

1 *Star, wind, and wave: searching for early Oceanic navigation terms*

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1 Introduction

For as far back as the four or five thousand years that we can trace them culturally, Austronesian speakers have preferred to live close to the sea. They have typically been sailors and fishermen. For as long as their settlements were confined to south-east Asia and north-west Melanesia, virtually all their sailing would have been between intervisible or near intervisible islands. However, about 1500 BC, a group of Austronesian speakers living somewhere in the region of the Bismarck Archipelago¹ began to move out eastwards, to the Solomons and beyond. Over the next few hundred years, their descendants explored and settled many of the major island groups of the south-western Pacific. Earliest movements as roughly dated by Lapita finds are: Santa Cruz and Vanuatu both ca. 1200 BC, Fiji and Tonga 1200–1000 BC (Kirch 1997:267–273).

Building on the experience of their Austronesian ancestors in island south-east Asia, and aided by an increasingly sophisticated canoe-building technology,² these ocean navigators accumulated a body of knowledge that enabled them to sail freely beyond sight of land while retaining their orientation of home. As Irwin (1992) has persuasively argued, even purely exploratory voyages into unknown waters were guided by knowledge of the prevailing wind system, ensuring that any push eastwards against the prevailing wind carried with it a good chance of a safe return.

More complex skills had to be brought to bear once new island groups were settled, a development which typically involved some regular trafficking between the old homeland and the new. These skills lay in recognising and memorising the regular patterning of

¹ That is, speakers of a language now referred to as Proto Oceanic.

² See Pawley and Pawley (1998)

naturally occurring phenomena such as star movements, wind systems, currents and swells as they applied to each new sea route, and in developing strategies that could be used in the committing to memory of these features.

The best scholarly minds of Europe had spent centuries developing ways of representing a curved world on a flat map and ways in which explorers could locate changing positions on their flat maps by using compass, sextant, chronometer, almanacs and various mathematical tables. When Europeans first ventured into the Pacific they had to grapple with the almost inconceivable notion that Pacific Islanders could navigate their canoes successfully over distances sometimes as great as a thousand miles without benefit of compass or chart or in fact any aids beyond what they held in their heads and what they could sense. In the mid-1960s, David Lewis, an experienced ocean yachtsman, aware that in some parts of the Pacific this skill was still practised, determined to seek out any remaining old-time navigators and sail with them where possible, to try to comprehend and record their navigational strategies. His resulting book, *We, the navigators* (1972), is the most complete record we are likely to get of this body of knowledge, rapidly disappearing with the increased presence of motorised boats and Western navigational technology. He was also at pains to record, in the languages of the navigators themselves, the names of the physical features on which they relied, the stars, different kinds of wave movements and so on. He took particular care to describe and name concepts for which Western navigation theory lacks any equivalent. He has thus provided us with an (admittedly small) list of words from Puluwat and Kiribati in Micronesia, Ninigo in the Western Admiralties, and a number of Polynesian languages, principally those of Tonga and Tahiti, and two Polynesian outliers, Pileni, in the Santa Cruz group, and Tikopia.

The purpose of this paper³ is to reconstruct the earliest possible Oceanic words from which are descended existing terms and meanings associated with the semantic field of navigation (largely as defined by Lewis 1994). For the most part they are terms of the physical world, of the night sky and the ocean seascape. Also explored are terms such as the Polynesian *kaveya* (star or other object for which one steers) and the Micronesian *etak* (a 'moving' reference point) which refer to concepts incompatible with Western navigation theory. For some of these we may be able to offer a Proto Oceanic (POc) origin. Undoubtedly, as navigation skills developed and were refined in the Pacific, new terms would have been required, or old meanings extended. There is a further complication in that we are not dealing with one homogeneous environment. Take just one example – the night sky. There is no change to the night sky as one travels east or west apart from changes to the times of star rise and star set. But the sky visible from the northern hemisphere is a different sky from that of the southern hemisphere. That part of the globe which we are concerned with here extends from roughly 15°N (Saipan) to 20°S (Tonga), with the presumed POc homeland in the Bismarck Archipelago lying just a few degrees south of the Equator. Similarly, the patterning of winds, currents and swells varies with latitude and with distance from land mass, ocean depth etc., as well as with the seasons.

Two papers, Malcolm Ross's *Proto Oceanic terms for meteorological phenomena* (1995) and Jeff Marck's *Proto Micronesian terms for the physical environment* (1994), skirt closely the subject matter of this paper. The former could in large part have been subsumed within the broader topic of navigational terms. However, the breadth and

³ This paper has been written under the auspices of the Oceanic Lexicon Project being undertaken within the Research School of Pacific and Asian Studies at the Australian National University under the direction of Andrew Pawley and Malcom Ross. Thanks are due to both, and to Jeff Marck, for their advice in the writing of this paper.

complexity of the topic of meteorological phenomena, particularly winds, have warranted separate treatment. Accordingly I have simply incorporated Ross's reconstructed POc wind terms in this paper without including his supporting evidence.

Subgrouping assumptions on which POc reconstructions are based, together with sound correspondences, have been detailed in earlier papers written as part of the Oceanic Lexicon Project.⁴ In brief, three primary subgroups⁵ are assumed: Admiralties and St Matthias (Adm), Western Oceanic (WOC) and Eastern Oceanic (EOc). Cognates from any two of these are regarded as sufficient justification for a POc reconstruction.

The Admiralties–St Matthias subgroup is treated for present purposes as having no internal subgrouping. The Western Oceanic subgroup consists of North New Guinea (NNG), Papuan Tip (PT) and Meso-Melanesian (MM) clusters. Etyma, which occur only in PT and NNG, are attributed to Proto New Guinea Oceanic (PNGOC). The Eastern Oceanic subgroup is assumed to consist of S.E. Solomonian (SES), North/Central Vanuatu (NCV), South Vanuatu (SV), New Caledonia (NCal), Nuclear Micronesian (Mic) and Central Pacific (CPa), the latter divided for convenience into Fijian (Fij) and Polynesian (Pn). Reflexes within any two of the EOc clusters are regarded as sufficient to justify a PEOc reconstruction.

Reconstructions for Proto Austronesian (PAN) and Proto Malayo Polynesian (PMP) have been taken from Blust's Austronesian Comparative Dictionary file (ACD). Reconstructions have also come from Bruce Biggs' Polynesian Lexicon (Pollex) file at the University of Auckland.

Within the cognate sets below, each language name is identified by its subgroup. Unless otherwise sourced, terms and glosses are from the dictionaries listed in the references. It should be pointed out that terms taken from the literature on navigation are often spelt in non-standard ways. Wherever possible, spelling has been checked against dictionary sources.

2 Reconstructions

2.1 Heavenly bodies

To early Oceanic navigators, as to the Arabs, the Phoenicians, the Vikings and other early navigators, the fundamental sources of position finding were the heavenly bodies.

Sky, heavens

The most soundly based reconstruction for sky is POc **lanjit*. In some Oceanic languages its meaning has been extended to include weather, apparently both as a general category and as a specific reference to kinds of weather, rain, wind, etc.

PAN **lanjiC* 'sky' (Dempwolff 1938)

PMP **lanjit* 'sky'

POc **lanjit* 'sky'

Adm:	Tench	<i>raŋiti</i>	'rain'
Adm:	Titan	<i>lan</i>	'sky, heaven'
NNG:	Manam	<i>lan</i>	'sky, heavens'

⁴ See Ross (1996) and Osmond (1996).

⁵ Abbreviations used throughout the paper are as given here.

NNG:	Hote	<i>len</i>	'heaven, sky; air'
MM:	Bali	<i>laniti</i>	'sky'
MM:	Tigak	<i>lanit</i>	'rain'
MM:	Nehan	<i>lanit</i>	'sky'
MM:	Haku	<i>lanjic</i>	'rain; sky'
SES:	Kwaio	<i>lanj</i>	'sky, heaven'
SES:	Arosi	<i>ranj</i>	'rain'
Mic:	Marshallese	<i>lanj</i>	'sky, heaven; weather'
Mic:	Woleaian	<i>lanj</i>	'sky; typhoon, rainstorm, wind'
Fij:	E. Fijian	<i>lomā/lanj</i>	'sky, heavens' (<i>lomā</i> 'the inside')
Pn:	Tongan	<i>lanj</i>	'sky, heavens'
Pn:	Samoa	<i>lanj</i>	'sky, heavens'

The sky was typically conceptualised as something spanning a flat world from horizon to horizon. In both Micronesia and Polynesia it was regarded as a dome or a series of domes resting on the earth and forming concentric horizons on its surface (Lewis 1978:121). In Kiribati the heavens, *karawa*, could be subdivided into a lower heaven of birds and clouds where things appear small, *karawa merimeri*; and a heaven of the stars, *karawa uatao*. Tongans identified both *lanj*, the sky, and *vavā*, which was the space between earth and sky. Some communities referred to the sky in legendary terms, conceiving it, for instance, as the home of the ancestors or of the Polynesian demigod, Maui.⁶ Micronesians referred in their legends to Kachaw, the sky world. Goodenough has reconstructed PMic **ka-dawa* 'heaven, sky' (Trukese *kachaw*, Ponapean *kataw*, Kosraen *kuhsra*, Kiribatese *karawa*). He points out that the root **dawa* matches up in regular sound correspondences with Fijian *dawa* 'to cross from one place to another, as by a bridge'. Its transitive form, *dawaka*, is glossed as 'to extend as far as', which Goodenough (1986:556) suggests contains the underlying idea of bridging or spanning (from horizon to horizon). For a Kiribatese navigator, however, the night sky was a vast roof. He never called it *karawa*, the usual Micronesian term for the heavens, but referred to it as *uma ni borau* 'the roof of voyaging' (Grimble, A. 1931:197).

Horizon

The line where sea meets sky is commonly referred to by a compound – either edge/walls/base of sky, edge of sea, or similar. I have located two sets of cognates, one limited to Polynesia, the other to Micronesia.

PPn **tafa(tafa)(ki)lanj* or **tafaqa-ki-lanj* 'horizon' (**tafa* 'side, edge', *lanj* 'sky')

Pn:	Tongan	<i>tafa(tafa)-?aki-lanj</i>	'horizon'
Pn:	Samoa	<i>tafa-tafa-?ilanj</i>	'horizon'
Pn:	E. Uvean	<i>tafa-?aki lagi</i>	'horizon, limit, edge'
Pn:	Maori	<i>taha(a)ranj</i>	'horizon'
Pn:	Tikopia	<i>tafa-tafā-ranj</i>	'horizon'
Pn:	Tokelauan	<i>tafa-tafālagi</i>	'horizon'

⁶ For instance, a Kiribati creation myth describes how the face of heaven was originally like hard rock stuck to the earth, but was prised apart and then held up by four women, who became like mighty trees (Grimble, R. 1972:39-41). The legend is echoed in Hawaii, where the sky dome is supported by four pillars, and in Tahiti, where the sky rests on ten pillars (Makemson 1941:199).

PWMic **pailani* 'horizon' (Marck 1994)

Mic:	Mortlockese	<i>payilén</i>	'horizon'
Mic:	Satawalese	(<i>p</i>) <i>payilen</i>	'horizon'
Mic:	Puluwatense	<i>yóró/ppáálan</i>	'horizon'
Mic:	Trukese	<i>óroppeyinen</i>	'horizon' (<i>oroppa</i> + <i>neni</i> 'rim of heaven')

Two S.E. Solomonian languages describe the horizon in terms of the sea rather than the sky. Lau and Kwaio both have *?aena asi*, literally 'foot, leg of the sea'. Other terms retain the more usual second element meaning 'sky' but vary the first element:

PT:	Motu	<i>guba dokona</i>	'horizon' (<i>guba</i> ⁷ 'sky', <i>doko</i> 'end')
SES:	Lau	<i>?aena salo</i>	'horizon' (<i>?aena</i> 'foot', <i>salo</i> ⁸ 'sky')
SES:	Arosi	<i>wa?a-ni-aro</i>	'horizon' (lit. 'beginning of the sky')
Mic:	Trukese	<i>epi-nen</i>	'horizon' (<i>epi</i> - 'bottom', <i>neni</i> 'sky')
Mic:	Marshallese	<i>kapin lan</i>	'horizon' (<i>kapi</i> 'bottom', <i>lan</i> 'sky')
Mic:	Kosraen	<i>pe kuhsra</i>	'horizon' (<i>pe</i> 'side', <i>kuhsra</i> 'sky/ heaven')
Mic:	Kiribatese	<i>te tatanja ni mainiku</i>	'eastern horizon' (lit. 'roof-plate of east') (Grimble, A. 1931:198)
Mic:	Kiribatese	<i>te tatanja ni maeao</i>	'western horizon' (lit. 'roof-plate of west') (Grimble, A. 1931:198)
Fij:	E. Fijian	<i>vū-ni-lanji</i>	'horizon' (lit. 'base of sky')
Fij:	Wayan	<i>vū-ni-lanji</i>	'horizon'
Pn:	Hawaiian	<i>kumu-lani</i>	'horizon' (lit. 'base of sky')
Pn:	Hawaiian	<i>pō?ai-lani</i>	'horizon' (lit. 'sky circle')
Pn:	Hawaiian	<i>kūkulu-o-lani</i>	'horizon' (Åkerblom 1968:15) (<i>kūkulu</i> 'pillar, post, side, edge, horizon' is used to denote the four pillars which were the principal supports of the heavenly dome (Makemson 1939:19)

It is a peculiarity of Kiribatese that features of the sky are typically referred to in terms of roof parts. This is because instruction in navigation was traditionally carried out in the *maneaba* or meeting house, with the great roof substituting for the sky. The night sky was *uma ni borau* 'the roof of voyaging'; the eastern and western horizons were *tatanja*, the term for the two large horizontal beams on which the rafters are placed; the meridian was marked by *taubuki* 'ridge of house roof' with the spot at which it was supported by a central pillar indicating the position of the zenith star, Rigel. The roof framework was a network of named criss-crossing rafters which served as a kind of grid reference that could, in the imagination, be transferred to the night sky. A Kiribatese navigator could thus estimate and identify altitudes of stars within a degree of two (Grimble, A. 1931:197-8).

⁷ From PNGOc **guba(r,R)* 'storm cloud', but in at least two Papuan Tip languages, Motu and Mekeo, meaning has become generalised to 'sky'.

⁸ Reflexes of Poc **qaRoq* 'clouds' (generic) typically serve as the term for sky in South-East Solomonian languages.

Sun

The sun is the main direction indicator during daylight, but its position must be related to the time of year. Actual points of sunrise and sunset move over a horizontal arc that gets progressively larger the further one is from the equator. Åkerblom (1968:15-17) and Makemson (1941:85) offer linguistic and archaeological⁹ evidence of Polynesian familiarity with the sun's apparent annual movement, a familiarity that it would be necessary in any event to presuppose to explain navigators' facility in using the sun as a bearing indicator. Polynesians have terms for the ecliptic – the path along which the sun appears to move over a year. For the Pukapukans, it was *te ala o te la*, literally 'the path of the sun'. Hawaiians called it *ke ala ula a ke kuʻukuʻu*, 'the bright road of the spider'. Hawaiian terms have been recorded for the sun's southern limit, *ke alanui polohiwa a Kanaloa*, literally 'the black-shining road of Kanaloa', and for its northern limit, *ke alanui polohiwa a Kane*, literally 'the black-shining road of Kane'.¹⁰ In Pukapuka, the terms for the solstices were *lua poto* 'short pit' and *lua loa* 'long pit', phrases which Beaglehole suggests refer to the short days of winter and the long days of summer respectively. Tahiti has corresponding terms – *rua poto* and *rua maoro*. The Maori use the one term, *mārua roa* 'long pit' for both solstices, and apply the term also to the month or season during which the sun is at its furthestmost points (Makemson 1941:85). The only Micronesian terms I have located have been recorded in a Gilbertese myth by Arthur Grimble, in which a tree, *Kai-n-tiku-aba*, whose right side is *te-au-meanj* 'northern solstice' and left side is *te-au-maiaki* 'southern solstice', springs from the spine of *Na Atibu* (Grimble, R. 1972:43). In his Gilbertese dictionary, Sabatier (1971) defines *au* as 'used to indicate sun's position north or south of the equator'; *meanj* is the directional 'north' and *maiaki* 'south'.

At its highest point each day the sun is also an accurate indicator of due north (unless you happen to be at the particular latitude for which the sun is then directly overhead). As Lewis (1994:384) points out, the north-south axis can be accurately ascertained at noon by the shadow of a vessel's mast, which points either due north or south depending on the latitude and the season.¹¹

Reconstruction of a POc term for the sun itself is not clearcut. Blust has reconstructed PAN **qajaw* or **qalejaw* as 'day', with POc **qajo*, also 'day'. In this he has revised both the form and meaning of Dempwolff's (1938) reconstruction PMP **ha(ŋ)gav* 'day, sun'. However, there is evidence both within and without the Oceanic region that the two senses of 'day' and 'sun' were commonly interchanged, with 'sun' being primary in Oceanic.

PAN **qajaw* or **qalejaw* 'day' (ACD)

PMP **ha(ŋ)gav* 'day, sun' (Dempwolff 1938)

POc **qaco*¹² 'sun, day'

Adm: Ponam *al* 'sun'

Adm: Mondropolon *al* 'sun'

⁹ Through identification of probable solar observation sites on, for instance, Mangareva and Easter Island. (Åkerblom 1968:17)

¹⁰ Kane and Kanaloa were important gods in the Polynesian pantheon, Kane being associated with light, Kanaloa with darkness. (Makemson 1941:21)

¹¹ Through measurement of the angle by which the position of the sun at midday differs from the vertical, the sun can also be a precise indicator of latitude. This latter property, although depended upon by Western navigational technology for a daily position fix, would have been of less use to canoe navigators whose main need was regular bearing indicators.

¹² In the standardised orthography used in the Oceanic Lexicon Project, Blust's /j/ is written as /c/.

PT:	Molima	<i>?asu</i>	'sun'
MM:	Nakanai	<i>haro</i>	'sun; day; good day'. (However this example gives food for thought – Nakanai also has a more specific reference to the sun as <i>la-mata-la-haro</i> 'the eye of the day: the sun' (Johnston computer file in progress), which suggests that 'day' is its primary meaning.)
MM:	Tigak	<i>ias</i>	'sun' (NB (<i>gan</i>) <i>ias</i> 'daytime')
MM:	Nalik	<i>ias</i>	'sun'
SES:	Bugotu	<i>aho</i>	'sun'
SES:	Gela	<i>aho</i>	'sun; good weather; put in the sun; experience good weather'
SES:	Lau	<i>sato</i>	'sun'
SES:	'Are'are	<i>rato</i>	'sun, sunshine, no rain, good weather'
SES:	Sa'a	<i>sato</i>	'sun, sunshine, fine weather'
NCV:	Mota	<i>loa</i>	'sun'
NCV:	Lonwolwol	<i>jal</i>	'sun'
NCV:	Paamese	<i>ealo</i>	'sunshine'
NCV:	Namakura	<i>?al</i>	'sun'
Mic:	Marshallese	<i>hal</i>	'sun'
Mic:	Woleaian	<i>yalo</i>	'sun'
Mic:	Puluwatese	<i>yalet</i>	'sun'

In Polynesia, reflexes of POc **qaco* are restricted to the sense of 'day, daylight' rather than 'sun' (Hawaiian, Maori, Rarotongan, Samoan, Tahitian *ao* 'day (not night)'; Samoan *aso*, Tuvaluan *aho* '(24 hour) day').

A second term, POc **raqan*, shows a similar blurring of meaning, with the S.E. Solomonic reflexes referring primarily to sunlight, the Micronesian unequivocally to day, and the Polynesian equally unequivocally to sun:

PAnc **daqani* 'day' (ACD)

POc **raqan* 'sunlight, sun, day'

SES:	Lau	<i>rā</i>	'sunlight'
SES:	Arosi	<i>rā(na)</i>	'sunshine'
Mic:	Marshallese	<i>rān</i>	'day, date'
Mic:	Ponapean	<i>rahn</i>	'day'
Mic:	Puluwatese	<i>ráán</i>	'day'
Mic:	Woleaian	<i>ran</i>	'day, date'

PPn **laqā* 'sun'

Pn:	Tongan	<i>la?ā</i>	'sun'
Pn:	Samoa	<i>lā</i>	'sun'
Pn:	Maori	<i>rā</i>	'sun'
Pn:	Tahitian	<i>rā</i>	'sun'
Pn:	Rapanui	<i>ra</i>	'sun'

Yet another contender for the POc term for sun is **sinaR*, which Blust (1998) glosses as 'shine'. While evidence from New Ireland, parts of the S.E. Solomons and Micronesia

support this meaning, reflexes from Western Oceanic, the Admiralties and other parts of the S.E. Solomons lean towards the meaning 'sun'.

PMP **sinaR* 'ray of light' (Dempwolff 1938)

POc **sinaR* 'shine (Blust 1998), sun'

Adm: Mussau	<i>sinak(a)</i>	'sun'
Adm: Tenis	<i>sinak(a)</i>	'sun'
Adm: Lou	<i>sinsin</i>	'sun'
PT: Motu	<i>dina</i>	'sun; day'
MM: Lavongai	<i>sinaŋ</i>	'sun; (sun) shine'
MM: Tigak	<i>sinaŋ (siŋan)</i>	'(sun) shine'
SES: Lau	<i>sina</i>	'to shine, give light'
SES: Kwaio	<i>sina</i>	'sun'
SES: 'Are'are	<i>sina</i>	'to shine, brighten; light, brightness'
SES: Sa'a	<i>sineli</i>	'to shine'
SES: Arosi	<i>sina</i>	'sun'
NCV: Mota	<i>siŋa</i>	'to shine'
Mic: Trukese	<i>ttina</i>	'shine, ray, brightness, beam'
Mic: Puluwatese	<i>tin</i>	'shine, as the sun'
Mic: Mortlockese	<i>tin, tina-</i>	'shine: used for fire, moon, lantern'
Mic: Satawalese	<i>(t-)tin</i>	'shine, ray, brightness, beam'
Fij: Rotuma	<i>sina</i>	'light, lamp, star'
Fij: E. Fijian	<i>siŋa</i>	'day, daylight, sun'
Fij: E. Fijian	<i>ðina</i>	'lamp, torch'

Building on its 'to shine' meaning, POc **sinaR* has given rise to a number of Polynesian terms which, with the addition of *mā* – a stativising prefix – refer to the moon:

PPn **mā-sina* 'moon'

Pn: Rennellese	<i>māsina</i>	'moon, month'
Pn: Tongan	<i>māhina</i>	'moon'
Pn: Samoan	<i>māsina</i>	'moon, month'
Pn: E. Futunan	<i>māsina</i>	'moon, month'
Pn: E. Uvean	<i>māhina</i>	'moon'
Pn: Maori	<i>māhina</i>	'moon'

Moon

The moon is of little value as a navigational aid. Its typical role is as a marker of periods of time. Reflexes of POc **bulan* (from Dempwolff's PMP **bulan*) 'moon' are widespread throughout the Western Oceanic region, the Admiralties, Vanuatu and Fiji. In Polynesia the term has become verbal (PPn **pula* 'to glow'), and the moon is referred to by reflexes of an Eastern Oceanic term PEOc **marama*, which are found in the S.E. Solomons (Lau *madama*), and throughout Micronesia (Mokil, Ponape, Puluwat, Truk *maram*) and Polynesia (Tahiti, Tikopia, Rarotonga *marama*), all 'moon'.

Stars

Although the sun serves as a direction marker, particularly at sunrise, noon and sunset, the stars are the critical signposts in guiding navigators across open sea. The age-old method of star navigation consists in laying a course direct to a given destination by keeping the bow of the vessel pointed towards a star near the horizon whose bearing corresponds to the direction of the destination, that is to say along a great circle route. As one star rises higher or sets, another of similar declination will be selected to take its place. For this purpose, the stars have obvious advantages over the sun. In the first place, the apparent movement of the stars is more stable than that of the sun. Although they rise each night four minutes earlier than on the previous night, they do so always at the same point on the horizon relative to a stationary observer. Second, the number and position of significant stars or star groups is on a scale that permits virtually an unlimited number of sequential stars or 'star paths' to be identified and memorised. Third, familiarity with the night sky as a whole can mean that even if the night is cloudy, the appearance of only a few stars can orient a skilled navigator.

It has already been pointed out that the northern hemisphere sky differs from that of the southern hemisphere. Polaris, for instance, that significant pointer of the northern sky, drops out of sight as one reaches the Equator. However, there are many stars common to a band of sky visible between, say, 15°N and 15°S, an area which includes New Guinea and its islands; almost all of Micronesia; the Solomons; northern Vanuatu; and part of Polynesia including the northern Cook Islands, Tuvalu and Tokelau but not Fiji or Tonga. Some star groups including the Southern Cross and its Pointers, the Pleiades, Orion's Belt and the triangle which Westerners refer to as Taurus are also recognised and named as units by Oceanic people. Many other patterns in the sky have been identified and named by them according to familiar shapes or to illustrate legends. I have reconstructed the following terms for stars and star groups. All known cognate sets are included, as well as other terms that carry information about the significance of particular stars to the naming community.

Star (generic)

PAn **bituqen* 'star' (ACD) (PMP **bi(t)uhen* 'star' (Dempwolff 1938))

POc **pituqon* 'star' (ACD)

Adm:	Titan	<i>pítuy</i>	'star'
NNG:	Lukep Pono	<i>pitiki</i>	'star'
NNG:	Takia	<i>patui</i>	'star'
PT:	Misima	<i>pútum</i>	'star'
PT:	Motu	<i>hisiu</i>	'star'
MM:	Nehan	<i>pitopit</i>	'star'
SES:	Arosi	<i>hi?u</i>	'star'
NCV:	Mota	<i>vitu</i>	'star'
NCV:	S.E. Ambrym	<i>hitu</i>	'star'
Mic:	Kiribatese	<i>itoi</i>	'star, constellation'
Mic:	Woleaian	<i>fiusiu</i>	'star'
Mic:	Puluwatese	<i>fúú</i>	'star; point of the compass; canoe course plotted by the stars'
Mic:	Marshallese	<i>iju</i>	'star'
Mic:	Mokilese	<i>uju</i>	'star'
Mic:	Ponapean	<i>usu</i>	'star'

Fij:	Rotuman	<i>hefu</i>	'star'
Pn:	Rennellese	<i>hetuʔu</i>	'star, constellation'
Pn:	Tongan	<i>fetuʔu</i>	'star; daisy'
Pn:	Hawaiian	<i>hōkū</i>	'star'
Pn:	Tikopia	<i>fetū</i>	'star, constellation'
Pn:	Anutan	<i>petū</i>	'star'

Venus (morning star, evening star)

The planets 'wander' in their movements and are of little use as guiding stars. The only one to feature regularly in word lists is Venus.

PMP **mantalaq* 'the morning (evening) star: Venus' (ACD)

PMP *(*t*)*ala(q)* 'star' (Dempwolff 1938)

POc **madala* 'the morning star' (Blust 1972)

Adm:	Lou	<i>ko/mtal</i>	'morning star/evening star: Venus'
Adm:	Titan	<i>āpa/tal</i>	'morning star which appears about 5 a.m.'
Adm:	Loniu	<i>kopo/matan</i>	'morning star'
NNG:	Labu	<i>metana</i>	'morning star'
SES:	'Are'are	<i>matarā ni tani</i>	'morning star' (<i>tani</i> 'daylight')
SES:	Sa'a	<i>madala</i>	'morning star'
SES:	Arosi	<i>madara</i>	'morning star'
Mic:	Mokilese	<i>mahlahl</i>	'morning star'

As in English, Venus often appears to have separate identities as Morning and Evening Star. The following illustrate:

as Morning Star:

(i) compounds from 'star' + 'day'

PPn **fetuqu qaho* 'Morning Star'

Pn:	Marquesan	<i>hetu ao</i>	'star of dawn' (Makemson 1941:207)
Pn:	Tongan	<i>fetuʔu ʔaho</i>	'morning star'
Pn:	Samoan	<i>fetū ao</i>	'Morning Star'
Pn:	Tikopia	<i>fetū ao</i>	'Morning Star'
Pn:	Anutan	<i>petū ao</i>	'Morning Star: Venus'
Pn:	Hawaiian	<i>hōkū-ao</i>	'Venus when seen in the morning'
Mic:	Ponapean	<i>usuhn rahn</i>	'Morning Star' (<i>rahn</i> 'day')
Mic:	Kiribatese	<i>itoi ni ʔaina</i>	'Morning Star' (<i>ʔaina</i> 'day, daylight')

(ii) other compounds

NNG:	Gedaged	<i>boi tinan</i>	'Morning Star' (<i>boi</i> 'star', <i>tinan</i> 'mother' or 'big') ¹³
NNG:	Manam	<i>goai zama</i>	'Morning Star' (<i>goai</i> 'star', <i>zama</i> 'tomorrow')
PT:	Motu	<i>hisiu bada</i>	'Morning Star' (<i>hisiu</i> 'star', <i>bada</i> 'large')

¹³ Poc **tina*, lit. 'mother', sometimes carries the interpretation 'big' in contrast to 'child/small' (see Matisoff 1992).

as Evening Star (various compounds):

MM:	Roviana	<i>govete pisi</i>	'Evening Star, Venus' (<i>govete</i> 'to flee, run away', <i>pisi</i> 'to sting or bite, as insects')
SES:	To'aba'ita	<i>bubufana</i>	'Evening Star' (<i>bubu</i> 'look at', <i>fana</i> 'eat; food' (Lichtenberk pers. comm.))
SES:	Lau	<i>būbūfana</i>	'Evening Star' (<i>bunbun</i> 'look at, gaze', <i>fana</i> 'to have a meal, food')
SES:	Arosi	<i>maŋai ŋau</i>	'Evening Star' (<i>maŋa</i> 'eat', <i>ŋau</i> 'eat food')
Pn:	Tikopia	<i>fetū ramaŋa</i>	Alternative name for evening star when standing in west, in monsoon nights (lit. 'torchlight fishing star')
Pn:	Hawaiian	<i>hōkū-kau-ʔōpae</i>	'Evening Star' (lit. 'star for placing shrimp')

Big Bird (constellation including Sirius, Canopus, Procyon, Betelgeuse, Rigel)

One of the few constellations I have been able to identify and trace back to a POc origin is *manuk* 'bird' (*manu* in Mic. and Pn.), usually translated as 'Big Bird' or 'Giant Bird'. Most of the stars which fall within the Western constellation of Orion would also be included within the larger *Manu* constellation. Lewis (1978:11) writes of following "the guiding star Betelgeuse in Orion, the northern wingtip of the Polynesian constellation Giant Bird, whose head is Sirius and whose nether wingtip Canopus." In his dictionary Firth (1985) describes Rigel, on Orion's knee, as a central star of *Manu*. Although Lewis and Firth refer to Betelgeuse as indicating *Manu*'s northern wingtip, Feinberg (188:104) marks it, from the Anutan point of view, with Procyon. Both are feasible. Feinberg (1988:110) also notes that on Nukumanu the Long Wing corresponds with Canopus but the Short Wing is marked by a star probably *Monocerus*.¹⁴

PMP **manuk* 'bird'

POC **manuk* 'bird, Bird constellation'

Adm:	Ninigo	<i>mān</i>	'(constellation incl.) Canopus, Sirius, Procea' (Lewis 1994:406)
Mic:	Puluwatese	<i>mān</i>	'a scattered group of stars, Canopus, Sirius, Procyon'
Mic:	Woleaian	<i>mal</i>	'Sirius-Procyon-Canopus star'
Pn:	Tikopia	<i>manu</i>	'Rigel' (part for whole) (Lewis 1978:33)
Pn:	Anutan	<i>manu</i>	'Bird constellation, consisting of Sirius (<i>Manu</i> 's body), Canopus (east wing), Procyon (north wing) and a few stars in between' (Feinberg 1988:100)

We also have various references to particular stars as *Manu*'s head, *Manu*'s body, etc.

¹⁴ Gladwin (1970:148) writes that "on Puluwat the cardinal direction is east, under the rising of Altair, the 'Big Bird'". This is something of a puzzle because, although both Altair and *Manu* rise just north of east, they rise many hours apart. Altair is definitely not a part of the *Manu* constellation. It would seem that here we have an instance of a prominent star or star group being equated with a cardinal reference point.

Adm:	Ninigo	<i>mānifono</i>	'Sirius' (<i>fono</i> 'head') (Lewis 1994:406)
Adm:	Ninigo	<i>mānitola</i>	'Procyon' (Lewis 1994:406)
Adm:	Ninigo	<i>mānihaiup</i>	'Canopus' (Lewis 1994:406)
Mic:	Kiribatese	<i>baba-ni-man</i>	'Sirius' (<i>baba</i> 'chest')
Mic:	Puluwatese	<i>yinekin-mān</i>	'Sirius' (<i>yinek</i> 'body, trunk')
Pn:	Anutan	<i>te tino a manu</i>	'Sirius' (<i>tino</i> 'body') (Feinberg 1988:100)
Pn:	Anutan	<i>te kaokao o manu</i>	'Manu's armpit: a group of four small stars near Sirius (Manu); said to pass almost directly over Tikopia when approaching from Anuta' (Feinberg 1988:101)
Pn:	Tikopia	<i>te opiŋa o manu</i>	'Manu's armpit' (Feinberg 1988:101). A Tikopian name but commonly used on Anuta.

Others have dropped direct reference to Manu but retain the bird metaphor.

Pn:	Anutan	<i>te kapakau pakatokerau</i>	'Procyon, the 'north wing' of Manu constellation' (<i>kapakau</i> 'wing', <i>tokerau</i> 'north' (Feinberg 1988:101)
Pn:	Tikopia	<i>kapakau fakatokerau</i>	'Betelgeuse'
Pn:	Anutan	<i>te kapakau (paka)toŋa</i>	'Canopus, Manu's east wing' (<i>kapakau</i> 'wing', <i>toŋa</i> 'south/east' (Feinberg 1988:101)
Pn:	Tikopia	<i>kapakau fakatoŋa</i>	'prob. Canopus'
Pn:	Pileni	<i>trekapekau ki ndeni</i>	'Canopus' (Lewis 1994:408). (Ndeni is an island south-west of Pileni.)
Pn:	Pileni	<i>trekapekau ki taumako</i>	'Betelgeuse' (Lewis 1994:408). (Taumako is an island east north-east of Pileni.)

Stars are frequently named because of their local or seasonal significance.

Mic:	Kiribatese	<i>kāma-n-nuka</i>	'Betelgeuse in Orion'. (<i>Kāma</i> is the name of a mythical being, <i>nuka</i> 'middle'.) (Grimble 1931:241)
Mic:	Kiribatese	<i>te taubuki</i>	'Rigel' (lit. 'ridge of house roof')
Pn:	Maori	<i>takurua</i>	'Sirius' (also 'winter') (Åkerblom 1968:19)
Pn:	Hawaiian	<i>hōkū-hoʻokele-waʻa</i>	'Sirius' (lit. 'canoe-guiding star')

Pleiades

The Pleiades, or Seven Sisters, are a group of stars of moderate brightness which, because of their number and closeness to each other, form a small bright patch in the sky. Until recent times they served as significant calendar stars over much of the Pacific, their reappearance each year marking the beginning of the annual seasonal cycle. Åkerblom (1968:97) reports that the Polynesian year begins in Tahiti when the Pleiades rise on the eastern horizon in the evening (late November). But in Pukapuka, Mangareva, Marquesas and parts of New Zealand the seasonal cycle begins when the Pleiades appear on the eastern

horizon shortly before sunrise (about the end of May). Teuira Henry in 1928 described the Tahitian year as consisting of two seasons, *matarí-i-nia* 'Pleiades above', the forerunners of the season of plenty, and *matarí-i-raro*, 'Pleiades below', the season of scarcity (quoted in Makemson 1941:92). Makemson (1941:76) believes that the Polynesians carried the Pleiades year with them into the Pacific from the ancient homeland of Asia. Kiribati also recognises two seasons, one marked by the appearance of the Pleiades, the other by Antares. (Grimble, R. 1972: 223). There is somewhat tentative evidence for a POc reconstruction, for which I can locate no cognates east of the Solomons. The PPn reconstruction is more soundly based.

POc **bulu* 'Pleiades'

MM:	Nakanai	<i>e-vulu</i>	'Pleiades' (v for exp. b)
MM:	Roviana	<i>bibolo</i>	'Pleiades'
SES:	Kwaio	<i>bulu-bulu</i>	'star; firefly'
SES:	Lau	<i>(bu)bulu</i>	'star'
SES:	'Are'are	<i>puru-puru</i>	'star, firefly'
SES:	Arosi	<i>buru</i>	'Pleiades'

In Polynesia and Micronesia, a different term, translatable literally as 'small face' or 'small eyes', is widespread.

PPn **mataliki* 'Pleiades'

Pn:	Niuean	<i>mataliki</i>	'Pleiades'
Pn:	Pukapukan	<i>mataliki</i>	'Pleiades'
Pn:	Tahitian	<i>matarí?i</i>	'Pleiades'
Pn:	Maori	<i>matariki</i>	'Pleiades, the first appearance of which before sunrise indicated the beginning of the Maori year (about the middle of June)'
Pn:	Hawaiian	<i>makali?i</i>	'Pleiades; month name; the six summer months collectively'
Pn:	Anutan	<i>matariki</i>	'Pleiades'
Pn:	Tikopia	<i>matariki</i>	'Pleiades (sign of advent of trade wind season when appears on eastern horizon before dawn, also sign for turmeric extraction)'

A number of similar terms in Micronesian languages (Kiribatese *matiriki*, Puluwatese *mwárikér*, Woleaian *mwegariger*, Carolinian *mwáárigghár*) lack appropriate sound correspondences, and are treated as borrowings.

In a number of languages of the north coast of New Guinea (Gedaged *bazas*, Biliau *barahas*, Takia *baras*) the stars are thought of as young unmarried women, associated with health and fertility rituals. When the constellation reappears in mid-June, it is time to prepare the fields for planting yams.

A second Maori term for the constellation is *ao kai* 'season of food' (Makemson 1941: 200).

Southern Cross and pointers

Although the Southern Cross is typically associated with the southern hemisphere, it is visible in the lower latitudes of the northern hemisphere, and is a significant navigational constellation for Micronesia. A PEOc reconstruction is proposed below. In several of the languages in the Solomons and Micronesia, the same term denotes both the constellation and a triggerfish. Presumably the constellation is seen as triggerfish-shaped. The Samoan term, *sumu*, although not cognate, is also the term for a triggerfish. The Hawaiian term, *newe*, may be a borrowing from the upright position Carolinian form (see below).

PEOc **bubu* 'Southern Cross'

SES: Sa'a	<i>hoi pupu</i>	'Southern Cross'
SES: Arosi	<i>hua i bubu</i>	'Southern Cross'
Mic: Mokilese	<i>loh/pwu</i>	'Southern Cross'
Mic: Woleaian	<i>bbū</i>	'Cross (star)'
Mic: Marshallese	<i>būbwin epōn</i>	'Southern Cross'
Mic: Puluwatese	<i>pwupw</i>	'Southern Cross'
Mic: Carolinian	<i>bwūbw</i>	'Southern Cross'
Mic: Carolinian	<i>wenewenūbw</i>	'Southern Cross in upright position'

Other terms are descriptive, with the net metaphor and the cross shape or crucifix recurring.

SES: Sa'a	<i>?ape</i>	'Southern Cross' (lit. 'large square fishing net fixed on four upright poles')
Fij: E. Fijian	<i>kalokalo-ni-ḏeva</i>	'Southern Cross' (<i>kalokalo</i> 'star', <i>ḏeva</i> 'the south or south-east wind')
Pn: Anutan	<i>te kupēṇa</i>	'The Net: Southern Cross' (Feinberg 1988: 191)
Pn: Tikopia	<i>te kau kupēṇa</i>	'pole-net handle' (<i>kau</i> 'handle' probably refers to the Pointers rather than the Cross, which is the net.)
Pn: Pileni	<i>kau vakorna</i>	'Southern Cross' (Lewis 1994:87)
Pn: Kapingamarangi	<i>tina ti raji</i>	'Southern Cross' (lit. 'sky mother')
Pn: Tikopia	<i>te uru a taṇata</i>	'Southern Cross' (lit. 'man's head')
Pn: Tikopia	<i>rakau tapu</i>	'Southern Cross' (lit. 'sacred timber') (Lewis 1994:407)
Pn: Hawaiian	<i>hōkū-keʻa</i>	'Southern Cross' (<i>keʻa</i> 'cross, crucifix')

The Pointers

The Pointers, Alpha and Beta Centauri, are widely referred to by compounds translatable as the 'two men'. The S.E. Solomonian form is derived from POc **mwaqane* 'man, male', while the Polynesian examples are reflexes of POc **tamwata* 'living person'.

SES: Sa'a	<i>ro mwane</i>	'Pointers (to Southern Cross)' (lit. 'two men')
Pn: Samoan	<i>lua taṇata</i>	'Pointers – Alpha and Beta Centauri' (Åkerblom 1968:27)
Pn: Tikopia	<i>rua taṇata</i>	'Southern Cross' (Lewis 1994:407)

Pn:	Tokelauan	<i>na tanata</i>	'these two stars are guides for voyages from Tokelau to Samoa' (MacGregor 1937:89)
Pn:	Hawaiian	<i>lua-ae-tanata</i>	'star used in navigating from Tonga north to Niuatoputapu' (Parsonson 1962:42)
Pn:	Anutan	<i>rua tanata</i>	Lit. 'double man': constellation consisting of two bright stars near the Southern Cross. Centaurus, also known as <i>te kau o te kupega</i> 'handle of fishing net' (Feinberg 1988:196)

Orion's Belt

It is hardly surprising that names for the group of three bright stars in a row should typically focus on the number. Terms in the S.E. Solomons, Polynesia and Micronesia all contain reflexes of POC **tolu* 'three'. In 'Are'are, Sa'a and Arosi in the S.E. Solomons they are named by the term for a three-man canoe *ta'e-oru*. In Tonga they are *alo-tolu* and in Tikopia and Anuta *ara-toru* 'path of three', a reference to an origin legend in which the three brothers of the demigod Motikitiki died and ascended to the sky when their outrigger was severed from their canoe following an argument (Feinberg 1988:11). In Maori they are referred to as *tau-toru* 'three men' (Åkerblom 1968:82), while in Tokelau according to Macgregor (1937:90) the group is called simply *tolu* 'three'. Pukapukans call them *toluŋa maui* 'Maui's three', Maui being a legendary Polynesian hero (Lewis 1994:408). The Carolinian name *elūwel* is the term for three plus the classifier for general objects. The North New Guinea language of Gedaged is an exception. Their term is *nituz*, which is also the term for a fish holder – the hooked string or branch used to string up fish.

Taurus, (the Triangle, the Triangle, the Tongs), including Aldebaran

No cognates are evident, but there is an apparent loan-translation, (or simply independent recognition of a common household utensil shape) in that Sa'a, Lau and two Polynesian languages all name the constellation with the local word for tongs.

SES:	Sa'a	<i>ireki</i>	'the Southern Triangle' (lit. 'tongs')
SES:	Lau	<i>sākai</i>	'bamboo tongs: name of constellation of six stars'
Pn:	Tikopia	<i>te ūkopi</i>	'the Tongs (Taurus's forehead), particularly Aldebaran' (Feinberg 1988:101). (Firth has <i>ūkofi</i>)
Pn:	Anutan	<i>te aŋa-aŋa</i>	'the Tongs: a constellation consisting of seven stars from Taurus arranged in a V pattern' (Feinberg 1988:189)

In Fiji the constellation is known as *laḍa*, literally 'a sail'.

There is a possible PEOC reconstruction for Aldebaran, the single brightest star of the group, although the Kapingamarangi term may well be a borrowing from Micronesia.

PEOC **ūnu* 'Aldebaran'

Mic:	Puluwatese	<i>wūn</i>	'Aldebaran'
Mic:	Woleaian	<i>ūlu</i>	'Aldebaran'. Also the name for a kind of dorfín (dorsal fin also triangular [MO])
Pn:	Kapingamarangi	<i>ūnu te</i>	'star name' (Pukui and Elbert 1973)

Other names located for Aldebaran include:

Mic:	Kiribatese	<i>te boto-n-aiai</i>	'Aldebaran (in Taurus)' (lit. 'ribs (<i>aiai</i>) of canoe', because it stands in the V-shaped portion of Taurus) (Grimble, A. 1931:241)
Pn:	Tahitian	<i>ana muri</i>	'Aldebaran' (Lewis 1994:403)
Pn:	Maori	<i>wero-i-te-kokota</i>	'Aldebaran' (Åkerblom 1968:19, from Beattie) (Tattoo design??)

Polaris

Polaris marks the centre of the North Celestial Pole. From the viewpoint of a stationary observer it never moves. It is also a good indicator of how far north of the Equator you happen to be. In Western terminology, if Polaris is 15° above the horizon, then your location will be at 15°N latitude. It disappears below the horizon as you move south across the Equator. It is valued by Micronesian sailors because it is always there unless obscured by cloud, and, being close to the horizon, it provides a good bearing (Gladwin 1970:148). The following compounds have been collected. Again we find loan translations rather than cognates.

Mic:	Puluwatese	<i>fúú há mwakét</i>	'Polaris' (lit. 'star not moving')
Mic:	Woleaian	<i>weleweleti iyefani</i>	'Polaris' (<i>welewe</i> 'straight, steady, still', <i>iyefani</i> 'north')
Pn:	Tahitian	<i>ana-nia</i>	'Polaris' (Lewis 1994:403)
Pn:	Hawaiian	<i>hōkū-paʻa</i>	'Polaris or North Star' (<i>paʻa</i> 'firm, steadfast')

Altair

The only cognate set located is from Micronesia.

Mic:	Puluwatese	<i>mááy láp</i>	'Altair; a month, about March: from <i>mááy</i> 'breadfruit', <i>lap</i> 'old'. (Breadfruit season here is May–Dec., so appearance of Altair marks the season of old breadfruit. It also marks the season of north-east winds and much sailing. <i>Mááylápánefán</i> is the name given to the season.)
Mic:	Woleaian	<i>maailapa</i>	'Altair, the most prominent star in Carolinian navigation'
Mic:	Satawalese	<i>mailap</i>	'Altair' (McCoy 1976)

The Maori name for Altair is *poutu-te-rangi* 'pillar of heaven', a reference to a creation myth in which the sky is supported on pillars (Makemson 1941:64).

Antares

Antares, in the western constellation of Scorpio, ranks with the Pleiades as the most important of the calendar stars throughout the whole Pacific area (Makemson 1941:98). I have located cognate sets from both Micronesia and Polynesia, terms from the latter referring at times to Venus.

PMic **sumwuri* 'Antares'

Mic: Trukese	<i>tumwur</i>	'Antares'
Mic: Carolinian	<i>tumur</i>	'Antares'
Mic: Puluwatese	<i>tumúr</i>	'Antares'
Mic: Woleaian	<i>tumwiri</i>	'Antares'
Mic: Kiribatese	<i>rimwima(a)ta</i>	'Antares'

PEllicean **refua* 'a star name, Antares?' (Pollex)

Pn: Marquesan	<i>ehua</i>	'Antares' (Makemson 1941:207)
Pn: Hawaiian	<i>we-lehu</i>	'Antares' (Makemson 1941:98)
Pn: Maori	<i>rerehu</i> or <i>rehua</i>	'Antares' (Makemson 1941:98)
Pn: Tuamotuan	<i>rehua</i>	'a star, Antares?'
Pn: Tahitian	<i>rehu</i>	'a month name, between December and January'

PPn **mele(mele)* 'Venus or Antares'

Pn: Pukapukan	<i>melemele</i>	'Antares' (Lewis 1994:406)
Pn: Kapingamarangi	<i>meremere</i>	'Antares'
Pn: Maori	<i>meremere</i>	'Venus as evening star'
Pn: Hawaiian	<i>melemele</i>	'name of a star (Venus?)'

The Tahitians called it *ana mua*. For them it represented the front pillar, the parent pillar of the sky (Makemson 1941:36).

Magellanic clouds

I have located terms only within Polynesia and Fiji. The reference to *rua* 'two' in Pileni and Manihiki is presumably to the Greater and Lesser Magellanic Clouds. They appear as two distinct nebulae.

PPn **maqafu* 'Magellanic Clouds'

Pn: Tongan	<i>maʔafu</i>	'Magellanic Clouds, a primary reference point for Tongan orientation', <i>maʔafu lele</i> 'flying fire' and <i>maʔafu toka</i> 'stationary fire'
Pn: Pileni	<i>lua mafu</i>	'Magellanic Clouds' (Lewis 1994:406)
Pn: Manihiki	<i>rua mafu</i>	'Magellanic Clouds' (Lewis 1994:407)

In Samoa, and also Anuta, they could simply be referred to as 'flying cloud' and 'stationary cloud'.

Pn: Samoan	<i>ao lele, ao toa</i>
Pn: Anutan	<i>ao rere, ao toka</i>

In E. Fijian they were *matādravu ni sautū*, literally 'hearth of peace and plenty'.

Milky Way

Makemson (1941:183) refers to the “Milky Way, whose change of position in the sky during the night provided the universal method of determining the passage of time”. I have a cognate set from Polynesia.

PPn **kaniwa* ‘the Milky Way’

Pn: Tongan	<i>kaniva</i>	‘the Milky Way’
Pn: Samoan	? <i>aniva</i>	‘The Milky Way’
Pn: Sikaiana	<i>kaniva</i>	‘rainbow’
Pn: Tikopia	<i>te kau tu keniva</i>	‘the Milky Way’ (lit. ‘handle of <i>keniva</i> ’)
Pn: Tokelauan	<i>kaniva</i>	‘the Milky Way’
Pn: W. Futunan	<i>kaniva</i>	‘the Milky Way’

In Gedaged (NNG) the Milky Way is *wat-daden* (*wat* ‘driftwood, flotsam’, *daden* ‘trade, barter’). The association is not explained.

In Carolinian the galaxy is *mesal fúú*, literally ‘the face of stars’.

Makemson (1941:183-186) lists a range of picturesque terms used by the Polynesians for the Milky Way which include the Mangaian *moko-roa-i-ata*, literally ‘long lizard of morning’, the Hawaiian *kuamoʻo* ‘backbone (of lizard)’, the Tuamotuan *vaero-o-te-moko* ‘tail of the lizard’ and a group of Maori terms, *ika-nui* ‘great fish’, *ika-roa* ‘long fish’ and *maŋo-roa* ‘long shark’. Still another Maori term for the Milky Way is *pae-roa-o-whanui*, literally ‘the long threshold of wide space’.

Star path

Firth (1954:91) writes:

The major navigational guide [in Tikopia] is the Star-path, the ‘Carrier’ (Kavenga). This is a succession of stars towards which the bow of the canoe is pointed. Each is used as a guide when it is low in the heaven; as it rises up overhead it is discarded and the course is reset by the next one in the series. One after another these stars rise till dawn, and at some times of the year a few still remain to rise when dawn breaks.

Lewis (1978:18) records identical advice given to him by a Tongan navigator in 1965, who refers to “*kaveiŋa*, the star path”.

PPn **kaveiŋa* ‘that which is steered for (usually a star)’. (From PPn **kawe* ‘to carry’ + *-i* (verbal suffix from POC transitive marker **i*) + *-ŋa* (nominaliser))

Pn: Tongan	<i>kaveiŋa</i>	‘star or other object for which one steers’
Pn: Pukapukan	<i>kaveiŋa</i>	‘a group of stars on the same declination, thought of as a constellation’
Pn: Tikopia	<i>kaveŋa</i>	‘carrier; esp. navigational aid by sequence of stars, star path’
Pn: Tahitian	<i>aveiŋa</i>	‘star path’
Pn: Tuamotuan	<i>kave(e)ŋa</i>	‘guiding star’
Pn: Rarotongan	<i>kaveiŋa</i>	‘that which is steered for’
Pn: Anutan	<i>kāveŋa</i>	‘the major guiding stars or constellations’

Feinberg (1988:100) adds a qualifier to the last-mentioned form. He writes: “The name *kāveŋa* ‘carrier’ refers to the particular star or constellation being followed at a given moment. A star path or sequence of stars that is followed from one island to the next,

including those stars not yet risen or already set, is a *kau panōa porau*. (lit. ‘company or group for voyaging’).” Feinberg describes this as the Anutans’ single most important navigational tool.

For Tikopia, Firth offers a purely literal term of *ara fetū* ‘star path’, and compares it with *ara a vaka* ‘canoe path’, the latter presumably referring to the actual sea route. The Maori term for star path is *ara whetū* (Grimble, R. 1972:296).

Although the Micronesians followed successive rising or falling stars in the same way, we lack a Micronesian term for the concept.

Beatrice Blackwood (1935:381-382) documents a voyage in the N.W. Solomons from Buka to Nissan made by Hanahan speakers which agrees in every respect with Firth’s description of navigating by using a star path. She gives a sequence of ten stars, but no term for the system.

Star rise and star set

Stars provide the most accurate bearings when they are low in the sky. Thus navigators describing star paths refer not to star X but to ‘rising X’ or ‘setting X’.

Rising

We have a POc reconstruction whose Micronesian reflexes can be added to star names. Thus, we find terms meaning Scorpio rising, Altair rising, etc.

POc **sake* ‘to rise, go up; upwards’

Adm:	Mussau	(<i>sae</i>) <i>sae(na)</i>	‘upwards’
PT:	Motu	<i>dae</i>	‘to ascend’
MM:	Bali-Vitu	<i>ḍaye</i>	‘(sun) rise’
MM:	Meramera	<i>saʔe</i>	‘climb’
SES:	Sa’a	<i>tae</i>	‘up, inland’
SES:	Arosi	<i>taʔe</i>	‘to go up, ascend’
SES:	Lau	<i>tae</i>	‘to rise, ascend, get up, climb’
SES:	Longgu	<i>taʔe</i>	‘to ascend, go up’
Mic:	Marshallese	<i>tak</i>	‘eastward, upward’
Mic:	Ponapean	<i>dak</i>	‘to rise, of the sun and moon’
Mic:	Mokilese	<i>dak</i>	‘to rise (of sun); to shine’
Mic:	Kosraen	<i>tak</i>	‘to rise’
Mic:	Kiribatese	<i>rake</i>	‘up, upwards, eastwards’
Mic:	Woleaian	<i>tag (tage)</i>	‘upward, eastward, up’ (<i>getage-fius</i> (noun), ‘rising stars’ e.g. <i>tagali-bbu</i> ‘Crux rising’, <i>tagali-matariuwa</i> ‘Scorpio rising’; also <i>tagali-yalo</i> ‘sunrise’)

Mic:	Puluwatese	<i>táán</i>	'to rise in the east, of stars' e.g. <i>táánupw</i> 'rising Southern Cross', <i>tááni méél</i> 'rising Vega'. Lewis (1994:404) refers to (uncorrected spelling) <i>daane elüel</i> 'rising Orion's Belt, 90°', <i>daane mailöb</i> 'rising Altair, 83°', and <i>daan uun</i> 'rising Aldebaran, 75°'.
Mic:	Carolinian	<i>táán</i>	'rising (esp. heavenly bodies)'
Fij:	E. Fijian	<i>ðake</i>	'east; upwards'
Pn:	Tongan	<i>hake</i>	'to go up, esp. from the sea to the land'
Pn:	Tongan	<i>ha-hake</i>	'east'

The term can be traced back to an earlier PMP **sa(ŋ)kay* 'catch a ride, ride on something' (ACD). This sense is preserved in many contemporary languages in addition to the 'rise, go up' sense. Reflexes can also carry the directional 'east'.

Setting

The POc term usually paired with **sake* 'to go up, upwards' is **sipo* 'go down, downwards'. Reflexes sometimes refer as well to the directional 'west'.

POc **sipo* 'go down, downwards'

Adm:	Lou	<i>si</i>	'down; descend'
PT:	Motu	<i>dihō</i>	'to go down, to descend'
MM:	Bali-Vitu	<i>(va)ðiyo(ni)</i>	'downwards'
MM:	Nakanai	<i>sivo</i>	'go down'
MM:	Tomoip	<i>tio</i>	'(sun) set'
SES:	Lau	<i>sifo</i>	'go down'
SES:	'Are'are	<i>siho</i>	'to set, of sun'
Mic:	Woleaian	<i>tubu</i>	'to set, of heavenly bodies' (e.g. <i>tubuli-weleogeo</i> 'Ursa Major setting', <i>tubuli-yalo</i> 'setting sun')
Mic:	Carolinian	<i>tubwu</i>	'to sink, go down, set (of sun, moon, stars)'; <i>tubwul</i> (n.) 'setting, setting position of stars, etc.'
Mic:	Puluwatese	<i>tupwu</i>	'to set, as the sun'
Mic:	Trukese	<i>tupwu</i>	'setting (western) position of a heavenly body'
Fij:	Wayan	<i>ðivo</i>	'sudden powerful gust; squall'
Fij:	E. Fijian	<i>ðivðivo</i>	'wind sweeping down from hills'
Pn:	Samoan	<i>ifo</i>	'downwards'
Pn:	Tongan	<i>hifo</i>	'downwards'
Pn:	Tikopia	<i>ifo</i>	'down, come down, descend'
Pn:	Maori	<i>iho</i>	'downwards'
Pn:	Hawaiian	<i>iho</i>	'downwards'

Jeff Marck (pers. comm.) has pointed out that in Micronesia, reflexes of POc **solo*, referring to mountain peak, tip of mast or similar high spot (see cognate set over page), are combined with reflexes of **sake* to describe the first sight of objects that break the horizon, or **sipo* to refer to the last sight of objects that disappear below it. When reflexes of **solo*

are linked with star names, they have come to carry the meaning of an object disappearing or setting.

Mic:	Puluwatese	<i>tolol</i>	(noun), 'setting, of stars' and <i>tololó</i> 'verb, to disappear, set, as a star'. e.g. <i>tolonupw</i> 'Southern Cross in setting position' (Elbert 1972). Lewis (1978:166) offers (his spelling) <i>doloni mariger</i> 'Pleiades setting' while (Finney 1976:24) lists <i>dolon uun</i> 'Aldebaran setting'.
Mic:	Woleaian	<i>tolo</i>	'to disappear, submerge, go out of sight, vanish'
Mic:	Marshallese	<i>tal</i>	'sink, submerge'
Mic:	Satawalese	<i>tol</i>	'disappear from sight'
Mic:	Carolinian	<i>tol, tololó</i>	'to disappear from sight, esp. over the horizon, or behind a cloud'

Zenith star

A zenith star is a star whose path is seen as lying directly overhead a particular island. It is thus a rough indicator of the latitude of that island. (It tells nothing of longitude, so is useful mainly in north-south voyages, such as from Hawaii to Tahiti.) For instance, Arcturus is the zenith star for Hawaii; Sirius marks Tahiti, Fiji and Vava'u in Tonga; while Rigel is the zenith star for Tikopia, Anuta and Vanikoro.

Lewis (1978:33) writes that "the determination by zenith stars of what amounts, in our terms, to latitude, has long been postulated as a Polynesian navigational method, but on largely circumstantial evidence". He records his subsequent emotion when a Tikopian navigator, Ramfe, referred to 'stars on top' as opposed to guiding stars. Ramfe knew that there were different 'on top' stars for other islands, and that his grandfather had known them but that he himself had forgotten them. Lewis (1978:33) writes that this information was later repeated independently by other Tikopian navigators. The only other direct reference Lewis (1978:77) makes comes from Tonga, where a member of the hereditary navigator clan, the Tuitas, told Lewis that a *fanakena* star, in secret Tuita usage, is 'a star that points down to an island, its overhead star'.

Although references to zenith stars are frequent in the literature, I cannot reconstruct any term for the concept. There is less need for zenith stars in the northern hemisphere, because Polaris is always a convenient indicator of latitude. The Micronesian navigators whose methods were described by Lewis, Gladwin and others, evidently made no use of zenith stars.¹⁵

Blust has reconstructed WMP **uRtuh* 'zenith; noon, mid-day' (ACD), i.e. with specific reference to the sun, but I have been unable to locate any Oceanic cognates. The only

¹⁵ However, Tom Davis, Cook Islander and experienced western-style ocean yachtsman, has provided a plausible solution to a question which has long puzzled Lewis and others concerned to understand the skills of the early Pacific navigators. This relates to a report made in 1866 by a Spanish Captain Sanchez after interviewing an Elato (Carolines) navigator, which refers to the observation of star zenith by filling a cane with water, and similar references to a Polynesian sextant or sacred calabash (Lewis 1978:78). Davis proposes that an instrument of this kind, i.e. a coconut with holes drilled appropriately, can identify when the angle of a particular star above the horizon is of a predetermined size, not the 90° of a zenith star, but rather one of about 45°, this being known in advance as the declination of this star when over a particular destination. In other words, it signifies that one is on the same latitude as one's destination. Davis (1992:70-73) gives a fuller description of the instrument and its use in his autobiography.

cognate set with associated meaning that I can find has terms restricted to the S.E. Solomons, where it means 'mountain', and Micronesia, where its meaning has been extended to include 'peak, pinnacle, top of mast', and in Carolinian and Satawal, to the height of the sun.

POc **solo* 'mountain, highlands interior'

MM:	Mono-Alu	<i>olo</i>	'mountain'
SES:	Lau	<i>tolo</i>	'mountain, hill country, interior of island'
Mic:	Puluwat	<i>tōl, tolon</i>	'top section of mast'
Mic:	Ponapean	<i>dohl</i>	'small mountain'
Mic:	Carolinian	<i>tōl</i>	'mountain peak; the time or height of the sun; the distance from one place to another' (Marck 1994)
Mic:	Marshallese	<i>tol</i>	'mountain'
Mic:	Kosraen	<i>olo</i>	'top, tip, apex'
Mic:	Mortlockese	<i>tōl</i>	'top of mast, peak, pinnacle' (Marck 1994)
Mic:	Satawalese	<i>tōl</i>	'height of sun' (<i>tolo</i> - 'mountain' (Marck 1994))

Kiribati has a term *taubuki ni karawa* for 'zenith', literally 'the ridgepole of heaven'. Note that *taubuki* is also the name for the zenith star Rigel.

Other terms appear to be unrelated:

Pn:	Samoa	<i>tumu-tumu</i>	'top; peak, height, zenith'
Pn:	Maori	<i>puāpa</i>	'zenith'. Also refers to Rigel, ¹⁶ in Orion's Belt.
Pn:	Anutan	<i>puŋapenua</i>	'summit; the highest point of an island'

The Hawaiians have a term for zenith, *hoʻokuʻi*, which is literally 'point of juncture'. Elbert and Pukui's dictionary records an expression *mai ka hoʻokuʻi a ka hālāwai* 'from zenith to horizon', *halawal* meaning 'meeting' as well as 'horizon'. Both terms appear to relate to the concept of sky zones, a kind of grid reference of lines drawn across the sky.

Star compass

The fact that stars always rise and set at the same point on the horizon has in some places led to the use of star names as cardinal compass points. A surviving example of a sidereal compass comes from the Carolines, where Goodenough in 1953 recorded a compass with thirty two named star positions (Lewis 1994:102). The terms cannot be equated precisely with the cardinal points of a European compass; they are not placed at regular intervals but are bunched together at their eastern and western margins. The primary compass point and basis of the Carolinian navigational system is the position where Altair rises in the east, in our terms at 8°30' N. No term has been located for the compass as such, but many of the stars identified in this paper – Altair, Aldebaran, Pleiades, Orion's Belt, and Antares – are represented on the Carolinian compass by both their rising and setting positions. Polaris represents due north. No fewer than five southerly directions are indicated by the various positions of the Southern Cross, depending upon whether its axis is upright, lying at either diagonal or horizontally on either side (Lewis 1994:103-106).

¹⁶ Rigel is not an overhead or zenith star for New Zealand, so one must assume that its dual meaning has been brought from a place where it is – i.e. about 8°S latitude, far north of New Zealand.

2.2 Winds

Navigators, steering primarily by sun and star, also need to take into account variable factors such as winds and currents for which a steersman must compensate if he is to maintain his course.

The Pacific wind systems and associated terminology have been described in detail in Ross (1995). He has reconstructed the following POc terms for seasonal winds and wind directions:

POc **raki* 'S.E. tradewinds; dry season associated with S.E. trades'

POc **apaRat* 'wet season when north-westerlies blow and sea is rough' (Dempwolff 1938.) (Fij. and Pn. reflexes refer to storms and cyclones associated with the wet season). (From PMP **habáRat* 'S.W. monsoon season, wet season')

POc **timu(R)* 'wind bringing light rain' (PMP **tímuR* 'south or east wind' (Dempwolff 1938))

POc **toŋa*. Meaning uncertain except for PPn reflex 'S.E. trades' (Pollex)

POc **tokelau(r)* 'N.W. storm wind' (?), PPn **tokelau* 'northerly quarter and wind from that quarter; N.W. storm winds' (Pollex)

POc **karak(a)* '(strong?) S.E. trades'

POc **muri/miri* 'S.E. trade wind'

POc **marau* 'S.E. trade wind'

POc **aqura* 'wind, particularly S.E. trade'

Wind compass

Terms for seasonal winds also come to be applied to that section of the compass from which the winds blow. Frequent reference is made in the literature to 'wind compasses'. Parsonson (1962:41) writes that "like the Arabs, the Polynesians divided the horizon into a greater or lesser number of points, the Tahitians into 16 parts, the Cook Islanders 32, to each of which corresponded a wind". Lewis (1984:112ff.) has recorded wind compasses in both the Southern Cooks and Pukapuka, the Tokelaus and Tahiti, and refers to rather more nebulous reports from the Carolines. He also reports a six-point wind compass from the Lau group of Fiji. Feinberg (1988:92) writes that "Anutans have what might be described as a rudimentary wind compass in that they know the prevailing winds at various seasons and use the same term for the wind coming from a particular direction and the name of the geographical bearing itself. However, the number of points is not great." Feinberg in fact lists six – *tokerau* (N.W.), *ruatū* (N.E.), *toŋa* (E), *tuauru* (S.E.), *raki* (S.W.), and *pakatiu* (W). He reports that Firth gave a similar description for Tikopia wind points, although the latter are rotated roughly 40° clockwise from the Anutan ones. Lewis (1994:118-119, quoting from Chappell) mentions a rare Melanesian example, from the Vitiaz Strait between New Guinea and New Britain, where a five-point wind compass from Siassi has been recorded.

There is general agreement that winds can equate with cardinal directions only in a very loose sense. Both Lewis and Gladwin reiterate that directions for the navigator need not be precise in the cartographer's sense; they only must be good enough to enable him to get where he wants to go with some margin for error. Winds indicate approximate directions; star bearings are absolute.

2.3 The seascape

In the area of sea signs, my hunt for terms has been much less successful than with heavenly bodies. There are a number of terms – for the sea itself, and for current, drift, wave and reef – which are not restricted to navigation, and which in any event are well-attested. Accordingly, I simply list the reconstructions:

POc **ma-sawa* ‘open sea, space’

POc **laman* ‘deep blue sea beyond the reef’ (Blust 1984a)

POc **tasik* ‘sea water, salt water’

POc **lauR* ‘sea, seashore, seawards’ (from PMP **lau(d)* ‘sea’)

POc **qaRus* ‘current’ (from PMP **qaRus* ‘current, flow’ (ACD))

POc **maqañur* ‘floating, adrift’ (ACD) (from PAn **ma-qañud* ‘adrift’ (from PAn **qañud* ‘drift on a current, carried away by flowing water’) (ACD))

POc **napo(k)* ‘wave’ (from PAn **Nabek* ‘breakers, surf, waves’) (ACD)

POc **sakaRu* ‘reef’ (from PMP **sakaRu* ‘reef’) (ACD)

A small group of terms may be considered as particularly significant to navigation. These are discussed below.

Swell

Ocean swells are unbreaking waves which have their origin in regions of strong and persistent winds such as the tradewinds or the monsoons. They travel beyond the wind systems that generate them, and remain after the wind has died away (Lewis 1994:124). Although they vary with the seasons, and to some extent with local weather conditions, their behaviour tends to be long-term, and thus reasonably predictable for any particular journey. Typically, two, three or more swells will move across or through each other simultaneously, requiring a high degree of skill on the part of the navigator first to distinguish and then to compensate for when maintaining course. Gladwin (1970:170) describes Puluwat as having three main swells, Big Wave, North Wave and South Wave. Lewis writes that in the Santa Cruz Group, three swells are considered to be present all year round. They are *hoa-hua-loa*, the long swell from the south-east, *hoa-hua-dela-tai*, the sea swell from east north-east and *hoa-hua-dela-hu* from the north-west. Lewis (1994:128) suspects that these originate from the S.E. trades, the N.E. trades and the N.W. monsoon respectively, and considers that this is a fairly general pattern in this segment of the Pacific. “Further eastward, but still south of the equator, we might expect the effects of the monsoon to be lost, and, once clear of the big Melanesian islands, for the Southern Ocean swell to sweep unhindered up from the south. This indeed is the pattern in the Gilberts and Tonga, with their ‘great swells’ from the east and south.”

We have a POc reconstruction, **ñalu(n)*, although there is some doubt as to whether it referred just to swells or to ocean waves of all kinds. Any known sea route can be expected to have its own probable swell pattern, with individual swells likely to be given local names.

PMP **qalun* ‘long rolling wave, swell, billow’ (ACD)

POc **ñalu(n)* ‘(ocean) wave’ (Blust 1972)

PT: Tubetube *yalu* ‘backwash from wave breaking on the beach’

SES: Lau *ñaluñalua* ‘a rough confused sea’

Mic:	Marshallese	<i>gol</i>	'ocean swell, mounting wave which does not break, billow'
Mic:	Kiribatese	<i>nao</i>	'wave, swell'
Mic:	Kiribatese	<i>nao banaki</i>	'long low swell from south (the main swell)'
Mic:	Kiribatese	<i>nao uea</i>	'area of intersecting swells west of land'
Mic:	Kiribatese	<i>nao makoro</i>	'refracted swell from east of land'
Pn:	Tongan	<i>ηalu</i>	'wave (when rolling in), breaker or surf'
Pn:	Samoa	<i>ηalu</i>	'wave, breaker; to be rough'
Pn:	Tikopia	<i>ηaru</i>	'wave, swell (normally used collectively in singular form)'
Pn:	Rapanui	<i>ηaru</i>	'to swim over the waves'
Pn:	Maori	<i>ηaru</i>	'wave of the sea'
Pn:	Anutan	<i>ηaru</i>	'wave (generic); breaker' (Feinberg 1988:192)
Pn:	Tikopia	<i>ηaru</i>	'wave, swell'

Heyen (1962:67) lists a further two Kiribatese terms, *ao-mean* 'the sea swell from the north' and *ao-maiaki* 'the sea swell from the south'.

Feinberg (1988:114) lists terms from Tikopia – *ηaru fenua*, and Anuta – *ηaru penua*, which refer to swells which have been reflected back from a land mass, and thus serve as indicators that land is close.

It is possible that a second reconstruction, PPn **peau* refers more specifically to swells.

PPn **peau* 'wave of the open sea'

Pn:	Samoa	<i>peau</i>	'wave, billow'
Pn:	Tuvaluan	<i>peau</i>	'wave of sea'
Pn:	Tokelauan	<i>peau</i>	'billow, roller'
Pn:	W. Futunan	<i>peau</i>	'white caps; swell in ocean'
Pn:	Tikopia	<i>peau</i>	'foam, spindrift at sea'

Deep phosphorescence

This phenomenon is distinct from surface phosphorescence. It comprises streaks and flashes of light a metre or so below the surface, and is in constant motion.

Its flashes dart out from the directions in which islands lie, or else flicker to and fro in line with these bearings. It is best seen 'in the middle sea, 80 – 100 miles out', but it invariably indicates the direction of land. As you approach land, it becomes scanty and finally disappears by the time the island (if an atoll) is well in sight. (Lewis 1994:253)

It is particularly marked on dark rainy nights, when it becomes the main direction finder. Lewis has recorded it in Pileni in the Reef Islands, in Tonga, and also in Micronesia, although in each place by unrelated names. In Pileni the term is *lapa*, a reflex of POc **lapa(r,R)* 'lightning'. In Tonga it is *ulo ʔa e tahi*, literally 'flame of the sea'. In Kiribatese it is called *te mata*, here in its sense of light or something used to give light. The only other reference to it is as a Marshallese term given by Lewis (1978:119) as *drojet*, which I cannot locate in the Marshallese dictionary although the second element *-jet* is from **tasik* 'sea water'. In any event, there is no evidence between the terms of either relatedness or borrowing.

Reference island

Lewis's books make frequent reference to *etak* islands, used as 'moving' reference points by Puluwat navigators. A voyage is conceived of as being divided into stages or segments with reference to a sequence of islands lying away to one side of the course. Each island is in turn conceptualised as moving while the canoe's position is held to be fixed relative to that of a given star with which each island is aligned. *Etak* refers both to the concept of dividing up the voyage in this way, and to the stages themselves.

An *etak* is a variable distance...[but] the *etak* island is generally so chosen as to make an *etak* segment somewhere around 20 miles. The first and last two *etaks* of a voyage are exceptions. These are the 'etak of sighting' and the 'etak of birds', and both are absolute distances of 10 miles. (Lewis 1978:147. See also Gladwin 1970:181-186.)

The only reference to *etak* as a concept is from the Carolines (*etak* in Puluwat and Satawal, *hatag* in Woleaian). However, Lewis believes that the navigator Tevake, from the Polynesian outlier Pileni, must have used a similar system. He writes:

His [Tevake's] ability to point out the direction of invisible islands whenever he wished is presumptive evidence that he was thinking in terms of some form of home-centre reference system.

and again (1994:171),

One cannot say whether or not Tevake's orientation concepts resemble the Carolinian one of *etak*. One can, however, be certain to this extent about the picture that his mind composed of the changing relationships of islands 50 and 100 miles from his course. This was of a similar order of accuracy and enabled him to point out the direction of invisible islands, in the same manner as the *etak* system.

I have not been able to trace the term elsewhere.

Sea marks

Lewis (1994:291) writes that:

The term 'sea marks' (*betia*) is a Gilbertese one, but the conception is not unique to that archipelago or to Micronesia. Carolinian navigators, for instance, learn sequences of what they call 'sea-life'. These, much more frequently than their Gilbertese counterparts, are transitory phenomena such as sightings of certain fish, and the like. Some, however, like a whirlpool on Uranie Bank, have real and permanent existence.

Lewis (1994:291) then includes a quote from Grimble:

There were certain traditional signs by which navigators judged their distance westward of the land. The safety limit to leeward (i.e. westward in the trade season) was called the Fish Wall of Kabaki. It consisted of a line of leaves and rubbish scattered over the sea from Makin to Samoa far to the westward of the land. This is probably quite true, the rubbish being carried by some current.

I cannot trace a source for the term *betia*, nor can I locate any comparable terms from other languages.

Expansion of target

Pacific navigators reduced their risk of missing a target island through various strategies designed to expand the target. As a general rule, low islands with trees are visible for a distance of about 10 miles. Bird sightings can at least double this range. Terns, noddies and boobies are all species that spend their days flying over off-shore fishing grounds. As night

approaches they will drop low over the water and make a beeline for their land roosts. The reverse occurs at dawn. Terns and noddies will range up to 20–25 miles offshore, while the range of boobies is 30–35 miles (Lewis 1978:30). Other indicators of nearby land include the presence of off-shore reefs, a change in the patterning of swells as one nears land caused by their refraction at a different angle, change in water colour, and particular effects in the clustering and colour of clouds that gather over land. Although these indicators are put to practical use in various parts of the Pacific, we have insufficient linguistic data to draw any conclusions about origins of these concepts.

3 Navigation in Western Oceanic and the Admiralties

3.1 Navigation in Western Oceanic

There is little information on navigation among the people of the Western Oceanic region. One might expect that any such skills would have been most developed in the offshore islands, particularly the smaller ones where trading was essential to a community's livelihood. One such region is the Milne Bay area off the tip of Papua, where the trading cycle known as the "kula ring" flourished until a few decades ago. We have some information on two of the communities involved, the Trobriand Islanders and the people of the Amphlett group. Malinowski (1922:225-226), writing on the navigation skills of the former, records that:

Taking the bearing by sight, and helped by the uniformity of winds, the natives have no need of even the most elementary knowledge of navigation. Barring accidents they never have to direct their course by the stars. Of these, they know certain outstanding constellations, sufficient to indicate for them the direction, should they need it. They have names for the Pleiades, for Orion, for the Southern Cross, and they also recognize a few constellations of their own construction.

Malinowski (1922:68) also mentions a particular Trobriand village, Wawela, as the traditional centre of astronomical knowledge, but its function seems to be restricted to regulation of a calendar and the fixing of significant dates.

Lauer (1976:86) has provided some information on the Amphlett Islanders. Their home is a small group of high islands situated south of the Trobriands.

The Amphlett Islanders do not appear to have developed sophisticated techniques for orientation and navigation. For example, although Amphlett men commonly know many stars by name they do not attempt to use their knowledge of the stars to guide them when sailing at night. The relative lack of sophistication in the navigation techniques of the Amphlett Islands, as well as those of their neighbours in the northern Massim, can probably be explained by the character of the voyages made in the area. The voyages are all short [no more than 75 km.]. Land, except during bad weather, is always visible...And the island targets are all large.

Lewis (1994:126, 134) interviewed two men in 1966 who had participated in the *hiri* trading voyages of the Motu people across the Gulf of Papua and reported using the deep ocean swells and star paths to guide their vessel. No terms were recorded.

Blackwood (1935:380-382) has given a description of voyaging undertaken by Buka people in the N.W. Solomons.

The people of the North Bougainville coast are not great sailors, and seldom venture on trips more than a few miles from the shore. Those of Buka...are more venturesome, and go, on occasion, as far as the island of Nissan, a trip involving little short of a hundred miles, mostly of open and sometimes stormy sea, to buy the pigs for which Nissan is famous.

These voyages are made in paddling, not sailing canoes. Voyages are made at night, and a star path is followed. Although Blackwood does not give this method of navigation by star path a particular name, it is obviously the same technique developed on such a broad scale in Polynesia and Micronesia.

3.2 Navigation in the Admiralties and St Matthias

I have not been able to locate any record of navigation techniques in this area apart from the brief description given by David Lewis on Ninigo, which lies 120 miles west of Manus and the same distance north of New Guinea. Although he sailed with the Islanders in their 50 foot canoes and referred to them as "true deep-sea navigators", his description of their technique is brief, and he does not give local terms. Lewis (1978:93) summarises:

It soon became apparent that it [Ninigo navigation] followed the general oceanic pattern. Steering was by stars rising or setting a little above the horizon; currents were known to vary with the monsoon and trade wind seasons and particular wave forms were regarded as being characteristic of different currents. There was also an unfamiliar high star technique, reminiscent of one sketchily reported from Samoa and the Tokelau Islands, which I was never able to fathom out.

4 Conclusions

Reconstructions of navigation terms for Proto Oceanic, Proto Micronesian and Proto Polynesian are listed in Table 1.

Lewis (1994:353-354), in summarising his findings, has written:

Particular ideas or techniques were favored in different archipelagos in accordance with local geographical and social factors. However, so far as can be determined by haphazardly recorded items of information, and by what is still remembered, the methods used were surprisingly homogeneous. So much so that it would overstep the evidence if one were to speak of separate or typical Polynesian and Micronesian systems. Navigation seems to have been equally efficient in both areas, and the techniques were very often identical.

Accordingly I came to the writing of this paper with the expectation that this similarity would be reflected in the navigation terms collected, explicable either through borrowing or through common ancestry. However, the reconstructions of POC, PMic and PPn terms listed in Table 1 provide very little proof of relatedness, except in less-specialised terms.

There is a fair degree of conformity among the Austronesian speakers of the Pacific in the way they view their physical world of sea and sky. Among the stars and star groups, for instance, Venus is typically labelled as the 'day star' or in association with events of dawn or dusk; Alpha and Beta Centauri are 'the two men'; Taurus is 'tongs'; Polaris is 'the star that does not move'. The horizon, predictably, is 'base of sky' or 'edge of sea'. It has come as something of a surprise, therefore, to find just how few cognate sets can be put together for concepts that are apparently widespread. What is particularly striking is the degree of apparent reinvention of terms for similar concepts. Many are transparent compounds, as if the concept is being described for the first time.

My guess as to why this should be, is to relate it to the fact that these are island communities scattered over a great distance. Each is its own physical world, with its own particular collection of weather patterns and physical features. The stars, for instance, are not only navigational aids; together with the sun and moon they are a community's clock and

calendar. But places separated by 30° latitude will have different seasonal cycles which will be marked by the appearance of different stars. Significant events for a local community will be such things as the time for harvesting breadfruit, the time for particular fish to be plentiful, the time for fair-weather sailing and the time of storms. Local events motivate local names.

The terms which throw least light historically are the most specialised navigational terms. The body of navigational knowledge held by a community was a precious commodity. Taken to extremes, as in Tonga, such knowledge was closely guarded. Here it was held by senior members of particular clans, and passed only to their descendants. Although all members of a community would be aware in a general way that star paths, swells and so on were aids to navigation, the actual terms used would in some places belong to secret usage. But even in less stratified communities, there would have been few skilled navigators at any one time. Arthur Grimble (1931:197) wrote that of the 30,000 inhabitants of the Gilbert Islands in his time (around the 1920's), fewer than 20 could speak with authority about the stars; and "those who have the knowledge are often most unwilling to impart it, for of all the secrets treasured by the native, those connected with navigation are still perhaps the most jealously prized and guarded." And, as has been well exemplified by Stephen Thomas in his 1987 book *The last navigator*, this knowledge could be lost within a generation or two.

So although we can recognise the same navigational techniques, such as the use of star paths and swells in places as far apart as the Papuan Gulf, the Admiralties, the Solomons, Micronesia and Polynesia, and techniques involving a wind compass and deep luminescence in Micronesia and Polynesia, we have virtually no linguistic proof that the terms by which they were described evolved from a common knowledge base. In this case, on the available limited data, linguistics is unable to provide an answer.

However, it seems that gains have been made in another, unexpected, direction. At least in the subgroups for which we have most data, that is, in the S.E. Solomons, Polynesia and Micronesia, the data are unusual in that the terms for what we might describe as cosmic features – heavenly bodies, the horizon, the solstices and the like – are not arbitrary names. They are overwhelmingly descriptive terms, transparent compounds that (a) reflect some specific function of the feature, whether they be calendar or navigation stars, or (b) that underpin their role in creation mythology. The Oceanic Lexicon project, of which this paper is a part, is organised on semantic principles partly in the belief that this will provide a basis for cultural reconstruction. In this sense, I believe that star names have offered us some rare clues as to the values and world view of Proto Oceanic speakers.

Table 1: Reconstructions of navigation terms

Term	POc	PMic	PPn
sky	<i>*lanjit</i>	<i>*lanji</i> <i>*kadawa</i> 'heavens'	<i>*lanji</i>
horizon		PWMic <i>*pai-lanji</i>	<i>*tafaqa-ki-lanji</i>
sun	<i>*qaco</i> 'sun, day' <i>*raqani</i> 'sunlight' <i>*sinaR</i> 'to shine, sun'	<i>*alo</i> 'sun' <i>*raani</i> 'day' <i>*sina</i> 'light, shine'	<i>*qaho</i> 'day, not night' <i>*laqaa</i> 'sun' <i>*maa-sina</i> 'moon'
moon	<i>*bulan</i> <i>*marama(R)</i> 'be light'	<i>*marama</i>	<i>*pula</i> 'to glow' <i>*malama</i> 'moon' <i>*maa-rama</i> 'light, bright'
star (generic)	<i>*pituqun</i>	<i>*fituu</i>	<i>*fetuqu</i>
Venus	<i>*(ma)dala</i>	<i>*matal</i>	<i>*fetuqu-qaho</i> 'day star'
Bird constellation	<i>*manuk</i>	<i>*ma(a)nu</i>	<i>*manu</i>
Pleiades	<i>*bulu</i>		<i>*mataliki</i>
Southern Cross		<i>*pwupwu</i>	
Pointers			<i>*rua tanata</i>
Orion's Belt	<i>*tolu-</i>	<i>*telu-</i>	<i>*tolu-</i>
Antares		<i>*sumwuri</i>	<i>*mele(mele)</i>
Magellanic Clouds			<i>*maqufu</i>
Milky Way			<i>*kaniwa</i>
star path (that which is steered for)			<i>*kaweija</i>
star rise	<i>*sake</i> 'to rise, upwards'	<i>*sake</i>	<i>*hake</i> 'upwards'
star set	<i>*sipo</i> 'to go down, downwards'	<i>*tupwu</i>	<i>*hifo</i> 'downwards'
	<i>*solo</i> 'mountain, peak'	<i>*zolo</i> 'to disappear (over horizon)'	
N.W. wind and quarter		<i>*tokelau(R)</i>	<i>*tokelau</i>
S.E. wind and quarter		<i>*tona</i>	<i>*tona</i>
? wind and quarter	<i>*raki</i> 'dry season of S.E. trades'	<i>*raki</i> 'summer season' assoc. wind and weather	<i>*laki</i> 'westerly quarter'
ocean swell	<i>*ŋalu(n)</i> 'wave, swell'	<i>*ŋalu</i> 'wave, swell'	<i>*ŋalu</i> 'wave'
wave, swell			<i>*peau</i> 'ocean swell, whether breaking or not'
lightning	<i>*lapa(r,R)</i>		<i>*lapa</i> 'flash of light'
open sea	<i>*masawa</i>	<i>*masawa</i>	<i>*wasa?</i>
sea, salt water	<i>*tasik</i>	<i>*tazi</i>	
deep blue sea	<i>*laman</i>		
current	<i>*qaRus</i>	<i>*aus</i>	<i>*qau</i>
reef	<i>*sakaRu</i>	<i>*sakau</i> 'reef, shoal, reef island'	<i>*hakau</i> 'coral reef'

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Computer files in progress:

Bruce Biggs' Polynesian Lexicon (Pollex)

Robert Blust's Austronesian Comparative Dictionary (ACD)

