Time Reckoning

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INTRODUCTION

Primitive systems of time reckoning or calendars are quickly disappearing worldwide. Since the 15th century, the Gregorian calendar in particular quickly spread over a wide area, under the influence of European culture. National leaders adopted the Gregorian calendar as they recognized the importance of calendars as a form of social control, and consequently this western calendar replaced primitive systems of time reckoning. Even where a primitive system of time reckoning is still used in daily life it tends to differ somewhat from its original form. Such modifications, together with incomplete or inaccurate recollections of traditional calendars, make the comparative study of time reckoning difficult.

Today the Galela use both the Mohammedan and Gregorian calendars, and their own calendar is no longer used in daily life. In this article I attempt to reconstruct their calendar using field data derived from interviews with the few people who still remember it.

Important elements of primitive calendars are sometimes overlooked in existing fields reports, making comparative study more difficult. To show what elements are required to describe a calendar, and to facilitate the discussion of the features of Galela time reckoning, five types of calendar still existing in Oceania are first summarized.

A brief review of the primitive calendars recorded from various parts of the world reveals four fundamental elements; those referring to sun phenomena, those referring to moon phenomena, those dealing with the phenomena of stars or constellations and those referring to other natural phenomena. Often, primitive calendars are composed of a combination of these elements. Two or more calendar systems can coexist in some societies, however, some elements and some systems do not have

equivalent value in the same society, and one is ordinarily dominant. The choice of an element or a calendar system depends, *inter alia*, on the degree of economic development, the mode of life, and the ecological context. The Micronesians, for example, usually employ the sidereal calendar in which the year is divided into 18–19 unequal periods based on the heliacal rising of particular stars or constellations. In addition, they have the shorter sidereal calendar in which lunar and sidereal cycles coincide with each other [GOODENOUGH 1951: 108–110]. This example shows that there are at least two calendar systems in Micronesian society, and that one is dominant. It is possible that the sidereal calendar is dominant in Micronesian society because they live on a small islands, are good navigators and have a highly developed knowledge of astronomy.

The second type of calendar is the natural phenomena calendar. In the Philippines, the Bontoc Igorot divide the year into eight unequal periods, regardless of their knowledge of the waxing and waning of the moon. These eight periods are closely related to agricultural practices, and seven of them are especially related to rice agriculture [JENKS 1905: 219–220]. No description is provided of the means used to mark the start of the first period, but it is known that natural phenomena are generally important for time reckoning in Northern Luzon. According to Scott [1958], the starting of farming in Northern Luzon is decided by the swelling of mountain streams, blossoming of certain trees, and the migration of birds. The Bontoc Igorot begin sowing when the cry of nestlings of the *kiling* bird is first heard [SCOTT 1958: 569–570].

In New Britain, the Maenga calendar is regulated by natural phenomena, despite their knowledge of lunar month reckoning, and of the sun's position on the solstice and of the movement of the Pleiades. They have twelve months, nine of which consist of 30 days. But one month consists of fifteen days and two months consist of five weeks [PANOFF 1969: 158]. The names of the months are closely related to those of certain plants because each month begins when the leaves of particular plants start to fall or when the flowers of other specific plants begin to bloom. The timing of Maenga annual festivals are also decided by natural phenomena [*ibid.*: 153–159].

But those types of calendar are rare. The most widespread are lunar calendar systems. However, if the lunar system alone is employed months do not correspond to seasons, as in the Mohammedan calendar in which seasons are completely neglected. The lunar system is usually combined with other systems; luni-natural phenomena, luni-solar, and luni-sidereal calendars. In the Trobriand Islands [LEACH 1950: 250–256] and Samoa [ANON. 1928: 231], the intercalation depends on the appearance of *palolo* (*Eunice viridis*) worms. Among the Yami of Botel Tobago Island (near Taiwan), the intercalation is regulated by the time of the appearance of flying fish (*Exocoetus*) [LEACH 1950: 258–261]. The Mae Enga people of the Western Highlands District of Papua New Guinea, have a luni-solar calendar in which the intercalation is regulated mainly by the position of the solstice [MEGGITT 1958: 74–77], and the Tongans have a luni-sidereal calendar in which the intercalation is regulated by the Pleiades [COLLOCOTT 1922: 164–173]. This calendar is widely found in Oceania

Table 1. Oceanian calendar types

element / type and sample	stars or constellations	sun	natural phenomena	moon	source
sidereal calendar					
the Micronesians	++	±	± (?)	±	GOODENOUGH [1951]
natural phenomena calendar					
the Maenge	±	±	++ (plants)	+	PANOFF [1969]
the Bontoc Igorot	−	−	++	−	JENKS [1905] SCOTT [1958]
luni-natural phenomena calendar					
the Trobriands	±	−	++ (*palolo*)	++	MALINOWSKI [1927] LEACH [1950]
the Samoans	±	−	++ (*palolo*)	++	ANON. [1928]
the Yami	−	−	++ (flying fish)	++	LEACH [1950]
luni-solar calendar					
the Mae Enga	−	++	+	++	MEGGITT [1958]
luni-sidereal calendar					
the Tongans	++ (the Pleiades)	−	+	++	COLLOCOTT [1922]
the Maori	++ (Orion)	±	+	++	BEST [1922]
lunar calendar					
the Mohammedan calendar	−	−	−	++	−
the Galela	++ (the Pleiades)	±	±	++	YOSHIDA

[NILSSON 1920: 274, 276]. Among the Maori a similar calendar is found on the east coast of the North Island: However instead of the Pleiades the Rigel of Orion is employed in the far North, in the South Island and in the Chatham Isles [BEST 1922: 4, 9]. Table 1 shows the basic types of calendars existing in Oceania. The Mohammedan calendar is included because it represents a rather special type.[1)]

1) This typology of primitive calendars is probably applicable for calendars from other areas outside Oceania. Cope [1919] presented another kind of typology of calendars which were employed by North American Indians; the descriptive type, the astronomical type, and the numeral type. However, his typology may not be applicable to calendars of the other areas.

Primitive Time-Reckoning by Nilsson [1920] is probably the best book in this field. However, Leach made the following comments on his work:

> ···careful consideration will show that such conclusions are inherent in the author's own preconceptions about the nature of time and in the assumptions he makes about the objectives of primitive "calendar makers." The empirical data, as it stands, might easily be twisted to support a number of alternative theories [LEACH 1950: 246].

Even if Nilsson's work has these limitations it is still valuable because it provides a large number of data collections on primitive calendars (some data, however, need re-evaluation).

Other factors concerning the classification of calendars should be discussed, such as the manner of recognition of years (especially half years, or rice years, or short years) and the divisions of the month (names of days or nights). These factors will be discussed in the relevant sections below.

I. GALELA TIME RECKONING

1. Year and Seasons

At present the Galela have two words which mean "year", *taun* and *musung*. However, neither word is Galela in origin, both having been borrowed from Malay. The former is from *tahun*, Malay for "year", and the latter is from *musim*, the word for "season". Many words for "year" found in Oceania have the same etymology. The Galela words were obviously borrowed from some Austronesian language, because the Galela language belongs to the North Halmahera languages, another language phylum. It is possible that they did not originally have the concept of "year" and never counted years.

Indeed, exact counting of years is not a common custom even now. For example, when the Galela were asked their age, many of them said they were 50 or 45, the same age as given in the electoral record compiled a few years ago, when only approximate ages could be recorded. When referring to past events, the Galela usually employ such expressions as "the time when Mt. Mamuya erupted" or "when my father died." Events such as a father's death are obviously not cyclical. Generally, the counting of years occurs when a culture reaches a certain stage of development, the need for exact enumeration arising as such institutional activities like education, conscription and tax collection develop.

The year is divided into two seasons, *o musung o kore mie* and *o musung o kore sara* (Fig. 1). The former means "the season of the north wind," which blows from December to April, and the latter means "the season of the south wind," which blows from June to October. However, *o kore sara* and *o kore mie* were borrowed from

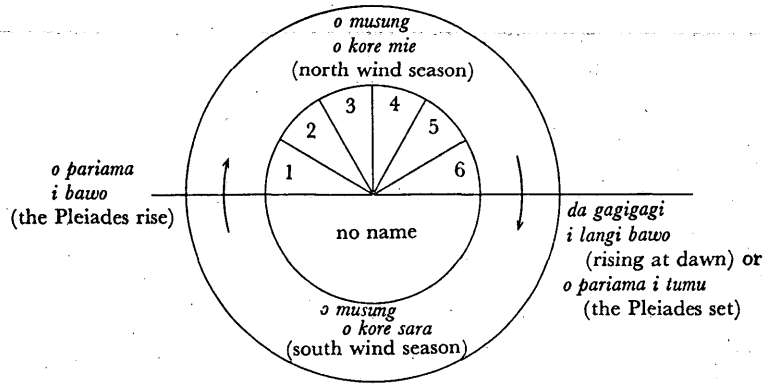

Fig. 1. The two seasons of the Galela.

Ternate [BAARDA 1895: 27–28]. It is not clear whether the Galela had the concept of season before borrowing the words from Ternate.

The division of seasons by the wind is common in the areas where trade winds or monsoons occur. However, it is impossible to determine exactly the change of the seasons solely by the direction of the monsoons, because there is a time lag between the change of the monsoons. The Galela determine the change of season by the Pleiades, *o pariama.* The north wind season begins when the Pleiades rise on the east horizon at the setting of the sun. This is called *o pariama i bawo* ("the Pleiades rise"). The south wind season begins when the Pleiades are seen on the east horizon just before the sunrise. This is called *da gagigagi* or *i langi bawo* ("rising at dawn"). Sometimes it is called *o pariama i tumu* ("the Pleiades set"). However, the villagers cannot actually observe the setting of the Pleiades because there are mountains to the west of the Galela area. Thus, they determine the change of the seasons by the appearance of the Pleiades on the east horizon at dawn or in the evening.

The appearance of the Pleiades in the evening also marks the start of the annual agricultural cycle, and the subsequent six months are given names and counted. The other six months are not counted and have no names. Although the Galela have no exact concept of the beginning of the year because they have no reckoning for years, it can be argued that the appearance of the Pleiades in the evening indicates the beginning of the year (the Pleiades year). The Pleiades year is seen not only in Tonga and New Zealand, but also in many other parts of the world [NILSSON 1920: 274–276]. However, the Pleiades year is most commonly found in Oceania.

The Galela portray the characteristics of the seasons as follows: The north wind season is also called "the rainy season" (*o musung muura*) when it is easy to get water but hard to obtain firewood. During this season the sea is very rough and generally not suitable for fishing. But fishing is not completely impossible and sometimes the boats can go out at night when the wind diminishes. On the other hand, the south wind season is called "the hot season" (*o musung da sahu*). During this season, it is easy to get firewood but hard to obtain water. Since the sea is calm this is a good season for fishing. In this season, the Galela go to C. Lelei to catch *ngawaro.*[2] It seems that the Galela recognize that the north wind season is an agricultural season and the other the fishing season, although agriculture and fishing is still carried on to some extent during both. Indeed, their agriculture mainly depends on root crops such as banana, sweet potato and manioc, allowing them to harvest at anytime.

They are aware of the seasonal changes in the positions of the sun, the moon and stars. The position of the sunrise, for instance, moves southwards in the north wind season, as if the north wind blew the sun toward the south. However, the range of movement is fairly limited and these positional changes are rarely employed for time reckoning.

2. Months

The Galela give names only to the six months in the north wind season and to

2) See Ogo, this volume, pp. 215–219.

none during the south wind season. The restricted meaning of *musung* indicates only those six months in the north wind season. When *musung* is used for the counting of years it indicates how many *musung* have passed; not a rare phenomenon world-wide.

The first month of the Galela calendar, *o nawoko*, begins when the Pleiades and the full moon rise almost together at sunset in the eastern sky. The exact timing of this phenomenon varies from year to year, yet it functions as a kind of intercalation.

The original meanings of the names of the six months have already been forgotten, but some are likely to have originated from Tobelo. The six months are (the Tobelo terms and glosses are taken from Hueting [1908]):

(1) *o nawoko*: This is approximately coincides with December in the western calendar. "Fish" in Tobelo (*o nauko*). This month is also called *o musung ma dodoro* ("the season to open the field").

(2) *o biango*: About January. "Crustacean" in Tobelo.

(3) *o sangoka*: About February. The meaning of this word is not clear. It may be that *oka* (suffix to indicate the past tense) is added to *hango* (answer).

(4) *ma ngopa*: About March. "Child" in Galela. *O sangoka* and *ma ngopa* are called *o musung ma lamo* ("the great season"), and also *o musung ma tutudu* ("the season for planting").

(5) *ma awa*: About April. "Mother" in Galela.

(6) *ma awa ma dudu*: About May. *Ma dudu* means "after" in Galela. This month is called *o musung ma gugutu* ("the harvest season").

The names of the months in Tobelo are exactly the same as in Galela [HUETING 1908]. Moreover, the names of the first three months appear to be Tobelo rather than Galela words. This suggests that both calendar systems, where six months are counted, derive from the same origin and that the Galela might have adopted this system from the Tobelo.

The calendar which consists of less than twelve months is called the shorter year; the calendar which consists of six months is called the half year; and the calendar in which months are counted only for the period of rice cultivation is referred to as the rice year. These calendars are found in other parts of the world in addition to Oceania. For example, the half year is commonly found in North Asia [NILSSON 1920: 89]. But there is a difference between North Asia, which has a winter, and Oceania, where there is no cold season. Nilsson [*ibid.*: 87–90] gathered examples of societies using the shorter year and the half year. The Kubu of Sumatra have the half year. The Balinese have two seasons, each of which consists of six months and both halves have the same names for the month. It is likely that they originally had a half year. Among the Dusun of Sabah, the hill-dwellers have a hill rice season consisting of six months, whereas the lowlanders have a wet rice season lasting eight months. The Toraja have a vacant period of two or three months. The Islamic

Malays of Sumatra have a rice year consisting of eleven months. On the other hand, the Marquesas have a shorter year consisting of ten months. The Wogeo, too, may have a half year [LEACH 1950: 256–258].

Probably some of the shorter years originally had twelve or thirteen named months. However, some months did not need to be counted since no work had to be done, thus the names of the months gradually vanished from the people's memory. This can be seen among the Trobriands; the names of the ten months of their agricultural period being widely used, whereas the names of the other two or three months are known by only a few people [MALINOWSKI 1927: 209–213; LEACH 1950: 249]. Likewise, some of the half years originally had twelve or thirteen named months. Thus, there could be two kinds of half years, the original half year and the surviving half year. The Galela half year appears to belong to the former, although sometimes it is rather difficult to distinguish between the two types.

3. Days in a Month

Galela people name each day of the month, the distinction of each day depending on the phase of the moon and the position of the moon at sunset or sunrise (Table 2 and Fig. 2). The first moon is called *o ngoosa i sisa* ("the moon vanishes"; *o ngoosa*=the moon and *sisa*=vanish) or *o ngoosa o wange aho* ("the moon goes

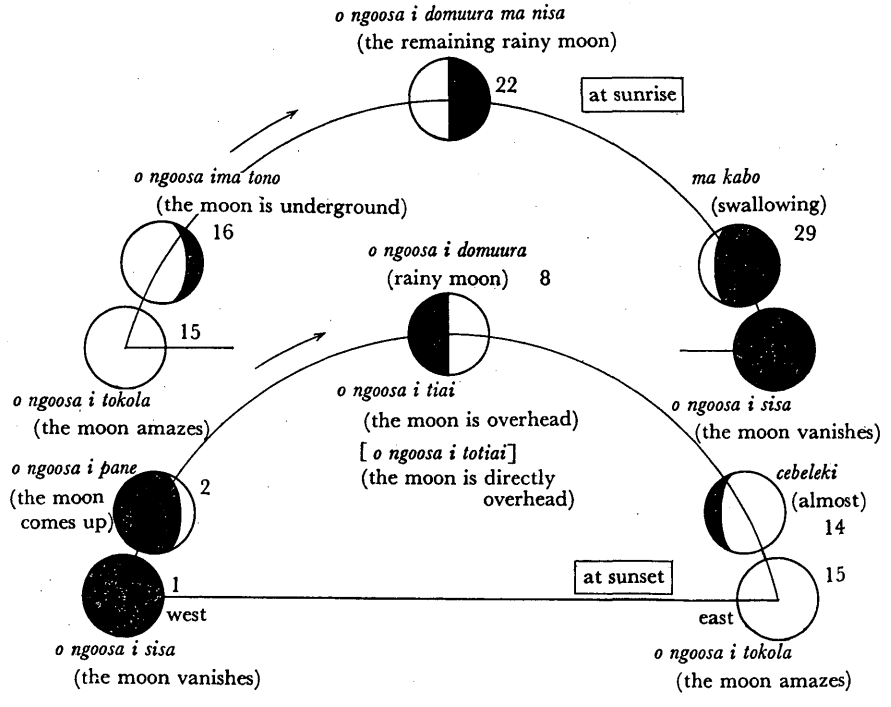

Fig. 2. Galela names for the positions and the phases of the moon.

Table 2. Galela names for the days of the month

1.	*o ngoosa i sisa*	
2.	*o ngoosa i pane* (*ma moi*)	
3.	*o ngoosa i pane ma sinoto*	(2)
4.	*o ngoosa i pane ma saange*	(3)
5.	*o ngoosa i pane ma iha*	(4)
6.	*o ngoosa i pane ma motoha*	(5)
7.	*o ngoosa i pane ma butanga*	(6)
8.	*o ngoosa i domuura* (*o ngoosa i tiai*)	
9.	*o ngoosa i kage ma moi*	(1)
10.	*o ngoosa i kage ma sinoto*	(2)
11.	*o ngoosa i kage ma saange*	(3)
12.	*o ngoosa i kage ma iha*	(4)
13.	*o ngoosa i kage ma motoha*	(5)
14.	*cebeleki*	
15.	*o ngoosa i tokola*	
16.	*o ngoosa ima tona* (*ma moi*)	
17.	*o ngoosa ima tona ma sinoto*	(2)
18.	*o ngoosa ima tona ma saange*	(3)
19.	*o ngoosa ima tona ma iha*	(4)
20.	*o ngoosa ima tona ma motoha*	(5)
21.	*o ngoosa ima tona ma butanga*	(6)
22.	*o ngoosa i domuura ma nisa*	
23.	*o ngoosa i kage ma nisa ma moi*	(1)
24.	*o ngoosa i kage ma nisa ma sinoto*	(2)
25.	*o ngoosa i kage ma nisa ma saange*	(3)
26.	*o ngoosa i kage ma nisa ma iha*	(4)
27.	*o ngoosa i kage ma nisa ma motoha*	(5)
28.	*o ngoosa i kage ma nisa ma butanga*	(6)
29.	*ma kabo*	

together with the sun"; *o wange*=the sun and *aho*=together). The latter shows that the Galela are clearly aware of the relationship between the movement of the sun and that of the moon. *O ngoosa i pane* ("the moon comes up") is the moon that shows a faint glow in the western sky just after sunset. However, they usually cannot see this moon because there are mountains to the west. After this, the moon waxes each night. The Galela count this change of the phases or the positions of the moon at sunset as follows; *o ngoosa i pane ma sinoto* (*sinoto*=two), *o ngoosa i pane ma saange* (*saange*=three), and so on until the half moon. The half moon is called *o ngoosa i domuura* ("rainy moon"), or *o ngoosa i tiai* ("the moon directly overhead"), because in the first case, according to the Galela, it often rains at the half moon, whereas in the second instance, the name indicates that the half moon is seen at the zenith at this time.

The nights following the half moon are reckoned as *o ngoosa i kage ma moi* ("the first after the moon"), *o ngoosa i kage ma sinoto*, and so on. The moon on the eve of the full moon is called *cebeleki* ("almost"). The full moon is *o ngoosa i tokola* ("the moon amazes"), and it rises in the eastern sky just as the sun sets in the west. The Galela recognize the day of the month by the position of the moon rather than

by its phases, because they usually point out the position of the moon when they explain what day it is. Furthermore, the phases of the moon are hardly even used in the names of the days. The Galela know the movements of the sun, the moon and stars so well that they focus on their position, even in the case of the moon rather than on the phases.

After the full moon, the moon is called *o ngoosa ima tona ma moi* ("the first moon being underground"), *o ngoosa ima tona ma sinoto*, and so on. These expressions clearly show that the moon is still under the eastern horizon as the sun sets in the west. At that time the Galela point out the positions of the moon in the western sky just before sunrise. The other half moon is called *o ngoosa i domuura ma nisa* ("the remaining rainy moon"). The nights after the other half moon are expressed as *o ngoosa i kage ma nisa ma moi* and so on. The moon on the eve of the first moon ("no moon") is called *ma kabo*. Small fish called *dadua* (*nike* in Indonesian) appear near the river when the first moon approaches. Then other larger fish also congregate there to feed on them. *Kabo* means "to swallow" and the name of the moon means "the moon by which *dadua* is swallowed." And then the first moon returns.

There are two problems concerning the Galela naming of days. The first has to do with the first day of the beginning of the month. The first day of the year begins with the full moon, whereas the first day of the month begins with no moon. The reckoning of the month appears to be independent of that of the days. The time of day, discussed below, begins at sunset. Therefore, the time of day and the day of the month are reckoned from the dark, whereas the month of the year is reckoned from the brightness. The notion that the new year is decided by the position of the pleiades in relation to the full moon might have been introduced to them. It is not clear whether or not they perceived this contradiction.

The other problem is related to the way of counting the days: (1) All the days of the month are reckoned; (2) only a few days have special names, and the other days are labelled by adding a regular ordering of numbers; and (3) a month is divided into four quarters. A calendar by which all the days of the month are reckoned is rare in insular Southeast Asia, although common in the Pacific area.[3] For example, the

3) In Taiwan all the days of the month are not counted [MABUCHI 1939: 161; NILSSON 1920: 165]. Every day of the month is not usually named in the Philippines. For example, the Bontoc Igorot have eight names for the phases of the moon [JENKS 1905: 43]. Among the Mendalam (inland) Kayan of Borneo, sixteen names for the phases of the moon are known [NILSSON 1920: 160]. In Indonesia, although every day of the month is not counted ordinarily, some peoples do have a system of counting; for example, those who have adopted some Indian calendar or the Mohammedan calendar, Malay people, the Atjenese, the Buginese, the Makassarese, the Javanese, the Balinese, and the Batak [ALKEMA & BEZEMER 1927: 335–351; WILKEN 1893: 191–200; WINKLER 1913: 436–447]. The Toraja reckon all the days in a month by employing different names, and this may be the sole case in which every day is reckoned independently of the influence of the Indian or Mohammedan calendars [ADRIANI & KRUYT 1951: 16–20].

Maori, Chathams, Hawaiians, Marquesas, Mangarevas, Rarotongans, and Tahitians reckon all days in the month [WILLIAMS 1928: 338–356]. However, those peoples use only the numbers from one to three or four for their calendars, whereas the Galela use the numbers from one to six. The Tongans use one to eight for their calendar, but not all days are reckoned; furthermore the waning of the moon is reckoned in reverse order, from eight to two [COLLOCOTT 1922: 168–170]. In the Tokala'u Islands, there is a calendar which uses high numbers (one to nine). However, the partial reverse ordering of numbers shows up in the counting of the waning moons. Moreover a month is divided into three parts [ANON. 1928: 293]. It is common in the Pacific area for a month to be divided into three parts: The ten bright nights just before and after the full moon, the ten dark nights of the waxing moon, and the other ten dark nights of the waning moon. This contrasts with the method in insular Southeast Asia where a month is typically divided into four parts. The ten bright nights are significant because social activities are held during these nights in the Pacific area. The Trobriands present an intermediate case: Although a month is divided into four parts, the two quarters before and after the full moon are given names but the other two quarters are not [MALINOWSKI 1927: 206–207].

Comparing the Galela notion of month with that of other peoples in the Pacific, it appears that the Galela division of month is similar to the others to the extent that all the days in the month are reckoned, although the use of numbers is somewhat different. On the other hand, the Galela division of months can also be said to be similar to that of insular Southeast Asia, in that a month is divided into four quarters.

Generally, the notion of assigning different names to all the days is connected with the notion of classifying days as good and bad for fishing, farming or festivals. However, no evidence of such notions is to be found among the Galela. It is possible that they recently received the notion of counting all the days, and were perhaps influenced in this by the Mohammedan calendar.

The Galela have words such as "tomorrow" and "yesterday" (Table 3 shows such expressions along with similar Tobelo expressions). They refer to the two coming days and the four past days. The words for the past two days, *kapagange* and *kapiiha*, are formed by adding *saange* (3) and *iha* (4) to *kaputu* which means "the night passes". The expressions after the four days prior to the moment of

Table 3. Relative names of day

English	Galela	Tobelo
the day after tomorrow	*midiri*	*midirigi*
tomorrow	*i langi*	*i yarehe*
today	*o wange nena*	*o wange nenanga*
yesterday	*kanugo*	*kanugono*
the day before yesterday	*kapidiri*	*kahidirigi*
three days ago	*kapagange*	*kahagangere*
four days ago	*kapiiha*	?

speaking are those such as *kaputu motoha* and *kaputu butanga* and so on [BAARDA 1895: 338].

4. The Division of Days

The Galela day begins with sunset. Moreover, night and day are two independent units. When the Galela count days they divide them into sequences such as two nights and three days. This notion, however, is prevalent throughout Indonesia and it is difficult to assess whether the Galela originally had it.

A day has three clear points of division, sunrise, noon, and sunset. A night begins at sunset and finishes at sunrise (Fig. 3). The sunset is expressed as *o wange i tumu*, and the sunrise is sometimes *o wange i polote*, although it is generally expressed as *o wange i bawo*. *O wange i bawo* ("the sun rises") indicates the time when the entire sun has appeared on the horizon, whereas *o wange i polote* ("the sun breaks") indicates the time when the top of the sun is just appearing. Likewise, *o wange i tumu* indicates the time when the sun has completely disappeared. *I madamada* means "evening" and belongs both to the night as well as to the day, beginning during daylight and continuing after dark, even though the division of the day itself finishes at sunset. *Nanga gogo pa mongo* ("the bodily hairs become invisible") occurs shortly after sunset. This period consists of only a few minutes at approximately 6.30 p.m. After this, *da putuka* ("already night") comes and *o putu i teka waasi* ("it is not deep into the night yet") follows. After about 9.00 p.m., time is expressed as *o putu i tekaka* ("it was already late in the night"). This lasts until midnight, *o putu i tongiraba* ("the middle of the night"). Midnight is also referred to as *o toko i soreka* ("a cock crowed once"), because the Galela believe that a cock crows only once at midnight. Some informants did not actually adhere to this belief, but they said that their ancestors believed it. The period from midnight to near sunrise is simply expressed as *o putu i tongiraba i pasa* ("the midnight has already passed"). Sometimes it is referred to as *o wange i dumu* ("the sun is near"). There was some disagreement among the informants about the latter expression, some saying that the expression should indicate the period when the sunrise is really approaching, before dawn, but that it does not indicate a specific period. The inconsistency among the informants is seen especially in the periods near dawn. One of the naming patterns encountered divides the period near dawn into three parts; *o putu nosi* ("still night"), *da ginita* ("dawn"), and *i langilangi* ("morning"). *O putu nosi* begins *o toko i sore i ramerameka* ("many cocks crowed many times") and *i dade da aare* ("the sky becomes whitish"). After a short time, *da ginita* comes, *seba da ginita* ("nearly dawn") begins, and *ngadahe da ginita* ("almost dawn") and *da ginita* ("[real] dawn") follows. *I langilangi* begins with *da tebika* ("already light"), and then *i langilangi ma dorosi* ("dark morning"); finally it becomes *i langilangi* ("[real] morning"), which continues after sunrise.

The transitional period between night and day tends to be labelled in a number of diverse ways among various peoples, including the Galela. Among the Tongans, for example, the pre-dawn period is referred to as *fakaholo-fonanga* ("making the

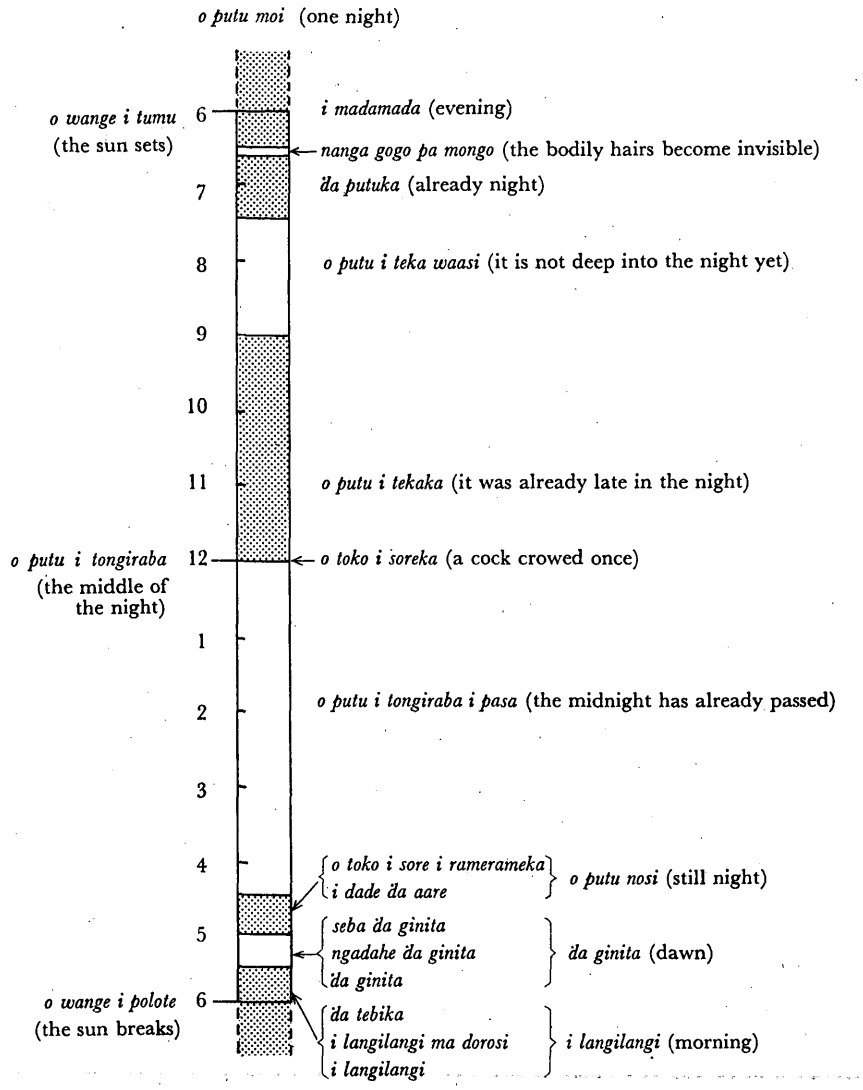

Fig. 3. Division of the night.

journey advance"), *moa mua* ("the later cock"), *fetuu aho* ("day star"), *ata a puaka* ("shadow of a pig"), *ata* ("shadow"), *mofoa ae ata* ("breaking of the shade"), *hengi-hengi* ("very early morning"), and *hopa ae laa* ("sunrise") [COLLOCOTT 1922: 17–18].

The Galela day begins at sunrise and the first period of the day is referred to as morning (*i langilangi*) (Fig. 4). After about 8 a.m. the expression changes to *o wange i kuruka* ("the already high sun"), and then to *o wange ma gakuka* ("the sun rose [for a long time]"). The period near noon is called *o wange i tiai* ("the overhead sun") and the middle of the day is *o wange i totiai* ("the just overhead sun"), although those expressions are sometimes used with the same meaning. The period after

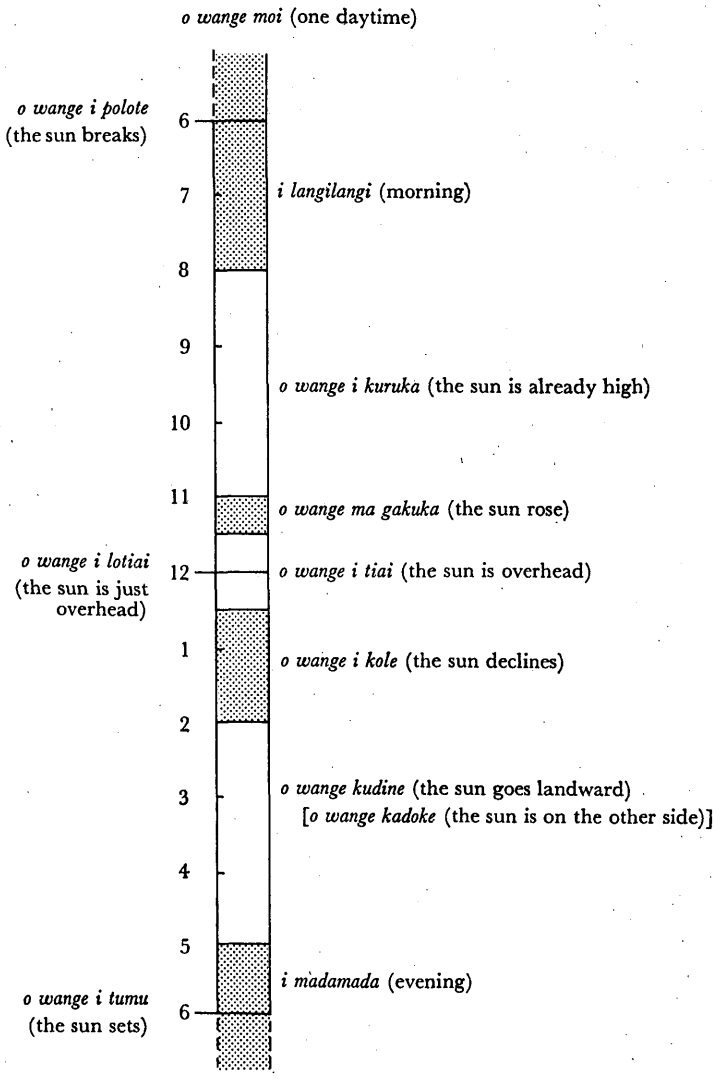

Fig. 4. Division of the daytime.

noon, is called *o wange i kole* ("the sun declines") and is followed by *o wange kudine* ("the sun goes landwards," i.e., westwards). *O wange kadoke* ("the sun is on the other side") is sometimes used instead of *o wange kudine*. Lastly, evening (*i madamada*) comes and the day finishes by sunset (*o wange i tumu*).

The Galela tell time during the daytime by the movement of the sun. Likewise they tell the time during the night by the movements of the moon and stars. They know the exact time even during the night, although the movements of the moon and stars are more complicated than that of the sun. The most important star for the Galela is the Pleiades (*o pariama*). *O loa saange* ("three stars"), which consists of

Procyon of the Canis Minor, Sirius of the Canis Major and Gamma of the Puppis, is also a prominent constellation for them. Sirius is especially well known and is given the name, *o ngoma bilatu* ("marked star"). Sirius is employed for orientation rather than for determination of time, because it usually indicates the east or the west. *O ngoosa ma lilia* ("[the star which] draws the moon") is also well known and is used for the determination of time. This star, which may be Mercury, takes almost the same course as the moon, but the speed of its movement is different. Sometimes it actually looks as if it was drawing the moon. There is another constellation also used to determine time, called *o sosolota ma duko* ("the tongs of the volcano"), but it is difficult to ascertain what this refers to.[4] Although Venus (*o koru ma ḍoga*) is known, it is not used for determination of time.[5]

Thus the Galela have no difficulty in determining time since they are familiar with the movement of the moon, the stars and the constellations, and their relationship to each other. Furthermore, they recognize the connection between these heavenly bodies and the tides. The ebb and the flow of the tide plays an important part in the lives of fishermen and regulates the traffic between coastal villages. The villages are connected by paths which run along the sandy beaches, and those paths are impassable at high tide. Thus the villagers know by the position of the moon and the stars when they can use the paths. Conversely, they can tell the time by the tide. When the heavenly bodies are invisible they use the tide to determine time.

5. Time Reckoning by the Growth of Rice

The Galela occasionally use the stages in the growth of rice for time reckoning (Table 4). Unlike other root crops, rice has several fixed stages from planting to harvest. This kind of time reckoning can be included among those based on natural phenomena.

O tamo refers to the rice-plant as well as to unhulled rice, hulled rice and boiled rice. There is only one Galela word for rice, in contrast to other peoples in Indonesia who generally have different words for three or four different forms of rice. This might indicate that the Galela adopted rice production relatively recently.

Rice is planted in the season known as *o musung ma lamo* (February to March according to the western calendar). The expressions associated with its cultivation are as follows (Fig. 4):

1. *Pa tudu*: "To dig a hole." To plant rice, men dig shallow holes with a digging stick; women put 4–10 rice seeds into each hole. Although sowing is called *po umo*, they do not use this expression, but use *pa tudu* ("to dig a hole"), which is men's work, for this stage.
2. *I gitiwi*: "To shoot sprouts." About 5–6 days after sowing, the sprouts begin

4) *O sosolota* is a kind of tongs made of the epidermis of the midrib of the sago palmleaf. (see Ishige, this volume, pp. 288–289).

5) *Koru* means the star which can be seen in the daytime. The original meaning of *ḍoga* is "too old" [BAARDA 1895: 114].

Table 4. Seasons, months and stages in growth of rice among the Galela

	season	month	stage in growth of rice
o musung o kore mie (north wind season)	*o musung ma dodoro* (forming field season)	*o nawoko* (fish)	
	—	*o bianga* (crustacean)	
	o musung ma tutudu (planting season)	*o sangoka* (?)	← *pa tudu* ← *i gitiwi* ← *ma boboko i singuna* ← *o guupu si lageu*
	o musung ma lamo (great season)	*ma ngopa* (child)	← *o paro ya uule* ← *o dodopu ḋa lutu* (*o age da lutu*)
	—	*ma awa* (mother)	← *ma lou i singoho* ← *ma boboko i togu* ← *i sai ma doto* ← *ḋa tiribu*
	o musung ma gugutu (harvest season)	*ma awa ma dudu* (after mother)	← *i supu i moimoi* ← *i supu i ramerame* ← *i tobabau* ← *ma ide ḋa kiopi*
o musung o kore sara (south wind season)		no name	← *i koku-lupa* ← *ḋa osaka* ← *pa utu*

to emerge. This expression is used when they appear a little above the surface of the ground.

3. *Ma boboko i singuna*: "Young leaves come out." In this stage, the second leaves come out. It is about two weeks after sowing.
4. *O guupu si lageu*: "A fly bends [the leaves of the rice plant]." The leaves bend when a fly alights on them. They do not bend when the wind blows, but they have grown so tall that they bend when a fly sits on them. This stage is about three weeks after sowing.
5. *O paro ya uule*: "To play in the wind." The leaves have grown so tall that they rustle when the wind blows. About a month after sowing.
6. *O dodopu ḋa lutu*: *O dodopu* is a pile of weeds pulled up in the field and *ḋa lutu* is "to sink" or "to hide," thus the expression denotes the time when the rice plants have grown tall enough to hide the heaps of weeds. This stage is also expressed as *o age ḋa lutu* (*o age* means "the stump of a tree"). It occurs about a month and a half to two months after sowing.
7. *Ma lou i singoho*: "Growing up to the height of a node of the *lou* bamboo." There are more than three kinds of bamboo; *lou* is the most rapidly growing and

has long internodes. This stage occurs a little before the flowering of the rice-plants. About two months and a week from the time of sowing.

8. *Ma boboko i togu*: "Young leaves stop [growing]." The leaves no longer grow at this stage and flowers are about to emerge. About two months and ten days from the time of sowing.
9. *I sai ma doto*: "To learn to fly." The flower buds swell up, and nearly bloom. About two months and two weeks from the time of sowing.
10. *Ḍa tiribu*: "To become pregnant." All flowers bloom and pollinate at this stage. About two months and three weeks from the time of sowing.
11. *I supu i moimoi*: "A few grains come out." At this stage some but not all the grains begin to appear. About three months from the time of sowing.
12. *I supu i ramerame*: "Many grains come out." All grains come out. About three months and a week from the time of sowing.
13. *I tobabau*: "To hang down." The ears hang down because of the weight of the grains. About three months and two weeks from the time of sowing.
14. *Ma ide ḍa kiopi*: "The tip is sour." The grains at the top of the ears are still green but the grains are already ripening. About three months and three weeks from the time of sowing.
15. *I koku-lupa*: "Almost". The grain are almost ripe. Four months from the time of sowing.
16. *Ḍa osaka*: "(The grains) are already ripe." The grains are ripe enough to be harvested. Four months and a week from the time of sowing.
17. *Pa utu*: "To crop." Rice is harvested at this stage. About four months and two weeks from the time of sowing.

The Galela have a type of millet called *o bobootene* (*Setaria italica* [L.] Beauvois). According to the villagers, the growth-stages of the millet are expressed in the same way as those of the rice. It is possible that the expressions for the stages in the growth of rice were developed by association with those for millet, because millet might have been introduced earlier to the Galela.

Now the Galela plant rice in *o musung ma lamo* and harvest the crop after the sixth month (*ma awa ma dudu*). Thus, the cultivation of rice is not completed within the six named months. This inconsistency may result from the different patterns of rice and millet cultivation.

II. CONCLUSION

The Galela calendar has for the most part been compared with those of insular Southeast Asia and the Pacific area. However, there are other calendars which have to be compared with that of the Galela. These are the calendars of New Guinea. This comparison is important because of New Guinea's geographical proximity to Halmahera and because the North Halmahera language group to which the Galela language belongs is closely related to the Papuan languages of Vogelkop [COWAN 1957a: 86–91, 1957b: 159–161].

However, only a few New Guinean calendars are known. The Mae Enga of the Western Highlands have a luni-solar calendar consisting of thirteen months [MEGGITT 1958]. In the coastal area, the Kiwai people of the Fly River have 13 lunar months regulated by stars [RILEY 1924: 73–75; NILSSON 1920: 207–208]. Eight months out of 13 are named after the stars or constellations: The first month is Achernar, the second the Pleiades, the third Orion, the fourth a combination of Capella, Sirius, and Canopus, the eighth Crux, the ninth Antares, the tenth Vega, and the eleventh Altair [NILSSON 1920: 208]. Reliance on stars or constellations for developing a calendar is widespread, not only in Micronesia but also on the south coast of New Guinea. According to Malinowski [1927], the Motu of the south coast of New Guinea have 13 months whereas the Mailu have no name for months [*ibid.*: 208–209]. The Wogeo, living on a small island off the north coast of New Guinea, have a calendar consisting of six months, which is regulated by the Pleiades and the *palolo* worms [LEACH 1950: 256–258]. The Wogeo do not cultivate rice, but root crops such as taro and bananas, and their calendar is employed for fixing the dates of celebration and ceremonies rather than for agriculture [HOGBIN 1938: 128, 136–142].

The calendars of New Guinea are so varied that there are no salient characteristics. A systematic comparison with the calendars of Vogelkop may uncover some relationship with that of Galela. Unfortunately no data for those calendars are yet available.

In summary, the features of Galela calendar are: (1) The calendar is luni-sidereal; (2) the year is regulated by the Pleiades (the Pleiades year); (3) only six months are labelled (half year); (4) all the days are reckoned; and (5) a month is divided into four parts. The Galela might have borrowed the Pleiades year from peoples in the Austronesian language group, and it is possible that the Galela calendar was reorganized through interaction with them. The Galela might have acquired the notion of year with the word *taun*, along with the Pleiades year. Although *musung* originated in an Austronesian language, the Galela must have already acquired the fundamental notion of seasonality, since most peoples have it even if they do not have lunar months. The peoples of the Torres Straits area, for example, have a notion of season even though they do not count months [RIVERS and RAY 1912: 225–228]. The Galela possibly had the notion of a lunar month prior to contacts with speakers of Austronesian languages. However, the notion of the lunar month might have become clearer through the adoption of the notion of year; at the same time the notion of a half year must also have been reinforced. The notion of a half year could have been formed before the introduction of a grain crop such as millet and rice, because the notion of a half year exists independently of grain crop agriculture, as in the case of the Wogeo. The system of counting all the days of the month might have begun as a result of the influence of the Mohammedan calendar and might not have been prevalent among the Galela: The manner of counting is too regular and the Galela names of the days do not seem to be associated with the notion of good or bad days, either for fishing or farming. The Galela might have

had only a few names for the phases of the moon. Those names are seen now as the specific names without numbers.

Galela calendar is syncretic, with different elements worked in like a mosaic. This is consistent with an overall trend in Galela culture; which is shot through with a combination of various elements derived from many different adjacent cultures, rather like a multi-colored mosaic, which integrates a variety of different shapes and designs.

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