry' (ABVD)
RA: Kawe ga'ni ‘sago (food)' (R); Laganyan ga'ni ‘sago (food)' (R); Matbat $n i^{12}$ 'sago (food)' (R); Ma'ya (M.) ga'ni ${ }^{3}$ 'sago (food)' (R); Ma'ya (S.) ga'ni ${ }^{3}$ 'sago (food)' (R)
Other: Kowiai garan 'neck’ (ABVD); Sekar gurar 'neck' (ABVD)
Other: Arguni gare 'year' (ABVD); Sekar gara 'year' (ABVD)
RA: Ambel ga(y) 'mouth’ (R); Kawe gal(o) 'mouth’ (R); Laganyan gal(o) 'mouth’ (R); Matbat $g^{21} l$ 'mouth' (R); Ma'ya (M.) 'gal(o) 'mouth' (R); Ma'ya (S.) 'gal(o) 'mouth' (R); Wauyai gal(o) 'mouth' (R)

RA: As gelas 'new' (ABVD); Biga gala'wa 'new' (R); Biga galawas 'new' (ABVD); Gebe galawau 'new' (ABVD); Kawe ga'wa 'new' (R); Laganyan gal'wa 'new' (R); Matbat wa³ ' 'new' (R); Ma'ya (M.) gala'wa ${ }^{12}$ 'new' (R); Ma'ya (S.) gala'wa ${ }^{12}$ 'new' (R); Wauyai gal'wa 'new' (R)

SH: Sawai gemune 'grass' (CAD)
RA: Gebe kamun 'grass' (ABVD)
SH: Gane git 'blood' (ABVD)
CB: Yaur jùtré ‘blood’ (K)
RA: Biga go 'hole' (R); Matbat $g a^{1} w^{\prime}$ 'hole' (R)
SH: Sawai gəf 'bamboo' (CAD) [?]
CB: Yerisiam gúàpà ‘bamboo sp.' (K) [?]
SH: Buli golo 'tail' (ABVD)
RA: Ambel gale(y) 'tail' (R)

CB: Umar goma 'maggot' (K); Yaur gómáàbré 'maggot' (K)
CB: Ansus gore marawang ‘snake,_k.o.' (P\&D)
Other: Arguni gor 'snake' (ABVD); Arguni wata-gor 'worm (earthworm)' (ABVD); Sekar gorgor 'worm (earthworm)' (ABVD)

SH: Buli gu 'snake' (ABVD); Sawai gu 'snake' (CAD)
RA: As gup 'earth/soil' (ABVD); Biga gago? 'earth/soil' (ABVD); Biga ga'gu 'ground' (R)
SH: Buli guguo 'nose' (ABVD); Sawai gegwes-o 'nose' (CAD)
CB: Moor gwapiatáo 'moray sp.' (K); Yaur gwápíatàavré 'eel sp.' (K); Yerisiam gwáapiàtè 'freshwater eel' (K)

CB: Yaur gwáváréjàavré 'goanna' (K); Yerisiam gwábáréèjà 'goanna' (K)
CB: Yaur gwòókàavré 'crow' (K); Yerisiam gwòókà ‘crow sp.' (K)
CB: Moor gworío 'tendon' (K); Yerisiam gwáarídìa 'tendon' (K)
RA: Kawe ha'fat(a) 'they' (R); Matbat hafo ${ }^{21}$ 'they' (R)
CB : Yaur hàgwàáré 'branch' $(\mathrm{K})$; Yerisiam óháháagwà 'tree branches' $(\mathrm{K})$
CB: Umar hamuen 'grass' (K); Wandamen samuen 'grass' (ABVD)
Other: Irarutu samwine 'grass' (ABVD)
SH: Gane hapuí 'how?' (ABVD); Gane pei hapuí 'how?' (ABVD); Taba ha pu 'how?' (ABVD)
CB: Moor haràma'a 'shark sp.' (K); Yerisiam héerápà 'hammerhead shark' (K)
CB: Umar hari ‘drum’ (K); Yaur hìrré ‘drum’ (K); Yerisiam áhíiráà ‘drum’ (K)
CB: Moor haríta 'Hariti' (K); Yaur hàrìtíe 'Hariti' (K)
CB: Umar haru 'coral' (K); Yerisiam háarú 'coral' (K)
CB : Umar hennen 'papaya' (K); Yaur hèrré 'papaya' (K); Yerisiam hénéróvà 'papaya' (K)
RA: Fiawat henyu 'nose' (R); Kawe a'nyu(o) 'nose' (R)
CB: Umar hiaranho kotem 'one thousand’ (K); Yaur híar rèebé ‘one thousand’ (K)
CB: Umar hibombrer 'cockroach' (K); Yaur hìbòogré 'cockroach' (K)
CB: Umar hien 'feces' ( K ); Yaur hìaré 'feces' ( K )
CB: Umar hih 'cloth' (K); Wandamen sis 'cloth’ (G); Yaur hìvie 'cloth' (K) [?]
CB: Umar hikro 'gecko' (K); Yaur hí’óròovré 'gecko sp.' (K)
CB: Umar hir 'dry in sun' (K); Yerisiam híiré 'dry in sun' (K)
CB: Umar honan 'outrigger' (K); Yaur hònggré ‘outrigger' (K)
CB: Umar honno 'roof' (K); Yaur hòròvré 'roof' (K)
CB: Umar hovane 'arrow' (K); Yaur óovàndé 'arrow' (K); Yerisiam óovánè ‘arrow’ (K)

CB: Umar huae 'vegetable' (K); Yaur húùré 'vegetable' (K)
CB: Umar huder 'go in' (K); Yaur hùdèeré 'go up' (K)
CB: Umar hugbo 'white' (K); Yaur húabóogrè 'white' (K)
CB: Yaur hùhùú'rè 'ask' (K); Yerisiam àhàhú 'ask' (K); Yerisiam hú 'ask' (K)
CB: Umar hun 'stab' (K); Yaur húundè ‘stab' (K); Yaur húunè ‘stab' (K); Yerisiam háhúnìa ‘stab’ (K); Yerisiam húnìa 'stab' (K)

CB: Umar hvatun 'tail' (K); Yaur hévúugrè 'tail' (K)
RA: Biga ies ‘dog’ (ABVD); Biga yes ${ }^{65}$ 'dog' (R); Ma'ya (M.) 'ye ${ }^{3}$ ' 'dog' (R)
RA: Biga if 'crocodile' (R); Fiawat wih 'crocodile’ (R); Laganyan wif 'crocodile' (R); Ma'ya (M.) 'wi ${ }^{12} f$ 'crocodile' (R); Ma'ya (S.) 'wi ${ }^{12 f}$ 'crocodile' (R); Wauyai yif 'crocodile’ (R)

RA: As ifsre 'that' (ABVD)
Other: Kowiai ifá 'that' (ABVD)
CB: Ambai i-isay 'to stab, pierce' (ABVD); Ambai isan 'stab' (Slz); Wandamen isan 'to stab, pierce' (ABVD); Wandamen isa(ne) 'stab' (G); Wandamen isani 'spear ; stab’ (G)

CB: Moor ìjo ‘3sg.Poss’ (K); Umar -i ‘3sg' (K); Umar i- ‘3sg' (K); Umar ije ‘3sg' (K); Yerisiam i'3sg’ (K); Yerisiam ìní ‘3sg' (K)

CB: Ambai i-kanui 'to spit’ (ABVD); Ambai kaniu 'spit' (Slz); Ansus kanyung 'spit' (P\&D); Wandamen kanisu 'to spit' (ABVD)

CB: Ambai ikararutu 'cold' (ABVD); Serui-Laut kararutu ‘cold' (Slm)
CB: Ambai i-kiri 'to bite’ (ABVD); Ambai kiri ‘bite’ (Slz); Ansus kari ‘bite’ (P\&D); Serui-Laut karifi 'to bite' (Slm); Wandamen karipe 'bite' (G)

CB: Ambai i-kuari 'to squeeze' (ABVD); Ambai kuwa(r) 'squeeze' (Slz); Wandamen kusar 'to squeeze' (ABVD)
RA: Ambel il 'mountain' (R); Biga yel 'mountain' (R); Kawe yil 'mountain' (R); Laganyan yil 'mountain' (R); Matbat he ${ }^{3} l$ 'mountain' (R); Ma'ya (M.) 'ye ${ }^{3} l$ 'mountain' (R); Ma'ya (S.) 'ye ${ }^{3} l$ 'mountain' (R); Wauyai yil 'mountain' (R)
CB : Moor éra 'mountain' (K); Yerisiam éerídìa 'mountain' (K)
CB: Yaur ìmìhìivré 'insect sp.' (K); Yerisiam kímíhívè ‘beetle sp.' (K)
CB: Ambai ina 'bone' (Slz); Ansus ina 'bone’ (P\&D); Serui-Laut ina 'bone’ (Slm); Wandamen sina 'bone' (ABVD)

CB: Serui-Laut ina ‘widow’ (Slm); Umar inar ‘widow’ (K); Yaur ínárpîré ‘widow’ (K); Yerisiam íniàrà ‘widow' (K)

CB: Ansus ina katuni 'aunt (mother's younger sister)' (P\&D); Wandamen sinia katu 'mother's younger sister' (G); Yerisiam ûnà àkùnía 'younger sister' (K)
CB: Yaur ínárúipûré ‘sea spirit' (K); Yerisiam ínárvúui 'river spirit' (K)
CB: Ambai indeatan 'nine' (Slz); Ansus indiatang 'nine' (P\&D)

CB: Ambai indea-toru 'eight' (Slz); Ansus indiatoru 'eight' (P\&D)
CB: Ambai inon-tarai 'person' (Slz); Ambai inonturai 'person/human being' (ABVD); Ansus inyontarai 'person' (P\&D); Serui-Laut inontarai 'person' (Slm)
CB: Ambai i-oa 'to stand' (ABVD); Ambai oa 'stand' (Slz); Ansus oa 'stand' (P\&D); Serui-Laut oa 'to stand' (Slm)
CB: Umar ire 'day' (K) [?]; Wandamen raria 'day' (ABVD)
Other: Irarutu rere 'day' (ABVD); Sekar rerera ‘day’ (ABVD)
CB: Ansus irei ‘sarong' (P\&D); Moor seregwía 'robe' (K); Umar hereu 'cloth' (K); Wandamen serei 'sarong cloth' (G); Yaur hèràuvré 'sarong' (K)
RA: Ambel irip(i) 'skin' (R)
CB: Biak rib ‘skin' (H)
CB: Moor iròri 'shellfish sp.' (K); Yerisiam diorí 'shellfish sp.' (K)
CB: Ambai i-ruti 'to hold' (ABVD); Ambai ru(t) 'hold' (Slz); Ansus ru 'hold' (P\&D); Wandamen ruti 'hold; grasp’ (G)

CB: Ambai i-so 'to throw' (ABVD); Ambai so 'throw' (Slz); Biak so 'to throw' (H); Moor toà 'throw' (K); Wandamen so 'to throw' (ABVD); Waropen soko 'to throw' (ABVD)
Other: Arguni -so 'to throw' (ABVD)
CB: Ambai i-tarabauri 'to split' (ABVD); Ansus tarabawi 'split (tree)' (P\&D)
CB: Ambai i-tawa 'to fall' (ABVD); Ambai tawa 'fall' (Slz); Ansus tawa 'fall' (P\&D); Wandamen tawa 'fall' (G)

RA: Gebe -itif 'to spit' (ABVD)
Other: Irarutu -matefe 'to spit' (ABVD)
CB: Ambai i-vata 'to lie down' (ABVD); Ambai watai 'lie down' (Slz); Wandamen bata 'to lie down' (ABVD); Wandamen vata 'lie down' (G)
CB: Ambai $i$-vori 'to buy' (ABVD); Ambai wori(r) 'buy' (Slz); Serui-Laut wori 'buy' (ACD);
Wandamen vori 'to buy' (ABVD)
CB: Yaur jáagrè ‘year’ (K); Yerisiam jámà ‘year’ (K)
CB: Yaur jáàré 'house' (K); Yerisiam ájáà ‘house' (K)
CB: Umar jabo 'cuscus sp.' (K); Yerisiam jàbó 'cuscus sp.' (K)
RA: Fiawat felum 'rain' (R); Kawe gu'lum 'rain' (R); Laganyan gu'lum 'rain' (R); Ma'ya (M.) 'goli ${ }^{12}$ m 'rain' (R); Ma'ya (S.) 'guli³m 'rain' (R); Wauyai gu'lum 'rain' (R)
CB: Umar jet 'mangrove worm' (K); Yerisiam jáàkà 'mangrove worm' (K)
RA: Ambel fey 'areca nut (Malay pinang)' (R); Biga gey 'areca nut (Malay pinang)' (R)
CB: Yaur jòoré 'new' (K); Yerisiam óoré ‘new’ (K)

RA: Ambel kabe 'nail' (R); Biga ka'ip(o) 'nail' (R); Fiawat esip 'nail' (R); Kawe a'seb(o) 'nail' (R); Laganyan $a^{\prime} \operatorname{seb}(\mathrm{o})$ 'nail' (R); Ma'ya (M.) $k a^{\prime} s i^{12} b$ 'nail' (R); Ma'ya (S.) $k a^{\prime} s^{3} p$ 'nail' (R); Ma'ya (S.) ka' $\mathrm{i}^{3} p$ 'nail' (R); Wauyai $k a^{\prime} \mathrm{Jeb}(\mathrm{o})$ 'nail' ( R )

CB: Yerisiam káabí ‘nail' (K) [?]
RA: Gebe kablei ‘dog’ (ABVD); Kawe a'bli ‘dog’ (R); Laganyan a'bli ‘dog’ (R); Ma'ya (S.) ka'ble ${ }^{3}$ ‘dog’ (R); Wauyai ka'bli ‘dog’ (R)

RA: Ambel kabom 'bone' (R); Biga ka'bom(o) 'bone' (R); Fiawat abom 'bone' (R); Kawe a'bom 'bone' (R); Laganyan a'bom 'bone' (R); Matbat bo ${ }^{21} m$ 'bone' (R); Ma'ya (M.) $k a^{\prime} b o^{12} m^{\prime}$ 'bone' (R); Ma'ya (S.) $k a^{\prime} b{ }^{12}{ }^{12}$ 'bone' (R); Wauyai ka'bom 'bone' (R)
RA: Ambel kabyot 'cold' (R); Biga kabu'tu 'cold' (R); Fiawat eblut 'cold' (R); Matbat $l^{12} t$ 'cold' (R); Ma'ya (M.) ka'bloti ${ }^{12}$ 'cold' (R); Ma'ya (S.) ka'bluti ${ }^{3}$ 'cold' (R)

CB: Ambai kadidu 'thunder' (ABVD); Ansus kaidu 'thunder' (P\&D); Biak kadadu 'thunder' (H); Serui-Laut kandidau 'thunder' (Slm)
CB: Ansus kaeri ‘urine’ (P\&D); Wandamen keri ‘defecate’ (G)
CB: Ambai kafa(r) 'fold' (Slz); Ansus kapa 'fold' (P\&D)
RA: Gebe kahña-k 'nose’ (ABVD); Wauyai (ka'nya) ka'sum(o) 'nose' (R)
CB: Ambai kahopa ‘earth/soil’ (ABVD); Ambai kakofa ‘earth/soil’ (Slz); Ansus kakopa ‘soil’ (P\&D); Serui-Laut kakofa 'land, soil' (Slm); Wandamen kakopa 'earth ; ground' (G)
CB: Ansus kai ‘chopsticks' (P\&D); Moor kaké ‘sago chopsticks' (K); Umar kae 'sago chopsticks' (K); Wandamen kai 'papeda spoon' (G); Yerisiam káèpà ‘sago chopsticks' (K)

RA: As kai 'long' (ABVD)
CB: Biak kwaïm 'long' (H); Biak kwaïn 'long’ (H); Umar kvon ‘a long time’ (K)
CB: Serui-Laut kai 'sago stirrer' (Slm); Umar kajavre 'sago stirrer' (K)
RA: Biga ka'i 'grass' (R); Kawe a'i 'grass' (R); Matbat kai ${ }^{12}$ ‘grass' (R); Ma'ya (M.) ka'i ${ }^{3}$ 'grass' (R); Ma'ya (S.) ka'i ${ }^{3}$ 'grass' (R); Wauyai ka'i 'grass' (R)

RA: Biga ka'i ko 'toe' (R); Biga ka'na ko 'finger' (R); Fiawat eme kop 'finger/toe' (R); Kawe kop $a^{\prime} u t[u]$ 'finger' (R); Ma'ya (M.) ka'ne 'kop(o) 'finger/toe' (R); Ma'ya (M.) 'ko ${ }^{12} p$ 'finger/toe' (R); Ma'ya (S.) ka'ne 'kop(o) 'finger/toe' (R)

CB: Ambai kaina 'cucumber' (Slz); Ambai kasina 'cucumber' (Slz); Serui-Laut kaina 'cucumber' (Slm); Umar kahnian ‘cucumber’ (K); Wandamen kasina ‘cucumber’ (G)

CB: Ansus kaitera 'corn' (P\&D); Biak kastera 'corn’ (H); Biak katera 'corn' (H)
CB: Ambai kaiveva 'lightning' (ABVD); Ambai kaiwewa 'lightning' (Slz); Ansus keiwiewari ‘lightning’ (P\&D); Serui-Laut kiabobari ‘lightning’ (Slm); Wandamen kabiebar 'lightning’ (G)

SH: Buli kakalā 'red' (ABVD)
RA: Matbat $k a^{3} l a^{3} n$ 'red' (R)
CB : Yerisiam káráráré 'red' $(\mathrm{K})$

CB: Moor kakaná’a 'jackfruit' (K); Serui-Laut nakinaki 'jackfruit' (Slm); Umar aknak 'fruit sp.'
(K); Wandamen akanak 'breadfruit' (G); Yaur á’nápîré 'fruit sp.' (K); Yerisiam náknáàkà 'fruit sp.' (K)
RA: Ambel kalo ‘star’ (R); Biga kala'mo 'star’ (R); Laganyan a'lo ‘star' (R); Matbat kamo ${ }^{12}$ w 'star’ (R)

RA: Biga ka'lu(o) 'tail' (R); Kawe a'yu 'tail' (R); Laganyan a'yu(o) 'tail' (R); Ma'ya (M.) ka'yu(o) 'tail' (R); Ma'ya (S.) ka'yu(o) 'tail' (R); Wauyai ka'yu(o) 'tail' (R)

CB: Umar kama 'shellfish sp.' (K); Wandamen kama 'k.o. spiral shell' (G)
CB: Ansus kamadadirui ‘swallow' (P\&D); Serui-Laut kamaridiri 'bird sp.' (Slm)
CB: Ambai kamambo 'butterfly' (Slz); Serui-Laut kamambo 'butterfly' (Slm)
CB: Ansus kamawo ‘starfish' (P\&D); Umar kabuabu 'sea star' (K); Wandamen kamuavu 'starfish' (G)

CB: Ansus kambirei 'hole’ (P\&D); Wandamen kamberei 'hole’ (G)
CB: Ambai kamiai ‘seed' (Slz); Ansus kami ‘seed’ (P\&D)
CB: Ambai kamiai ‘stone’ (Slz); Ansus kami 'stone’ (P\&D); Serui-Laut kami ‘stone’ (Slm)
Other: Irarutu kamí 'stone' (M)
RA: Biga kamiaran 'small' (ABVD)
CB: Moor marà'u 'small' (K); Waropen kumara 'small' (ABVD)
SH: Gane kamudi 'thick' (ABVD); Taba kamudu 'thick' (ABVD)
CB: Umar kamo 'thick' (K)
CB: Ambai kamuki 'friend’ (Slz); Dusner kamuk 'friend’ (D\&M); Moor kamúka 'friend’ (K); Umar kamuk 'friend' (K); Yaur ámú'rè 'friend' (K)

CB: Ambai kamutu 'anchor' (Slz); Ansus kamutu 'anchor' (P\&D); Biak kàmutu 'anchor' (H); Moor kamitúa 'anchor' (K); Umar kamutu 'anchor' (K); Wandamen kamita 'anchor' (G); Yaur àmùtùuvré 'anchor' (K); Yerisiam kámútúuvè 'anchor' (K)

RA: Biga ka'nan 'sago (food)' (R)
CB: Ambai anan 'sago pudding' (Slz); Ansus anang ‘sago_tree' (P\&D); Ansus anang 'sago_(processed)' (P\&D); Serui-Laut ana 'sago porridge’ (Slm); Umar utan ‘sago flour' (K) [?]; Wandamen ana 'sago porridge' (G); Yerisiam íníaahánà ‘sago porridge' (K)

CB: Ambai kananata 'firefly' (Slz); Umar natar 'firefly' (K)
CB: Ambai kanay 'neck' (ABVD)
Mamberamo: Warembori koran 'neck' (Donohue 1999); Yoke karamb- 'neck’ (Donohue 1999)
CB: Umar kaneba 'honey' (K); Yerisiam kénébà 'honey' (K)
CB: Ansus kangkani ‘White-bellied Sea Eagle’ (P\&D); Biak mangangan 'large bird, bird of prey’ (H); Umar ggan ‘eagle’ (K); Wandamen kakane ‘eagle’ (G); Yaur gánggánìivré 'hawk' (K); Yerisiam gánggáaní 'hawk sp.' (K)

Other: Irarutu kangkáni ‘eagle’ (M)
SH: Buli kaño 'ear' (ABVD)
RA: Gebe kahña- 'ear' (ABVD)
CB: Ambai kantantini 'cockroach' (Slz); Ansus kantanting 'cockroach' (P\&D)
RA: Biga ka'nun(o) 'human hair (body)' (R); Gebe kaliñun 'hair' (ABVD); Ma'ya (M.) ka'nyunu³t 'human hair (body)' (R); Ma'ya (S.) ka'nyunu ${ }^{3} t$ 'human hair (body)' (R)

RA: Biga ka'nyan ‘small' (R); Kawe ga'nan 'small' (R); Laganyan ga'nan 'small' (R); Ma'ya (M.) ga'na ${ }^{12} n$ 'small' (R); Ma'ya (S.) ga'na ${ }^{12} n$ 'small' (R); Wauyai ga'nan 'small' (R)
CB: Ansus kapa 'sea_sponge' (P\&D); Ansus kapo 'fungus' (P\&D); Wandamen kapo 'mushroom' (G)
Other: Irarutu kapúpa 'mushroom' (M)
CB: Ansus kapa dupapei ‘Spotted Cuscus' (P\&D); Ansus kapa dura 'red cuscus' (P\&D); Ansus kapa duwua 'white cuscus' (P\&D); Ansus kapa gondoi 'cuscus,_k.o._terrestrial' (P\&D); Biak kapa 'cuscus' (H)
CB: Ansus kapa musi 'tree kangaroo' (P\&D); Ansus musi 'tree kangaroo' (P\&D); Moor vùsi 'tree kangaroo' (K); Waropen wusi 'tree kangaroo' (Held 1942)
SH: Buli kapcut 'thick' (ABVD)
RA: Gebe kapcit 'thick' (ABVD)
CB: Biak kàprer 'tongue' (H)
Mamberamo: Warembori ke-peren-do 'Tongue’ (Donohue 1999)
Other: Sekar kerir 'tongue' (ABVD)
RA: Ambel kaprun 'feather' (R); As pərun 'feather' (ABVD); Biga kanono 'feather' (ABVD); Biga ka'nun(o) 'feather' (R); Fiawat enun 'feather' (R); Laganyan ap'nuni 'feather' (R); Ma'ya (M.) ka'nyun(o) 'feather' (R); Ma'ya (S.) ka'lun(o) 'feather' (R); Wauyai kap'nun 'feather' (R)

SH: Gane kapudung ‘dull, blunt’ (ABVD)
CB: Serui-Laut kabu 'dull, blunt' (Slm); Wandamen kabur 'dull, blunt' (ABVD); Yerisiam kámpúté 'blunt' (K)
Other: Sekar akapugam 'dull, blunt' (ABVD)
RA: Ambel kapyan(i) 'hand' (R); Kawe kop(o) 'hand' (R); Laganyan a'ne kop(o) 'hand' ( R )
CB: Umar kar 'thick bamboo sp.' (K); Wandamen karie 'k.o. bamboo' (G); Yerisiam káàrà 'bamboo' (K)

CB: Ambai karata ‘jellyfish’ (Slz); Ansus karata ‘jellyfish’ (P\&D); Serui-Laut karata ‘jellyfish’ (Slm); Wandamen sarata 'jellyfish' (G)

CB: Biak karĕmbòbò ‘shellfish sp.' (H); Moor korombòvi ‘shellfish sp.' (K); Wandamen korombowi 'cowrie shell' (G)
RA: As karen 'to sew' (ABVD); Gebe fakariy 'to sew' (ABVD)
CB: Moor kari'ì 'throw' (K); Serui-Laut ka 'to throw' (Slm); Yerisiam káará 'throw' (K)

CB: Biak karuk 'to cut, hack' (H); Yerisiam ká róokáté 'cut' (K)
CB: Ambai kase 'tie' (Slz); Ansus kaei 'tie' (P\&D); Wandamen kasie 'tie' (G); Wandamen kasies 'to tie up, fasten' (ABVD)
CB: Ambai kasou 'angry' (Slz); Serui-Laut kaisau 'angry' (Slm); Wandamen kasio 'angry' (G)
Other: Arguni kasumbe 'red' (ABVD); Sekar kasumba 'red' (ABVD)
CB: Ansus katerine 'just now' (P\&D); Wandamen katuerinei 'progressive aspect ; just now' (G)
CB: Moor katibúa 'maize’ (K); Umar kavuki ‘corn' (K); Wandamen pavuki ‘corn' (G); Yerisiam kávókívè 'corn’ (K)

SH: Gane katobat 'short' (ABVD); Sawai $n$-ketobe 'short' (CAD)
Other: Kowiai tóba 'short' (ABVD)
RA: Biga ka'tum(o) ‘seed' (R); Ma'ya (M.) 'fum(o) ‘seed' (R)
CB: Ambai kauboi ‘worm' (Slz); Wandamen kasibui ‘worm (earthworm)' (ABVD)
CB: Serui-Laut kaumayai 'fog' (Slm); Wandamen kamayow 'fog' (ABVD)
CB: Ambai kaun 'ginger' (Slz); Serui-Laut kau 'ginger' (Slm)
CB: Biak kawàsa 'person/human being' (H); Wandamen kawasa 'guest ; person ; society' (G)
RA: Biga ka'wat(o) 'root' (R); Fiawat awa 'root' (R); Gebe kawao 'root' (ABVD); Kawe a'wat(o) 'root' (R); Laganyan $a^{\prime} h a t(0)$ 'root' (R); Ma'ya (M.) ka'wat(o) 'root' (R); Ma'ya (S.) ka'wat(o) 'root' (R); Wauyai ka'wat 'root' (R)
CB: Ambai kaweini ‘prawn’ (Slz); Ansus kaweing 'shrimp' (P\&D)
CB: Ansus kawio 'speak' (P\&D); Wandamen kavio 'speak; talk' (G)
CB: Ansus kawio 'language' (P\&D); Serui-Laut kavo 'language' (Slm); Wandamen kavio 'word ; language' (G)
CB: Ansus kawuwu 'bamboo,_k.o._thin' (P\&D); Moor kòvu'a 'bamboo' (K) [?]; Wandamen kavuvui 'bamboo shoot' (G)
CB: Umar kdiar 'leech' (K); Yerisiam ídíèrà 'leech' (K)
Mamberamo: Warembori keere-ro 'Tall' (Donohue 1999); Yoke keri 'tall' (Donohue 1999)
CB: Ambai kefa 'near' (ABVD); Ambai kefan 'near' (Slz); Serui-Laut (na) kefa 'near' (Slm)
CB: Ambai keke ‘green’ (Slz); Ansus mekae ‘green’ (P\&D); Umar mkat ‘green’ (K); Wandamen kake 'green/blue' (G); Waropen kakesio 'green' (ABVD)

Mamberamo: Warembori ke-kombo-ro ‘Bone’ (Donohue 1999); Yoke akombu 'bone’ (Donohue 1999)

CB: Biak kenĕm 'to live, be alive' (H); Umar tomun 'live’ (K) [?]; Wandamen tenam 'live’ (G)
Mamberamo: Warembori k-epi-ro ‘Leg’ (Donohue 1999); Yoke pi ‘leg’ (Donohue 1999)
CB: Umar ker 'sago waste' (K); Yaur èrré 'leftover sago' (K)
CB : Biak kèrĕt 'clan' (H); Moor kèret 'clan' (K)

CB: Biak kèrĕt 'canoe shelter' (H); Moor kèret 'canoe shelter' (K); Umar keret 'canoe shelter' (K)
CB: Ambai kerira 'bad, evil' (ABVD); Wandamen kariria 'bad ; evil' (G)
RA: As kerja 'to work' (ABVD); Biga -karajan 'to work' (ABVD); Gebe karajan 'to work' (ABVD)
CB: Dusner kardia 'work' (D\&M); Dusner kardian 'work' (D\&M); Moor kardíana 'work' (K); Yerisiam kárádíané 'work' (K)
Other: Kowiai -’arjang 'to work' (ABVD); Sekar kərja 'to work' (ABVD)
Mamberamo: Warembori ke-waro-ro 'Stomach' (Donohue 1999); Yoke waro 'stomach' (Donohue 1999)

CB: Biak kfo 'to shoot (with an arrow)' (H); Dusner tpo 'shoot.with.an.arrow' (D\&M)
CB: Ansus kiai 'completely' (P\&D); Wandamen kiais 'empty ; gone' (G)
Mamberamo: Warembori -kiaw 'completive' (Donohue 1999); Yoke -kiaw 'completive' (Donohue 1999)

CB: Umar kibuni 'goanna' (K); Yerisiam kímbúníivè 'goanna sp.' (K)
SH: Gane kidkuda 'black' (ABVD); Taba kuda 'black' (ABVD)
Other: Arguni udude 'black' (ABVD); Sekar kudkuda 'black' (ABVD)
CB: Ambai kikairi ‘leech’ (Slz); Serui-Laut kiairi ‘leech' (Slm)
SH: Gane kiklé 'hair' (ABVD); Gane kiklena 'hair' (ABVD); Taba kakle 'hair' (ABVD)
CB: Umar kimbo 'chile pepper' (K); Yaur ìmbòovré 'chile pepper' (K); Yerisiam kímbóovè 'chile pepper' (K)

CB: Ambai kipau 'crooked’ (Slz); Ansus kepau 'crooked' (P\&D)
RA: Ambel kitem ‘one’ (R); Biga ka'tem ‘one’ (R); Biga katen ‘One’ (ABVD); Fiawat әtem ‘one’ (R); Kawe a'tem 'one' (R); Laganyan a'tem 'one' (R); Matbat te ${ }^{3} m$ 'one' (R); Ma'ya (M.) ka'te ${ }^{12} m$ 'one’ (R); Ma'ya (S.) ka'te ${ }^{12} m$ 'one' (R); Wauyai ka'tem 'one' (R)

CB: Umar kotem 'one’ (K)
CB : Umar kman 'worm' (K); Yaur màambré 'worm' (K)
CB: Umar kmaren 'barbed spear' (K); Wandamen kamareni 'many-pointed fishing spear' (G)
CB: Biak knenĕf 'peer' (H); Moor aninì 'peer' (K); Umar tnin 'peek at' (K)
CB: Moor kodovío 'frog' (K); Wandamen kodo 'frog' (G)
CB: Ambai koi 'bed’ (Slz)
Other: Irarutu kói 'bed' (M)
RA: As ks-k ‘snake’ (ABVD); Biga kok ‘snake’ (R); Fiawat ko ‘snake’ (R); Kawe kok ‘snake’ (R); Laganyan kok ‘snake' (R); Matbat $k o^{3} k$ 'snake' (R); Ma'ya (M.) 'ko ${ }^{12}$ k ‘snake' (R); Ma'ya (S.) 'ko ${ }^{12}$ k 'snake' (R)
CB: Biak ikàk 'snake’ (H)
SH: Gane koku 'neck' (ABVD); Sawai koko 'neck' (CAD)

RA: Ambel kakon 'neck' (R); As -akı 'neck' (ABVD); Gebe kokə 'neck' (ABVD)
SH: Taba kolay 'snake' (ABVD)
CB: Biak kòrwèn ‘legendary giant snake’ (H); Dusner kariom ‘snake’ (D\&M); Umar kro ‘snake' (K); Wandamen koro 'snake’ (G); Wandamen korow 'snake’ (ABVD)

SH: Gane komu 'hand' (ABVD); Taba komo 'hand' (ABVD)
RA: Gebe kame 'hand' (ABVD)
CB: Umar konori ‘flute' (K); Yaur ónórì̀vré 'flute' (K)
CB: Ambai kontai 'also' (Slz); Wandamen kota 'also ; too' (G)
CB: Biak kosàn 'bamboo sp. (edible)' (H); Wandamen kosa 'k.o. bamboo' (G)
RA: Biga kotor 'dirty' (ABVD)
CB: Yaur 'òotòrè ‘dirty' (K)
Other: Arguni koturo 'dirty' (ABVD); Kowiai 'otor 'dirty' (ABVD)
CB: Biak kum 'feather' (H); Wandamen tu[m] 'feather' (ABVD)
CB: Ansus kumai 'child' (P\&D); Dusner komoi ‘son' (D\&M); Moor komòi ‘male child' (K);
Wandamen komoi 'term of address for a younger man from an elder' (G)
CB: Moor kumamí 'sea cucumber' (K); Umar kumami ‘sea cucumber' (K); Wandamen kumami ‘sea cucumber' (G)

CB: Serui-Laut kumariri ‘spinach’ (Slm); Wandamen rau kumawi ‘spinach’ (G); Yaur úmágwìrìjé ‘spinach sp.' (K); Yerisiam kómágwìirì ‘spinach’ (K)

CB: Ansus kurakura 'White-lipped Tree Frog' (P\&D); Biak kròkrò 'frog' (H); Moor karekuré'a 'frog' (K); Serui-Laut kura kurai 'frog' (Slm)

CB: Ambai kuru- 'back' (Slz); Ambai kuruu- 'back' (ABVD); Biak kru- 'back' (H); Wandamen karu 'back' (ABVD)
RA: Biga -kut 'to cut, hack' (ABVD)
CB: Ambai i-kutui 'to cut, hack' (ABVD); Ambai kutu 'cut through' (Slz); Ansus tekutu 'cut' (P\&D); Dusner kut 'cut' (D\&M); Dusner totkut 'cut.into.pieces' (D\&M); Serui-Laut kutu 'to cut' (Slm); Serui-Laut kutui 'to cut down' (Slm); Umar utu 'cut down' (K); Wandamen kutu 'cut' (G)
RA: Gebe kuts 'head' (ABVD); Kawe a'ut sap(o) 'head' (R); Ma'ya (M.) ka'ut 'head' (R); Ma'ya (S.) $k a^{\prime} u^{3} t$ 'head (fig.)' (R); Ma'ya (S.) ka'ut(o) 'head' (R); Wauyai ka'ut 'head' (R)

SH: Taba kutu 'small' (ABVD) [?]
CB: Ambai katui 'small' (Slz); Ambai ketui 'small' (ABVD); Biak kasun 'small' (H) [?]; Wandamen katu 'small' (G); Yerisiam ákúuná ‘small' (K)
CB: Ansus kuwera 'bathe (self)' (P\&D); Serui-Laut kobira 'to bathe' (Slm); Wandamen kubira 'bathe' (G)

RA: Matbat $l a^{3} n$ 'song' (R)
CB: Wandamen ran(u) 'song' (G)

SH: Gane lai ‘stone’ (ABVD); Sawai lyy 'stone’ (CAD); Taba lalai ‘stone’ (ABVD)
RA: As lali ‘dirty' (ABVD)
CB: Ambai rarika ‘dirty’ (Slz); Wandamen rariai ‘dirty’ (ABVD); Yerisiam óráríijárà ‘dirty’ (K)
RA: Ambel lalo 'thunder' (R); As als? 'thunder' (ABVD); Biga lo'lo 'thunder' (R); Gebe lolo 'thunder' (ABVD); Kawe 'lol[o] 'thunder' (R); Laganyan 'lol[o] 'thunder' (R); Ma'ya (M.) 'lolo ${ }^{12}$ 'thunder' (R); Ma'ya (S.) 'lolos 'thunder' (R); Wauyai 'lol[o] 'thunder' (R)
RA: Ambel lan 'fly (insect)' (R); Matbat $k a l{ }^{12} \eta$ 'fly (insect)' (R)
RA: Ambel lanyan wane 'today' (R); Biga man'yan ene 'today' (R); Fiawat yahan eme 'today' (R); Kawe yan gin 'today' (R); Laganyan lyaha'pin 'today' (R); Matbat la ${ }^{121}$ ino 'today' (R); Ma'ya (M.) 'lyasan ne 'today' (R); Ma'ya (S.) 'lasan 'gine 'today' (R); Wauyai lan 'gine 'today' (R)

SH: Buli las 'near' (ABVD)
RA: Gebe las 'near' (ABVD)
RA: Ambel l-asabyay 'burn (trans.)' (R); Kawe a'blay 'burn (trans.)' (R); Wauyai w-asa'blay 'burn (trans.)' (R)

RA: Ambel layn ‘sand’ (R); Biga len ‘sand’ (R); Fiawat len ‘sand’ (R); Kawe len ‘sand’ (R); Laganyan a'len 'sand' (R); Matbat ye ${ }^{3} n$ 'sand' (R); Ma'ya (M.) 'le $e^{12} n$ 'sand' (R); Ma'ya (S.) ' $l e^{12} n$ 'sand' (R); Wauyai len 'sand' (R)

RA: Ma'ya (M.) ' $l e^{3}$ 'land' (R); Ma'ya (S.) 'le ${ }^{3}$ 'land' (R)
CB: Ambai rei 'land’ (Slz); Dusner re 'landward' (D\&M); Moor ré 'land' (K); Serui-Laut reirei 'land' (Slm); Wandamen rei ‘land ; shore’ (G)
SH: Gane lekat 'bad, evil' (ABVD)
RA: Gebe le 'bad, evil' (ABVD)
SH: Gane lekat 'rotten' (ABVD); Taba lekto 'rotten' (ABVD)
SH: Buli lēmlēm 'lightning' (ABVD)
RA: Ambel lalew 'lightning' (R); As lcu 'lightning’ (ABVD); Gebe lamlcm 'lightning' (ABVD); Laganyan lab'leb 'lightning' (R); Wauyai lab'leb 'lightning' (R)
RA: Ambel l-ey 'eat (tr.)' (R) [?]; As -ap 'to eat' (ABVD); Biga l-a 'eat (tr.)' (R); Fiawat l-a 'eat (tr.)' (R); Kawe w-a 'eat (tr.)' (R); Laganyan w-a 'eat (tr.)' (R); Matbat $n-a^{21}$ 'eat (tr.)' (R); Ma'ya (M.) w-a 'eat (tr.)' (R); Ma'ya (S.) w-a 'eat (tr.)' (R); Wauyai w-a 'eat (tr.)' (R)
SH: Gane loál 'big' (ABVD); Taba lollol 'big' (ABVD)
SH: Buli lois 'to steal' (ABVD)
RA: Gebe -lous 'to steal' (ABVD)
RA: Ambel lomo 'blood' (R); As laməs ‘blood' (ABVD); Biga lo'mos 'blood' (R); Fiawat lamoh 'blood' (R); Laganyan 'lomoh 'blood' (R); Ma'ya (M.) 'lomo ${ }^{12}$ s 'blood' (R); Ma'ya (S.) 'lomo³s 'blood' (R); Wauyai 'lomo 'blood' (R)
RA: As -lu 'to vomit' (ABVD)

CB: Waropen koraru 'to vomit' (ABVD) [?]; Yaur dùú'rè 'vomit' (K) [?]
Other: Irarutu marue 'to vomit' (ABVD)
SH: Buli luā ‘where?' (ABVD); Gane paló ‘where?' (ABVD); Gane paló li ‘where?' (ABVD); Taba lo (li) ‘where?’ (ABVD)
RA: Gebe loa 'where?' (ABVD)
SH: Gane lutan 'fire' (ABVD); Sawai luten 'fire' (CAD); Taba lutan 'fire' (ABVD)
RA: Matbat $m a^{21} t a$ 'hand' (R)
CB: Umar mamon 'palm of hand' (K)
CB: Yaur màahré 'dry' ( K ); Yerisiam máhé 'dry' ( K )
RA: Biga ma'bis 'black' (R); Matbat kabi $^{12} t$ 'black' (R)
CB: Yaur mábórrè 'Mambor' (K); Yerisiam mámbóòrè 'Mambor' (K)
RA: Ambel mabot 'sweat' (R); Biga ba'bos 'sweat' (R) [?]; Fiawat mesəbot 'sweat' (R); Kawe manyo'bot ‘sweat' (R); Laganyan manyo'bot ‘sweat' (R); Matbat sabo ${ }^{12} t$ 'sweat' (R); Ma'ya (M.) mas'masa ${ }^{12}$ 'sweat' (R); Ma'ya (S.) mas'masa ${ }^{3}$ 'sweat' (R); Ma'ya (S.) ma'Jobott 'sweat' (R)
RA: Kawe ma'cu 'areca nut (Malay pinang)' (R); Laganyan $a m^{\prime} c u$ 'areca nut (Malay pinang)'
(R); Ma'ya (M.) kama'fu 'areca nut (Malay pinang)' (R); Ma'ya (S.) $k a m ' f u^{3}$ 'areca nut (Malay pinang)' (R); Wauyai kam' $^{\prime}$ cu 'areca nut (Malay pinang)' (R)
RA: Kawe madyo'rom 'night' (R); Laganyan madyo'rom 'night' (R); Wauyai madyo'rom 'night' (R)
SH: Buli mafyél 'to dream' (ABVD)
RA: Biga -mñal 'to dream' (ABVD); Gebe masnel 'to dream' (ABVD)
CB: Biak mafu 'to dream' (H)
SH: Gane magamin 'sharp' (ABVD)
CB: Moor maraminî 'sharp' (K)
CB: Yaur màhèeré 'tuna sp.' (K); Yerisiam máhéréevè 'tuna sp.' (K)
CB: Umar mai 'mother' (K); Wandamen mai 'mother' (G)
RA: As mair 'rain' (ABVD)
CB: Ambai meta 'rain' (ABVD); Biak mèkĕm 'rain' (H); Serui-Laut metan 'rain' (Slm)
RA: As makam 'rotten' (ABVD); Biga malakams 'rotten' (ABVD); Gebe mjakam 'rotten' (ABVD)
RA: Biga ma'las 'long' (R); Fiawat malah 'long' (R); Gebe malawas 'long' (ABVD); Kawe ba'la(w)
 (R); Wauyai ba'la 'long' (R)

CB: Umar mbrar 'long' (K); Yaur bràá'rè 'long' (K)
Other: Arguni mbara... 'long' (ABVD); Irarutu mərəro ‘long' (ABVD) [?]; Kowiai maráwas 'long’ (ABVD); Sekar manawas 'long' (ABVD)

SH: Gane maleu 'other' (ABVD); Taba maleo 'other’ (ABVD)
SH: Buli mamagal 'big' (ABVD)

Other: Sekar mage:n 'big' (ABVD)
Mamberamo: Warembori mamana-ro 'Good' (Donohue 1999); Yoke mamana 'good' (Donohue 1999)

CB: Ansus mamang 'rain' (P\&D); Serui-Laut mama 'rain' (Slm)
Mamberamo: Warembori mamasi ‘Yellow’ (Donohue 1999); Warembori mamasi ‘Green’ (Donohue 1999); Yoke mamasa 'green/yellow' (Donohue 1999)

CB: Moor mambéra 'sweet potato' ( K ); Yaur úmámbéèrrè ‘sweet potato' ( K )
CB: Ambai mambiriu 'crowned pigeon' (Slz); Ansus mambaru 'Victoria Crowned Pigeon' (P\&D)
CB: Biak mambruk ‘crown pigeon' (H); Umar mambrut 'crown pigeon' (K); Wandamen mambruke 'crowned pigeon' (G); Yaur máavrùgré 'crown pigeon' (K)

CB: Umar mamen 'fish-hook' (K); Wandamen mamei 'hook ; fish hook' (G)
CB: Wandamen mamo ‘so that' (G); Yaur máamónáhǎ 'for that reason’ (K)
CB: Ambai mamuna 'evil' (Slz); Ansus mamuna 'evil' (P\&D)
CB: Ansus mamurang 'bamboo,_large' (P\&D); Dusner mamora 'bamboo' (D\&M); Serui-Laut mamura 'bamboo sp. (large)' (Slm); Wandamen mamura 'bamboo' (G)

CB: Moor mananà 'sweet' (K); Umar eman 'sweet' (K)
CB: Wandamen manana 'to steal' (ABVD); Waropen wumana 'to steal' (ABVD)
Other: Arguni -menena 'to steal' (ABVD)
RA: Biga mañanam 'sharp' (ABVD); Gebe myanan 'sharp' (ABVD)
CB: Ambai mananu 'leader' (Slz); Biak mànanir 'clan leader' (H); Biak mànanur 'clan leader' (H); Umar mananir 'leader' (K); Yaur mànànìivré 'head' (K)
CB: Moor mandakíra 'sea cucumber sp.' (K); Wandamen mandakiri ' (G)
RA: Ambel mandep 'cloud' (R)
CB: Ansus mandipi ‘cloud' (P\&D); Biak màndif 'cloud' (H)
CB: Ambai maneiru 'how many (animate)' (Slz); Yaur ménéerà 'how many?' (K)
Mamberamo: Warembori manggamba-ro ‘Cloud' (Donohue 1999); Yoke nangamba 'cloud' (Donohue 1999)
Other: Kowiai mánggan ‘sharp’ (ABVD); Sekar magan ‘sharp’ (ABVD)
CB: Umar maniani 'tree sp.' (K); Yerisiam máníànì 'tree sp.' (K)
Mamberamo: Warembori man(i)-indowa-ro 'Egg' (Donohue 1999); Yoke -nduß(u) 'egg' (Donohue 1999)

CB: Ambai maninkapoi 'hot (water)' (Slz); Ansus mangkakopi 'hot' (P\&D)
CB: Moor manitá 'friend' (K); Serui-Laut maneta 'sibling' (Slm); Umar maneta 'friend' (K); Wandamen maneta 'friend' (G)

CB: Ambai manivovi 'friend' (Slz); Biak manibob 'friend' (H); Biak manibowi 'friend' (H); SeruiLaut manivovi 'friend' (Slm); Yerisiam márábóòvà 'friend' (K) [?]
Mamberamo: Warembori manivovi-ro 'Friend' (Donohue 1999)
CB: Ambai manken 'sea bird' (Slz); Ansus mangkeng 'tern' (P\&D); Moor mànggena 'bird sp.' (K); Umar manggen 'bird sp.' (K)

CB: Biak mankòkò ‘chicken’ (H); Moor kokó ‘chicken’ (K); Umar kokor ‘chicken’ (K); Wandamen kokori 'chicken’ (G); Yaur ò’òoré 'chicken' (K); Yerisiam kókórvè ‘chicken’ (K)
CB: Serui-Laut mankombararei ‘dolphin' (Slm); Umar manggombo ‘dolphin' (K)
CB: Ambai man-kukei ‘chicken' (Slz); Ansus mangkuei ‘chicken’ (P\&D)
CB: Ambai mansani ‘widower' (Slz); Biak mànsiani ‘widower' (H); Moor maisána ‘widower' (K); Serui-Laut mansani ‘widower' (Slm); Umar mahian 'widower’ (K); Yaur máhíapîré 'widower' (K)

CB: Dusner mansren ‘God’ (D\&M); Dusner sern ‘God’ (D\&M); Moor sien 'God’ (K); Wandamen sien 'god ; master' (G)
CB: Ambai man-tei ‘who' (Slz); Ansus matei ‘who?' (P\&D); Wandamen tei 'who' (G)
SH: Gane manusia 'person/human being' (ABVD); Taba manusia 'person/human being' (ABVD) Other: Sekar mancia 'person/human being' (ABVD)

CB : Dusner manvetatu 'bird.of.paradise’ (D\&M); Yerisiam máná tóotà 'bird of paradise' (K)
RA: Biga mapane ‘who?' (ABVD); Biga ma'pe ‘who' (R); Matbat $m a^{21} n$ 'who' (R)
CB: Moor màpara ‘valley’ (K); Wandamen mapar ‘valley ; plain’ (G)
CB: Moor mará’a ‘steal' (K); Moor marahá ‘steal' (K); Umar an mare ‘steal’ (K); Yerisiam bàmàrá 'steal' (K)

CB: Ambai marain-deni ‘fishhook’ (Slz); Ansus maraindeng ‘fish hook' (P\&D)
CB: Ambai marandin ‘decorate’ (Slz); Wandamen marandi ‘wear jewelry ; decorate oneself' (G); Yerisiam párátía ‘decorate’ (K)
CB: Ansus marapa werau 'greens,_k.o.' (P\&D); Ansus marapa weraung 'tulip' (P\&D); Wandamen marapa rau 'k.o. vegetable' (G)
CB: Moor mararígwa 'storm' (K); Yerisiam órárígùa 'noise' (K)
CB: Ansus marewa 'ray' (P\&D); Serui-Laut marebo 'ray sp.' (Slm); Umar nambrer 'ray sp.' (K)
CB: Ambai marisani 'pepper' (Slz); Biak marisàn 'chile pepper' (H); Wandamen marisia 'chili pepper' (G)

CB: Moor maró'a ‘sink' (K); Serui-Laut marutu 'to sink’ (Slm)
CB: Moor maruatî ‘dry' (K); Umar mare 'dry' (K)
CB: Moor masasu'î ‘destroyed’ (K); Wandamen masabu 'broken ; cracked’ (G); Wandamen masasabu 'smashed; shattered' (G)

RA: As mason 'heavy' (ABVD); Biga mason 'heavy' (ABVD); Biga ma'sun 'heavy' (R); Fiawat meson 'heavy' (R); Laganyan ma'fon[o] 'heavy' (R)
CB: Waropen mahuna 'heavy' (ABVD)
CB: Moor matì ‘ripe’ (K); Yerisiam máaté 'ripe’ (K)
Mamberamo: Warembori matin-do 'Bathe (tr)' (Donohue 1999); Yoke masi 'wash' (Donohue 1999)

Mamberamo: Warembori matiran-do 'Roof' (Donohue 1999); Yoke maseraygan 'roof' (Donohue 1999)

RA: Kawe mat sa'gi ‘who’ (R); Laganyan mat sa'gya ‘who’ (R); Ma'ya (M.) mi'sa-gia ‘who’ (R); Ma'ya (S.) mi'sa 'who' (R); Wauyai mat sa'gya 'who' (R)
RA: Biga ma'tumol(o) 'people' (R); Kawe ma'tumol(o) 'people' (R); Laganyan ma'tumol(o) 'people' (R); Ma'ya (M.) ma'tumol(o) 'people' (R); Ma'ya (S.) mu'tumol(o) 'people' (R); Wauyai ma'tumol(o) 'people' (R)
Other: Irarutu matú 'person' (M)
CB: Ambai mawai ‘sago pounder' (Slz); Ansus amau 'sago_pounder' (P\&D)
CB: Ansus mayapi ‘younger sister’ (P\&D); Wandamen madiawi ‘younger sibling’ (G)
Mamberamo: Warembori maya-ro ‘Cuscus’ (Donohue 1999); Yoke marayi ‘cuscus’ (Donohue 1999)

CB: Ansus mayoi ‘sit, be at’ (P\&D); Wandamen masoi ‘sit’ (G)
CB: Umar mbre 'see' (K); Waropen ambora 'to see' (ABVD)
CB: Umar mbren 'tongue' (K); Waropen mebero 'tongue' (ABVD); Waropen mero 'tongue' (ABVD)
CB: Ambai mei ‘play' (Slz); Moor méa ‘play' (K); Moor mearà ‘play' (K); Wandamen meire 'play’ (G)

CB: Ambai meiri ‘alone’ (Slz); Ambai mesiri ‘alone’ (Slz); Wandamen mesari 'alone’ (G)
RA: Fiawat meful ‘oil' (R); Laganyan ma'ful[u] ‘oil' (R); Ma'ya (S.) ma' ${ }^{\prime} u l u^{3}$ 'oil’ (R)
RA: Fiawat melim 'night' (R); Laganyan ma'le 'night' (R); Ma'ya (M.) ma'le ${ }^{12}$ 'night' (R); Ma'ya (S.) ma'le ${ }^{12}$ 'night' (R); Wauyai ma'le 'night' ( R )

CB: Ambai mengapoi ‘warm' (ABVD); Serui-Laut mengkakopi ‘warm' (Slm)
CB: Ambai mereha 'water' (ABVD); Wandamen maria 'water' (G)
SH: Buli mēt 'cloud' (ABVD)
RA: Biga met 'cloud' (R); Fiawat mit ‘cloud' (R); Gebe mist ‘cloud' (ABVD); Kawe met 'cloud' (R); Laganyan met 'cloud' (R); Ma'ya (M.) 'me ${ }^{12} t$ 'cloud' (R); Ma'ya (S.) 'me ${ }^{12} t$ 'cloud' (R); Wauyai met 'cloud' (R)
RA: Ambel metapa 'who' (R); Fiawat metsapa 'who' (R)
RA: Biga mettn ‘dry' (ABVD); Fiawat meten ‘dry' (R); Kawe me'ten ‘dry' (R); Laganyan me'ten ‘dry’ (R); Ma'ya (M.) 'mete ${ }^{12} n$ 'dry' (R); Ma'ya (S.) 'mete ${ }^{3} n$ 'dry' (R); Wauyai me'ten 'dry’ (R)

SH: Buli mgini 'to burn' (ABVD)
RA: Biga l-agi'nim 'burn (trans.)' (R); Ma'ya (M.) wa'gini³m 'burn (trans.)' (R)
CB: Umar mhe 'sago swamp' (K); Yaur hèríe ‘sago area’ (K)
SH: Gane mikoat 'red' (ABVD); Sawai n-mekot 'red' (CAD); Taba makot 'red' (ABVD)
RA: Ambel milik ‘oil' (R) [?]; Matbat $m n i^{12} k$ ‘oil' (R)
CB: Ambai manin ‘oil’ (Slz); Ansus maning ‘oil' (P\&D); Biak mani ‘oil' (H); Serui-Laut mani ‘oil’ (Slm); Umar mani ‘oil’ (K)

CB: Ambai mireka ‘die’ (Slz); Serui-Laut marea 'to die’ (Slm)
 mlongan 'long' (ABVD)

CB: Biak mniwĕr 'wasp’ (H); Moor mananíva 'bee’ (K); Wandamen mania(i) 'wasp ; bee’ (G); Yaur nìjé ‘wasp’ (K); Yerisiam kénébà níainé 'bee’ (K); Yerisiam náníijárà ‘wasp’ (K)

SH: Taba mnopa 'wide’ (ABVD)
RA: Biga manapa 'wide' (ABVD)
CB: Umar mnue 'out' (K); Yaur nèmnî̀ 'used up’ (K)
CB: Moor mo 'place' (K); Yaur mó ‘place' (K)
SH: Gane moda ‘wind’ (ABVD); Sawai more 'wind' (CAD); Taba moda ‘wind’ (ABVD)
RA: Ambel moro 'wind' (R); Biga mo'ro 'wind' (R); Fiawat mor 'wind' (R); Gebe mors ‘wind' (ABVD); Kawe 'mor[o] 'wind' (R); Laganyan 'mor[o] 'wind' (R); Ma'ya (M.) 'moro ${ }^{12}$ 'wind' (R); Ma'ya (S.) 'moro3 'wind' (R); Wauyai 'mor[o] 'wind' (R)
CB: Umar moga 'crow sp.' (K); Wandamen moga 'crow' (G)
CB: Yaur móhámè ‘Neg’ (K); Yerisiam má ‘Neg’ (K)
Mamberamo: Warembori mopi ‘PP, PPSi’ (Donohue 1999); Yoke mopay ‘grandparent’ (Donohue 1999)

CB: Moor mòra 'Moor' (K); Yaur mórrè ‘Moor' (K); Yerisiam móòrè ‘Moor' (K)
CB: Moor mòra ríana ‘Moor language' (K); Yaur ríin mórrè ‘Moor language' (K)
CB: Umar mot 'baked sago' (K); Yaur móò'ré 'baked sago' (K); Yerisiam móòkà 'baked sago' (K)
CB: Umar mot aka 'ball-shaped sago' (K); Yaur mó àkáe 'ball-shaped baked sago' (K); Yerisiam àká 'ball-shaped baked sago' (K)

CB: Umar mot hoda ‘oven-baked sago’ (K); Yerisiam móhàdáà ‘oven’ (K)
RA: Biga mo'to 'much' (R); Fiawat mot 'much' (R); Kawe 'mot[o] 'much' (R); Laganyan 'mot[o] 'much' (R); Matbat to ${ }^{12}$ 'much' (R); Ma'ya (M.) 'moto ${ }^{12}$ 'much' (R); Ma'ya (S.) 'mo ${ }^{12} t$ 'much' (R); Wauyai 'mot[o] 'much' (R)
SH: Buli [m]sai ‘wide’ (ABVD); Sawai $n-\varepsilon$-msəy ‘wide’ (CAD)
SH: Buli mumis 'mosquito' (ABVD)

RA: Biga kamumus 'mosquito' (ABVD)
CB: Biak mumĕs 'mosquito' (H); Wandamen kamumi[s] 'mosquito' (ABVD)
CB: Ansus muna 'fish_with_net' (P\&D) [?]; Yaur múùré 'fish net' (K) [?]
CB: Ambai mundiai 'earthquake’ (Slz); Wandamen mundiya 'earthquake’ (G); Yaur múndíijàavré 'earthquake' (K)

CB: Umar munia 'spear' (K); Yerisiam múnî̀jà 'spear' (K)
CB: Ambai muntun 'pigeon' (Slz) [?]; Ansus mandung 'Ped Imperial Pigeon' (P\&D); Yaur màndùhré 'pigeon' (K)

CB: Ambai munu 'house' (Slz); Ansus manu 'house' (P\&D); Serui-Laut manu 'house' (Slm)
CB: Ansus munua 'tuna' (P\&D); Umar munua 'tuna sp.' (K)
CB: Ambai muran 'east' (Slz); Ansus wope murang 'east' (P\&D); Serui-Laut wana murang 'east' (Slm)
CB : Yaur mư'ré 'canoe mooring' (K); Yerisiam múngkrè 'canoe mooring' (K)
CB: Ansus muri 'crab’ (P\&D); Wandamen muri 'crab’ (G)
CB: Ambai na 'at' (ABVD); Ansus na 'at' (P\&D); Moor -na 'Loc' (K); Serui-Laut na 'in/from' (Slm);
Wandamen na 'at ; in' (G); Waropen na 'at' (ABVD)
Other: Kowiai -na 'at' (ABVD)
RA: Matbat $n a^{1}$ 'rain' (R)
CB: Ansus miuna 'rain_(verb)' (P\&D); Moor ùnuma 'rain' (K); Wandamen muna 'rain' (G); Yaur nàtèehré 'rain' (K) [??]
Other: Arguni umun 'rain' (ABVD); Kowiai óma 'rain' (ABVD) [?]
RA: Matbat $n a^{12} n$ 'animal' (R)
CB: Yaur náhnáàrré 'animal' (K)
RA: Matbat $n-a^{21} t$ 'bite' (R)
CB: Moor àì ‘bite’ (K); Umar wat 'bite’ (K); Yerisiam áaká ‘bite’ (K)
CB: Biak nadi ‘pray' (H); Dusner nadi ‘prayer' (D\&M); Moor ve-nàdi ‘pray’ (K); Umar nadi ‘pray’ $(\mathrm{K})$; Wandamen venadi 'pray' (G); Yaur náadìe 'pray' (K); Yerisiam nàádì 'pray’ (K)

CB: Umar nae 'leaf' (K); Yaur náarògré 'leaf' (K)
Other: Arguni nane 'leaf' (ABVD)
CB: Ambai nafa 'sand' (Slz); Moor nàha'a 'sand' (K); Waropen nafa 'sand' (ABVD)
CB: Dusner nai 'later' (D\&M); Moor nóndé 'later' (K); Wandamen nani 'later' (G); Yaur nádà 'later' (K)

CB: Ansus nai 'live_at' (P\&D); Wandamen na(i) 'be at ; reside' (G)
Other: Sekar nais 'to live, be alive' (ABVD)
CB: Umar najat 'plate' (K); Yaur nàjàa'ré 'plate' (K)

RA: Biga n-a'mat 'burn (intr. 3S)' (R); Kawe nya'mat 'burn (intr. 3S)' (R); Laganyan nya'mat 'burn (intr. 3S)' (R); Ma'ya (M.) ny-'ama ${ }^{12} t$ 'burn (intr. 3S)' (R); Ma'ya (S.) ny-'ama ${ }^{3} t$ 'burn (intr. 3S)' (R); Wauyai nya'mat 'burn (intr. 3S)' (R)
CB: Umar naniet 'orphan’ (K); Yaur nànèetré ‘orphan’ (K)
CB: Ansus nao, na tatoi ‘where?' (P\&D); Wandamen na toi ‘where’ (G)
Mamberamo: Warembori napermba 'Beach' (Donohue 1999); Yoke naupa 'beach' (Donohue 1999)

CB: Waropen -nasa 'to hear' (ABVD); Waropen nata 'to hear' (ABVD)
Mamberamo: Warembori nata-na-o 'Hear’ (Donohue 1999); Yoke nanta 'hear' (Donohue 1999)
CB: Ansus nau 'cat' (P\&D); Umar nao 'cat' (K); Wandamen niau 'cat' (G); Yaur nàovré 'cat' (K); Yerisiam náo 'cat' (K)
CB: Moor naviré ‘Nabire’ (K); Umar navirei ‘Nabire’ (K); Yaur návírèijè ‘Nabire’ (K); Yerisiam návírèi 'Nabire' (K)
CB: Ambai nawan 'basket' (Slz); Ansus rawang 'fish_basket' (P\&D); Wandamen nawa 'net ; basket' (G)

SH: Sawai $n$-bวy 'to lie down' (CAD)
RA: Laganyan w-aba'lyoy(o) ‘lie down’ (R); Wauyai a'bloy[o] ‘lie down’ (R)
CB: Dusner ndi- ‘3SG’ (D\&M); Wandamen andi ‘he/she/it ; 3sg pronoun' (G)
CB: Ambai neki ‘cat' (Slz); Serui-Laut méki ‘cat' (Slm)
CB: Moor nèma 'tongue’ (K); Yerisiam níaméené 'tongue' (K)
SH: Buli nēsa 'other' (ABVD)
RA: As nsa 'other' (ABVD)
CB: Serui-Laut netava 'sibling' (Slm); Wandamen neta katu 'younger sibling' (G)
CB: Ansus neuna 'scale,_fish' (P\&D); Moor noná 'fish scale' (K); Yerisiam núuné 'fish-scale' (K)
RA: Gebe $\eta a$ 'sky' (ABVD); Ma'ya (M.) 'na ${ }^{12}$ 'sky' (R); Ma'ya (S.) 'na ${ }^{12}$ ‘sky' (R)
SH: Buli $\eta a$ 'moon' (ABVD)
RA: Matbat $n a^{41}$ 'moon' (R)
SH: Taba ngan 'day' (ABVD)
RA: As nan 'day' (ABVD); Biga mañan ‘day' (ABVD)
SH: Gane nganga 'to yawn' (ABVD); Sawai $n$-عnąp 'to yawn' (CAD)
SH: Sawai yay-o 'tooth' (CAD)
CB: Biak na 'tooth' (H)
CB: Ambai nin- 'here' (Slz); Ansus na nina 'here' (P\&D); Wandamen nina 'here' (G)
SH: Buli ñiñ̄en ‘sand' (ABVD); Gane minyana 'sand' (ABVD); Taba nyanyana 'sand' (ABVD)
RA: Gebe miñen 'sand' (ABVD)

CB: Ambai ninuai ‘sand' (ABVD); Serui-Laut nunoi ‘sand’ (Slm)
Other: Irarutu inneñevo 'sand' (ABVD)
SH: Gane ninik 'mosquito' (ABVD); Sawai nine 'mosquito' (CAD)
RA: Gebe nini 'mosquito' (ABVD)
CB: Moor tanìna 'mosquito' (K) [?]; Waropen nini 'mosquito' (ABVD)
Mamberamo: Warembori ini-ro 'Mosquito' (Donohue 1999); Yoke nina 'mosquito' (Donohue 1999)

CB: Ambai noi 'knife’ (Slz); Ansus nyoi 'knife’ (P\&D); Dusner noi 'knife' (D\&M); Serui-Laut noi 'knife’ (Slm); Wandamen nioi 'knife’ (G); Yerisiam níòi 'machete' (K)
RA: Ambel now 'house' (R); Fiawat now 'house' (R)
SH: Sawai n-pcloy 'big' (CAD)
RA: Biga pa'ley 'big' (R); Fiawat peley 'big' (R); Gebe pial 'big' (ABVD); Kawe pa'le(y) 'big' (R); Laganyan pa'le 'big' (R); Ma'ya (M.) pa'le 'big' (R); Ma'ya (S.) pa'le ${ }^{3}$ 'big' ( R ); Wauyai pa'le 'big' (R)

RA: Matbat $n u^{12}$ 'to kiss' (R)
CB: Ambai -naha 'to sniff, smell' (ABVD); Biak nàsĕm 'to sniff, smell' (H); Moor anità 'kiss' (K); Umar noh 'smell' (K); Wandamen anasa 'to sniff, smell' (ABVD); Waropen asasa 'to sniff, smell' (ABVD) [?]; Yaur núuhnè 'kiss' (K); Yerisiam nóhà 'kiss' (K)
CB: Ambai numbuain ‘sand’ (Slz); Ansus ruwuang 'sand' (P\&D); Wandamen rubua ‘sand' (G); Wandamen rubua[n] 'sand' (ABVD)

CB: Ambai nu-randaun 'hair (head)' (Slz); Ansus duandaung 'hair' (P\&D); Wandamen ru nandao 'hair' (G); Wandamen runandau 'hair' (ABVD)

Mamberamo: Warembori nut dipi-ro ‘Betel’ (Donohue 1999); Yoke dipißu 'betel nut' (Donohue 1999)

CB: Serui-Laut nyai ‘disappear' (Slm); Umar niot 'disappear' (K); Wandamen nai ‘disappear' (G)
RA: Ambel nyan 'betel leaf (Malay biji sirih)' (R); Kawe 'nyana 'betel leaf (Malay biji sirih)' (R); Laganyan nyan[a] 'betel leaf (Malay biji sirih)' (R); Matbat na ${ }^{1} n$ 'betel leaf (M. biji sirih)' (R); Ma'ya (M.) 'nyana ${ }^{12}$ 'betel leaf (Malay biji sirih)' (R); Ma'ya (S.) 'nya ${ }^{12} n$ 'betel leaf (Malay biji sirih)' (R); Wauyai nyan[a] 'betel leaf (Malay biji sirih)' (R)
CB: Biak nān 'betel pepper' (H); Moor inána 'betel pepper' (K); Umar nian 'betel' (K); Yerisiam náríníànà ‘betel’ (K)
Mamberamo: Warembori nan-do ‘Chewing betel' (Donohue 1999); Yoke nans- 'betel pepper' (Donohue 1999)
CB: Umar o 'mouth' (K); Yaur ómògrè 'mouth' (K); Yerisiam ópáahé 'hole' (K)
CB: Umar odu 'smoke' (K); Yaur ódùgrè 'smoke' (K)
RA: Gebe -of 'to say' (ABVD)
CB: Biak kòfèn 'to say' (H); Serui-Laut afa 'to say’ (Slm); Waropen afa 'to say' (ABVD); Waropen ofa 'to say' (ABVD)

SH: Gane ofal 'to squeeze' (ABVD); Taba -ohal 'to squeeze' (ABVD)
RA: Biga -ogol 'to vomit' (ABVD); Gebe -ogol 'to vomit' (ABVD)
CB: Umar oh 'paddle' (K); Yaur úhrè 'paddle' (K); Yerisiam óòhà 'paddle' (K)
SH: Gane ólai 'to dig' (ABVD); Sawai n-oyle 'to dig' (CAD)
RA: Gebe -alai 'to dig' (ABVD)
CB: Ambai arai 'dig' (Slz); Ambai i-sarai 'to dig' (ABVD); Ambai sirai ‘dig' (Slz); Ansus irai 'dig' (P\&D); Serui-Laut arai 'to dig’ (Slm); Serui-Laut irai 'to dig' (Slm); Umar hrae ‘dig’ (K); Wandamen sarai 'to dig' (ABVD)
SH: Buli olat 'sea' (ABVD); Gane wolat 'sea' (ABVD); Sawai wolet 'sea' (CAD); Taba wolat 'sea' (ABVD)
RA: Biga wulut 'sea' (ABVD)
SH: Buli oy 'to bite' (ABVD); Gane pakat 'to bite' (ABVD) [?]
RA: Gebe -kכŋวt 'to bite' (ABVD)
CB: Ansus ong 'give' (P\&D); Serui-Laut ona 'to give' (Slm); Serui-Laut ona 'to give' (Slm); SeruiLaut oni 'to give' (Slm); Serui-Laut oni 'to give' (Slm); Wandamen one 'give' (G)
CB: Umar opun 'bamboo stem' (K); Yerisiam ópúnè 'bamboo stem' (K)
CB: Dusner or 'call' (D\&M); Moor orî 'call' (K)
CB: Moor oranî 'pull' (K); Yerisiam óoránà 'pull' (K)
Mamberamo: Warembori ore 'Give’ (Donohue 1999); Yoke o 'give' (Donohue 1999)
SH: Buli osal 'to stand' (ABVD); Gane wosal 'to stand' (ABVD); Sawai n-osel 'stand' (CAD); Taba -wosal 'to stand' (ABVD)
RA: Ambel l-ol 'stand' (R); As -ss 'to stand' (ABVD); Biga -awol 'to stand' (ABVD); Biga l-a'wul 'stand' (R); Fiawat l-ohol 'stand' (R); Kawe w-ol ‘stand' (R); Laganyan 'w-ohol ‘stand’ (R); Matbat $n$-o ${ }^{12} l$ ‘stand' (R); Ma'ya (M.) ' $w$-oso ${ }^{12} l$ 'stand' (R); Ma'ya (S.) ' $w$-oso ${ }^{3} l$ 'stand' (R); Wauyai w-ol 'stand' (R)
CB: Biak orĕs 'to stand' (H); Dusner ors 'stand' (D\&M); Umar he 'stand' (K); Wandamen osa 'stand' (G); Wandamen osa[r] 'to stand' (ABVD); Waropen osaro 'to stand' (ABVD); Waropen otaro 'to stand' (ABVD); Yerisiam óohé 'stand' (K)
Other: Arguni -ser 'to stand' (ABVD)
Mamberamo: Warembori ovo-ro ‘Arrow' (Donohue 1999); Yoke aßua 'arrow' (Donohue 1999)
CB: Ambai padamara 'lamp' (Slz); Ansus padamara 'lamp' (P\&D); Moor padamára 'gas lantern' (K); Wandamen padamara 'lamp' (G)

Mamberamo: Warembori pandamara 'Lamp' (Donohue 1999)
CB: Ansus pai 'run' (P\&D); Serui-Laut afai-afai 'to run' (Slm); Wandamen apai 'run' (G)
CB: Ansus pai 'that over there' (P\&D); Wandamen pai 'DET' (G)
SH: Gane pait 'moon' (ABVD)

RA: As pai? 'moon' (ABVD); Biga pet 'moon' (ABVD); Biga pit 'moon' (R); Fiawat pit 'moon' (R); Gebe pait 'moon' (ABVD); Kawe pit 'moon' (R); Laganyan pit 'moon' (R); Ma'ya (M.) 'pi ${ }^{12} t$ 'moon' (R); Ma'ya (S.) 'pi ${ }^{12} t$ 'moon' (R); Wauyai pit 'moon' (R)
CB: Ambai embai 'moon’ (Slz); Ansus yembai 'moon' (P\&D); Biak paik 'moon' (H); Serui-Laut embai 'moon' (Slm); Wandamen sembai 'moon' (ABVD); Wandamen sembie 'moon' (G)
Other: Irarutu seba 'moon' (ABVD); Irarutu sibá 'moon' (M); Sekar bunan 'moon' (ABVD)
RA: As pa-lfi ‘right' (ABVD); Biga palafi ‘right' (ABVD)
Mamberamo: Warembori pamarsa 'Knife' (Donohue 1999) [Malay loan]; Yoke pamaraasi 'knife' (Donohue 1999) [Malay loan]

CB: Biak pànda ‘gun' (H); Moor pandá ‘gun' (K); Umar pandija 'gun' (K); Wandamen pandaya ‘gun’ (G); Yaur pándépîré ‘gun’ (K); Yerisiam páandépì ‘gun’ (K)
CB: Wandamen papano 'soft coral' (G); Yerisiam pàmpùnúa háarú 'coral sp.' (K)
SH: Buli papleo 'tongue’ (ABVD); Sawai psple-o 'tongue’ (CAD); Taba plelo 'tongue' (ABVD)
RA: Matbat para ${ }^{12}$ l 'tongue' (R)
SH: Taba pappuko 'knee'
RA: Biga ka'i ka'puk(o) ‘knee’ (R); Fiawat epyabu 'knee’ (R); Kawe kam a'puk(o) 'knee’ (R); Laganyan a'ne a'puk(o) 'knee' (R); Matbat we $e^{21} t a-p u^{21} k$ 'knee' (R); Ma'ya (M.) ka'pu ${ }^{3} k$ 'knee' (R); Ma'ya (S.) ka'ne ka'puk(o) 'knee' (R); Wauyai ka'ne ka'puk(o) 'knee' (R)
CB: Ansus aeu bu 'knee' (P\&D); Moor nevú'a 'knee' (K); Serui-Laut aebua 'knee’ (Slm); Umar gavu 'knee' (K); Wandamen aibu 'knee' (G); Yaur évúujè 'knee' (K); Yerisiam níbúgùa 'knee' (K)
Mamberamo: Warembori ke-vua-ro 'Knee’ (Donohue 1999); Yoke ßuak 'knee’ (Donohue 1999)
Other: Irarutu wifú 'knee' (M)
CB: Ansus parai ‘mangrove’ (P\&D); Wandamen ai parai 'k.o. mangrove tree’ (G)
CB: Moor parìgi ‘well' (K); Umar parigi ‘well' (K); Yaur pàrìgìvré ‘well' (K)
CB: Ansus paroai 'plate’ (P\&D); Serui-Laut faurai ‘plate’ (Slm)
CB: Dusner pasis ‘quietly’ (D\&M); Wandamen asisi ‘silent’ (G)
RA: Biga pelimi ‘left' (ABVD); Gebe palpalima 'left' (ABVD)
CB: Biak pĕnor 'egg' (H); Wandamen ponori ‘egg' (G)
Mamberamo: Warembori pere-o ‘Cold’ (Donohue 1999); Yoke puru ‘cold’ (Donohue 1999)
Mamberamo: Warembori pere-yo ‘Die’ (Donohue 1999); Yoke piru ‘die’ (Donohue 1999)
RA: As perim 'cold' (ABVD)
CB: Biak prim 'cold' (H)
CB: Ambai pia-rei 'twenty' (Slz); Ansus piarei 'twenty' (P\&D)
CB: Biak pimàm 'sea cucumber' (H) [?]; Wandamen piomberi 'k.o. sea cucumber' (G) [?]
RA: Ma'ya (S.) 'pina ${ }^{3}$ 'widow' (R)
CB: Moor bindó 'widow' (K)

CB : Biak piòpĕr 'white' ( H ); Biak piupěr 'white' ( H )
Mamberamo: Warembori pepera 'White’ (Donohue 1999)
CB: Moor pìpi ‘money' (K); Umar pipi ‘money’ (K); Wandamen pipi ‘money’ (G); Yaur pìpìivré 'money' (K)

CB: Dusner pir 'put' (D\&M); Wandamen pi 'place ; put' (G)
CB: Ambai pirandima 'bitter' (Slz); Serui-Laut piarima 'bitter' (Slm)
SH: Buli pitan 'to tie up, fasten' (ABVD); Sawai $n$-piten 'to tie' (CAD)
RA: As -batin 'to tie up, fasten' (ABVD); Gebe kapitan 'to tie up, fasten' (ABVD)
CB: Ansus poa 'flood' (P\&D); Moor fóara 'flood' (K)
SH: Gane poi 'head' (ABVD); Taba poyo 'head' (ABVD)
CB: Moor pondarànu 'pandanus leaf' (K); Umar ponda 'pandanus' (K)
Mamberamo: Warembori poso-ro 'Spear’ (Donohue 1999); Yoke poso ‘spear’ (Donohue 1999)
CB: Ansus poT 'fish with line' (P\&D); Wandamen pote 'catch (fish) ; go fishing' (G)
CB: Ansus poti ‘Hawksbill_Turtle’ (P\&D); Wandamen poti ‘small sea turtle’ (G)
SH: Gane puí 'what?' (ABVD); Taba pu 'what?' (ABVD)
CB : Yerisiam púmáànà 'grandfather' ( K )
Mamberamo: Warembori puma ‘CC' (Donohue 1999); Yoke puma 'grandchild’ (Donohue 1999)
SH: Buli puypuy ‘dull, blunt' (ABVD)
Other: Irarutu púma ‘dull' (M)
Mamberamo: Warembori pu-ro 'tail' (Donohue 1999); Yoke pi-a 'tail' (Donohue 1999)
Other: Arguni -p waper 'to hit' (ABVD); Kowiai -bába' 'to hit' (ABVD); Sekar baban 'to hit' (ABVD)
RA: Ambel pya 'human hair (head)' (R); Biga pa 'human hair (head)' (R); Kawe ta'pla 'human hair (head)' (R); Laganyan ta'plya 'human hair (head)' (R); Ma'ya (M.) 'plya ${ }^{12}$ 'human hair (head)' (R); Ma'ya (S.) 'plya 'human hair (head)' (R); Wauyai ta'pla 'human hair' (R)
CB: Ambai rabuan 'between' (Slz); Ambai rabuan 'middle' (Slz); Moor ravu'éna 'middle' (K); Serui-Laut $\operatorname{rabua(n)~'between,~among'~(Slm);~Wandamen~vara~kei~rabua~'middle~finger;~ring~}$ finger' (G); Yerisiam ráúugwánà 'in the middle’ (K)

CB: Moor ragwènde 'bamboo pole' (K); Umar rawojan 'barbed spear' (K); Waropen raghéano 'fish spear with three or four points' (Held 1942); Yaur ràgwìapìiré 'barbed spear' (K)
CB: Ambai rai 'enemy' (Slz); Serui-Laut verait 'enemy' (Slm)
CB: Ansus rai 'later' (P\&D); Moor ré 'later' (K)
CB: Serui-Laut raida 'day' (Slm); Wandamen raria 'day' (G)
CB: Ambai rain 'bay' (Slz); Ansus rawing 'bay' (P\&D); Wandamen raimu 'bay area' (G)

CB: Serui-Laut rain 'nest' (Slm); Wandamen karaini 'bee hive ; nest' (G)
CB: Biak rāk ‘slave raiding group' (H); Moor rá'a 'slave raiding group' (K); Serui-Laut rait 'war' (Slm); Serui-Laut rait 'slave raid' (Slm); Umar rat 'raiding group' (K); Yaur rèe'ré 'raiding group' (K); Yerisiam rátìa 'raiding group' (K)
CB: Moor ráma 'bead' (K); Wandamen ramor 'bead' (G)
CB: Serui-Laut ramansea 'hot water' (Slm); Wandamen karumas 'hot water' (G)
CB: Ambai ramati 'to scratch' (ABVD); Ansus karamuti ‘scratch' (P\&D)
CB: Ansus randaung 'roof' (P\&D); Wandamen nandau 'thatched roof made of sago leaves' (G)
CB: Ambai randawai 'mast' (Slz); Ansus nandowai 'mast' (P\&D); Umar nandowain 'mast' (K)
CB: Ambai rando 'banana' (Slz); Ansus nando 'banana' (P\&D); Serui-Laut nando 'banana' (Slm);
Wandamen nando 'banana' (G)
CB: Ambai raori 'beads' (Slz); Biak ira 'bead' (H); Yerisiam ráù 'beads' (K)
CB: Yerisiam rárì 'know' (K)
Other: Irarutu -rarune 'to know, be knowledgeable' (ABVD)
CB: Ambai rarika 'cloud' (Slz); Moor rìra'a 'storm cloud' (K); Serui-Laut raria 'cloud' (Slm); Yaur rìré 'cloud' (K); Yerisiam ráríjárà 'rain cloud' (K)
CB: Moor raròni 'ray sp.' (K); Umar raroni 'ray sp.' (K)
CB: Ambai raukai ‘octopus' (Slz); Ansus rakuai ‘octopus' (P\&D); Yaur réè'ré ‘octopus' (K) [?]; Yerisiam rákúài 'octopus' (K)
CB: Serui-Laut raukana 'neck' (Slm); Wandamen rau 'neck' (G); Yaur rá'gwárie 'neck' (K)
CB: Ansus rau paraing 'thirsty' (P\&D); Serui-Laut raufarai 'thirsty' (Slm); Wandamen rauparare 'thirsty' (G)
CB: Ambai reantenan 'first' (Slz); Wandamen retena 'first' (G)
Other: Irarutu -rega 'to live, be alive' (ABVD); Kowiai rúga 'to live, be alive' (ABVD)
CB: Ambai reirei 'jungle’ (Slz); Serui-Laut rei 'forest, jungle’ (Slm); Wandamen rei 'woods/forest' (ABVD)
CB: Ambai rema 'betel pepper' (Slz); Ansus rema 'betel pepper' (P\&D); Serui-Laut remah 'betel pepper' (Slm)
CB: Serui-Laut repati ‘arrow’ (Slm); Waropen repati ‘large arrow’ (Held 1942); Waropen repeti 'large arrow' (Held 1942)

CB: Ansus repui ‘back' (P\&D); Dusner pur 'back' (D\&M); Wandamen pui 'behind' (G)
CB: Ambai rerawa 'skin' (Slz); Ansus rerawa (riri) 'skin' (P\&D); Serui-Laut rerawa 'skin' (Slm); Wandamen rawa 'skin' (G); Waropen ru 'skin' (ABVD) [?]

CB: Ambai reti 'needle' (Slz); Biak rèt 'needle' (H); Moor rèti ‘sewing needle’ (K); Serui-Laut reti 'needle' (Slm); Umar ret 'needle' (K); Wandamen ret 'needle' (ABVD); Waropen rete 'needle' (ABVD); Yaur rèt pàivré 'sewing needle' (K)

CB: Ambai rewankuai 'plate’ (Slz); Moor revanggúa 'plate’ (K); Moor verenggúa 'plate’ (K); Yerisiam rémbágwóníài 'plate' (K)
CB: Ambai rewo- 'forehead' (Slz); Wandamen re worera 'forehead' (G)
CB: Moor ríana 'language' (K); Yaur rûgrè 'language' (K); Yerisiam árínà 'voice’ (K)
CB: Ansus riapu 'itch' (P\&D); Umar riavu 'itch' (K); Yaur révrè 'itch' (K)
CB: Dusner riari 'so' (D\&M); Moor rarî 'so' (K)
CB: Umar rien 'centipede' (K); Yaur rìgré 'centipede' (K)
CB: Yaur rîhré 'garden' (K); Yerisiam ríhìa 'garden' (K)
CB: Ambai rika 'blood' (Slz); Ansus ria 'blood' (P\&D); Biak rik 'blood' (H); Serui-Laut riaat 'blood' (Slm); Wandamen ria[t] 'blood' (ABVD); Wandamen riate 'blood' (G)
CB: Ambai rirau 'smoke' (ABVD); Ambai riraun 'smoke' (Slz); Serui-Laut rirau 'smoke' (Slm)
CB: Ambai riwan 'change' (Slz); Wandamen riwa 'change' (G)
CB: Biak ro 'at' (H); Dusner ro 'at' (D\&M)
CB: Biak rò 'thing' (H); Biak roï 'thing' (H); Dusner ro 'thing' (D\&M); Moor ró 'thing' (K); SeruiLaut raa 'thing' (Slm)

CB: Ambai roa 'lime' (Slz); Serui-Laut rowa 'lime (for betel)' (Slm)
CB: Ansus roi ‘sing' (P\&D); Serui-Laut roi 'to sing' (Slm); Umar rui ‘sing' (K); Wandamen roi 'sing' (G); Yaur rùújè ‘sing' (K); Yerisiam rói ‘sing’ (K)

Mamberamo: Warembori du-yo 'Sing’ (Donohue 1999)
CB: Umar rojo ‘night' (K); Yaur òròójè ‘night' (K); Yaur ròojé ‘night low tide’ (K); Yerisiam róoi 'night' (K)

CB: Ambai romi ‘garden’ (Slz); Ansus romi ‘garden' (P\&D); Serui-Laut romi 'garden' (Slm);
Wandamen rom(i) 'garden' (G)
CB: Yaur ròojé 'song' (K); Yerisiam rói 'song' (K)
CB: Ansus rora 'hit' (P\&D); Wandamen rora 'hit' (G)
CB: Ambai rora 'sky' (ABVD); Ansus rora 'sky' (P\&D); Serui-Laut rora 'sky' (Slm); Wandamen rora 'sky' (ABVD); Waropen dora 'sky' (ABVD)
Mamberamo: Warembori doromo-ro 'Sky' (Donohue 1999)
CB: Ambai roro-(man/win)-katui ‘sibling (younger, different sex)' (Slz); Dusner srar 'sibling' (D\&M); Moor raròti ‘sibling' (K); Serui-Laut raro ‘sibling’ (Slm); Yerisiam ráaó ‘sibling’ (K)

CB: Ambai rotan ‘bag' (Slz); Ansus rotang ‘net bag' (P\&D); Dusner roton 'bag’ (D\&M); Wandamen rota 'bag' (G)

CB: Ansus rowang 'chop down' (P\&D); Serui-Laut robani 'to cut down' (Slm)
CB: Ambai roya(r) 'roll' (Slz); Wandamen royare 'roll' (G)

CB: Umar rui 'yellow' (K); Yerisiam ràúi 'yellow' (K)
Other: Arguni -rur 'to swim' (ABVD); Sekar ruri 'to swim' (ABVD)
CB: Ambai ruru 'lake’ (ABVD); Ansus ruru 'lake’ (P\&D); Serui-Laut ruru 'lake' (Slm); Wandamen ruru 'lake' (G)
CB: Umar rut 'pull' (K); Yaur rúútnè 'pull tight' (K)
CB : Yaur rùuríe 'bird sp.' (K); Yerisiam rúrùitijáà 'bird sp.' (K)
RA: Gebe safsef 'rat' (ABVD)
Other: Irarutu safé 'rat, mouse' (M)
RA: Laganyan sa'gul(o) 'nose' (R); Ma'ya (M.) Jo'gul(o) 'nose' (R); Ma'ya (S.) sa'gul(o) 'nose' (R)
Other: Arguni sair 'fish' (ABVD); Sekar sair 'fish' (ABVD)
CB: Biak samaràka ‘watermelon' (H); Moor samaràka 'watermelon' (K); Umar hamaraka 'watermelon' (K); Wandamen samaraka 'watermelon' (G); Yaur hámárà’àavré 'watermelon' (K)
CB: Biak sàmbròr 'ray sp. (large)' (H); Moor samaróráo 'ray sp.' (K)
CB: Moor sanipapó 'langsat fruit' (K); Wandamen sanaipori 'k.o. fruit' (G); Wandamen sanaivepori
'k.o. fruit' (G); Yaur hánérèpòovré 'langsat fruit' (K)
RA: Ma'ya (S.) san'su ${ }^{3} n$ 'clothes' (R)
CB: Ansus asung 'clothes' (P\&D); Dusner sasun 'shirt' (D\&M); Moor raresúna 'clothing' (K); Umar hahun 'shirt' (K); Wandamen sasu 'clothes' (G)
CB: Biak sār 'left (side)' (H); Wandamen sara 'left' (ABVD)
CB: Ansus saraka ‘armband' (P\&D); Biak sāràk ‘silver; silver armband' (H); Moor saráka 'armband' (K); Serui-Laut saraka-wara 'armband' (Slm); Serui-Laut seraka 'silver' (Slm); Umar hiarak 'armband' (K); Wandamen sarak ‘bracelet' (G); Yaur hàràa'ré 'armband' (K); Yerisiam háráakvè ‘armband’ (K)

CB: Biak sarera 'fishing rod' (H); Moor saréra 'fishing rod' (K); Umar harera 'fishing rod' (K); Wandamen sarera 'fishing pole' (G); Yaur háréràavré 'fishing rod' (K); Yerisiam sárérà 'fishing rod' (K)

CB: Ambai saroi ‘whale’ (Slz); Ansus aroi ‘whale’ (P\&D); Serui-Laut aroowi ‘whale’ (Slm); Umar haroi 'whale’ (K); Yaur hàròovré ‘whale’ (K); Yerisiam háróvréevè ‘whale’ (K)

CB: Ansus sasinai 'thorn' (P\&D); Serui-Laut ansasinai 'thorn' (Slm)
CB: Wandamen sasiri ‘see' (G); Wandamen ser[a] 'to see' (ABVD); Wandamen serai 'see' (G); Waropen sira 'to see' (ABVD)
Other: Irarutu -masi 'to see' (ABVD); Irarutu sí 'to see' (M); Kowiai -sefa 'to see' (ABVD)
CB: Biak sasurum 'fish sp.' (H); Umar hahuru 'fish sp.' (K)
Other: Kowiai sawana 'fog' (ABVD); Sekar soan 'fog' (ABVD)
CB: Ambai sawaya 'crawl' (Slz); Wandamen sabaya 'crawl ; trap' (G)
SH: Buli segal 'to split' (ABVD); Gane sagal 'to split' (ABVD); Sawai $n$-čggel 'to split' (CAD)

CB: Ansus sekop 'shovel' (P\&D); Wandamen sikop 'shovel' (G)
CB: Ambai sera 'seek' (Slz); Dusner serep 'seek' (D\&M); Wandamen sasera(i) 'look for ; seek' (G)
CB: Wandamen sereni 'papaya' (G)
Other: Irarutu siríne 'papaya' (M)
CB: Ambai siai ‘other' (ABVD); Biak wèsĕ 'other' (H); Wandamen esa 'other' (ABVD); Wandamen esi[a] 'other' (ABVD)
Other: Kowiai ésa 'other' (ABVD)
CB: Ambai sifo 'fly (v.)' (Slz); Serui-Laut safo 'to fly' (Slm); Wandamen sapo(p) 'fly' (G)
Other: Kowiai -tif 'to fly' (ABVD)
Other: Arguni -sigir 'to sniff, smell' (ABVD); Sekar sigir 'to sniff, smell' (ABVD)
CB: Ambai simbena 'thin' (ABVD); Serui-Laut sambena 'thin (materials)' (Slm)
CB: Ambai simitoi ‘citrus' (Slz); Moor simutó 'citrus fruit' (K); Wandamen simuti ‘orange ; lemon’ (G); Yaur hímútòovré 'citrus' (K)

RA: Ma'ya (S.) 'siri(o) 'juice' (R)
CB: Moor iró 'broth' (K); Umar ari 'broth' (K); Yerisiam óría 'broth' (K)
SH: Buli [si] tol ‘Three’ (ABVD); Gane ptol ‘Three’ (ABVD); Taba p-tol ‘Three’ (ABVD)
RA: Ambel tul 'three' (R); As tu 'Three’ (ABVD); Gebe pi-tol 'Three' (ABVD); Kawe tul 'three' (R); Laganyan tul 'three' (R); Wauyai tul 'three' (R)
CB: Ambai bo-toru 'Three' (ABVD); Biak kiòr 'three' (H); Wandamen toru 'Three' (ABVD)
Other: Irarutu tora 'Three' (ABVD)
CB: Wandamen siverere ‘star’ (ABVD); Wandamen sivererei ‘star' (G); Waropen siwerere 'star' ( ABVD ); Yaur hívérèrè pàivré 'star' ( K )
SH: Buli smat 'person/human being' (ABVD)
RA: Ambel met 'person' (R); Biga mat 'person' (R); Biga matumolo 'person/human being' (ABVD); Fiawat met 'person' (R); Kawe mat 'person' (R); Laganyan mat 'person' (R); Matbat mat 'person' (R); Ma'ya (S.) 'mat 'person' (R); Wauyai mat 'person' (R)
Other: Irarutu matu 'person/human being' (ABVD)
SH: Buli smo 'mouth' (ABVD); Gane sumu 'mouth' (ABVD); Taba sumo 'mouth' (ABVD)
RA: Biga samo- 'mouth' (ABVD)
Other: Sekar suma-n 'mouth' (ABVD)
CB: Biak snòn-snòn 'name’ (H); Dusner snori ‘name-3SG.POSS’ (D\&M)
CB: Dusner snontu 'person' (D\&M); Umar nomtu 'person' (K)
SH: Gane soat 'to tie up, fasten' (ABVD)
CB: Serui-Laut sawooi 'to tie' (Slm) [?]
Other: Kowiai -sáut 'to tie up, fasten' (ABVD); Sekar sait 'to tie up, fasten' (ABVD)

RA: Biga 'sobo 'horn' (R); Matbat $s o^{21} p$ 'horn' (R)
CB: Waropen soko 'to pound, beat' (ABVD)
Other: Arguni -so 'to pound, beat' (ABVD)
CB: Moor somúna 'shark' (K); Wandamen suomuse 'shark' (G)
CB: Biak sònger 'musical instrument' (H); Moor sòngger 'flute' (K); Serui-Laut songger 'flute’ (Slm)
SH: Buli soraf 'to suck' (ABVD)
RA: Biga suruf 'to suck' (ABVD); Gebe -sərəf 'to suck' (ABVD)
CB: Wandamen sorane 'wear' (G); Yerisiam óoráné 'use' (K)
RA: Ma'ya (S.) ' $s u^{3} n$ 'to enter' (R)
CB: Ambai suai 'enter' (Slz); Moor 'atù 'enter' (K) [?]; Wandamen su 'enter' (G)
CB: Biak sum 'to suck, kiss' (H); Moor tuamà 'suck on' (K); Wandamen sum 'to suck' (ABVD); Waropen suma 'to suck' (ABVD); Waropen tutuma 'to suck' (ABVD) [?]; Yerisiam húumé 'suck' (K)

CB: Ambai sumoi 'aunt (FS)' (Slz); Ansus sumoni 'aunt (father's sister)' (P\&D); Wandamen sumo 'aunt' (G)
CB: Biak surat 'book' (H); Umar hurat 'book' (K); Waropen suraka 'book' (Held 1942); Waropen surati 'book' (Held 1942); Yaur hùràatré 'book' (K); Yerisiam húráakvè 'book’ (K)
Other: Irarutu súrati ‘letter’ (M)
CB: Moor susu ìjo 'sea cucumber sp.' (K); Wandamen susu ' (G)
SH: Buli ta 'to pound, beat' (ABVD)
CB: Ambai tara 'pound (sago)' (Slz); Ansus tara 'pound (sago tree)' (P\&D); Dusner tar 'shred' (D\&M); Moor 'arà 'strike' (K); Umar tar 'pound (sago)' (K); Wandamen tara 'pound sago' (G); Yaur 'èérè 'pound (sago)' (K); Yerisiam káré 'pound (sago)' (K)

CB: Ambai taba 'wall' (Slz); Serui-Laut ampetaba 'wall' (Slm)

## RA: Biga -tabu 'to hold' (ABVD)

CB: Wandamen tapu 'hug ; grasp ; hold' (G)
SH: Taba -tagil 'to walk' (ABVD)
RA: Ambel la-tan 'walk' (R); As -tan 'to walk' (ABVD); Biga tag ‘walk' (R); Fiawat ta 'walk' (R); Kawe dag 'walk' (R); Laganyan dag ‘walk' (R); Ma'ya (M.) 'da ${ }^{12} g$ 'walk' (R); Ma'ya (S.) 'da ${ }^{12} k$ 'walk' (R); Wauyai dag ‘walk’ (R)
Other: Kowiai -táng 'to walk' (ABVD)
RA: Ambel tafi 'eye' (R); Biga ta ka'us(o) 'eye' (R); Biga taךkabul 'eye' (ABVD); Fiawat ta 'eye’ (R); Kawe ta bul(o) ‘eye’ (R); Laganyan ta abul(o) ‘eye’ (R); Ma'ya (M.) ta ka'bul(o) ‘eye’ (R); Ma'ya (S.) 'ta(o) 'eye' (R); Wauyai ta bul(o) 'eye' (R)
Mamberamo: Warembori taka-ro ‘Bad' (Donohue 1999) [?]; Yoke yazaya 'bad’ (Donohue 1999) [?]

CB: Ambai takatui ‘sibling (younger, different sex)' (Slz); Ansus tama katuni 'uncle (father's younger brother)' (P\&D)

RA: Ambel tal 'banana' (R); Biga tal 'banana' (R); Fiawat tal 'banana' (R); Kawe 'tal[a] 'banana' (R); Laganyan 'tal[a] 'banana' (R); Ma'ya (M.) 'tala ${ }^{12}$ 'banana' (R); Ma'ya (S.) 'tala3 'banana' (R); Wauyai 'tal[a] 'banana' (R)

SH: Gane talaga 'lake’ (ABVD); Taba talaga 'lake’ (ABVD)
RA: Biga ta'leb(o) 'tongue' (R); Biga telebo- 'tongue’ (ABVD); Fiawat telebey 'tongue' (R)
CB: Ambai taman 'axe’ (Slz); Ansus tamang 'axe’ (P\&D); Dusner tman 'axe’ (D\&M); Moor tamasî 'axe' (K); Serui-Laut tama 'axe' (Slm); Waropen mano 'axe' (Held 1942)
Mamberamo: Warembori man-do 'Axe' (Donohue 1999)
CB: Ansus tamepa 'turtle,_k.o.' (P\&D); Yerisiam tápépà 'turtle sp.' (K)
CB: Ambai tana 'short' (ABVD); Ambai tanan 'short (vertical)' (Slz); Ambai tinan 'short (horizontal)' (Slz); Ansus tenang 'short' (P\&D); Serui-Laut sana 'short' (Slm); Wandamen tanam 'short' (ABVD)
Other: Arguni tam... 'short' (ABVD) [?]
RA: Kawe tan'duk 'horn' (R); Laganyan 'tandu 'horn' (R); Ma'ya (M.) 'tandu 'horn' (R); Ma'ya (S.) 'tandu ${ }^{3}$ 'horn' (R)

Other: Arguni -tanem 'to hear' (ABVD); Sekar tanam 'to hear' (ABVD)
CB: Ambai tapere- 'tongue' (Slz); Serui-Laut ore-tapare 'tongue' (Slm); Wandamen sore tapare 'tongue' (G); Wandamen tapara 'tongue' (ABVD); Yaur tápárémbrè 'tongue' (K)
CB: Ansus tapui 'pig' (P\&D); Serui-Laut tafui 'pig' (Slm)
CB: Ambai taraa- 'ear' (ABVD); Wandamen taradir 'ear' (ABVD)
CB: Ambai tarai 'meat' (Slz); Ansus tarai 'body' (P\&D); Ansus tarai tarai 'flesh' (P\&D); Biak kràf 'meat/flesh' (H); Moor tùra 'flesh' (K) [?]; Serui-Laut tarai 'body, flesh' (Slm); Umar trai 'flesh' (K); Wandamen tarai 'body; flesh' (G)

CB: Moor tarána 'harpoon' (K); Yaur tràgré 'harpoon' (K); Yerisiam táráànà ‘harpoon' (K)
CB: Ambai tara-o 'hear' (Slz); Ansus tarao 'hear' (P\&D); Serui-Laut taraoa 'to hear' (Slm)
CB: Ambai tara-pararo 'deaf' (Slz); Ansus tarau paro ‘deaf' (P\&D)
CB: Ambai tara-reai 'cheek' (Slz); Ansus tarandeu 'cheek' (P\&D); Serui-Laut tararei ‘cheek' (Slm); Wandamen tarare 'cheek' (G)
SH: Taba tatal 'to split' (ABVD)
CB: Waropen taka 'to split' (ABVD)
CB: Ambai taun 'sago powder' (Slz); Serui-Laut tau 'sago' (Slm); Wandamen tau ‘sago' (G)
Other: Irarutu taúna 'sago cake' (M) [?]
CB: Ambai tawa 'old (thing)' (Slz); Ansus tawa 'old (things)' (P\&D); Ansus tewa 'old (people)' (P\&D)

CB: Ambai tawai ‘snake’ (Slz); Serui-Laut tawai ‘snake’ (Slm); Wandamen tawai 'snake’ (G)
CB: Ansus tei 'ladder' (P\&D); Umar tet 'ladder' (K); Wandamen ate 'ladder; stair' (G); Yerisiam kéèkà 'ladder' (K)
RA: As talami 'red' (ABVD); Laganyan tal'me 'red' (R)
RA: Biga ten(o) 'give' (R); Kawe ten(o) 'give' (R)
RA: Fiawat tepyep 'lightning' (R)
CB: Umar tpe 'lightning' (K)
CB: Ansus tera 'hit_(target)' (P\&D); Wandamen tera 'fall on ; hit' (G)
SH: Buli tig 'to throw' (ABVD)
RA: As -ti? 'to throw' (ABVD); Biga -ete 'to throw' (ABVD); Gebe -te 'to throw' (ABVD)
CB: Umar matin 'throw' (K)
Other: Irarutu -mati 'to throw' (ABVD)
SH: Gane tijá 'that' (ABVD)
RA: Gebe tea 'that' (ABVD)
CB: Ansus timburi ‘cassava’ (P\&D); Biak fàrkia timòr 'cassava’ (H); Moor timùri ‘cassava' (K);
Umar timuri 'cassava' (K); Wandamen timuri rau 'cassava leaf' (G); Yaur tìmùrì̀vré 'cassava' (K)
Mamberamo: Warembori timori ‘Cassava’ (Donohue 1999); Yoke timor $\beta$ 人a 'cassava’ (Donohue 1999)

RA: Fiawat tit 'run' (R); Kawe 'tit[i] 'run' (R); Laganyan 'tit[i] 'run' (R); Ma'ya (M.) 'siti ${ }^{12}$ 'run’ (R); Ma'ya (S.) 'siti ' 'run' (R)

CB: Ambai tita(k) 'peel (v.)' (Slz); Ansus tita 'peel' (P\&D)
CB: Umar to 'measure' (K); Yerisiam kàkó 'measure' (K)
Mamberamo: Warembori totai ‘eZ, (P)*PeSiD’ (Donohue 1999); Yoke otay ‘elder sister’ (Donohue 1999)

CB: Ambai towai ‘swamp' (Slz); Ansus towai ‘swamp’ (P\&D)
SH: Gane tua 'to buy' (ABVD)
CB: Umar tuat 'buy' (K)
CB: Ambai tukai ‘fish (v.)' (Slz); Ansus tui 'catch fish' (P\&D); Ansus tuia 'catch fish with a line’ (P\&D)

CB: Moor turé 'mouth' (K); Wandamen sore 'mouth; lips' (G)
CB: Moor tùruma 'halfbeak' (K); Yerisiam túurúmà 'fish sp.' (K)
SH: Buli tusa 'to stab, pierce' (ABVD); Taba -tusa 'to stab, pierce' (ABVD)
CB: Wandamen tisa 'stab' (G)
RA: As -uac 'back' (ABVD)
CB: Waropen ruai 'back' (ABVD)

CB: Ambai uai 'mountain' (Slz); Ansus wi 'mountain' (P\&D); Ansus wi 'mountain' (P\&D); SeruiLaut wi 'mountain' (Slm); Wandamen wis 'mountain' (G)
SH: Buli uba 'gunpowder' (ACD)
CB: Ansus uba 'medicinal plants' (P\&D); Biak uba 'gunpowder' (H); Waropen uba 'medicine; gunpowder' (ACD)
CB: Moor úma 'star' (K); Yerisiam túùmà 'star' (K)
Other: Kowiai oma-óma 'star' (ABVD)
CB: Ambai umbe 'bushknife' (Slz); Ansus umbe 'machete' (P\&D); Dusner smber 'machete' (D\&M); Serui-Laut umbe 'machete' (Slm)
SH: Gane unak 'to know, be knowledgeable’ (ABVD); Taba -unak 'to know, be knowledgeable' (ABVD)
RA: As -nun 'to know, be knowledgeable' (ABVD); Biga l-un(o) 'know' (R); Biga -uno 'to know, be knowledgeable' (ABVD); Fiawat l-un 'know' (R); Gebe -una 'to know, be knowledgeable’ (ABVD); Kawe w-un(o) 'know' (R); Laganyan 'w-un(o) 'know' (R); Ma'ya (M.) 'w-un(o) 'know' (R); Ma'ya (S.) 'w-un(o) 'know' (R); Wauyai w-un(o) 'know' (R)

CB: Umar nune 'know' (K)
CB: Yaur ú’nè ‘draw water' (K); Yerisiam úukú 'draw water' (K)
SH: Buli untup 'luck, fortune, profit' (ACD)
CB: Biak untung 'windfall, piece of good luck' (H)
Other: Kowiai untuy 'profit; to win' (ACD)
RA: Biga $u(o)$ 'head' (R); Biga wu- 'head' (ABVD)
CB: Biak rwu- 'head' (H); Dusner rvu 'head' (D\&M); Moor vàru 'head' (K); Umar du 'head' (K); Wandamen ru 'head' (G); Yaur dójè 'head' (K)
Other: Arguni aru- 'head' (ABVD)
RA: As up 'night' (ABVD); Gebe op 'night' (ABVD)
CB: Biak ròb 'night' (H); Dusner rov 'night' (D\&M)
Mamberamo: Warembori upi-ro ‘Sago tree’ (Donohue 1999); Yoke upi ‘sago tree’ (Donohue 1999)

CB: Ambai ure- ‘eye’ (Slz); Serui-Laut re ‘eye’ (Slm); Serui-Laut rure ‘eye’ (Slm); Wandamen re 'eye' (G)
CB: Ansus urundaing ‘wok' (P\&D); Serui-Laut rundai ‘wok' (Slm); Umar rundain 'wok' (K)
SH: Gane usnu 'nose' (ABVD); Gane usnut 'nose' (ACD); Taba hungo 'nose' (ABVD)
RA: Ambel sun 'nose' (R); As -samu ‘nose’ (ABVD) [?]; Biga sa'nu(o) 'nose' (R); Biga senu- 'nose’ (ABVD)
CB: Biak snò- ‘nose' (H); Wandamen suo 'nose' (G)
RA: Biga uta- 'back' (ABVD)
CB: Umar uten 'back' (K)

RA: Biga u'tum 'betel leaf (Malay biji sirih)' (R); Fiawat wotum 'betel leaf (Malay biji sirih)' (R)
CB: Umar $u v$ 'hit' (K); Yaur ùvrùhné 'hit' (K)
CB: Wandamen vakirini 'frog' (G)
Other: Irarutu wagri' 'frog' (M)
CB: Ambai varapema ‘wing' (ABVD); Ambai wara-peman ‘wing' (Slz); Ansus warapema 'wing' (P\&D)
CB: Dusner ve 'VBLZ' (D\&M); Umar $e$ - 'Vblz' (K); Yaur $e$ - 'Vblz' (K); Yerisiam $e$ - 'Vblz' (K)
CB: Dusner ve 'become' (D\&M); Wandamen ve 'become' (G)
CB: Moor vehío 'light' ( K ); Yaur névéhè 'light' ( K )
CB: Moor verìra'a 'dirty' (K); Wandamen verariate 'dirty' (G); Waropen werira 'dirty’ (ABVD)
CB: Ambai vioai ‘lory’ (Slz); Ansus wioi ‘Black-capped Lory’ (P\&D)
CB: Umar vodar 'flood' (K); Yaur vòdré 'flood' (K)
CB: Umar vramogre ‘outrigger-boom rod’ (K); Yaur vràmòogré 'boom-outrigger rod’ (K)
CB: Umar wae ‘oh’ (K); Yaur gwáè ‘how sad!' (K); Yerisiam gwáéè 'pity’ (K)
CB: Umar wahi 'tree kangaroo' (K); Yaur gwàhíe 'tree kangaroo' (K)
SH: Gane wai ‘small’ (ABVD)
RA: Fiawat we 'small' (R); Matbat wa3y 'small' (R)
SH: Gane waik 'to turn' (ABVD)
RA: Gebe -kawai- 'to turn' (ABVD)
CB: Ambai wairoi 'far' (ABVD); Ambai waroi 'far' (Slz); Ansus woroi 'far' (P\&D); Serui-Laut woroi 'far' (Slm); Wandamen woroi 'far' (ABVD)

CB: Biak wairus 'needle' (H); Serui-Laut wairusi 'large needle’ (Slm); Yaur gwàirùuhré ‘sewing needle' (K); Yerisiam gwáirúuvè 'needle' (K)

RA: Ambel wali 'tooth' (R); Fiawat weli 'tooth' (R)
RA: As -walu 'mouth' (ABVD)
CB: Ambai boro- 'mouth' (Slz); Ansus woreu 'mouth' (P\&D); Waropen boro 'mouth' (ABVD);
Waropen woro[do] 'mouth' (ABVD)
Mamberamo: Warembori ke-vo-ro 'Mouth' (Donohue 1999); Yoke $\beta$ undu- 'mouth' (Donohue 1999)

CB: Wandamen wam 'blood' (G)
Other: Irarutu wámasa 'blood' (M)
CB: Ambai wama 'hornbill' (Slz); Ansus wama 'hornbill' (P\&D); Serui-Laut uama 'hornbill' (Slm);
Wandamen wamar 'Papuan (Blyth's) hornbill' (G)
Mamberamo: Warembori waman-do 'Hornbill' (Donohue 1999)
CB: Biak wān 'wallaby' (H); Moor gwaná 'wallaby' (K)

CB: Ambai wana ‘wind' (ABVD); Ansus wanang 'wind' (P\&D); Biak wām 'wind' (H); Moor ragwamá 'north-east wind' (K); Serui-Laut wana 'wind' (Slm); Wandamen wana 'wind' (G); Waropen wama 'wind' (ABVD)
Mamberamo: Warembori wame-ro ‘Wind’ (Donohue 1999); Yoke wamb-a 'wind' (Donohue 1999)
CB: Ansus wane, na wana 'over there' (P\&D); Wandamen wana 'there (far distance)' (G)
CB: Biak wàngar 'rat, mouse' (H); Umar wanggar 'rat' (K); Wandamen wanggar 'mouse' (G)
SH: Buli wànat 'meat/flesh' (ABVD); Gane wontu 'meat/flesh' (ABVD) [?]
RA: Ambel wanat(i) 'flesh, meat, fruit' (R); Biga 'wanat(o) 'flesh, meat, fruit' (R); Fiawat wanat 'flesh, meat, fruit' (R); Gebe wayat 'meat/flesh' (ABVD); Kawe awa'nat 'flesh, meat, fruit' (R); Laganyan $a^{\prime}$ wanat 'flesh, meat, fruit' (R); Matbat $\eta a^{21} t$ 'flesh, meat, fruit' (R); Ma'ya (M.) 'wana ${ }^{12}$ 'flesh, meat, fruit' (R); Ma'ya (S.) 'wana ${ }^{3} t$ 'flesh, meat, fruit' (R); Wauyai kawa'nat 'flesh, meat, fruit' (R)

CB: Dusner wanggou ‘arrow' (D\&M); Umar wagu 'arrow' (K)
Other: Irarutu wagəbú 'arrow' (M)
CB: Ambai wankori ‘crocodile’ (Slz); Ansus wonggori 'crocodile’ (P\&D); Biak wòngor 'crocodile’ (H); Serui-Laut wangkori 'crocodile' (Slm); Waropen anggoro 'crocodile' (Held 1942)

SH: Buli wao 'neck’ (ABVD); Taba ggowo 'neck' (ABVD)
CB: Ambai wape 'but' (Slz); Dusner vape 'but' (D\&M); Wandamen vape 'but' (G)
CB: Ambai wara-diu 'fingernail' (Slz); Ansus waraudi 'fingernail' (P\&D); Serui-Laut varadi 'fingernail, toenail' (Slm); Wandamen vara kiai dir 'fingernail' (G); Wandamen vara kiai dire 'fingernail' (G)
CB: Ambai wara-keka 'finger' (Slz); Ansus warau kikea 'finger' (P\&D); Serui-Laut warakea 'finger' (Slm); Wandamen vara kiai 'finger' (G)
CB: Serui-Laut wararu 'tendon, vein' (Slm); Wandamen wai re 'vein' (G)
RA: Ambel ware (y) 'tongue' (R); Kawe wal(o) 'tongue' (R); Wauyai wal(o) 'tongue' (R)
Other: Kowiai yera 'tongue' (ABVD)
Mamberamo: Warembori wati 'Four’ (Donohue 1999); Yoke zasi 'four’ (Donohue 1999)
CB: Ambai wati 'see' (Slz); Serui-Laut wai 'to see' (Slm)
CB: Ansus wawu 'flee’ (P\&D) [?]; Dusner mbur 'go.home' (D\&M); Moor vavú 'go home' (K); Umar vur 'go home' (K); Wandamen vavu 'go home' (G); Yaur híivújè 'go home' (K); Yerisiam pú 'go home' (K) [?]
CB: Ansus wawu 'fireplace' (P\&D); Umar wavun 'fireplace' (K)
CB: Ambai we 'for' (Slz); Ansus we 'for' ( $\mathrm{P} \& \mathrm{D}$ ); Biak be 'to' (H); Dusner ve 'to' ( $\mathrm{D} \& \mathrm{M}$ ); Moor ve 'Loc' (K); Waropen we 'in, inside' (ABVD)
RA: As -we? kapa? 'to split' (ABVD); Biga -apa 'to split' (ABVD); Gebe kapau 'to split' (ABVD)
CB: Biak kabas 'to split' (H)
Mamberamo: Warembori wen-do 'Rope’ (Donohue 1999); Yoke wani 'rope’ (Donohue 1999)

SH: Taba -wet 'to hit' (ABVD)
CB: Waropen we 'to hit' (ABVD)
CB : Biak wèwĕr 'lightning' (H); Wandamen vera-vera 'lightning' (G)
CB: Ansus wi 'forest' (P\&D)
Other: Irarutu witú 'forest, jungle' (M)
CB: Ansus wio 'smoke' (P\&D); Wandamen woyow 'smoke' (ABVD)
SH: Sawai witen-ča 'hundred' (CAD); Taba utin 'hundred'
CB: Umar utinho kotem 'one hundred' (K); Wandamen utin 'twenty' (G); Yaur útín rèebé 'one hundred' (K)
RA: As wo 'wind' (ABVD); Matbat $w o^{41}$ 'wind' (R); Matbat $w u^{41}$ 'wind' (R)
SH: Gane wom 'to come' (ABVD); Taba -wom 'to come' (ABVD)
CB: Ambai woman 'outrigger' (Slz); Ansus womang 'outrigger' (P\&D); Wandamen soma 'bamboo pole stabilizing an outrigger canoe' (G)
CB: Ambai wombua 'spear (n.)' (Slz); Ansus wondua 'spear' (P\&D)
CB: Ambai womin 'servant/captive' (Slz); Biak wòmìn 'slaaf' (H); Moor gwòmina 'bait' (K)
CB: Ansus wongkiang 'board' (P\&D); Serui-Laut ongka 'board' (Slm); Umar wonggian 'board' (K)
CB: Ansus wonyai 'bucket' (P\&D); Wandamen wonioi 'k.o. traditional wooden bowl' (G); Yerisiam gwóníài ‘wooden bowl’ (K)
CB: Ansus wopeu 'nose' (P\&D); Serui-Laut wompi 'nose’ (Slm)
CB: Ansus wope wanamba 'north' (P\&D); Serui-Laut wana mba 'north' (Slm)
CB: Ansus worewu 'peninsular' (P\&D); Waropen ghoro 'snake' (ABVD); Waropen [w]oro 'snake' (ABVD); Yerisiam gwóorú 'snake' (K)
CB: Ambai wori ‘sea spirit' (Slz); Ansus wori 'spirit,_sea*' (P\&D); Umar ori 'sea spirit' (K); Yaur gwóorìjé 'sea spirit' (K)
CB: Umar woriori 'bird sp.' (K); Yerisiam gwóríorívè 'bird sp.' (K)
CB: Ansus woroi ‘old (things)' (P\&D); Wandamen woroi 'long (time)' (G); Yaur vòrré 'old' (K)
SH: Sawai wowo 'root' (CAD); Taba wowo 'root' (ABVD)
SH: Taba wulo 'liver' (ABVD)
RA: Biga lu(o) 'liver' (R); Ma'ya (S.) 'lo ${ }^{3} n$ 'liver' (R); Wauyai lu 'liver' (R)
RA: Kawe 'w-un[u] 'swim' (R); Ma'ya (S.) w-a'un 'swim' (R)
RA: Fiawat yahan 'sun, day' (R); Kawe yan ‘sun, day' (R); Laganyan lya'han ‘sun, day' (R); Matbat la ${ }^{121}$ ‘sun, day' (R); Ma'ya (M.) 'lyasa ${ }^{12} n$ 'sun, day' (R); Ma'ya (S.) 'lasa³n ‘sun, day' (R); Wauyai lan 'sun, day' (R)
CB: Ambai aha 'day' (ABVD)

SH: Buli yas 'to swim' (ABVD)
RA: Ambel la 'swim' (R); As -as 'to swim' (ABVD); Biga l-as ‘swim' (R); Biga -mas 'to swim' (ABVD); Fiawat l-ah 'swim' (R); Gebe -yas 'to swim' (ABVD); Laganyan w-ah 'swim' (R); Matbat la $a^{3}$ ' 'swim' (R); Ma'ya (M.) ' $w-a^{12} s$ 'swim' (R); Wauyai $w$-a 'swim' (R)
CB: Biak ās 'to swim' (H); Moor áta 'swim' (K); Umar ejah ‘swim' (K) [?]; Wandamen as 'swim' (G); Wandamen as(e) 'to swim' (ABVD)

Mamberamo: Warembori ate 'Swim' (Donohue 1999)
CB: Ambai yawa 'reef' (Slz); Umar jawar 'reef' (K)
CB: Ambai ye 'fishtrap' (Slz); Ansus ye 'fish poison' (P\&D); Wandamen yer 'fish poison' (G)
SH: Sawai yعfen 'road' (CAD)
RA: Gebe yefen 'road/path' (ABVD)
CB: Ansus yenayu ‘dry’ (P\&D); Serui-Laut sanaya ‘dry’ (Slm); Wandamen sanaia ‘dry’ (G);
Wandamen sinaya 'dry' (ABVD)
RA: Ambel yene ‘ I ' ( R ); As ane ' I ' (ABVD); Biga in ' I ' ( R ); Biga ini ' I ' (ABVD); Fiawat ine ' I ' ( R );
Gebe ane ‘I' (ABVD); Kawe 'yene ‘I' (R); Laganyan 'yene ‘I' (R); Ma'ya (M.) 'ene ‘I' (R); Ma'ya (S.) 'ene ‘I' (R); Wauyai 'yene ' I ' ( R )
CB: Umar ene '1sg' (K); Yerisiam ne- '1sg' (K); Yerisiam né '1sg' (K)
Other: Arguni embie 'I' (ABVD)
SH: Gane yo ‘dog’ (ABVD); Sawai yaw ‘dog’ (CAD); Taba nyo ‘dog' (ABVD)
RA: Ambel yoy 'heart' (R); Matbat $l{ }^{21} y$ 'heart' (R)


[^0]:    ${ }^{1}$ In this work, 'New Guinea' refers to the island that is divided in half politically between Papua New Guinea in the east and two provinces of Indonesia (Papua and Papua Barat) in the west. Papua New Guinea is a former British and Australian colony; its lingua franca is Tok Pisin. The Indonesian side, until recently known as Irian Jaya, was part of the Dutch East Indies; its lingue franche are Indonesian and Papuan Malay.
    ${ }^{2}$ See, for example, Lynch et al. (2002); Ross et al. (1998).

[^1]:    ${ }^{3}$ This fieldwork took place from 2008-13. It was partially supported by an Individual Graduate Scholarship from the Endangered Languages Documentation Programme ('Documentation of Moor, an Austronesian language of Cenderawasih Bay, Indonesia', 2010-13).
    ${ }^{4}$ These contributors were Hamim Al Fatih for Gane, Legaya Jumahir Jamulia for Patani, and Kalu Mata for Gebe.

[^2]:    ${ }^{5}$ Ross (1997: 217) defines density as "the number of relationships an individual has with other individuals", intensity as "the amount of time two people spend together and the intimacy of that relationship", and multiplexity as "the number of purposes for which two people relate to each other".

[^3]:    ${ }^{6}$ Derivational morphology is less clear-cut. It is not discussed here, because it is not relevant to my analysis of morphological innovations in SHWNG.

[^4]:    ${ }^{1}$ Ross (2009) argues that several of these branches group together as Proto-Nuclear Austronesian. The result is largely compatible with Blust's analysis.
    ${ }^{2}$ For a recent opposing view, see Donohue and Denham (2010).

[^5]:    ${ }^{3}$ Ross (1992) disputes the evidence for reconstructing *c, *D, * $\tilde{n}$, and ${ }^{*} r$ to PAn. If this is correct, these consonants were PMP innovations.

[^6]:    ${ }^{4}$ PMP was, in fact, the first Austronesian proto-language to be reconstructed, in Dempwolff (1934-38)'s foundational work. Dempwolff did not have access to Formosan data. The modern terminological distinction between PAn and PMP dates to Blust (1977).

[^7]:    ${ }^{5}$ Blust (1993) does not discuss the status of *D in PCEMP. However, Blust (2013: 575) states that * $D$ only has distinct reflexes from *d in WMP languages. I therefore assume that *D > *d in PCEMP.

[^8]:    ${ }^{6}$ These numbers were calculated by combining the innovations proposed in Blust (1978a, 1983-4) and subtracting those later assigned to PCEMP in Blust (1993).

[^9]:    ${ }^{1}$ Also known by its former names of Geelvink Bay and Sarera Bay.
    ${ }^{2}$ The northern half of Halmahera and the Bird's Head are occupied by Papuan languages.
    ${ }^{3}$ Language names and status as language or dialect are drawn from recent fieldwork when possible: for Taba, Bowden (2001); for Raja Ampat, Remijsen (2001b) and van der Leeden (1993); for Bedoanas and Erokwanas, Harald Hammarström (p.c., 2010); for Irarutu and Kuri, Jason Jackson (p.c., 2010); for Moor, Umar, Yaur, and Yerisiam, my own fieldwork; for Roon, David Gil (p.c., 2010); for Warembori and Yoke, Donohue (1999). Otherwise, information is drawn from the Ethnologue (Lewis 2009). The Ethnologue consider Bata to be a dialect of Ma'ya, so it has no ISO 639-3 code.

[^10]:    ${ }^{4}$ The exceptions are the Kawe and Wauyai of Waigeo, who maintained traditional beliefs until they became Christian in the mid-20th century.

[^11]:    ${ }^{5}$ This summary of Adriani and Kruyt (1914) is partly based on Blust (1978a: 183).

[^12]:    6"Het is uit deze lijst geheel duidelijk, dat het Oost-Makiansch bij de talen van Z. Halmahera, het gebied der Kalana Fat (Waigeoe, Salawati, Misol), het Noefoorsch en zijne verwanten behoort."
    ${ }^{7}$ Dyen calls this language "Japen". Silzer (1983: 9) evidently was able to determine that it was Ambai.

[^13]:    ${ }^{8}$ Most modifications are for clarity of presentation, but I have also made also one substantial change: reflexes are given from PMP rather than PAn, since changes from PAn to PMP are not relevant to the status of SHWNG. (At the time of Blust's paper, there was not yet consensus on the validity of PMP.) An error in change 10 has also been corrected: the original reads * $u_{2}$, i.e., * $u$ in the penult, but it is clear from elsewhere that * $u$ in the ultima is intended. The orthography and reconstructed PMP phonology follow Blust (2013).
    ${ }^{9}$ These caveats also apply to the supporting forms from other SHWNG languages presented later in the paper.
    ${ }^{10}$ For example, although only one supporting form is given under change 1 (PMP *pitu > Buli fit, Numfor fik'seven'), one of the supporting forms for change 9 also illustrates change 1 (PMP *pa(n)pan > Buli fafan, Numfor am-bafen 'plank').
    ${ }^{11}$ Blust (1978b: 29) notes the irregular correspondence in dalim, stating that it is the only case of *t $>d$ in Buli.

[^14]:    ${ }^{12}$ Blust cites the following proto-forms as undergoing syncope in various SHWNG languages: PMP *banua 'inhabited area', PMP *bulu 'feather', PMP *mata 'eye', PMP *paniki 'fruit bat', PMP *t-ina 'mother', PMP *tinaqi 'intestines', PEMP *matu 'dry coconut', PEMP *natu 'child'.

[^15]:    ${ }^{13}$ Change 4a might be added to this list, since all languages investigated by Blust either undergo it or show no evidence against it. It was left out because Blust does not clearly state that he considers it to be a Proto-SHWNG innovation.

[^16]:    ${ }^{14}$ I have relabeled Ross's changes to be consistent with the numbering used throughout this chapter. Note that Ross's * $Z=$ Blust's *z, and that Blust does not recognize PMP *H or *?

[^17]:    ${ }^{15}$ Anceaux (1961a) includes all Cenderawasih Bay languages listed in $\$ 3.1$ except Tandia, Umar, Yaur, and Yerisiam.
    ${ }^{16}$ Voorhoeve (1989: 114) also assumed that Blust included Irarutu in SHWNG.

[^18]:    ${ }^{17}$ Jason Jackson (p.c., 2010) informs me that Irarutu and Kuri have few similar vocabulary items on a basic wordlist, but that speakers of one language claim to understand the other without difficulty. This suggests pervasive bilingualism between Irarutu and Kuri speakers, complicating how to interpret reports of their similarity.
    ${ }^{18}$ Smits and Voorhoeve (1992a, 1992b), apparently published after Blust (1993) was written, contains lexical data from Bedoanas and Erokwanas. Unfortunately, the data are not sufficient, or sufficiently reliable, to be used for classification.
    ${ }^{19}$ Another feature that distinguishes the South Halmahera languages, although Blust does not mention it (perhaps because it is not highly diagnostic), is the outcome of the merger in change 6 as $l$ rather than $r$.

[^19]:    ${ }^{20}$ For the identification of this language (called Misool by Blust) as Ma'ya, cf. Remijsen (2001b: 17).
    ${ }^{21}$ Additionally, the outcome of change 6 is not a Proto-RASH innovation if Proto-SHWNG already had *l (as, for example, Ross has claimed).
    ${ }^{22} \mathrm{He}$ apparently excludes Gebe from this subgroup, considering it to be "an offshoot of the Patani language from southeastern Halmahera" (van der Leeden 1993: 10).
    ${ }^{23}$ The tree is copied from Blust (1978a: 205), who received clarifications from Anceaux of some unintended ambiguities in the original classification. The Biak Group has been renamed Biakic for clarity, and the group as a whole (not named by Anceaux) has been labeled Cenderawasih Bay.

[^20]:    ${ }^{24}$ As mentioned above, Blust (1978a) uses Anceaux's classification in order to determine what evidence is sufficient to show that all Cenderawasih Bay languages underwent a sound change: it must be shared by Biakic, Waropen, Moor, and Yapen. This line of reasoning is somewhat obscure. Since the changes in question presumably occurred in Proto-SHWNG, and since Blust appears to accept Anceaux's Cenderawasih Bay group, finding evidence of SHWNG innovations in any individual Cenderawasih Bay language should be enough to make a good case for including the whole group in SHWNG. Perhaps Blust thought that there was better evidence for Anceaux's subgroups that for the group as a whole.

[^21]:    ${ }^{25}$ Van den Berg relies on Anceaux (1961a) and Laycock (1978) for Moor, which contain various inaccuracies, but better data would probably not significantly change his analysis.
    ${ }^{26}$ The only language in van den Berg's sample that does not make the distinction is Taba, which he argues has lost it.
    ${ }^{27}$ This procedure appears to be at variance with van den Berg's acceptance of Remijsen's Proto-RASH, and with his statement that "I will not be concerned with the details of subgrouping in this article" (2009: 218). His reconstruction presupposes a different subgrouping from Remijsen's, and moreover, one that not been proposed elsewhere to my knowledge.

[^22]:    ${ }^{1}$ Arnold (2014) shows that Ambel $f, \phi$, and $h$ are variants of a single phoneme /f/.

[^23]:    ${ }^{2}$ See $\S 4.2 .21$ for *mb clusters.
    ${ }^{3}$ More data might well produce evidence of variation in As, Gebe, or Matbat as well.
    ${ }^{4}$ Warembori has a single phoneme /b/ which is pronounced $b$ word-initially and $\beta$ intervocalically. These allophones are spelled $b$ and $v$, respectively.

[^24]:    ${ }^{5}$ See $\S 4.2 .6$ for palatalization of * $t$ before *i. See $\S 4.2 .21$ for ${ }^{*} n t$ clusters.
    ${ }^{6}$ In several words, the outcome is $k$ in the Hirom dialect and $?$ in the Ayombai dialect. Examples are Hirom muká'-a, Ayombai mu'á'-a 'afraid'; Hirom kú'-a, Ayombai ú-a 'louse'. (Moor has no word-initial contrast between $?$ and $\varnothing$ on nouns.)

[^25]:    ${ }^{7}$ Whatever the intermediate stage between * $t$ and $h$, it could not have been identical to the reflex of *s, which remains $s$ in most Raja Ampat languages ( $\$ 4.2 .10$ ).
    ${ }^{8}$ Ambai wa/wisi 'hungry' apparently shows an analogous development. However, palatalized *t otherwise apparently merged with *s in Ambai, as in PMP *qutin > *usi > *si > i- 'penis'.

[^26]:    ${ }^{9}$ See $\S 4.2 .21$ for * $\eta k$ clusters.
    ${ }^{10}$ There is no word-initial contrast between $?$ and $\varnothing$ on Moor nouns. Ayombai $u^{\prime}-a$ 'louse' is thus consistent with $* k>$ ?
    ${ }^{11}$ The Yaur reflex may in fact be regular for initial position. In the other attested examples, it is not possible to distinguish initial 3 from $\varnothing$.

[^27]:    ${ }^{12}$ Older sources for Umar often write $s$ instead of $h$. During my fieldwork, speakers claimed that $h$ was the correct sound, but occasionally produced forms with $s$. The change was evidently quite recent, and may not have run to completion.
    ${ }^{13}$ Ambai sura 'ten' may be a borrowing from a neighboring language.

[^28]:    ${ }^{14}$ See §4.2.21 for *nd clusters.
    ${ }^{15}$ Warembori has a single phoneme /d/ which is pronounced $d$ word-initially and $r$ intervocalically. These allophones are reflected in the orthography.

[^29]:    ${ }^{16}$ Warembori (and, apparently, Yoke) have a single phoneme /d/ which is pronounced $d$ word-initially and $r$ intervocalically. These allophones are reflected in the orthography. It is unclear why the word for 'five' was transcribed with initial $r$ in Warembori.

[^30]:    ${ }^{17}$ Ansus shows irregular loss of * $m$ word-finally in PMP *qayam > aya 'bird'.
    ${ }^{18}$ Ambai, Ansus, Umar, and Wandamen show irregular preservation of word-final * $m$ in their reflexes of PMP *tanam 'to plant'.
    ${ }^{19}$ The Yaur development is quite unusual, but it occurs in only one language.

[^31]:    ${ }^{20}$ Ansus tawan 'a tree: Pometia pinnata' may be mistranscribed, It is derived from Blust (2014), while most other Ansus data are derived from Price and Donohue (2009).

[^32]:    ${ }^{21}$ Umar, which shares common developments of *z with Yaur and Yerisiam, apparently did not participate in this change.

[^33]:    ${ }^{22}$ There are no $r$-initial verbal suffixes in Yaur.
    ${ }^{23}$ The conditioning would be more phonetically natural if * $r$ was a uvular fricative or trill, similar to PMP *R. This is possible, but there is no independent evidence for it.
    ${ }^{24}$ See $\S 5.3 .3$ for a discussion of vowel length and tonal developments.

[^34]:    ${ }^{25}$ The unrounding in PMP *wiRi > Yerisiam bá-giru 'left (side)' is regular. Yerisiam does not permit $/ \mathrm{g}^{\mathrm{w}} /$ before a high vowel, changing it to $/ \mathrm{g} /$.

[^35]:    ${ }^{26}$ Sawai stress is regularly penultimate, unless the penult contains $\varepsilon$, in which case it is final (Whisler and Whisler 1995: 1:661). mepin 'woman' thus has final stress.

[^36]:    ${ }^{27}$ The variation in Biak is prosodically conditioned. The vowel is realized as a (or $\varnothing$ ) unless the word falls at the end of an intonational phrase, in which case the final syllable is stressed and the vowel is realized as $e$ (van den Heuvel 2006: 27).

[^37]:    ${ }^{28}$ See footnote 27 on the previous page for the conditioning of the two Biak outcomes.

[^38]:    ${ }^{29}$ See footnote 27 on page 72 for the conditioning of the two Biak outcomes.

[^39]:    ${ }^{30}$ Examples are PMP *asu > Sekar yasi 'dog', and PMP *hapuy > Arguni yaf, Sekar yafi 'fire'.

[^40]:    ${ }^{31}$ Examples are reflexes of PMP *məñak 'fat, grease'; PMP *qatəp 'roof'; PCEMP *qenəp 'lie down to sleep'; PMP *qitoluR 'egg'; and PMP *tanam 'to plant'. The only exception is PMP *lipən 'tooth', perhaps because the other vowel is $i$. There is no evidence for harmony in Matbat, due to its tendency towards monosyllabicity.
    ${ }^{32}$ The discrepancy betwen Gebe $\supset$ and $o$ is due to a transcriptional difference in the two sources consulted.
    ${ }^{33}$ Reflexes of "pzñu 'the green turtle, Chelonia mydas' generally have $e$ or $i$ instead, as first noted by Blust (1978a).

[^41]:    ${ }^{34}$ See footnote 27 on page 72 for the conditioning of the two Biak outcomes.

[^42]:    ${ }^{35} \mathrm{As}$-meli/s 'laugh' and Fiawat mena 'fat' should probably be counted as examples of syncope. The vowel $e$ may be due either to reduction of the penultimate syllable without loss, or restoration following loss.

[^43]:    ${ }^{36}$ Lower numbered changes precede higher numbered changes. Unless otherwise specified, there is no evidence for sequencing among unnumbered changes or changes with the same number.

[^44]:    ${ }^{1}$ Waropen and Roon are two additional SHWNG languages that may have some kind of tonal contrast, but for which data are currently insufficient to resolve the question. Van Velzen (1994) claims in passing, with no examples or analysis, that Waropen has three distinctive tones (high, mid, and low). Anceaux (n.d.)'s transcription of Roon [ $\beta$ 'ra:na] 'my arm' versus [ $\beta$ 'rana] 'his/her arm' may be a misinterpretation of a tonal contrast as a length contrast.
    ${ }^{2}$ This summary is partly based on Remijsen (2007: 27).

[^45]:    ${ }^{3}$ There are not enough data to determine if this word is really exceptional, or regular according to some other change.
    ${ }^{4}$ There is some ambiguity about the precise environment in which epenthetic final o appears: Remijsen (2001b: 70) claims sentence-finally, while Remijsen (2007: 25) claims utterance-finally. In either case, it is a significant innovation.

[^46]:    ${ }^{5}$ Laycock (1978) first observed that Moor was tonal. He cited a few minimal pairs but gave no analysis. This section covers the Hirom dialect, the Moor dialect with which I am most familiar. Impressionistically, tonal differences among dialects are limited to the phonetic realization of tones. The Ayombai dialect shows the greatest difference compared to the system described here.
    ${ }^{6}$ In the description below, epenthetic final $a$ is disregarded when counting syllables. For example, "final syllable" refers to the final underlying syllable.
    ${ }^{7}$ Phonetic transcription follows IPA: [á] = high pitch, [ā] = mid pitch, [à] = low pitch. In the tone pattern schemas used here and in following sections, $\mathrm{H}=$ high, $\mathrm{M}=$ mid, $\mathrm{L}=$ low, $\mathrm{F}=$ falling, $\mathrm{R}=$ rising, * = zero or more of the preceding tone/pitch.

[^47]:    ${ }^{8}$ The only attested monosyllable with tone 4 is $\hat{\imath}$ 'he, she'.

[^48]:    ${ }^{9}$ As noted above, the epenthetic final $a$ is not counted.

[^49]:    ${ }^{10}$ Anceaux (1961b) first observed that Yerisiam was tonal. He cited a few minimal pairs but gave no analysis.

[^50]:    ${ }^{11}$ There is some evidence that underlyingly long vowels are permitted more generally on final level syllables. The word nó 'hear' becomes nóo when followed by the negator $v e ̀$, whereas pú 'go home' remains

[^51]:    the same. This suggests an underlying length contrast that is neutralized in final position. This question has not yet been systematically investigated.
    ${ }^{12}$ Monosyllables with VVG diphthongs have tone pattern 1, as becomes clear when a pronominal prefix is added (see above): né-róoi 'my night'. Monosyllables with monomoraic diphthongs have pattern 3: nè-rói 'my song'.
    ${ }^{13}$ The final $a ̀$ before the enclitic is inserted by a regular phonological rule.

[^52]:    ${ }^{14}$ Pattern 3 does not permit long vowels, as noted above.
    ${ }^{15}$ This leaves open the question of how áû and áúù acquired their falling tone in the first place. These words do not have clear Austronesian etymologies. One possibility is that they are loanwords, and their

[^53]:    tone is preserved from the donor language. However, it is difficult to trace the origin of most of the nonAustronesian vocabulary in Yerisiam (and other SHWNG languages).
    ${ }^{16}$ There is no synchronic evidence that -à is analyzable as a suffix, but there are enough historical examples that it must have been previously. Its function is unkown.
    ${ }^{17}$ The three sequences presumably merged prior to the development of low tone, though Rivierre does not explicitly address this question.
    ${ }^{18}$ Proto-Oceanic * $a$ is reflected as $\varepsilon$ in Cèmuhî, and had no effect on tone.

[^54]:    ${ }^{19}$ Yaur was not known to be tonal prior to my fieldwork.

[^55]:    ${ }^{20}$ Biga also has epenthetic final $o$ in prepausal position in various words (Remijsen 2001b: 158). Biga is not known with certainty to be tonal, and Remijsen does not transcribe tone in his wordlist. It therefore cannot be determined whether epenthetic final $o$ in Biga has the same origin as in Ma'ya and Matbat, though it seems likely that there is some relationship.

[^56]:    ${ }^{21}$ See Donohue (1997) for a general survey of tone in New Guinea.
    ${ }^{22}$ Drabbe (1953), a grammar of the coastal varieties of Kamoro, makes no mention of tone. Donohue (2005: 35) claims that (coastal) Kamoro is tonal, but I have not been able to trace the source of this claim.

[^57]:    ${ }^{1}$ Moor a'ó and ma'ó are synchronically paucal, further supporting derivation from a historical trial. Oddly, however, mu'ó and ti'ó are not paucal.

[^58]:    ${ }^{2}$ Some SHWNG languages also distinguish dual and trial forms. These are generally synchronically transparent, and so are not covered here.
    ${ }^{3}$ Biga lacks conclusive evidence. Grace $(1955-6)$ indicates that Biga's consonantal conjugation is similar to Ma'ya (S.). Since Grace's data are partially inconsistent with the vocalic conjugation in Remijsen (2001b), they are not included in the tables. However, I assume on a preliminary basis that Biga undergoes infixation, since Remijsen does not give the consonantal conjugation.

[^59]:    ${ }^{4}$ I analyze Busami $s$ - as deriving from earlier *ty-. I analyze Moor and Umar $j$ - as deriving from earlier $* y$-, and therefore being unrelated (see §4.2.22).

[^60]:    ${ }^{5}$ For the lack of these categories in Taba, see Bowden (2001). Hamim Al Fatih (p.c., 2013) confirms that Gane is identical to Taba in this respect.

[^61]:    ${ }^{6}$ Some SHWNG languages also distinguish dual and trial forms. These are generally synchronically transparent, and so are not covered here.

[^62]:    ${ }^{7}$ Ross (2006) does not reconstruct a PMP GEN2 pronoun for 1PL.IN, presumably because the evidence is not conclusive. Blust (1977: 11) tentatively reconstructs PMP 1PL.IN *ni-ta for the equivalent of Ross's GEN2. Blust's *ni-ta, if correct, could explain the origin of these suffixes, which perhaps show the outcome of *ni-ta > *nta. (A similar change is thought to have produced Proto-Oceanic *-da (Ross, p.c., 2014).) The evidently irregular outcome of *nta would still qualify as a distinctive innovation in this case.
    ${ }^{8}$ An alternative explanation is that these forms derive from *ni-ta (see footnote 7 ).
    ${ }^{9}$ Kawe and Ma'ya (S.) 3pl $-n$ most likely also derive from GEN2 $2=$ nida. However, it is unlikely that this $-n$ is responsible for 1pl.IN $-n$, as extension from 3pl to 1pl.IN alone is implausible.

[^63]:    ${ }^{1}$ Fiawat is a dialect of Maden, but data are lacking from other Maden dialects, so only Fiawat is mentioned here. See $\$ 7.2 .5$ for more on the classification of Maden. Bata is presumably to be included under Proto-RASH as well, but no data are available.

[^64]:    ${ }^{2}$ During the course of my research, Gasser (2014) independently proposed Proto-Biak-Yapen on the basis of the first innovation. Proto-Biak-Yapen is essentially my Proto-Cenderawasih Bay under a different name.
    ${ }^{3}$ The case of Umar is in fact ambiguous. Its 3sG prefix $j$ - is most straightforwardly derived from *y-. This could either be a reduction of * $d y$ - or an unrelated innovation.

[^65]:    ${ }^{4}$ Ma'ya oral tradition places their origin in western Waigeo (Remijsen 2001b: 164). This is not straightforwardly consistent with a Misool origin for Proto-Ma'ya-Matbat. If this tradition reflects historical reality, one way to reconcile it with a Misool origin would be to assume multiple migrations (from Misool to Waigeo and back again). This would be consistent with the Ma'ya's sea-oriented culture ( $\S(3.2)$.

[^66]:    ${ }^{5}$ Under this scenario, epenthetic final $o$ in Biga (see $\$ 5.4$, footnote 20) would most likely be attributable to Ma'ya influence.

