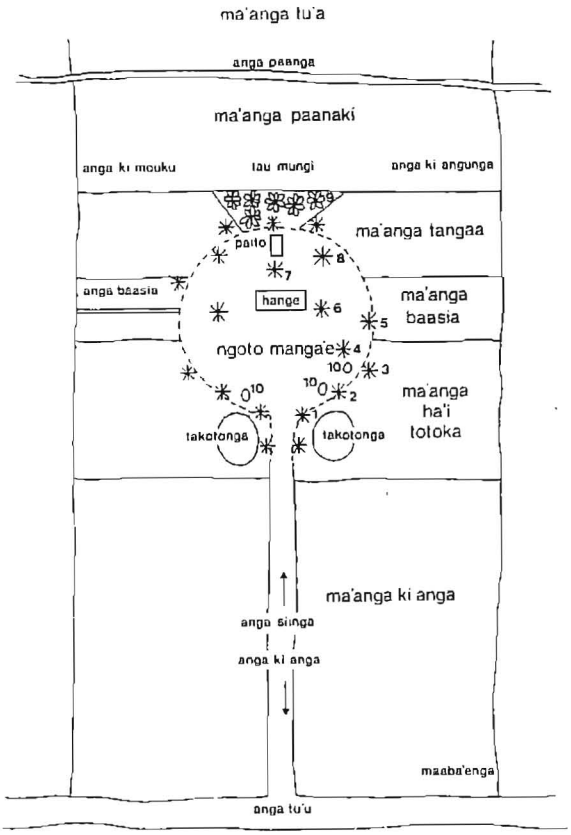


Fig. 81. A traditional Bellonese homestead. Translation of the Be. words on the fig.:

ma'anga tu'a: backgarden area
angaa panga: small bush trail, running parallel to *angatu'u,* lit., crooked path
ma'anga paanaki: garden area 'just beyond the defecation place
anga ki mouku: 'trail to forest' (access way to women's defecation grounds)
anga ki 'angunga: 'trail to the top' (access way to men's defecation grounds)
tau mungi: place behind, often with bananas and pandanus
ma'anga tangaa: garden area at the end [of the house]
ma'anga baasi'a: garden area between houses
anga baasi'a: trail between settlements
paito: kitchen
hange: living house
ngotomanga'e: ritual ground in front of house
ma'anga ha'itotoka: front side garden area
takotonga: ancestors' grave
ma'anga ki anga: garden area at the trail
anga singa: sidetrail from the main trail, cross by path
anga ki anga: trail to main trail, bytrail
angatu'u: main trail, lit., permanent trail

a way as to make the central path a line of division. For the landholders this reduced access to the sea; possibilities for operating from canoes from a leeward coast were drastically reduced if the fishermen had to use solely their own coastal trail, ('b' in fig. 80). Possibly the acceptance of one coast-orientated strip reflects a decrease in the importance of fishing.

Fragmentation of holdings developed further when population pressure increased. Many new settlements had neither coastal trail nor forest area, ('c' in fig. 80). Viability of a holding relied more and more on cultivable land; coastal trails and forest resources were used in common within lineages under supervision of a kinsman who normally by primogeniture was the leader (*hakahua*).

Land utilization became increasingly intensive when population pressure augmented. As people utilized smaller areas they had to live closer together, and social interactions could be more frequent. After the introduction of iron tools, less time had to be spent on work and were instead used socially, if a parallel can be drawn to observations on New Guinea (R. Salisbury 1962). Christianity with its demands of daily services may further have reinforced a tendency towards a greater expenditure of active time on social interactions than on subsistence production. Still, the 'string' pattern was a rational solution to the problem of how to locate homesteads. (For a fuller treatment of changing post-Christianity localizational patterns, see in chapter 7.)

The explanations offered here on the localizational patterns, rest all on the assumption of 'rationality' in localization and tenure. As this as-

maabaenga: boundary line, division line between gardens
1) *niu kunga ba'e:* coconut palm(s) at the graves. Lit., where one pays respect
2) *niu ao:* coconuts close together
3) *niu tingiba:* coconut standing oblique
4) *niu 'ungu kainanga:* coconut at the head of ceremonial grounds
5) *niu tingiba:* see 3)
6) *niu tangaa:* coconut at the gables
7) *niu potu mungi:* coconut in the place behind
8) *niu potu hai 'umu:* coconut where ovens are made
9) *na huti ta'ane:* bananas of the coarse type, plantains
10) *pua:* betel palms

Fig. 82. Ngongona, a modern village, 1966. Most houses stand in a row parallel to the main trail in the traditional way. The areas between houses and the main trail have been assembled into a village green, used for football and other common activities.

sumption leads to realistic consequences, accessibility must be a property for any place recognized by the Bellonese. If combined with a recognition of amounts of transport involved in utilizing a given resource, and the amounts of the resource necessary for the subsistence production, a rational localization will develop. The Bellonese are aware of rationality as evident from many discussions about localization, for example of an eventual new rest house for visiting government personnel, building of council headquarters, and erection of a store house for dried copra. The latter discussion was elucidating as to Bellonese rationality. It involved considerations on the places where drying of copra should take place, the saving of weight by thorough drying before carrying and other fundamental principles of 'geography of transportation'.

On a smaller scale locational rationality is apparent in the arrangement of the traditional single homestead (*manaha*); see fig. 81. The house is conveniently placed near the coconut trees which function as a source of drinking water. In front of the house the ritual ground and dancing place, *ngotomanga'e*, is found. Kitchen houses (*paito*) are placed neatly behind the house to avoid smells – even the sight of women working with food was conceived as disgusting in the eyes of a chief. Bananas in the backyard gain the advantage of ashes and other fertilizing refuse from the kitchen and hide the two separate lavatory areas from the general view. At the same time banana leaves are conveniently at hand for wrapping food for the oven, and a small grove of pandanus palms deliver thatch leaves for quick repairs. The highest yielding garden areas, at the same time those demanding most labour, are found within a very short distance; the main trail (*angatu'u*) and probably two small side trails (*anga baasia*) serve as communications with neighbours respectively. A coastal trail traverses the property to the sea, giving access to forest resources as well. The ancestors' graves (*takotonga*) are placed neatly at the entrance of the homestead, reflecting respect and frequent worship. Near these sometimes a few valuable betel palms or appreciated fruit trees can be found. The whole arrangement reveals a profound adaptation to the principle of least effort, and further presents a pleasant picture to the Bellonese (and to Euro-Americans as well).

Modern dwellings have different surroundings and are usually placed in villages; they have, however, many features in common with the traditional arrangement (see fig. 82), although the design of houses is strongly modified, as described in chapter 3.

7. Changes in Bellonese subsistence 1938—66

Geographers and ethnographers have often been justly accused of clinging to static descriptions when analysing foreign cultures. This is easily explainable, although still unfortunate. Detailed observations are extraordinarily time-consuming, and surveys of long duration often become all but prohibitively expensive. Hence follow-ups are too seldom made in the same area. R. Firth's work on Tikopia is one of the few happy exceptions, and even there the material collected is mostly amenable only to comparatively static analyses. In all cases it would be desirable to obtain continuous observations at least for key phenomena. In the microcosms usually observed by geographers and ethnographers accidental phenomena may play a decisive role, sometimes colouring the whole work. On the other hand, observations at close quarters can reveal functional correlations otherwise neglected, which justify such investigations. Still to obtain dynamic analysis it would naturally be preferable if observations could be both in detail and at the same time extended over a long period of time.

Unfortunately, the material on change on Bellona since 1938 is sketchy. However, it does not preclude a tentative 'dynamic' analysis. In the present context the main interest has been to follow population growth and changes in land use. The problem has been if a simple connection between population pressure and cultivated acreage or intensity of cultivation could be demonstrated.

7.1 The choice of 1938 as a base

The year 1938 is a most convenient starting point for research on Bellona. With the dramatic introduction of Christianity a great many cultural features were undoubtedly profoundly alterated, religious beliefs and later a vast range of general cultural attitudes were changed. At first changes were relatively insignificant except for the religious sphere of the Bellonese culture (which is very difficult to delimit!) because of an almost total loss of contact with the world beyond Rennell and Bellona, a consequence of the outbreak of World War II. At the end of the Guadalcanal campaign, Bellona was visited by American ships which anchored at Ahanga Bay, and Rennell even had a US Air Force recreational resort at the lake near Tingoa. These contacts were generally friendly but mostly insignificant with regard to subsistence production. New items presented by the Americans to the people were either 'just presents' or too incompatible with the system to be adaptable. Changes in the subsistence base came when Melanesian missionaries commenced work on Bellona and when people employed on plantations brought back new and good ideas. This development started in about 1947, and at least compared with the changes from 1938 to 1947, was less influential. Immediately after the introduction of Christianity most former taboo areas were secularized and put to new uses. It is difficult to estimate the areas of the sites concerned, mainly because the areas were taboo in different ways for different people; sometimes even cultivation was allowed some people while fear prevented others even from entering.

Research of the psychologist R. Kuschel, aims at an accurate analysis of this question and at a determination of the size of the areas. Until then, at an approximate guess 50 ha. were transferred from sacred to secular uses after 1938 as an immediate result of the change in religion.

7.2 Material for evaluation of changes

Nearly all the material for the analysis of the first part of the period is based on reconstruction of data. In a society where oral tradition is still strongly rooted, this may be done with a large degree of reliability especially when the information concerned is at the centre of general interest, as subsistence is. Still a reconstruction should be treated as such, and should be checked for consistency with other data. Important data illustrating changes in subsistence are based mainly on population figures and land-utilization techniques. Very little material is available from official sources on population except for recent years, but genealogical awareness is well developed, and the Bellonese take great interest in mutual help in establishing such facts. Two 'hindcast censuses' of the 1938 population (one compiled by T. Monberg with the help of several local people who participated in the revolutionary events of that time, and one made independently by the present writer)

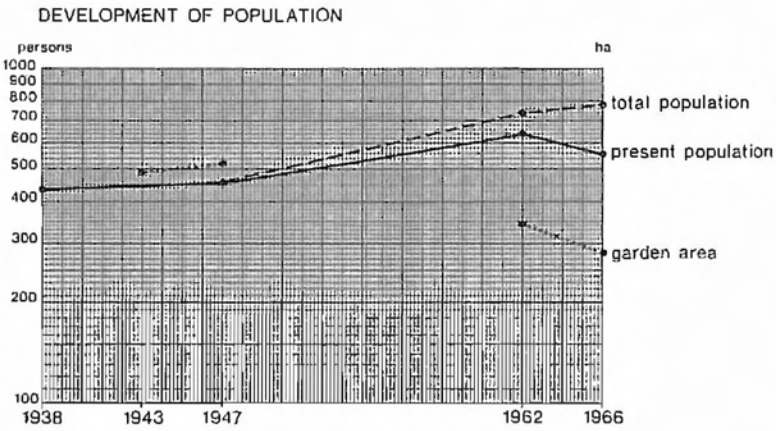


Fig. 83. Development of population 1938–66, as from reconstructed and actual censuses.

differed by only a few persons – children who died young and about whom information at the time of decease was less well remembered. Such differences are quite insignificant in the subsistence context.

Former land use usually presents the greatest difficulties, but fortunately historical documentation was unexpectedly available in the form of aerial photography. Bellona was photographed by the US Air Force in August 1943 from an altitude of 12,000 ft. using a 154.4 mm focal length lens. The photographs are of amazingly good quality, especially when wartime conditions are considered. With the consent of the British Government, the photographs were kindly set at our disposal by the US Air Force. Also a set of photographs taken by the British in 1947 was made available. The photographs were taken from an altitude of 20,000 ft. with a 153.2 mm camera, and are of equally high quality, though the small scale was a disadvantage for our purpose. Another photographic survey was made in 1962 by the Royal Air Force from an altitude of 30,000 ft. also with a 153.2 mm lens camera. Although very useful, it is regrettable that the 1962 photography was not with a more advanced type of camera that would have given better detail. This is not to make an unfair comparison with the 1966 photographic survey (mentioned in chapter 3), which was made on request, with specified requirements, and was accordingly of very high quality. As with the 1966 land utilization, an attempt was made to establish utilization patterns in 1943, 1947, and 1962 by interpretation of the aerial photographs. The quality of the pictures did not allow as detailed an interpretation as from those taken in 1966; a division into fewer classes of land use was therefore necessary. It was particularly regrettable that the scale of the photographs did not allow adequate checks on the height of vegetation by stereoscopic means. The classifications were therefore mainly based on 'grey-tones' and 'textures'. The accuracy achievable was never better than about $\pm$ 5 % of error.

7.3 Population growth 1938–66

Besides the previously mentioned count of population for 1938 a similar one was made, based on the aerial photography on which settlements were clearly visible for 1947. For the year 1962 a detailed census taken by T. Monberg and L. Christensen was available. A few corrections were added to this by Taupongi in 1965. The three counts, together with the 1966 census, are the data points on fig. 83; the number of Bellonese present on the island is shown separately in parantheses.

With a small population such as this, stochastic elements in population growth are often conspicuous. Therefore it does not add greatly to our knowledge to discover that the annual net increase of population was about 0.9 % in the period 1938–47, 3.2 % 1947–62, and 1.5 % from 1962–66, or an overall average 1938–66 of 2.1 % which appears to be a spectacular increase. The increase in resident de facto population, however, has been less than 0.9 %. Emigration was presumably the reason for this modest increase, but the figure is apt to hide the occurrence of great fluctuations in the number of people staying on Bellona. In 1962 far more people seem to have been present than would have been expected from the normal figures for migration. This may, however,

be due to incorrect counting – children accompanying their parents to the plantations do not always seem to have been noted as absent from Bellona. Anyway, the number present fluctuates with the season, so too much should not be read into this scanty material. The large net increase in population seems to have been counterset by an outward migration of nearly 24 % of the total population. Changes in land utilization (analysed later in this chapter) and thus in production may explain this fact or at least reveal if population pressure was the main reason. Explanations for the population increase shall not be attempted here. A glance at the population pyramid for the de jure population may suggest 'cultural shock' as an explanation for the significant stagnation immediately after Christianization. Although the rate of increase after 1947 was great, it should be realised that it is not remarkable in view of general Pacific standards and can probably be explained by the sex/age structure in the 1947–66 period (see e.g. N. MacArthur, 1966); possibly a relatively young population started a population boom when restrictions on family extension were suddenly lifted.

7.4 Development in land utilization 1938–66:

7.4.1 Changes in cultivation

The land utilization as assessed from aerial photographs 1943, 1947, and 1962 is shown in table 42, together with figures from 1966 for comparison. Because of the much smaller scale of the photographic base of the older material, figures have been rounded to avoid a false impression of accuracy. The old photographs could not be interpreted in detail because of lack of a ground survey to check land use classes. For instance the distinction between 'old fallows' and secondary forests has been impossible to make even from stereoscopic pairs of photographs, as has also distinction between the single stages in the garden/fallow cycle.

There have also been some changes in the meaning of area classes as is obvious in the 'village area' category. In 1943 settled areas were small (dispersed) units, in 1966 these settlements had almost totally vanished and villages proper had taken their place. After 1947, in fact, the village areas remained almost constant. The table gives varying areas for the encircling reef; probably the reef area has been almost constant during the period, but surf and tide conditions, different water levels and conditions for exposure affect the assessment from photographs. Similar arguments are valid for the coastal terrace.

When total garden areas are considered they add up to about 500 ha. in the first period, but only to about 300 in the last one. From 1962 to 1966 it seems to be safely conclusive that the area were diminished mainly by the planting of coconut palms. Fortunately enough for the investigation the various cultivated areas are easily identifiable from the photographs whether they are areas under annual or perennial crops in the coherent central area of cultivation or in the remote clearings. With these the problem was in some places the presence of deep shadows either from virgin forest or valley sides; these greatly obscured the area limits.

The table reveals also the difficulties in distinguishing the classes 'primary forest' and 'old fallow'. It is a regrettable fact that such distinctions demand highly detailed photographs for a base. Such were not at hand and as a consequence whether new land has been brought under cultivation during the period analysed must remain unanswered. Probably a reduction of primary forests has taken place, but it cannot be demonstrated from the analyses. If the various photographs are compared area by area, it is possible to arrive at less confusing results; but the assessments have purposely been made independently to avoid repetition of errors once introduced. The sum of the area categories 'primary forest' and 'old fallows' is amazingly constant except for a small increase from 1943–47 to 1962–66. This increase is possibly due to giving up of some garden areas too remote from the new villages. Some of these areas have been inspected in the field; largely their soils are rather poor.

Some comments remain to be given for the most essential data of the table, namely for the garden areas. All possible inaccuracies considered, these areas have no doubt been decreased from the first period to the last. Between 1962 and 1966 some of the garden land has been planted with coconut palms. In paragraph 7.6 the last period has been further analysed. The decrease in productive land for annual crops has been partly offset by the replanting of fallows with sweet potatoes and by a reduction of fallow periods to the minimum necessary to re-establish fertility.

TABLE 42. Land utilization 1943, 1947, 1962, and 1966 *)
Bellona total and on districts assessed from aerial photographs (ha.)

		1943	1947	1962	1966
Bellona total					
Reef area		71	64	95	86
Coastal terrace		41	43	43	41
Primary forest		796	571	607	675
Garden areas in abaaba	under crop and fallow in rotation	30	18	14	12
	old fallow	75 486	64 505	54 342	33 294
Garden areas in tino henua	under crop and fallow in rotation	456	487	328	282
	old fallow	213	449	521	444
Coconut area		-	-	37	124
Village area		37	20	20	20
		1719	1716	1719	1717
Sa'aiho district					
Reef area		18	19	24	21
Coastal terrace		8	10	10	10
Primary forest		84	78	80	89
Cultivated in abaaba	under crop and fallow in rotation	8	8	12	5
	old fallow	15	18	9	10
Cultivated in tino henua	under crop and fallow in rotation	93	113	80	64
	old fallow	41	26	52	50
Coconut area		-	-	3	20
Village area		5	2	3	3
		272	274	273	272
Ghongau district					
Reef area		33	28	41	36
Coastal terrace		21	21	21	20
Primary forest		515	313	352	405
Cultivated in abaaba	under crop and fallow in rotation	8	8	12	5
	old fallow	15	18	9	10
Cultivated in tino henua	under crop and fallow in rotation	93	113	80	64
	old fallow	41	26	52	50
Coconut area		-	-	3	20
Village area		26	15	14	14
		1077	1076	1074	1076
Matangi district					
Reef area		21	18	30	29
Coastal area		12	12	12	12
Primary forest		197	180	175	180
Cultivated in abaaba	under crop and fallow in rotation	10	4	1	2
	old fallow	12	29	8	14
Cultivated in tino henua	under crop and fallow in rotation	86	86	37	42
	old fallow	26	36	97	61
Coconut area		-	-	80	25
Village area		6	3	3	3
		370	368	371	368

*) For further details on 1966, see table 12. Note: As figures are rounded, sums may vary slightly.

7.4.2 Changes in residential pattern

Whereas changes in general land use are difficult to pinpoint by aerial photographic interpretation, changes in the position of dwellings are simple to document, especially since verbal verification for such matters is more readily available and more reliable. In general, the settlement patterns have become more concentrated. If the total length of the main trail were to be related to the part of it lined with settlements, it seems that about the same proportion of the trail has a settled fringe now, as it had in 1938 (15–20 %). This can be explained by the fact that though the population living on Bellona has grown, houses of the larger family units have tended to keep about the same front-length toward the main trail. The linear settlement arrangement has survived, and the villages take up about the same frontage as the sum of the detached settlements. But a significant agglomeration has taken place. From more than 24 independent homesteads in 1943, 8 more or less independent villages have developed (see fig. 84). The mean distance between neighbouring 'units', then and now, has grown from a maximum of about 250 m. (1943) measured along the trail to more than 750 m. (1966); the latter figure includes the remaining small independent settlements and shows the long stretches of trail without settlements. Changes in population clearly depict the development towards agglomeration. The process has certainly been one of trial and error as can be seen from the village history chart (fig. 85). At one time (1943) 33 'villages' were started, each with its own church. Often the 'villages' comprised only one or a couple of dwellings plus the church. No doubt traditional fighting for prestige, and the retention of former patterns of worship in temples were still operative. After 1950 –52 the number of villages was quickly reduced to that of today: seven to eight. The number of churches was similarly reduced from about that of the old temples to the present number. Probably the reduction of places for worship did not mean any reduction of building or upkeep costs. Generally the new churches are larger and demand higher building costs than the old temples.

Settlement patterns are an important part of culture. The Bellonese may therefore have had valid reasons other than the traditional desire of being on good terms with one's personal gods, to preserve the old settlement pattern such as the desire to live near their gardenland. Traditionally distances to gardenland were short; often people moved temporarily when distant gardenlands were cultivated, primarily to reduce the time spent in walking. This is surprising, especially since walking distances were normally small, seldom exceeding 500 m., exceptions being when 'distant' land was, for example, inherited. Possibly the reluctance to walk long distances was related to the bad state of the trails at that time (iron machetes were still rare) or to the need to watch the cultivated areas very closely.

In the spatial context, the main trail – kept clear by common efforts – was the major artery in daily home-to-work traffic. The main trail (or one of its parallel trails) was used for part of the route, and often one of the costal trails formed the last section. Because these latter trails, oriented orthogonally to the main trail, were less comfortable, the preferred zone for making gardens in early times was probably within a triangle, with its right angle centered on the homestead, and with the longest side along the main trail (see fig. 86). This hypothetical arrangement would account for the wide spacing between original settlements, and for the fact that the boundary areas of settlements were less intensively cultivated (the traditional fighting over the exact location of boundaries is an alternative or supplementary explanation). With population growth, the concentration of settlements by fragmentation of the original holdings changed the form of the 'activity area' from something like rhombes into rectangles, which seem to have been the general form of cultivated areas at the time of Christianization.

The building of churches did not change the latter arrangement until about 1950, when a concentration into larger villages began. No doubt the intense church activities imposed heavy demands on normal daily work patterns, but even if missionary pressure influenced the process of agglomeration, there must have been strong 'internal' motivation to change.

The observed worshipping activities in 1965–66 interfered little with subsistence work: usually everyone joined in the morning and evening prayers in church, and a weekly holiday was established. But this picture is far from those hectic days of early Christianity when 'Bellona sounded with bells [which were actually scrapped gas containers] chiming all day, and singing and praying went on

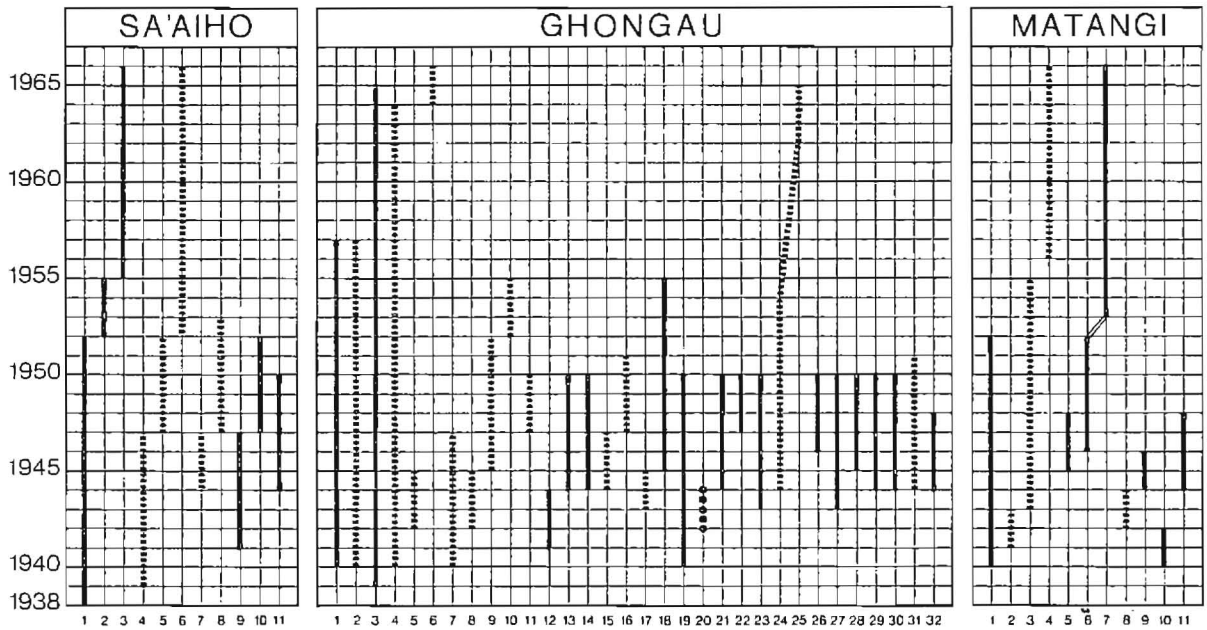


Fig. 84. Erection and abandonment of churches 1938–66. The numbers refer to table 43. Thick lines: Seventh Day Adventists. Stippled lines: South Seas Evangelical Church. Dotted: Church of England.

forever', as one informant described it. The new arrangement of settlements influences subsistence work. Previously every family lived on its own ground practically in the gardens it cultivated, but after the concentration most people had to walk long distances from home to gardens and back.

The amount of extra travelling caused by resettlement is illustrated in fig. 87. On pre-village Bellona the cultivators lived on their cultivated lots along the main trail. Here the plots are assumed to be of equal width, *a*, and settlements to be spaced at regular intervals. The cultivators continued to grow crops on same plots and are assumed to settle in the village at regular intervals, *b*, and in the same order as their dwellings before. Location of the village centre was in the middle of the total length of the cultivators' plots measured along the trail.

When daily walks before and after resettlement are compared, it is sufficient to consider walks to garden and back along the trail, because walks in the gardens are identical. Access to the gardens is always from the middle of the trail front.

Two cases must be considered, either the number of cultivators is even or uneven.

If number of cultivators is even, we get for the added walk to the garden, considering the total village, including return travels:

m^2 (a–b):2.

If number of cultivators is uneven we get similarly, including return travels:

(m^2–1) (a–b):2.

Of course the assumptions are not totally realistic: spacing was at somewhat irregular intervals, the order was not maintained when moves occurred. The real world would generally induce more extra walks than m^2 (a–b):2. Here it is only worth noticing that establishing of a large village (like Ngongona for example) really meant an extra expenditure of work: if *m* was about 100, *a* about 50 m., and *b* about 10 m. the total extra length of walking was 100^2 (50–10):2 = 200 (km). When cultivators work 8 hours a day (totalling 800 hours/day) the daily extra expenditure is about 5 per cent (at a walking speed of 5 km. per hour). If a siesta is held in the village, the expenditure is of course doubled.

Because of lack of data on actual transports it is hard to analyse what influence this 'dislocation' of people has had from a subsistence economic point of view, but there is at least some evidence that remote lots of fertile land have been given up. This is the case in Matangi and in the eastern

TABLE 43.

Names and founders of churches (villages), Bellona 1938-1966 (see fig. 84).

Sa'aiho district

No. on fig. 84	Village	Founder
1	Matahenua i tai	Taaika
2	Ngangapongia 'Bellona'	Taaika
3	Matahenua	Taaika
4	Pebaingangi	Matthew Taupongi
5	Ahanga	Matthew Taupongi
6	Ngotokanaba	Naham, Sau'uhi, Matthew
7	Kaangaba	Sanga'eha
8	Tepuipui	Sanga'eha
9	Tongomainge	Temoa
10	Patonu	Temoa
11	Tongaba	Bete

Ghongau district

No. on fig. 84	Village	Founder
1	Angaiho	Pongi
2	Kapata	P. Sa'engeika
3	Ngongona	Takiika
4	Ghongau	Taugenga
5	Tahakingoto I	Haibaangu'a
6	Tahakingoto II	Tauasoa, Tuhanuku, Panio
7	Nama'unga	Hosiah
8	Ngikobaka	Moses
9	Te'atumatangi	Moses
10	Anuta	Steven Kabei
11	Patonu (i Tauahiti)	Hosiah
12	Singaiia	Maitaki
13	Kaangibi	Maitoki
14	Sauhakapoi	Saubeetape
15	Tepotuhenua	Aron Ngibauika
16	Labangu	Aron Ngibaulka
17	Okota	Simon Namona
18	Ngotokangibi	Hakalingitango (?)
19	Hangemangama	Topue
20	Hangekumi	Momoka
21	-	-
22	Mata'ubea	Teikaungua
23	Tesauma	Tauniu
24	Hangekumi	Philip Tukaika
25	Pauta	Philip Tukaika
26	Sa'atupu	Tekiuniu
27	Hutimangu	Hakama'uhenua
28	Sa'apai	Maitaki
29	Tepoongima	Hautahi
30	'One I Kangibi	Pongi
31	'One II Tingoa	P. Sa'engeika
32	Kanaba	Mangie

Matangi district

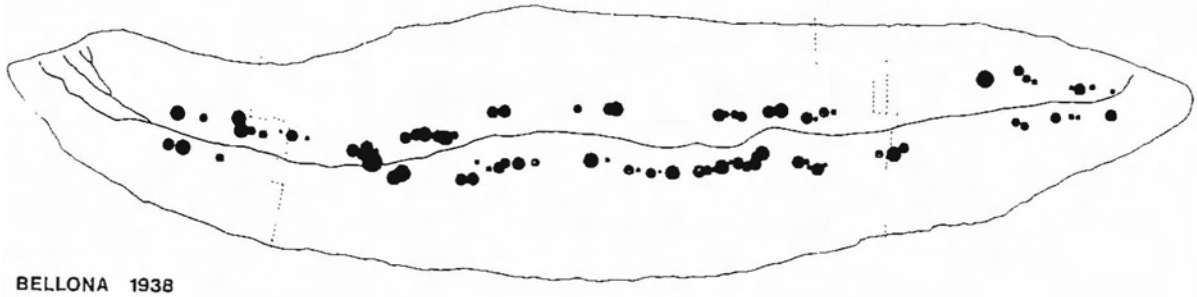
No. on fig. 84	Village	Founder
1	Bangaangiu	Temoa
2	Henuangiki	Tuhamanu
3	Ahea	Tuhamanu
4	Ahea	Jaben Puia
5	Tehakapaia	Kumingau
6	Tahanuku	Tongaka
7	Matangi	Tongaka
8	Tingoa	Tekapini
9	Tonga	Ngepetuha
10	Henuaasoa	Panio, Tauniu
11	Te'atubai	Tukungei Sa'u

parts of Ghongau district, less so in Sa'aiho, where land is scarcer. The introduction and popularity of the bicycle on Bellona is probably in part due to this problem of increased time spent in travelling caused by agglomeration. The drain on work power caused by longer walking distances is hard to evaluate, because the walking possibly to some degree has been regarded as leisure time. In the peak periods of work, however, the extra walking has reduced effective daily workhours considerably.

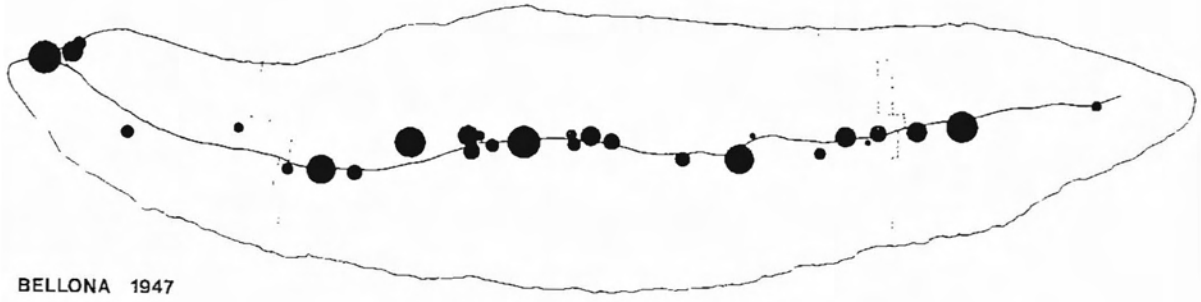
It must be noted that the new settlement pattern may be quite rational from other points of view than that of subsistence production. If daily living patterns changed to involve a proportionally greater amount of time spent in activities as attendance at worship and school, it may surely be advantageous to move into villages. After all, garden work takes only a small part of the available working hours. The development of villages can be seen both as a cause to and a symptomatic of change in daily behavioural patterns. However, the main interest has here been to demonstrate the effect of localization in an 'underdeveloped' society.

7.5 Establishment of local copra production

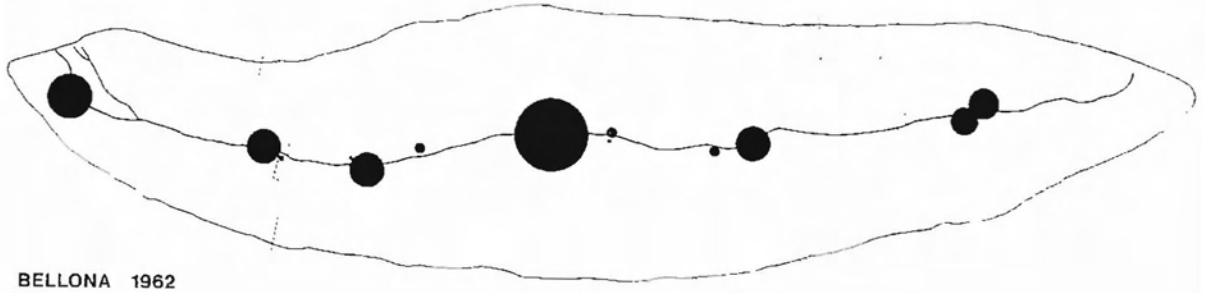
In paragraph 3.7, the planting of coconuts was discussed as one of the major assets of the monetary



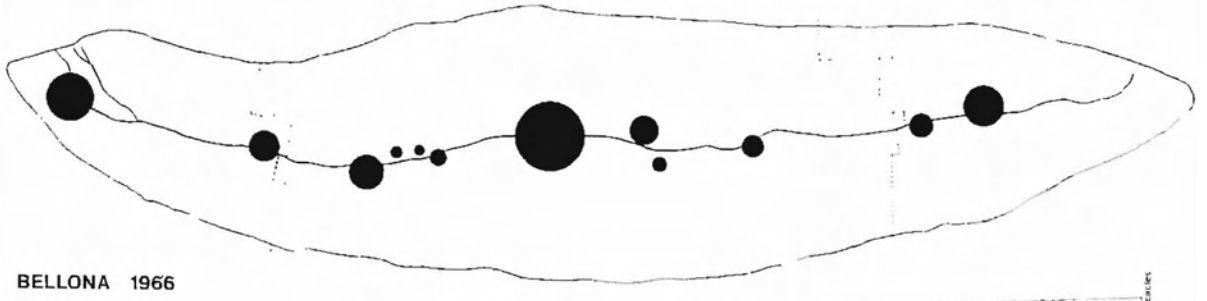
BELLONA 1938



BELLONA 1947



BELLONA 1962



BELLONA 1966

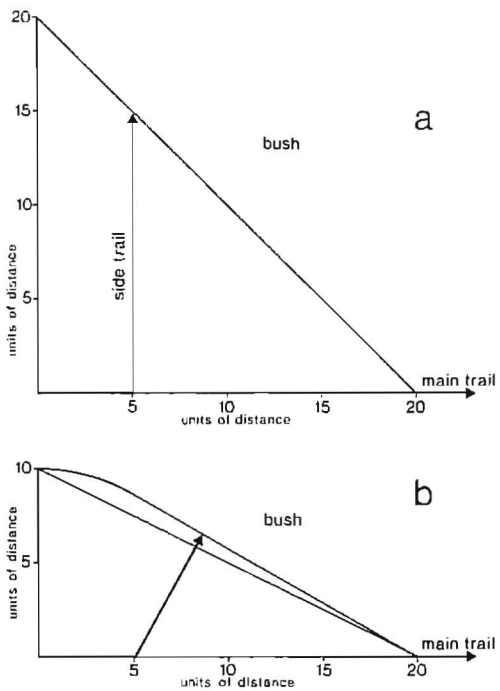


Fig. 86. Shape of areas accessible by walking in one unit of time. Walking on trails is assumed to be twice as fast as walking elsewhere. In *a* the traffic is confined to main trail and numerous side trails; in *b* no side trails exist; bush walking is uninfluenced by direction though still only half as fast as on the trails.

The fig. illustrates why almost every garden area is served by direct trails.

sector of the economy. Planting started on a significant scale after 1947, as can be seen from the aerial photographs. It increased through the 50s and even more so in recent years. Of the central plain, the best cultivable land on Bellona, slightly less than 5 % was planted with coconut palms in 1962, but in 1966 more than 10 % was planted, and the intentions were to plant more. The resulting loss in carrying capacity certainly exceeds 10 % as only the best areas are used for coconuts. The Bellonese are well aware of the fact that the palms will grow on less fertile land, but they also realize the importance of situating this crop with its heavy transport demands as close to the main trail as possible. In 1966, plans for buying a

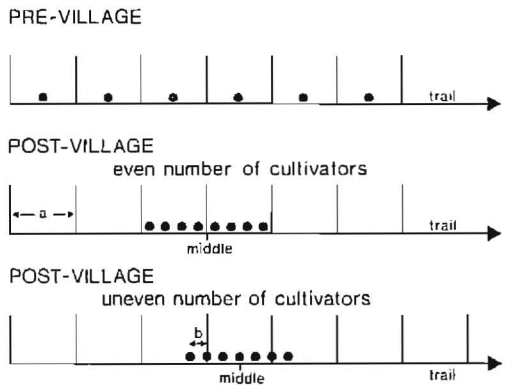


Fig. 87. The extra travelling caused by agglomeration of cultivators in villages. There are *m* cultivators living from lots each *a* wide. In villages the cultivators are only separated by a distance *b*. For explanation: see text.

tractor to ease transport to the coast were eagerly discussed. Also an improvement of storage facilities was planned. Combined with a better arrangement of shipping these changes were thought to promote copra production without increasing demands for work.

Discussions on the future availability of supplies of food were also frequently heard. There was a general anxiety over the foreseeable difficulties arising from a further reduction of food producing areas by the increasing copra production. Many young men were eager to produce more copra, disregarding their future need for food crop land. At present the duty of providing food for the population rested mainly with the older generation. A split between interests of young and old was therefore often recognizable.

7.6 Reconstruction of the main features of development

It seems convenient to distinguish two phases in development of inflicting changes in subsistence: an early phase covering the years 1938 to 1950, and the period from 1950 to the time of the survey.

7.6.1 The early post-Christian period, 1938 to 1950

The period was characterized by very little contact with the outer world, mainly because of the outbreak of the Pacific War which paralyzed connections with the British government from about 1940. Christianization had already brought some

Fig. 85. Distribution of population on homesteads. In 1938 the population was fairly evenly settled; later it was agglomerated in villages. Recently, there is again a tendency to disperse settlements.

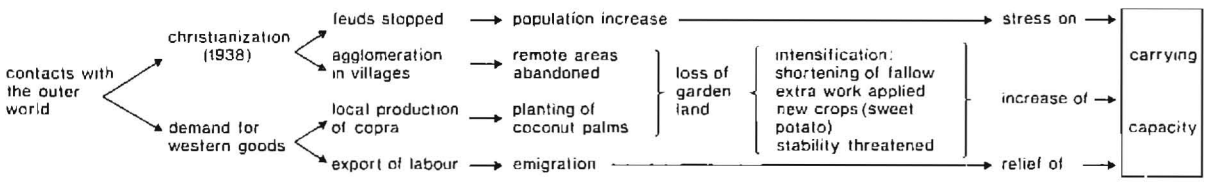


Fig. 88. Diagram showing main features of post-Christianity development influencing "carrying capacity".

changes: the end of internal warfare and desacralization of about 50 ha. of non-cultivated sacred areas.

The sudden cessation of fighting meant also that remote homesteads formerly used as hide-outs were given up. People reoccupied the land along the main trail and have stayed there ever since; cultivation of the remote gardens declined conspicuously. The main trail now became a safe main road and churches were erected along it. Initially each lineage had its own church, just as it had its own temples; at the end of the period the multitude of churches were replaced by a smaller number, all built in villages. Warfare had previously meant a population check by the inflicted high mortality and by limiting cohabitation of married couples. When wars were stopped there were, contrary to what might have been expected, no significant increases in population for the next years. Later a moderate population growth began. Still, the larger population could easily provide for its sustenance in the traditional ways. At least photographs from 1943 and 1947 reveal no changes in the gardening system, but a pronounced change in distribution of garden areas as induced by the new villages.

It must be noticed that introduction of iron tools and a few more artifacts date back to the last decade of the 19th century; generally an assimilation of the new tools into the subsistence technique had already taken place.

7.6.2 The period 1950 to 1966

After World War II contacts were again reestablished with the Solomons resulting in many innovations: Bellonese went away to work on plantations from whence they came back to tell of the wonderful things money could buy. Missionairies were sent to Bellona, as were government officers; a new set of horticultural plants was introduced and villages were organized.

From the effects of the new peaceful life the annual rate of increase of the population was about tripled. At the same time large scale planting of coconut palms started on some of the most valuable parts of the gardenland. The intention was to exploit the possibility of acquiring money to meet the new demands for foreign articles. Unfortunately the losses by the planting of coconuts on productive food crop land, combined with the losses from decreased accessibility to the remote gardens, tended to diminish the carrying capacity for the growing population. In the early sixties a number of families had to go off to plantations, partly forced by the lack of gardenland, partly driven by desires to earn money and have new experiences.

The imminent pressure on gardening land was to some degree relieved by an intensification of cultivation. In 1938 population density was about 50 persons per km² of cultivated land 'in rotation'; in 1966 it was between 65–86 persons per km². Higher yields were brought about by a shortening of the traditional fallow period, partly by the introduction of sweet potatoes. In spite of the reduced areas the total horticultural yields seem to have been kept nearly constant or slightly increasing, but at higher costs of labour and transport. Apparently the higher costs were rewarded by access to new kinds of consumer goods. As shown previously (paragraph 3.2) some imported tools helped to keep the necessary extra labour at an 'acceptable' level.

As has been maintained previously (E. Boserup 1957) effects of population growth tend to generate more productivity, once horticultural land becomes restricted. On Bellona this also seems to have been the case, but two points are worth noticing: the pressure on land stems primarily from the increase in 'living standard' (agglomeration of settlements, import of foreign goods) and the effects of the pressure are both resulting in increased efficiency and migration. In 1966 about 300 Bellonese were absent from the island. Most of these were only temporarily away, but a number had no or little intention of returning except for

visits. It was impossible during the field survey to collect information on all migrators on the question whether they intended to return, regrettable because the answers might shed light on the carrying capacity problem. From 1938 to 1966 the number of Bellonese having their sustenance on Bellona has been raised from about 420 to about 550. Probably the carrying capacity of the subsistence system of that time was not fully exploited, but it seems that the Bellonese themselves felt they were approaching the limit in 1966 with the population then residing on the island.

In the diagram above (fig. 88) it has been attempted to depict the main influences on carrying capacity via some important linkages.

The interesting problem of the future is whether an improvement of the carrying capacity via development of subsistence techniques will enable the increasing population to take their sustenance from the island or will force them to migrate. Or will a new form of population check reappear? Soon these problems will not only be one for the population of 'outlying' islands, but will encompass more and more of Oceania.

8. Survey and classification of Bellonese subsistence

At the outset of the book the aims of the investigation were described. First the elements of the Bellonese subsistence 'syndrome' were presented: production of means for subsistence, population, and some factors in the physical and social milieu influencing production (chapter 1). The elements were then further analysed (chapters 2 to 7).

In the following some of the main characteristics are summarized with an attempt to arrange them in an order of logical consequence. Finally it has been tried to classify Bellonese subsistence within a general frame.

About 1965 the material base of Bellonese life was still mainly produced within the island itself. Imports were few, based on the income from a small copra export and the returns from emigrated labour. Some developments had taken place in subsistence by means of new imports, but the subsistence technology remained largely unchanged. Monetary evaluation was only slowly intruding the Bellonese minds; values of products of the subsistence sector were not compared in monetary terms. In the present work some values have been made compared with the labour cost of production (see chapter 3).

Three areas of subsistence production have been analysed: production/consumption of food, shelter, and 'tools'. These branches of production are of course mutually connected, but has been treated separately for convenience.

Horticulture is most important in food production as are gathering, collecting, and especially fishing, less so hunting.

There is a large potential for horticultural production on Bellona (see chapter 5). One of the most serious hindrances for its exploitation is probably the unreliable climate, especially variations in precipitation, accentuated by the low water retention capacity of the soil. Occasional torrentuous rains mean a strong leaching of mineral nutrients from the soil, that further has a low cation exchange capability. Still, a production of up to 15 t. of dry matter per ha./yr. seems feasible.

The applied horticultural techniques (see chapter 2) must be viewed on this background of high inherent fertility and relatively large areas available. An area and labour extensive form of horticulture is employed. With annual and biannual crops from 3 to 15 years of fallow are used. Fallows are cleared with axe and knife, and with some crops a swidden technique is used leaving the soil fertilized with ashes. With this bush or forest type of shifting cultivation the digging stick is an appropriate implement for opening the soil. The digging stick is used as a crowbar for the breaking of roots, and as a probing stick for examining the thickness of the soil.

The heterogeneous seedbeds are best utilized with mixed crops, each selected for the individual spots of soil recognized by ecological indicators as stake and kind of fallow plants. Main crops are yams, taros, and bananas (chapter 2.1, appendix B 1 to 3) of which taros and bananas combine in two-storied gardens. An intensive selection of food plants has been made during centuries and has lead to distinction of many physiological types of plants and of genetical phenomena as mutations. About 300 utilized plants have been recorded.

The production strategy as sketched means large yields per workhour, but also large variation of yields. These are seasonal as well as annual. To ensure adequate supplies a large surplus is normally produced. In 1965–66, a year of abundance, food production exeeded standard consumption by about 50 % at a cost of less than 33 % of normal working hours (see chapter 5).

The importance of direct food extraction (gathering, collecting, hunting, and fishing) in normal years is explained by the seasonal gaps in food supply and by a potential undersupply of certain elements in the diet mainly protein. Extractive techniques, especially gathering, are also important for survival during scarcities. Except during seasonal abundances (as of *ghape* plants and flying fish) the extractive techniques are less economical per workhour than horticulture for supplying calorific food.

Most of the 'accessories to subsistence' were made in a simple way with relatively small amounts of labour. Traditionally, both houses and canoes were made more elaborately. Possibly this has been given up because of the short lifespan; houses are abandoned because people move, and canoes are frequently lost by cracking and by hurri-

canes. Further, canoes are rarely used for voyaging nowadays, so simpler craft serve normal purposes sufficiently well. Many implements are also simply made and frequently neglected after use as are digging sticks; their utility depends more on selection of the proper type of material than on the subsequent manufacturing. Some of the locally made accessories have been substituted by imports, as have barkcloth with calico and shell adzes with steel axes (chapters 3.2).

Only some social features of the subsistence 'syndrome' have been touched upon in this book, namely those most immediately connected with production. The obligations to work and distribution of products were found to be connected, but the land tenurial system might tend to leave the population with very unequal access to cultivable land. However, some regulatory mechanisms were established that opened possibilities to lessen social tensions otherwise inevitable: usufructus rights to land for other than owners and an adoption custom providing missing male successors where necessary to take land over in the patrilineal heritage system. Some rules of obligation to plant gardens were almost necessary to avoid heavy losses of garden yields because of temporarily insufficient work force.

To ease comparisons it is convenient to find a universal framework for description of production systems or material culture such as one based on applied technology. Many typologies use in fact technology as their main criteria. One needs only to think of the historical division into a stone-, bronze-, and iron-age, as originally suggested by the Danish 19th century archaeologist, Chr. J. Thomsen. Also a division into gatherers, hunters, herdsmen, and agriculturists has survived till the present day; this was refined by E. Hahn (1908) who divided the agricultural stage into periods with digging stick, hoe, and plough). German ethnographers distinguished between small-grain and large-grain stages of agriculture, thought to have developed normally from an initial root-crop stage. One of the most successful attempts to establish a typology of agriculture was made by D. Whittlesey (1936). Unfortunately too little was known about shifting cultivation at that time to include it appropriately, see D. Whittlesey (1937 a and b). In a few cases there is archaeological evidence for a development along such lines (Clark and Piggot, 1965) but it is not very likely that the idea is universally applicable; a plough-stage needs not to follow a hoe-stage. Further, typology of subsistence technologies can hardly be based on a single feature like the 'essential tool', as maintained by L. Bobek (1959).

An important aspect of agricultural typology is the technique applied to sustain soil fertility. Without animal husbandry and import of fertilizers, fertility is generally maintained by the effects of local weathering, either directly or via accumulation in vegetation. In long-fallow systems conspicuous amounts of plant nutrients may be stored in vegetation; in short-fallow systems the soil is more and more important as a store for plant nutrients, and the vegetation less. Long ago it was found that fertility per area unit is higher with longer fallow periods (see E. Stålfelt 1960, P. Gourou 1958); hence the old fallows were preferred as long as area reserves were large enough. Lately it has been stressed by E. Boserup (1965) that work inputs are smaller with long fallows. Intensity of land use or technique to sustain fertility varies in a graded scale from forest fallowing to multiple crops per annum. The world-wide changes in agricultural technique during increased population pressure can thus be conceived as a continuous substitution of inputs in production: work substitutes for areas. The tools used in cultivation seem to vary: the digging stick is economically employed in fields after long fallowing, which neither hoe nor plough is. In grass fallows the hoe is a most convenient instrument. The plough enters the scene when draught animals are available and intensive treatment of soil is necessary to increase mineralization of soil as with short fallows or permanent cultivation. Most likely the work per area unit is steadily increased with the transition from long to short fallows, even when changing tools are considered.

This leads to a slightly more general formulation with an ecological typology, including some fundamental ones for societies given crudely in table 44.

The first stage of the table has the natural ecosystem as an environmental base; all yields are taken directly from nature's own stable ecosystems. Only fractions of totally stored energy in such an ecosystem is usually exploitable for direct human use; the energy content of food harvest is high compared with the energy spent to acquire food. The carrying capacity is low. It is given roughly

TABLE 44.

Ecological types of food production.

Environmental base	Natural stability	Technology base - means of food production	Energy output/input	Approximate carrying capacity (density of population)	Typical size of society
Natural ecosystem	High	Direct extraction, 'foraging' (gathering, collecting, and fishing, hunting	large	1/km^2	family (band)
Manipulated -	↓	Agriculture (shifting cultivation, herding)		50-100/km^2	tribe
Transformed -	Low	Agriculture (sedentary cultivation, mixed farming)	small	50-500/km^2	nation
Subsidized	Low (but balanced by scientific knowledge?)	Industrial agriculture. Industry	small (but cheap energy transferred)	not defined	'global'

in the table as 1 per km^2; this restricts size of societies; in the few existing 'foraging' societies, the societal unit cannot normally exceed family size, if every person should have access to sufficiently large areas for his sustenance within his radius of action.

Manipulation of ecosystems usually means that some biological components are changed. Other changes are slight: some rejuvenations of natural systems typically take place by shifting cultivation. Natural stability is therefore decreased, but carrying capacity increases. The human energy input is increased, but yields seem to increase at a lower rate. Hence the output: input ratio decreases. For Bellonese horticulture it varies from about 15:1 to 25:1 depending on crops, about the proportion found by R. Rappaport (1968 and 1971) on New Guinea. Population densities about 50–100 inhabitants per km^2 limit the size of societies to 'tribes' or villages.

With transformed ecosystems the change of components encompasses also the abiotic element: the soil is tilled and – with mixed farming systems – manured. Some of the transformed systems reach exceedingly high carrying capacities as by the hydraulic civilizations of East Asia, where population densities range up to about 600 per km^2. and permit formation of whole nations. Such transformations as intensive tilling, manuring, irrigation, and weeding take much human energy. There is almost no natural stability; stability requires work and vigilance. The energy exchange ratio is often about 3 to 1; but the intense work substitutes – as seen above – for land.

The transformed systems of the modern world may be considered extreme developments of other work intensive land use systems that are sustained by enormous imports of fertilizers, biocides, use of water, and fuel energy for the machinery. In U.S. wheat agriculture in about 1965 the energy output was only slightly larger than the input. This was economically feasible because wheat calories cost about 5 to 6 times more than diesel oil calories (F. Cottrell, 1955). Because of transfers the carrying capacity is ill defined for systems that depend on intricate spatial arrangements. To retain 'stability' numerous materials must be in constant supply. This again requires an almost global control of necessary resources and of requirements. Compared with this, the Bellonese live in a microcosm, almost as isolated as in a spacecraft.

Technological typologies have been extended to include more features. G. Hatt (1922 and earlier) turned attention to division of labour between sexes to separate primitive agriculture from agriculture with tilling. Hatt believed that women usually did the main part of the work in semi-agriculture, where tools as digging stick and hoe were utilized, but not when the plough was introduced. While it seems sustainable that women lost importance in plough-agriculture (the origin of sex-roles in present Western world?), work in

the fields is much less rigidly divided between sexes in non-ploughing agricultural societies. Hatt's attempt to include social features in his classification, though unsuccessful, was the start of rethinking typology. New genetic typologies have been devised (J. Nicolaisen 1963, C. G. Feilberg 1964). The genetic or 'developmental' typologies may convey some misinterpretations. One is important enough to be warned against, namely to regard modern representatives of types as forming a hierarchy of stages spanning from simple 'primitive' to 'developed' forms. The technology of a modern collecting society may easily be more 'developed' than an agricultural technology of the past. In fact development of agricultural technology has followed several lines. Hence some shifting cultivation technologies may easily be more refined and well adapted to milieu than some with permanent tillage.

Within modern typologies the tendency has been to attempt to include all relevant features. An agricultural typology was established by an International Geographical Union Commission. Major result have been the reports (especially by J. Kostrowicki 1970) stressing the great number of features inherent in the description of agriculture grouped under headings such as 1) social characteristics, 2) organizational and technical (functional) characteristics, and 3) production characteristics. Each heading further includes a great variety of aspects which will not be repeated here. Overshadowing other difficulties is still the problem of rank order and of separating the insignificant from the important. To overcome the difficulties with comparisons between different types of agriculture a typogramme has been developed by J. Kostrowicki (1972). This seems to be a useful tool in perceiving differences.

There is a certain convergence between the views expressed by agricultural typologists and anthropological economists. The latter aimed early at a broadening of the concept of economic base (R. Thurnwald 1933, M. Herskovits 1952). According to S. Udy (1959) four main characteristics are necessary when depicting any economy:

1) technological complexity and the division of labour
2) structure and membership of productive units
3) systems and media of exchange
4) control of wealth and capital

Later authors, especially Manning Nash (1966), have elaborated these points and have added one more important element, that of scale of the economy. It has not been within the scope of this book to characterize the Bellonese economy fully, but most of the points coined by Nash have still been more or less touched upon, such as 1) decision making, 2) availability of resources, 3) social units in consumption and production, 4) scale of economy, 5) norms and institutions in the economy. All the points (most so 5) need further elaboration.

No existing typology is completely satisfactory for classifying the Bellonese subsistence system. If the changes are considered especially important, as they often are, present typologies are of little use; they give little chances for making prognoses.

Continuation of the research on subsistence may possibly most advantageously be directed towards developing a dynamic system description necessary to assess more precisely the limits for and conditions of development. As many of the developing countries literally consist of thousands of small subsistence units, they deserve more devoted research in the future.

Dansk resumé

Selvforsyning på øen Bellona (Mungiki)

Et studie over de kulturøkologiske forhold på en isoleret polynesisk Stillehavsø i protektoratet De britiske Salomonøer.

0 Introduktion

0.1 Arbejdets formål

Arbejdet er et forsøg på at beskrive de funktioner, der i et isoleret område står i forbindelse med selvforsyningen ved et landbrug af 'flyttemarkstype' (shifting cultivation). Det forsøges yderligere at vurdere landbruget med hensyn til den rationalitet, brugerne udviser, og det forsøges, om der kan findes veldefinerede mål for brugets effektivitet. Selvforsyningssystemet søges også belyst med hensyn til dets implikationer i forhold til arealkrav, arbejdskraft og sociale forhold, fx organisationsmæssige og ejendomsretlige.

Baggrunden for arbejdet er, at man i dansk kulturgeografi og etnografi traditionelt beskæftiger sig med sammenhængen miljø–kultur. Med støtte i kvantitative metoder og i et begrebsapparat fra biologiens økologi synes der at være basis for en nyvurdering af det klassiske tema. To begreber er essentielle i forholdet mellem fysisk miljø og kultur, nemlig effektivitet og stabilitet. Til en undersøgelse af disse forhold er en mindre, isoleret ø med stigende befolkningspres velegnet.

0.2 Valg af område

Øen Bellona (*Mungiki*) blev valgt fordi den opfyldte de nævnte krav. Den er på knap 20 km² og har været temmelig utilgængelig på grund af dårlige landsætningsforhold og stor afstand til nærmeste større øer, se fig. 1 og tabel 1. Befolkningen er vokset fra godt 400 (1938) til knap 800 (1966). Isolationen er dog kun partiel; der er en vigtig befolkningssammenhæng (exogami) med naboøen Rennell, ingen med de melanesiske Salomonøer. Produktionsmæssigt er Bellona selvforsynende, bortset fra en lille handelsmæssig udveksling af varer og tjenesteydelser. Der gives derefter en kort oversigt over øens kontakter med omverdenen. Da Bellona allerede havde været genstand for intensiv dansk forskning (se tabel 2) var øen særlig tiltrækkende som forskningsobjekt: en betydelig baggrundsviden var tilgængelig gennem Torben Monbergs, Samuel H. Elberts og Rolf Kuschels arbejder.

0.3 Feltdagbog

Afsnittet er et kort rids af feltarbejdsdagbogen for de to ophold (1965 og 1966), der danner basis for nærværende undersøgelse. Det fremgår, at uheldige omstændigheder (influenzaepidemi og tørke) bevirkede, at undersøgelserne fik afvigelser fra det planlagte forløb.

0.4 Dataindsamling i felten

Problemet: dataindsamling i felten, berøres kort, specielt med hensyn til informanter. Med hensyn til disse var Bellona et ekceptionelt godt undersøgelsesområde, stor åbenhed og pålidelighed var reglen. Visse informanter arbejdede reelt periodevis som selvstændige, kompetente undersøgere, specielt Taupongi og Sengeika Tepuke, begge fra landsbyen Matahenua.

0.5 Bellonesiske mål; opfattelse af fysisk miljø

Som baggrund for problemet vedrørende tydning af indhentet information gives et rids over bellonesiske mål og lokal opfattelse af fysisk miljø.

0.5.1

Belloneserne anvender et titalssystem beslægtet med vort eget, men der benyttes flere forskellige systemer af 'enheder', således tælles *'uhi* yams som par, mens *'uhingaba* yams tælles ti ad gangen. Mål og vægt findes ikke i et konsistent system. Som længdemål anvendes visse størrelser af legemsmål, se fig. 4. Egentlige arealmål findes ikke. Arealer udledes lejlighedsvis af længdemål. For arealer af 'plantebede' i haver anvendes en slags standard, ved udmåling af hvilken der tages hensyn til jordens egnethed. Vægt er uden nogen egentlig fællesenhed; man regner med en størrelse som en 'byrde' o. l. Problemerne med tidsmåling er endnu større; der er ingen definerede enheder mindre end en halv dag. Formentlig står mangelen på veldefinerede måleenheder generelt i forbindelse med, at der ikke er behov for nøjagtigere mål end de forhåndenværende i den bellonesiske hverdag, men mangelen er i hvert fald et alvorligt 'oversættelsesproblem'.

Vedrørende det fysiske miljø gælder det, at de bellonesiske begreber, hvormed dette beskrives, afviger betydeligt fra vore på mange områder.

0.5.2

Land beskrives ved begreber, der tydeligvis er relateret til udnyttelse, se fig. 5. 'Landets krop' eller 'kerne' er den tidligere lagunebund i den centrale del af øen. Den fremtræder nu med meget frugtbar jord bærende bopladser og landsbyer langs den centrale sti hvorom også haver, brakarealer og kokoslunde ligger. I en bræmme omkring ligger den tidligere revterrasse, som kun har begrænset dyrkningsmæssig værdi. Især mellem de tidligere rev, nu omkring 50 m over havniveau, der som en høj kant afspærrer Bellonas indre

fra havet, findes enkelte dyrkbare lavninger. Selve de gamle rev er næsten overalt beklædt med primær skov.

0.5.3

Jordbunden deles op i to grupper efter tekstur: i ler, sandet ler (*kenge*) og sand, ofte med konkretioner (*malanga*). Yderligere opdeles grupperne efter forskellige kriterier bl. a. farve; *kenge* deles således i mindst 5 klasser. Bellonesernes kriterier for klassificering af jord afviger i princippet ikke meget fra de ellers anvendte, men bygger naturligvis ikke på kvantitative undersøgelser.

0.5.4

Vejr. Betegnelser for fx vind refererer meget til 'brugssituationen'. Vind klassificeres ikke alene efter vore begreber, men også efter opførsel, dens grad af konstans med hensyn til styrke og retning. Nedbør betragtes særligt ud fra virkningen på afgrøder.

0.5.5

Plantesystematik, specielt dyrkede planters. En oversigt over 'systemet' er vist i tabel 4. Den bellonesiske klassifikation afviger fra vor ved ikke at have et generelt paradigma som grundlag. Yderligere afspejler den klart brugshensyn: den er utroligt detaljeret vedr. dyrkede planter (hvor den bevæger sig på varietet/klon niveau) og meget grov vedrørende 'ukrudt'.

0.6 Anvendelighed af lokal information

Der er store vanskeligheder ved at bruge lokale oplysninger til belysning af begreber, der ikke indgår i de lokale problemstillinger.

1 'Subsistens syndromet'

'Subsistens syndromet' opfattes som et funktionelt hele omfattende såvel de elementer i det fysiske miljø som af samfundslivet, der betinger den for befolkningen nødvendige materielle produktion, subsistensbasis.

Denne betragtning placerer en analyse af den materielle produktionsproces centralt, et synspunkt, der er beslægtet med den historiske materialisme og i et vist omfang indgår i moderne samfundsvidenskab. Angrebsvinklen er for selvforsyningssamfund ganske analog med den, der anvendes i økologi.

Subsistens syndromet kan gøres til genstand for systemanalyse, hvilket dog forudsætter, at interaktionen mellem elementerne kan beskrives kvantitativt. Dette er ikke muligt for subsistensforholdene på Bellona. Det forsøges at vise, at erkendelse af syndromet er vigtigt for en analyse af sådanne forhold som 'bæreevne for befolkning' og 'stabilitet' på Bellona.

Dispositionen for arbejdet er afledt af de nævnte betragtninger. Først analyseres den materielle produktion (kap. 2 og 3), dernæst diskuteres befolkningens størrelse i relation til denne (kap. 4 og 5). Til sidst behandles det fysiske miljø som grundlag for produktionen (kap. 6). Bogen afsluttes med kapitler over ændringer i subsistensforholdene 1938–66 (kap. 7) og en oversigt og klassifikation af subsistensforhold.

2 Den bellonesiske subsistens produktion

Den bellonesiske subsistens produktion behandles efter nedenstående oversigt:

2.0 Subsistens produktion

fødevareproduktion 2.1–2.4	havebrug	2.1
	indsamling	2.2
	fiskeri	2.3
	tilberedning af fødevarer	2.4
produktion af andre nødvendigheder 2.5	personlig komfort; 'klimaskærm' (opvarmning, tøj, huse)	
	produktionsmateriel: kanoer, redskaber.	

Det er forsøgt at måle inputs i produktionen ved anvendt areal og arbejdskraft; outputs er så vidt muligt opgivet i vægt eller anden konventionel enhed. Da prisbetragtninger hentet fra den lille bellonesiske export af varer og arbejde (tjenesteydelser) næppe lader sig direkte overføre til et 'skyggeprissystem', forsøges i stedet arbejdstids- og energimæssige mål anvendt som fælles målestok.

Generelt er den bellonesiske subsistens produktion baseret på anvendelsen af simple redskaber, der repræsenterer små investeringer målt ved anvendt arbejdskraft. Men produktionssystemet kan næppe kaldes hverken simpelt eller uudviklet. Dets strategi afviger fundamentalt fra fx vesteuropæisk-nordamerikansk. Der trækkes på mange 'nicher' ved hjælp af et stort antal dyrkede, forskellige planter. Indgrebet i naturen, specielt ved jordbehandling er svagt. En stor del af vedligeholdelse af fertilitet sker via den 'vilde' naturs mekanismer, idet man efterligner vegetationsudviklingen i naturlige lysninger ved bestandig foryngelse af skovvegetationen.

2.1 Havebrug

Bellonesisk landbrug beskrives som havebrug, fordi afgrøderne formeres vegetativt, plantes, behandles individuelt og blandes over arealerne.

2.1.1

Det store antal bellonesiske nytteplanter behandles i grupper svarende til bellonesisk opfattelse. (Se også

appendix B-1, B-2, B-3.) Hovedvægten ligger på rodplanter. Stor betydning har yams-dyrkningen (Dioscorea esculenta, D. alata, D. bulbifera og D. pentaphylla), og et meget stort antal underarter/varianter udskilles. I øvrigt dyrkes flere arter af Aracéer, særlig taro og dermed beslægtede. Også bananer, delvis af en speciel oceanisk type indgår. Der synes at kunne skelnes mellem flere sæt af planter efter traditionens oplysninger om introduktion (appendix D). De ældste, såkaldte *hiti*-planter omfatter mange, for fleres vedkommende giftige planter med kun små forrådsorganer. Mange formeres både sexuelt og vegetativt. De findes nu ofte forvildede som også andre steder i Oceanien. Enkelte, fx *aka* (Pueraria triloba) er meget lidt kendt som dyrkede planter. Formodentlig har de sammen med planter, der indsamledes, og i forbindelse med fiskeri kun kunnet være basis for en ganske ringe befolkning. Et andet 'lag' af planter, de før-missionske, omfatter højereydende planter, men med mindre artsmæssig spredning. Navnene tyder på tilførsel fra omliggende øer i forbindelse med kanoer, der har været slået ud af kurs. En enkelt før-missionsk plante *bunge* (Ipomoea gracilis R.Br.) er et ikke uinteressant eksempel på en gammel dyrkning af en slægtning fra bataten med nyopdagede paralleller på Ny Guinea. Fra sidste halvdel af 1800-tallet stammer ganske få indførte planter, der spredtes med europæere. Efter 1938 har nyintroducerede planter, med undtagelse af bataten, spillet en meget lille rolle. Kun planter, der passer ind i den traditionelle dyrkning, er akcepteret i nævneværdigt omfang.

2.1.2

Yams-, taro- og banan-haver er de almindeligste typer på Bellona. De er sjældent plantet med en enkelt afgrøde, skønt dette er et prestigesymbol. Lokalvariationen i fertilitet gør anvendelsen af planter med varierede krav mere fordelagtig.

2.1.3

Plantningsmønstret i haverne er rationelt: et trekantmønster (fig. 21) tilstræbes, men må ofte tillempes jordbundsforhold m. m.

2.1.4

De enkelte stadier i havearbejdet beskrives dernæst detaljeret: rekognoscering, rydning, tørring, brænding, gravning og plantning. Som eksempel på arbejdets tilpasning til naturforholdene vises et eksempel på anlæg af en *beetape*-have, fig. 24, 27 og 28. De bedst egnede planter til forholdene i haven udsøges. Efter yams-havens anlæg bliver planterne staget og luget én til flere gange, inden høsten finder sted. Ved sidste lugning fjernes kun planter, som anses for at skade tilgroningen af brakarealet.

Proceduren for yams-havens anlæg sammenholdes dernæst med andre havers (se tabel 5).

2.1.5

Handler om brakgenvæksten (se også appendix C). Dens sammensætning afhænger en del af jordbunden og afgrøden. Når genvæksten har et passende volumen, anses den for moden, især hvis et særligt sæt af planter er til stede i den. I nyeste tid har nogle introducerede planter udviklet sig til generende ukrudt, særlig det såkaldte *ngei*-græs (Paspalum conjugatum Berg).

2.1.6

Landbrugskalenderen er vist i tabel 7. Den genspejler summarisk oplysning, der er indhentet ved interviews, og bør sammenlignes med appendix J, der er udarbejdet på basis af bellonesiske dagbøger, ført over kvinders og mænds aktiviteter i de enkelte landsbyer.

Kalenderen er i princippet bygget over måneperioderne, men korrigeres ved stjerneobservationer. Dyrkningen styres ved hjælp af disse. Plantning og høst af yams begynder, når særlige konstellationer bliver synlige på den østlige morgenhimmel.

2.1.7

Heri er opgjort udbytter og arbejdskrav for visse typer af haver. Havernes blandede natur og det faktum, at høsten finder sted gradvis, gør det vanskeligt at bestemme høst for haverne. Der er anvendt tre metoder: 1) udbyttebestemmelse for enkeltarter sammen med bestemmelse af enkeltplanters arealkrav, 2) hel eller partiel afhøstning af haver, samt 3) skøn over udbytter ved hjælp af lokale oplysninger om høsten i antal kurve på basis af 'standardvægt' af kurveindhold. Bestemmelserne, der er vist i tabellerne 8 og 9 svarer nogenlunde sammen. Kombinationen af udbytte og arbejde er vist for de enkelte typer i fig. 41 a og b. Hvis disse resultater omregnes, fås fig. 42 a og b, der viser, hvor meget arbejde og areal, der medgår til produktion af 1 ton afgrøde.

De afgrøder, der ydede mest pr. ha var banan og yams. Banan giver dog meget varierende udbytter. Taro og batat ydede noget mindre end de nævnte.

Arbejdsydelsen for de forskellige afgrøder var også vanskelig at vurdere, specielt fordi den enkelte have – fx ved indhold af store træer kan kræve et arbejde, der afviger betydeligt fra normalen. Man foretrækker af rydningsmæssige grunde, at brakken ikke er alt for gammel.

I rækkefølge steg den nødvendige arbejdsydelse pr. ha fra banan, taro, yams til batat. De enkelte arbejdstrin diskuteres dernæst; rydning, 'gravning', og plantning udgør langt hovedparten af arbejdet, mens lugning (på grund af svedjeteknikken) er af meget ringe omfang, men stærkt varierende.

Hvis arealer og arbejder sammensættes til produktion af 1 ton afgrøde pr. år, er banan og yams de fordelagtigste afgrøder, taro og batat de 'dyreste'. Indregnes den minimale braktid ses batat at blive billigst og banan den dyreste afgrøde.

Det er bemærkelsesværdigt, at placeringen efter egnethed for afgrøderne afhænger af, hvor meget areal man kan tillade sig at bruge. Uden arealknaphed er de afgrøder, der foretrækkes, bananer og taro, med arealknaphed er det yams og batater. Dette er samtidig den rækkefølge, afgrøderne er introduceret i bruget i. Se appendix D.

2.2 Samlervirksomhed og jagt

Samlervirksomhed deles i en del angelsaksisk litteratur op i to typer: 'gathering' og 'collecting', hvoraf den første betegner en ikke-systematisk indsamling og den sidste en systematisk, ofte sæsonbestemt indsamling, hvor rute og type af materiale er nøje fastlagt. Samlererhvervet betyder stadig en del på Bellona; ca. 1 måned pr. år skaffes hovedparten af føden på denne måde. Årsagen dertil synes at være, at de forskellige afgrøder med deres ringe holdbarhed efterlader en forsyningsmæssig svag periode. En anden vigtig årsag er sandsynligvis, at det skift i diæt, der finder sted ved overgang til indsamlet føde, er af betydning ved at sikre tilførsel af mineraler, vitaminer og proteiner med aminosyrer, der er sjældne i den daglige kost.

Jagt på flagermus og duer har haft en større betydning tidligere, men er nu uvigtig.

2.3 Fiskeri

Fiskeri er stadig af overordentlig stor betydning. Det er lykkedes at bestemme en del af de fangede arter, se appendix B-5. En række typer af fiskeri gennemgås. En del er individuelt, hvad enten det foregår ved afsøgning af revet, svømmende med eller uden dykkerbriller eller pr. kano. Spyd eller linefiskeri foretrækkes af den individuelle fisker. Betydeligt større betydning har de kooperative fiskeriformer, især håndnetfiskeri efter flyvefisk fra kano. Fig. 43 og 53 viser kanofiskeri og det vanlige udstyr til et sådant. De tidligere anvendte store net (snørenet) er næsten gået af brug. Fiskeriets betydning lader sig kun skønsvis anslå, men er hovedsagelig knyttet til dets betydning som leverandør af protein med varieret sammensætning.

2.4 Tilberedning af fødevarer

Fødevaretilberedning er helt nødvendig for de vigtigste fødevareemners vedkommende, da de er lettere giftige i rå tilstand. Der lægges stor vægt på, at mad er 'mør', hvilket oftest opnås ved behandling i jordovne. Derudover anvendes en slags grillning og røgning.

Nogle opskrifter på de almindeligste bellonesiske retter er angivet. De viser en varieret anvendelse af de mest tilgængelige planter. Tilberedningen synes ret skånsom over for mange næringsstoffer og følger et høkasseprincip. Tabene ved tilberedningen er relativt små, omkring 10 % af råvaren. Derimod er arbejdet temmeligt stort, især da det også omfatter brændehugst.

2.5 Produktion af tekniske hjælpemidler til selvforsyningen

Trods det humidt tropiske klima er klimaskærm nødvendig. Specielt efter nedbør optræder temperaturer på 16–19° ret ofte, og den høje luftfugtighed og ringe påklædning gør klimabeskyttelse nødvendig.

Ofte klarer man sig med varme fra bål. Ekstra påklædning anvendtes meget sjældent tidligere, da man fremstillede tøj af bark (*tapa*). Tøjet sys nu af importerede materialer. Til sovebrug syr og fletter man dog stadig måtter af egne materialer. Inden for husbyggeri er der sket en voldsom ændring fra den hævdvundne *hata* (se fig. 48), via huse bygget på jorden og med ståhøjde, til nutidens pælehuse. En af de vigtigste grunde til ændringerne er antagelig indførselen af petroleumslamper, der gjorde det attraktivt at opholde sig og bevæge sig indendørs i større udstrækning end før. Bellonesiske huse er konstruktivt endnu ikke tilpasset ændringerne, de har bl. a. for ringe stabilitet. Holdbarheden er desuden ringe, ca. 3–5 år. Prestigebyggeri til afløsning af de gamle *hange hakahuahua* har ofte imiteret 'savet' tømmer og bliktag. Bliktaget mindsker vedligeholdelsen meget, men det runde, naturlige tømmer var mere praktisk i anvendelse end det moderne. (En ny udvikling oplyses at genindføre rundstokkene.) Omkostningerne ved de traditionelle huse anslås ud fra flere eksempler at være på ca. 70 arbejdsdage for et '5 favnes hus', se tabel 10. Den lave fremstillingsomkostning må dog sammenholdes med den ringe holdbarhed. Til gengæld er der opnået en ret stor frihed med hensyn til lokalisering; dels kan eksisterende huse flyttes i en vis udstrækning, dels sker fornyelsen hurtigt.

Redskaber fremstilles til brug ved subsistensproduktionen særligt til fiskeri, hvorimod havebruget udføres med simple redskaber (gravestokke) til engangsanvendelse. De forskellige fiskeriredskabers fremstilling omtales med reference til Birket-Smiths beskrivelse (1957) og opgørelse af arbejdskraftforbrug. Kanobyggeriet gennemgås, og det konstateres, at selv om den enkelte kano er billig at fremstille, kræver flåden et ret stort antal arbejdsdage årligt til fornyelse.

3 En oversigt over den samlede bellonesiske materielle produktion 1966

Et af problemerne ved en (delvis) kvantitativ analyse af en subsistensøkonomi er at finde en fællesværdimåler. Værdien af land er vanskelig at bestemme fordi det ikke omsættes. Arbejdskraft kan måles ved tidsforbrug eller i energi; der er dog svære begrænsninger i anvendeligheden af begge mål. Anvendelse af 'skyggepriser' afledt fra værdien af den yderst begrænsede export eller fra arbejdsløn opnået ved plantagearbejde forsøgtes. Da der exporteres varer og arbejde næsten uanset den opnåede pris, er de nævnte skyggepriser imidlertid ret urealistiske; det samme gælder skyggepriser ansat på grundlag af værdi af importvarer, hvor disse erstatter hjemmeproducerede.

Subsistensproduktionen behandles i 3.1–3.5, den markedsførte produktion i 3.6. Oversigter er givet i tabel 15 og 26.

3.1 Landbrugsproduktionen 1965–66

De vigtigste inputs er landareal, lægge-/såmateriale og arbejde .

Arealerne blev opgjort via flyvefotografering og markundersøgelse. Den sidste sigtede på at fastlægge foto-kortets målestok, markundersøgelsen på at sikre identifikationen af de vigtigste arealklasser.

Interpretationen af flyvebillederne skete hovedsageligt på basis af gråtone, 'tekstur' og stereoskopisk skønnet vegetationshøjde inden for de arealer, hvis konturer røbede haveanvendelse (se tabel 11). Brakarealer af forskellig alder viste sig vanskelige at udskille. Totalarealet viste sig at være 17,2 km², inkl. rev. Af landarealet er knap 71 % dækket af vild plantevækst; knap 26 % er landbrugsareal og godt 1 % bebygget. (Se fig. 56.)

De aktuelle havearealer fandtes ved markidentifikation og udmåling på flyvebilleder. Delarealer fandtes ved vejning af udskårne kortarealer. Ud fra de fundne brakarealer ses en tydelig reduktion af det årligt tilplantede hareareal. Reduktionen modvirkes produktionsmæssigt af, at brakken efter yams-haver i omkring halvdelen af tilfældene udnyttes til batat. Det synes, at arealer, der ligger brak mere end de nødvendige 5–6 år (for yams), indskrænkes mere og mere. På den anden side er der endnu land nok til, at den traditionelle brakperiode for de forskellige afgrøder kan opretholdes.

Arbejdet, der er nødvendigt for dyrkningen af de fundne arealer, er skønnet ud fra de forskellige landbrugsafgrøders 'normal' forbrug.

Læggematerialet udgør fra 0,2–0,5 t/ha for yamshaver. Det samlede forbrug er fra 5–13 t/år; sandsynligvis i den lavere del af intervallet, fordi man bevidst gør det så lille som muligt.

Udbyttet kan kun angives med forsigtighed. Der er anvendt gennemsnitsværdier. Totaludbytter er angivet i tabel 32. Overvejelser vedr. nøjagtigheden synes at vise den som ± 10 %, men det må bemærkes, at den kun refererer til undersøgelsesåret.

De flerårige afgrøders forhold er enklere end de normale haveafgrøder. Arealerne lod sig let bestemme, da især kokospalmer er let genkendelige. Udbytterne er trods 'for tæt' plantning ret høje, ca. 2,2 t pr. ha, men store arealer udnyttes for tilfældigt, se tabel 26. Den anvendte arbejdskraft er sparsom, men skønnes ud fra nogle eksempler at nå ca. 100 timer pr. ha.

3.2 Samlererhverv og jagt

Fra de tilgængelige oplysninger ser det ud til, at samlererhvervet lægger beslag på omkring 3 timer daglig i en måned for alle voksne bellonesere; til gengæld dækker erhvervet levnedsmiddelforsyningen i samme tid. Der er set bort fra jagt i den samlede opgørelse.

3.3 Fiskeri

Fiskeri organiseres af smågrupper inden for den enkelte landsby. Undersøgelsen foretoges derfor på landsbybasis.

Fiskeriet er ret arbejdskrævende. I sæsonen fisker ca. $^1/_5$ af den mandlige, arbejdsdygtige befolkning regelmæssigt; på årsbasis i gennemsnit er dette dog kun ca. 45 gange à omkring 8 timer. Heri er ikke medregnet de nødvendige hvileperioder, og der er en betydelig individuel variation. Arbejdsudgiften til fartøjer og grej omtales i 3.4.

Udbytterne var meget svingende, specielt for linefiskeri. Det er skønnet på grundlag af de relativt få målte fangster. Det målte gennemsnit var omkring 20 kg per mand per fiskeri. Den samlede bellonesiske fangst er næppe mindre end ca. 60 tons pr. år.

3.4 Produktion af 'tilbehør' til subsistensproduktion

Til beskyttelse mod klimaet benyttes bål, som oftest også indgår i anden anvendelse. Der fremstilles desuden et stort antal måtter til sovebrug (*baghu* og *malikope*). Pandanus-bladene til måtter er dyrkede. Det nødvendige antal arbejdstimer pr. år er beregnet ud fra måtteantal og levetid samt gennemsnitlig fremstillingstid. Boligudgifterne ansloges efter en optælling af huse (se tabel 10). Husenes levetid og reparationsudgifter blev skønnet udfra en opgørelse over huses alder og det antal gange, de var hovedrepareret. 'Fremstillingsprisen' for et enkelt hus er undersøgt særligt grundigt (se 2.4) og andre huses omkostninger er relateret til den. De samlede boligomkostninger for befolkningen er anført i tabel 15.

Produktionsomkostningerne for kanoer opgjordes efter samme princip. Bestanden var på 48 brugbare kanoer, og levetiden gennemsnitligt omkring 2 år.

Levetiden er svær at skønne, i praksis afhænger den ikke blot af slitage, men nok så meget af forlis.

For net, fakler og andet grej til fiskeri foretoges et skøn over arbejdsomkostningerne.

De samlede omkostninger for tilbehør til subsistensproduktionen er opgjort i tabel 15. 'Service' i subsistens-sektoren omfatter især husholdningsarbejde, der ved skøn bygget på iagttagelser kræver ca. 4 timers dagligt arbejde pr. husholdning. Omfanget af arbejdet er ret beskedent efter europæisk målestok, og det er fordelt på familiemedlemmerne. Uddannelse, også med hensyn til subsistensaktiviteterne, kræver overordentlig megen tid. Den er ikke opgjort ved denne undersøgelse fordi så megen instruktion finder sted ved iagttagelse af voksnes aktiviteter. Både undervisningsaktivitet og sociale aktiviteter indgår i 'dagbogsundersøgelsen', men de er i øvrigt ikke nærmere analyseret. Tidsforbruget ved pleje af syge er ret stort.

Kapital i form af investeret arbejde i 'varige goder' er en relativt lille post i bellonesisk økonomi. Fx er kapital investeret i boliger kun 3½ gange den årlige vedligeholdelse, tilsvarende gælder for kanoer. Der er en tendens til at søge levealderen for kapitalgoderne forøget bl. a. ved importerede hjælpemidler.

3.5 Udgifter og udbytter i den monetære sektor 1965–66

Pengeøkonomien var meget ringe udviklet. Alle elementære fornødenheder som førevarer og bolig var uden for pengeøkonomien. Kun til enkelte formål var penge nødvendige: til kirkelige afgifter, skatter, skolepenge og til al import af varer. Alligevel var der ingen egentlig integration mellem subsistens- og pengeøkonomi.

Penge er svære at få fat i for belloneserne. Der var kun to væsentlige indkomstkilder: export af arbejdskraft og export af lokalproduceret kopra.

Arbejdskraft exporteredes overvejende til plantagerne på Salomon-øerne, hvorfra penge sendes tilbage i form af opsparing og i form af indkøbte varer. Fordelingen efter varernes art undersøgtes for det tilbagesendte (se tabel 22). En stor del af vareimporten var til imødegåelse af rationelle behov, der vanskeligt kunne tilfredsstilles med hjemmeproducerede varer.

Kopraexporten var først organiseret gennem et lokalt kooperativ, hvis sammenbrud er analyseret af T. Monberg (1966). Både sociale og tekniske problemer var medvirkende til bankerotten, og samme problemer synes endnu at eksistere. Til beregning af arbejdsudgiften ved kopraproduktionen observeredes to produktioner, der begge omfattede ca. en ha. Pr. ha krævedes ca. 430 arbejdstimer og der høstedes ca. 4000 'nødder'. Det samlede arbejdsforbrug til exporten (ca. 18 tons i 1965) kan kun gives omtrentligt, da kopraudbyttet pr. ha. svinger fra omkring 1 t. til godt 2 t. pr. ha. Det betydeligste arbejdsforbrug skyldes anvendelsen af meget primitive tørreovne (se fig. 59).

Til sidst sammenlignes export af arbejdskraft og lokal kopraproduktion som måder at hjembringe valuta på. Hvis der var rigeligt af arealer, ville lokal kopraproduktion være fordelagtigst, men kun en del af befolkningen har tilstrækkelige arealer.

Det vigtige spørgsmål om lønsomheden ved udenrigshandelen overhovedet belyses kort i forhold til forskellige varegrupper. Med hensyn til tekstiler opnås et fordelagtigt varebytte. Selv om kopra kræver ret megen tid at producere og indbringer ret lidt, er importeret bomuldstøj nemlig alligevel bedre end traditionelt barkklæde *tapa* (som fx ikke kan vaskes). I andre tilfælde er substitution med importerede varer mindre indlysende fordelagtig. Bliktage medfører en klar formindskelse af boligudgiften, men giver mindre behagelige huse at opholde sig i. Med en times arbejde produceres der lokalt fra 1 til 7 kg tørstof, men der kan kun købes ca. ½ kg tørstof (ris) for lønnen for dette arbejde. Fødevarer importeres derfor kun undtagelsesvis. Derimod importeres 'nye artikler' almindeligt; særligt bemærkedes lamper, vandtanke, cykler, symaskiner og radioer.

3.6 'Kapital': akkumuleret arbejde i subsistenssektoren

I tilknytning til undersøgelsen af optjeningen i den monetære sektor opgjordes den samlede værdi af de indkøbte varige forbrugsgoder (tabel 27). Cykler udgjorde omkring 24 %, bliktage og vandtanke 20 %, radioer 14 %. Symaskiner, en produktiv investering, udgjorde hele 32 %. Den samlede værdi af de nævnte genstande svarer til ét års samlet pengeindkomst. Det bemærkes, at en stor del af indkomsterne er brugt til skolepenge, skat og kirketiende.

3.7–3.8 En oversigt over den bellonesiske økonomi

Der gives en oversigt over 'pengeøkonomien' bl. a. sammenlignet på arbejdstimebasis. Tre fjerdedele af det mulige arbejdsvolumen er til rådighed på Bellona, resten er knyttet til de bellonesere, der har taget ophold uden for Bellona. Ca. halvdelen af arbejdsstyrken på Bellona anvendes til subsistensaktiviteter og kopraproduktion; resten anvendes til sociale aktiviteter eller udnyttes ikke.

4 Den bellonesiske befolkning set i sammenhæng med subsistensproduktionen

I kapitlet undersøges forbindelsen mellem befolkningens forsyningsbehov for fødevarer og produktionens størrelse. Befolkningens behov er beregnet på basis af dens antal, dens alders-, køns- og vægtfordeling og 'normalbehov' efter FAO's tabeller.

4.1 Folketal

En brugbar folketælling var ikke til rådighed. Denne organiseredes på husholdninger. En tilsvarende baseret på tælling i slægtskabsgrupper udarbejdedes af T. Monberg. Tællingerne svarede til hinanden; det ser ud til, at husholdningstællingen var velegnet til bestemmelse af 'de facto' befolkning, hvorimod tællingen på slægtskabsforhold var velegnet til 'de jure' befolkningens bestemmelse. Den sidste metode var for øvrigt generelt overlegen, hvilket understreger den afgørende rolle slægtskabsforhold har i det bellonesiske samfund.

En særlig vanskelighed bestod i, at en persons navn skifter meget stærkt efter dennes alder og status, efter den, der bruger navnet, og situationen.

En anden vanskelighed var aldersbestemmelse, da belloneserne ikke bruger 'kalenderalderen', men snarere lægger vægt på 'udviklingsstade i samfundsmæssig henseende'.

Ved løsningen af problemerne anvendtes en personregistrering i stedet for tilfældige navne, og alder bestemtes på grundlag af relativ alder (tabel 29) og vigtigere historiske begivenheder (appendix E).

På grundlag af de indhentede oplysninger konstrueredes befolkningspyramider for henholdsvis de jure og de facto befolkning (fig. 61 og 62). FAO's tabeller (1951 og 1957) forudsætter, at arbejdsintensiteten er jævnførbar med visse beskrevne 'normalaktiviteter' og at personernes hvilestofskifte afhænger af køn, alder, legemsvægt og omgivelsernes temperatur på angiven måde. De fleste af de nævnte forskrifter var ret lette at følge, men legemsvægtkurven måtte findes ved vejning af et antal personer (se fig. 64).

Ud fra de nævnte oplysninger kalkuleredes befolkningens totale kaloriebehov og dens proteinbehov.

4.2 Fødevareforsyning og -behov

En sammenligning mellem forsyninger med fødevarer og behov 1965–66 synes at vise en overproduktion på 94 % af kaloriebehovet og 63 % af proteinbehovet.

Selvom beregningerne er ret grove, er der ingen tvivl om, at 1965–66 var et overskudsår. Ofte kan man have vanskelighed med at skaffe de nødvendige fødevarer.

Det nævnte forhold understreger betydningen af 'det normale overskud' ved selvforsyning (Allan 1958).

For diskussion af begrebet 'bæreevne for befolkning' er det 'normale overskud' meget vigtigt. Da overskuddet er nødvendigt, er en nøjagtig kalkule af bæreevne ikke uden videre mulig. Ved en forøgelse af lagerholdbarhed for lokalafgrøder kan overskuddet mindskes, men det kan også gøres mindre ved en bedre integration i markedssystemerne.

Bæreevnebegrebet i forhold til et givet produktionssystem lider også af den vanskelighed, at behovene er vanskelige at fastsætte. Her er regnet med minimumsbehov, men selv disse afhænger af, hvad der vil blive tolereret. Antagelsen af en norm, fx i stil med FAO's, er nødvendig for at gøre begrebet operativt.

Et andet problem er om indregning af det til minimumsproduktionen nødvendige arbejde skal finde sted. På fig. 64 markerer 'a' bæreevnen nødvendigt arbejde fraregnet, og 'b' bæreevnen med nødvendigt arbejde medregnet. Det er afgjort nyttigst, hvis en definition svarende til 'b' anvendes i praksis, men det er vanskeligt at bestemme de indgående størrelser. Det ville yderligere være ønskeligt, om 'bæreevne' for et landbrug blev sat i forbindelse med viden om klimatisk bestemt potentiel produktion (evt. under gældende jordbundsforhold). Herved kunne brugbare effektivitetsmål defineres.

5 Forbindelsen mellem sociale forhold og subsistensproduktion

Blandt de vigtige sammenhænge mellem subsistensproduktion og samfundsforhold må nævnes 1) ejendomsretlige forhold – en institution, der regulerer de tilgængelige arealer for produktionen, 2) fordeling af produkterne, hvorved de enkelte individer får deres forsyning, 3) fordeling og organisering af arbejdet og endelig 4) regulering af produktionens størrelse.

5.1 Fordeling af jord

Ejendomsretten til jord er baseret på individuel besiddelse. Ejendomsretten er differentieret i grader alt efter jordens anvendelsesmuligheder: havebrugsland ejes individuelt mens fx skovarealer oftest kan bruges af alle inden for samme slægtskabslinje.

Land kan erhverves ved a) opdyrkning af ingenmandsland, b) ved arv eller c) ved gave. De sidste 'landnam' fandt sted, da tabu ophævedes 1938 for en del tidligere hellige arealer. Oftest følger arv og gave samme princip: der overdrages jord blandt nærbeslægtede i mandslinjen (undtagelsesvis arver også kvinder), kun sjældent gives jord til ikke-beslægtede. Landkortet afspejler derfor slægtskabsforhold (se pl. 6–9, land tenure 1965–66). Billedet er dog præget af ændringer fra princippet bl. a. forårsaget af krige.

Hvis jordfordelingen udelukkende skete ved arv, ville skævhederne i fordelingen antagelig have gjort situationen uholdbar for længst. Et udbredt adoptionssystem medvirker til at udjævne forskellene.

Ud over adoptionsmekanismen tjener også en usufructus-regel til at sikre en jævnere adgang til jord. Efter den sidstnævnte regel har enhver ret til at tage enårige afgrøder på ubenyttet jord, der tilhører personer inden for ens egen patrilineale slægtskabsgruppe.

Der findes intet system, der direkte knytter befolkningstal og arealer sammen svarende til det for Tikopia beskrevne (R. Firth 1939).

5.2 Fordeling af produktionen

Fordelingsforholdene er forskellige inden for subsistensproduktionen og uden for denne. Inden for subsistensproduktionen betragtes fødevareproduktion og anden produktion hver for sig.

Fødevarefordelingen var tidligere bl. a. forbundet med religiøse riter. I nutiden finder en tilsvarende fordeling sted ved fester, både af verdslig og religiøs art, men tillige også en mere dagligdags fordeling. Rationalet bag de hyppige fordelinger er muligvis, at så mange fødevarer, fx fisk, er af ringe holdbarhed og fås i store, men stærkt svingende mængder. I almindelighed fordeles fødevarerne ret jævnt efter behov, skønt det tilsyneladende sker efter social status. Dette hænger sammen med, at personer i høje statuslag opnår og vedligeholder prestige ved at give bort.

Subsistensvarer af ikke-fødevaremæssig art produceres i reglen specielt til én persons brug. Det ydede arbejde må han være rede til at genyde. I visse tilfælde er de producerede genstande til fælles nytte, fx stor-kanoer, *baka'eha*.

Inden for pengeøkonomien gælder fordelingsprincippet kun til en vis grad. Penge tjent ved kopraproduktion undtages ofte den fordeling, som den tidligere fødevareproduktion fra det samme areal var underkastet. Efterhånden som kokosarealerne vokser, vil derfor mere og mere jord gå ud af selvforsyningen og det gamle systems levedygtighed blive undergravet.

5.3 Arbejdsfordelingen inden for subsistenssektoren

Næsten ethvert arbejde startes på individuel basis, men de fleste mere arbejdskrævende udføres af en større gruppe.

En sandsynlig forklaring på at så meget arbejde sker gruppevis, er, at samarbejde er nødvendigt i flere tilfælde. For at undgå tab ved udvaskning bør plantning af yamshaver ske hurtigt, hvilket lettest finder sted ved anvendelse af en stor arbejdsstyrke. Den ydede assistance tilbagebetales i regelen ved genydelser af tilsvarende art. Det er betydningsfuldt, at arbejdsgrupperne ofte anvendes til indlæring af vigtige færdigheder.

5.4 Regulering af subsistensproduktionen

Reguleringen af subsistensproduktionens størrelse er ikke sikkert kendt. En detaljeret planlægning af omfanget er næppe nødvendig på grund af forsyningssystemets store smidighed: det dyrkede areal kan fx reguleres meget i årets løb. Variabiliteten af udbytterne gør det dog usikkert om forsyningerne vil blive tilstrækkelige.

En langsigtet regulering af befolkning/areal forholdet er endnu et uløst problem. Der findes ikke (som fx på Tikopia) nogen regel for styring af befolkningstallet.

6 Subsistensproduktionen i relation til miljøforhold

I kapitlet lægges hovedvægten på at undersøge de miljømæssige begrænsninger for et landbrug af bellonesisk type. Dette gøres ved at betragte nogle vigtige vækstfaktorer: lys, temperatur, nedbør og næringsioner hver for sig i den nævnte rækkefølge, idet deres begrænsede virkning søges vurderet.

6.1 Stråling

Strålingen må betragtes som en hovedbegrænsning, da den er udtryk for den energi, der er til rådighed for fotosyntesen.

Nettostråling ved jordoverfladen søgtes derfor målt ved hjælp af en Robitsch actinograf som skønnedes rimelig nøjagtig til måling af daglige, modtagne totalmængder af energi. I det tidsrum, målingerne foretoges, udgjorde den modtagne stråling 40,5 % af den teoretisk mulige (Angot's værdier). Den årlige, modtagne stråling beregnedes herudfra at udgøre ca. 52.3×10^0 MJ/ha. Ud fra indkommende fotosyntetisk aktiv stråling og en maximal effektivitet for grønne blade fundet i litteraturen skulle det teoretisk være muligt at opnå en høst på op til knap 43 tons tørstof/ha. Tydeligvis er en beregning som anført for summarisk; bl. a. betyder åndingstabet, der især styres af temperaturen, meget. Til en nøjagtigere beregning må nettoproduktionen antagelig findes for en given plante ved at beregne primær bruttoproduktion som funktion af stråling og derfra subtrahere åndingstabet som funktion af temperaturen. Der savnes endnu en rimelig procedure for en sådan beregning, der kan være nyttig for en kalkule af maximal opnåelig planteproduktion, hvis vand- og næringsforhold optimeres (hvilket er en positiv bestræbelse for landbrugeren inden for hans muligheders ramme).

Antagelig er Bellonas tørstofproduktion pr. ha. på årsbasis, når kun lys og temperatur betragtes, næppe væsentlig større end den danske bl. a. på grund af respirationstabet.

6.2 Vand

Vandfaktoren som begrænsning for produktionen synes ikke umiddelbar at være af betydning på Bellona, hvor observationer over to år viser en årsnedbør, der overstiger 250 cm.

På grund af jordernes lave vandkapacitet er det imidlertid direkte observerbart, at de lokale kulturplanter ofte er udsat for produktionsstop. Tabel 37

viser 'våde' og 'tørre' perioders hyppighed i forhold til periodens længde (1, 2, 3 . . . dage). Taro skønnes på dette grundlag at være skadelidte i 8 % af året, men produktionstabet på grund af 'tørke' er større; skønnet ca. 20 %. Yams taber antagelig ca. 10 % af vækstsæsonen p.g.a. tørke. På den anden side er yams veltilpasset bl. a. ved, at der er ret store chancer for tørvejr til brænding af haver i august og meget lille visnefare i hovedvækstsæsonen. De andre afgrøder synes at være intermediære i forhold til nævnte.

Der tages en del forholdsregler til beskyttelse af afgrøderne mod udsving i fugtighed. Således viser nogle fugtighedsprofiler (fig. 73), at fugtigheden er meget ensartet i hele havens luftmasse, mens den skifter stærkt over bar jord. Jordtemperaturerne ses at holdes ret lave under skyggetræer. Dette er måske vigtigt for taro; Stanhill (1965) har påvist, at jordtemperaturer over 33° hindrer spiring.

6.3 Jordbund

Jordbundsfaktoren betragtes her især i forbindelse med næringsjonforsyningen. Det skønnedes interessant at følge udviklingen i næringsstofmængden i jorden under flyttemarksbruget med dets eventuelle afbrænding og langtidsbrak af arealerne. Indholdet i 200 prøver analyseredes for en del joner sammen med pH og oxiderbart organisk materiale (appendix F og fig. 76). Analyserne viser: a) svindet af joner omkring plantestederne, b) den forskel der er mellem de 'rige' (leragtige) jorder og de 'fattigere' (sandede jorder med konkretionsindhold), c) jonindholdet svinger lidt under dyrknings-brakcyklus, men bliver for de vigtige næringjoner aldrig særlig højt. Makronæringsstofferne betragtedes derfor nærmere. Nitrogen kunne ikke bestemmes nærmere på grund af manglende udstyr i felten, men da den bortgår ved brænding, må der antagelig virke en ikke-bælgplante som kvælstofsamler. Fosfor er rigeligt til stede i tilgængelig form. Svovl, som også bortgår ved brænding, tilføres antagelig i tilstrækkelig mængde luftbåret. Magnesium er rigeligt til stede i de fleste jorder (moderbjergarten er dolomit), og det samme gælder kalcium. Derimod synes kalium at kunne være udbyttebegrænsende (se tabel 39) især for visse afgrøder. Brakvegetation af forskellig alder undersøgtes derfor ved foraskning for kaliumindhold; dette syntes at vokse på tre år til en størrelse, der er tilstrækkelig til en normal afgrøde. Da jordernes evne til fastholdelse af katjoner er svag (er hovedsagelig knyttet til humusfraktionen på grund af en lille og uegnet lerfraktion), er vegetationen følgelig et meget vigtigt magasin for næringsjoner i landbrugssystemet.

For yderligere at konstatere om kaliumtilførselen er en vigtig begrænsning, foretoges et lille gødskningsforsøg, der godtgjorde en effekt af både nitrogen og kaliumholdig gødning. Et forbehold må dog tages, da afhøstningen skete i forfatterens fravær.

Sluttelig foretoges en undersøgelse, der peger på, at jordbundsprofilets dybde er afgørende for bellonesisk brug af jord til haver. Er dybden over ca. 25 cm er jorden for over 75 % vedkommende dyrket; er den mindre er kun ca. 22 % dyrket.

6.4 Miljøkatastrofer

Det er forsøgt oplyst, hvilke natur-risici, der især påvirker den bellonesiske selvforsyningsproduktion. Blandt disse spiller tørke og orkaner en rolle, men nutildags især importerede smitsomme sygdomme, specielt tuberkulose.

6.5 Lokaliseringen som miljøtilpasning

Af hensyn til subsistensproduktionen må der rådes over havebrugsland, 'skov' med planter for samlererhvervet og tømmer og endelig over adgangsarealer til havet af hensyn til fiskeri og indsamling. Ethvert uafhængigt brug har alle disse arealklasser; brugene er derfor af 'radial' eller 'stribe' type, således som øen er opbygget.

Ejendomsmønsteret er ændret fra type a til type b (se fig. 80) efterhånden som intensiteten i landudnyttelsen er steget. Adgangsmuligheden til alle arealtyper er halveret, og forsyningerne opretholdes kun i kraft af de større udbytter af haverne. Dette understreges af, at kun havearealerne fragmenteres stærkt ved gentagne arvedelinger.

Også i indretningen af den traditionelle boplads ses en betydelig rationalitet (se fig. 81). Beboelseshuset er placeret midt i de mest besøgskrævende arealer, haverne. Det er omgivet af kokospalmer, der giver skygge og læ; samtidig tjener de som leverandør af 'drikkevand'. Asken fra køkkenhusets bål er en virksom gødning for 'baghavens' bananplanter og skruepalmer (der samtidig leverer henholdsvis indpakningsblade til fødevarer, som skal i ovnen, og blade til reparation af husenes tækning. Forfædrenes grave er anbragt ved indgangen til dansepladsen; selve anbringelsen viser den ærefrygt, der udvistes forfædrene.

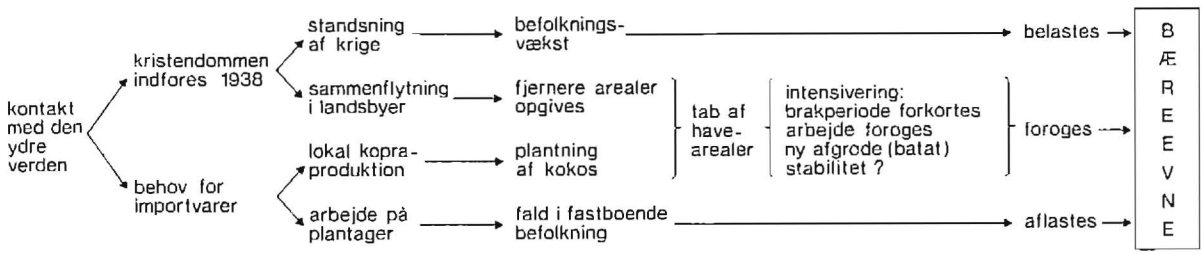
Den ændrede lokalisering kan altså tydes som symptom på ændring i tidsanvendelsen.

7 Ændringer i subsistensforholdene 1938–66

Kun en statisk-komparativ analyse er mulig på det materiale, der har kunnet sammenstilles.

7.1 Udgangspunkt

I 1938 indførtes kristendommen på Bellona, hvilket medførte mange andre ændringer; dette år, der står



skarpt indprentet i bellonesernes erindring, markerer et brud med det traditionelle liv.

7.2 Kildemateriale

Blandt det materiale, der kan bruges til at belyse udviklingen, er to typer særlig pålidelige: befolkningstallene (1938, 1943, 1947, 1962 og 1966) samt de oplysninger om arealbenyttelsen, der kan udledes af flyvebilleder fra samme år (undtagen 1938).

7.3 Befolkning 1938–66

Befolkningsudviklingen 1938–66 lader sig rekonstruere med rimelig sikkerhed. Tilvæksten har ikke været opsigtsvækkende stor (ca. 9 ‰ pr. år), men i et så lille materiale er 'tilfældige' påvirkninger meget markante. Dette gælder således en stærk nedgang i antallet af børnefødsler i årene efter kristendommens indførelse. På grund af emigration er antallet af personer, der opholdt sig på øen, ikke vokset i takt med befolkningsvæksten. Alligevel er stigningen fra godt 400 i 1938 til godt 550 i 1966 af stor betydning (fig. 83).

7.4 Arealbenyttelse

Arealbenyttelsestallene må tages med et vist forbehold på grund af analyseusikkerheden ved flybilledtolkning. Det påvises dog, at en stigning i opdyrket areal op til 1947 er afløst af en formindskelse i den senere del af undersøgelsesperioden. Forsyningsmæssigt er dette des mere påfaldende, fordi en femtedel af det dyrkede areal efterhånden anvendes til kokosdyrkning. Virkningen af ændringen har været, at brakperiodens længde er nedskåret til omkring det minimum, der efter erfaringen er nødvendigt for opretholdelse af fertiliteten. Samtidig er der indført en ny afgrøde, *bataten*, der gror i brakken umiddelbart efter yamshøst.

En forklaring på, at dyrkningen af så store arealer er opgivet, ligger muligvis i, at bebyggelsen er blevet mere agglomereret. Fænomenet skyldes hovedsagelig, at kirkebesøg blev meget hyppige i den bellonesiske hverdag efter 1938. Til at begynde med benyttedes et stort antal (24) kirker – svarende til de gamle templer; antallet er nu reduceret til 7–8.

7.5 Etablering af lokal kopraproduktion

Koncentrationen i landsbyer kalkuleres til at koste mindst ca. 10 % mere arbejde ved havedyrkningen (se fig. 87).

7.6 Hovedtræk af udviklingen

Udviklingen summeres i et diagram, der viser, at bæreevnen for befolkning er påvirket. Endnu synes bæreevnen ikke mindsket; til gengæld kræver produktionen mere arbejde (jfr. E. Boserups hypotese) og måske er stabiliteten i udbytterne truet.

8 Oversigt over undersøgelsen af bellonesiske subsistensforhold og forsøg på at opstille et klassifikationssystem for produktionssystemer på økologisk grundlag

Det bellonesiske produktionssystem synes meget veltilpasset til de produktionsbetingelser, en isoleret tropisk ø med en ret stor befolkningstæthed giver. Med beskedne arbejdsydelser fås ret høje – omend svingende – udbytter, der tilsammen sikrer befolkningens eksistens. Det energetiske bytteforhold er meget gunstigt (1 energienhed arbejde kan omsættes helt op til 27 energienheder afgrøde), og ved benyttelse af den naurlige brakvegetation synes de cirkulerende næringsjonmængder at kunne holdes i et rimeligt niveau. Havebruget producerer hovedparten af fødevareforbruget, mens fiskeri og indsamling af vild føde har mere specielle formål, henholdsvis forsyning med protein og varieret kost i en sløj forsyningsperiode.

Vigtigste 'kapitalgoder' er kanoer og huse; begge er de imidlertid arbejdsprisbillige, men til gengæld lidet holdbare.

Exporten af arbejdskraft og kopra benyttes til at skaffe dækning for skatter, afgifter m. m. og til betaling af en import af vigtige varer. Disse analyseredes efter art. Mange varer indførtes, fordi det var 'nye varer' eller forbedringer. Bl. a. det ringe bytteforhold forhindrer en stærkere udvikling af exporten.

De sociale elementer, der er af direkte betydning for produktionen, er især fordelingssystemer og orga-

Økologisk klassifikation af produktionstyper.

Miljømæssig basis	Naturlig stabilitet	Teknologisk basis	Bæreevne	Samfundsstørrelse
Naturligt økosystem	høj	direkte extraktion (samlere, jægere, fiskere)	ca. 1/km^2	'bande'
manipuleret økosystem	↓	havebrug (flyttemarksbrug), nomadisk kvæghold	50-100/km^2	'stamme'
transformeret økosystem	lav	agerbrug (permanent), husdyrbrug	50-500/km^2	'nation'
subsideret økosystem	lav, balanceret ved videnskabelige indgreb	industrialisering	udefineret	'international'

nisation. Jordfordelingen synes umiddelbart dårligt skikket til at sikre alle tilstrækkelige forsyninger, men dette sker ved et adoptionssystem, en usufructus ret til jord og en ret effektiv fordeling af nødvendighedsartikler.

Fordelingssystemet trues stærkt ved indførelse af pengeøkonomi.

Det synes som om arbejdsformen er tilpasset behovet for en hurtig indsats, bl. a. når den brændte mark skal tilplantes. I hvert fald er arbejde i grupper almindeligt; hertil svarer en pligt til genhjælp.

Hvis den miljømæssige basis for produktion opdeles i fire klasser, svarer dette nøje til fire klasser af produktionssystemer (se tabel).

Det er klart, at et subsistensbrug ikke lader sig beskrive og klassificere ud fra så få og enkle kriterier som i skemaet. Forsøget er anført, fordi målsætninger for produktionen synes at falde inden for økologiske rammer: opnåelse af sufficient selvforsyning.

Miljømæssigt viser forsyningssystemet mange tilpasninger: klima- og jordbundsmæssigt, og ved stabil udnyttelse af en lang række ressourcer. Balancen synes truet, da udnyttelsessystemet muligvis viser sig følsomt for det ekstra befolkningspres – fx er der opstået problemer ved batatdyrkning.

Genskabelse af balancen vil antagelig først og fremmest kræve justering af det sociale system med hensyn til fordeling af jord og produktion.

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Appendix A

Bellonese geographical knowledge prior to European contact

(For a short survey see: Elbert and Monberg 1965: From the Two Canoes, chapt. 18. References to this work are given as: Canoes followed by 'T' or 'N' with a number which denotes the relevant text or note number).

Be. = Bellona or Bellonese, Re. = Rennell or Rennellese.

Rennell (Be: *Mungaba*). Frequent contacts with this neighbouring island, both recent and throughout history. 34 Rennellese were living on Bellona in 1966, and nearly all grown-up male Bellonese had visited Rennell. It was, and is still, regarded as dangerous to cross the islands in native craft, least so in the *matakitaki* season (the calm period). Special formulas were recited before voyages in pre-Christian times. Many traditions tell about voyages, more than a dozen of which are published in Canoes. Especially informative are T67 and T92 (ancestors who lived on both islands), T99 (in which a canoe lost its way and finally was wrecked at sea), and also T125 and T151 (illustrative of the dangers at sea).

Indispensable Reefs (Be: *Ngotoakau*). Uninhabited, almost vegetationless atoll south of Re., traditionally visited by fishing expeditions.

Guadalcanal. (Probably the place traditionally called *Kenga* in Be., now often *Ngolekana*. This term is rather unspecific,*) sometimes meaning the Solomons in general or even the Florida group). Trips were made to Guadalcanal; a cano paddled there 1945. Among the crew was Sau'eha (Matabaingei-lineage). The mountains of Guadalcanal may be discerned from the cliffs at *Mungitehenua* on exceptionally clear days. Canoes T228 and T229 refer to *Kenga*. Varieties of the *boiato*-yam, the *'uhingaba*-yam and papaya are said to have been introduced from *Kenga*.

San Christoval (Be.: *Makila* or *Paungo*). Tradition mentions Ngaakei's visit to *Makila* followed by a long stay there (Canoes T227 B). *Makila* is without any doubt a Be. version of the local name (Makira) for San Christoval. In Canoes N227 B, *Paungo* is said to be an unindentified place in the Solomons. Canoes T230—discussing the voyage of Sumui—mentions *Paungo* as its destination. It looks as if the informant for Canoes T227 B confused Ngaakei's and Sumui's voyages, but—interestingly enough—identifies *Makila* with *Paungo*. Spanish sources (e.g. H. Gallego's log-book 1567–69) refer to San Christoval as Paubro (Pauvro). According to Jack-Hinton, 1969, this is a rendering of the surviving native name Bauro. *Paungo* is probably the usual Be. version of Bauro. It is highly probable that *Paungo* is San Christoval, because some plants introduced to Be. from *Paungo*, e.g. *kape Paungo*—a large dry-land taro (Alocasia macrorrhiza)—is said to be abundant there.

Russell Islands: no contacts reported.

Stewart Islands (Sikaiana): No traditional contacts reported.

Santa Cruz (Ndendi) Be.: *Teni*. Possibly the local name of Santa Cruz, Ndendi, is preserved on Be. in the name of a wild, edible yam: *'uhi Teni*, (a Dioscorea esculenta variety) said to have been introduced from *Teni* in older times. Otherwise no contacts recorded.

Banks Islands: No contacts reported.

Reef Islands (Nupani): No contacts reported. The name Niupani is well-known on Be.; it is a common Polynesian place-name, and may not be identical with *Nupani*. In modern Be. Reef Islands are called *Tekau*.

Duff Islands (local and Be.: *Taumako*). Probably *Taumako* was known to the Be. because of a visit from two drifting canoes (*baka tahea*), Canoes T217, T218, T219, and T224. Although visits from drifting canoes were greatly desired by all Be. who regarded them as a gift from the gods, they could remember no details about Taumako, which the people from the canoes presumably told them.

Woodlark Island (local: *Murua*, Be.: *Mungua*). Perhaps Woodlark was the island visited (twice?) by the famous Ngaakei (Canoes T227). As a result of this voyage, at least four new plant varieties are said to have been introduced to Be., also the name *Ghongau*.

Tikopia (Be.: *Kopia*). Canoes T226, gives a short account of two castaway Tikopians landing on Bellona in the 1930s with their canoe. R. Firth (1931) cites a native story from Tikopia of a visit to Re. and mentions another visit in his text, both of them some years before 1929. This seems to substantiate the hypothesis that the "90°–100° corridor" was an important path for communication between the Polynesian outliers. A cultivated yam (Dioscorea alata) on Be. is called *Kopia* after Tikopia, but it is not known whether it was actually introduced from there. A dance, *ngongole*, came from there as also the name Tahua.

Rotuma (Be.: *Ngotuma*). Castaways from Rotuma (?) once visited Be. (Canoes T220, T221, T222, and T223). A type of pandanus (*hanga Ngotuma*) is said to have been introduced from Rotuma.

Lord Howe Island or Ontong Java (local: *Liuaniua*;

*) According to Levy & Smith, Kela is the proto-Malaitan name for the south-end of Guadalcanal (information from S. H. Elbert).

Be.: *Nguaniua*). No traditions report contacts, but an ancient place name on Re. near the village *Hatagua* is *Nguaniua*.

Samoa (Be.: *Sa'amoa*). No geographical knowledge reported, but the name *Sa'amoa* is found in the genealogy of the Ngoha clan, generation 9, Canoes T149.

Futuna and Wallis (Uvea). (Be.: *Hutuna*, *'Ubea*). One would suspect that these are the islands mentioned in Canoes T66, but the tradition is far too meagre in detail to allow any definite conclusions confirming *'Ubea* as the specific original home of the first immigrants to Be. On the other hand, there is no available evidence against such a conclusion: Uvea is a volcanic island, so the Bellonese basaltic goddess-image may have come from there. *'Ubea* is said to have been visited, later, by Be. in search of turmeric for ceremonies (Canoes T124). It is worth noting that Futuna and Wallis both lie in the "90°–100° corridor" to Polynesia.

Tonga Islands. Oral traditions refer to some cultivated plants as coming from Tonga (e.g. a type of alata yam), but it should be remembered that in Be. *Tonga* is unspecific, often meaning just "eastern". The place name *Nuku'angoha* may stem from *Tonga*, but it is not clear if it is specific to *Tonga*.

Marquesas Islands, Hiva-Oa. Maybe "*Siba*" in Be. refers to Hiva(-'Oa), Canoes T1.

In addition to the above-mentioned place names in Be. lore—which certainly underline the paucity of contacts with surrounding people and thereby the effectiveness of the ocean barrier—it must be noted that the first period of western contact (before Christianization) brought a mass of new knowledge to the Be. Thus the island was visited in the 1890s by ships from Queensland (introducing new plants, and—of paramount importance—iron), and in the 1920s by Japanese trawlers (which brought e.g. the *'uhingaba mai Laapani* yam (a Dioscorea esculenta type).

In recent years many Be. have gained new knowledge of the Solomons while working on plantations. Some have also visited Rabaul on New Britain and two men, Taupongi and Pungeba, have even paid visits to Denmark. From reading and writing letters and listening to the radio, the Be. have gained knowledge about the general features of world geography. This knowledge tends to change completely the traditional local concept of the world with Be. and Re. at the centre surrounded by vast expanses of sea, broken only by the dangerous Solomons and a few, very small Polynesian islands.

Appendix B-1

Utilized plants of Bellona Island, listed alphabetically after vernacular names

The list gives for each plant a short description with distinguishing characteristics, particulars as to its use, occurrence, and the period in which it was introduced into the island according to traditions. Further, a scientific identification as to family and species when available. A final number refers to file number in the Botanical Museum, University of Copenhagen, if sample is kept there. R before number indicates that the specimen identified was collected on Rennell. Occurrence is given non-quantitatively as: Rare, Occasional, Common.

Periods of introduction or of initiation of use as found in traditions:

Hiti. A period before the invasion of Bellona by the eight original ancestors. According to traditions the *hiti* were the original inhabitants of the island.

Early. Period between the invasion and the first European contacts in the second half of the 19th century.

Late. After European contacts, but before Christianization in 1938.

Recent. Introductions after 1938. Where possible year of introduction is given in parenthesis.

Specimen Nos.:

2730–2999 collected on Rennell by H. Dissing 18/8–30/8 1962
3000–3170 collected on Rennell by T. Wolff 14/3–6/4 1965
3201–3332 collected on Bellona by S. Christiansen 1/5–24/5 1965
3333–3479 collected on Bellona by S. Christiansen 10/9–18/10 1966
3501–3589 collected on Rennell and Bellona by S. Christiansen Dec. 1969

Most of the identifications were supplied by Dr. Bertel Hansen, Botanical Museum, University of Copenhagen, whose assistance is gratefully acknowledged.

aamiti. An unidentified large forest tree. Wood used for house timber, but regarded as inferior.

aapunga. An unidentified vine used as medicine for coughing. Not collected.

'aatiti. An introduced tree with inedible fruit used to seal canoe cracks. Probably Parinarium sp.

'aatiu. A wild melon; its fruits are eaten raw or cooked in oven. Rare. Early introduction? CUCURBITACEAE. Cucumis melo L. 3099.

aatoka. A fern usually found in fallow gardens, mainly on poorer or exhausted soils. FILICINAE, species not identified. 3465, 3527.

aatuku. An unidentified vine; its bark is used for rope.

abubu. General name for Potato Yams, bulbil-bearing, non-poisonous yams with thornless, left-twining vines (see also *soi*). Flattish, curved tubers (*mungi*) and bulbils (*hua*) are eaten. Tubers said to be best developed in *kenge* types of soil, bulbils on *malanga* types. *A.* are often found climbing trees near old homesteads, and in gardens. *A.* tubers are usually harvested in May-June and bulbils in January-February. A. are said to have originated in Paungo (San Cristobal) in a remote past. DIOSCOREACEAE. Dioscorea bulbifera L. Several kinds known:

abubu mata malolo, with smooth-skinned bulbils and tubers. 3370.

abubu Paungo, similar to *a. mata malolo*, but darker. Both common. 3440.

ghope, an *a.* with narrow, sharp-pointed leaves. Whitish bulbils. An ancient type and a newer one, introduced in about 1936. 3272.

koingau, a rare subtype of *a.* Old.

maasiu, *a.* with dark leaf bases, and glossy leaves. Old. Rare.

mangitebe or *mangangitebe*. Small, light-skinned and light-fleshed bulbils and very small tubers. Rare. Old.

mangitebe 'ungi. A dark variety of the above. Rare.

mongetau. Seems to be a rare subtype of *posu*. Old.

mota. An *a.* with smooth-skinned bulbils and tubers. Old and rare. *Mota malolo* (or *mata malolo*) seems to be identical with *a. mata malolo*.

posu. Reddish vines, developing tasty, pear-shaped tuber. Old. Rare. 3223, 3260.

aghaagha. Morning Glory; a vine from fallow gardens and secondary forests resembling sweet potato, but without edible tubers. Has violet flowers. Leaves and woody stems eaten during scarcities. Rare. *Hiti.* CONVOLVULACEAE. Ipomoea congesta R.Br. 3315.

aka (lit., root). Vines with three-fingered leaves. Long, thin roots or tubers. Stems, leaves and esp. tubers eaten. Growing on any type of ground, usually in remote clearings and in forest. Cultivated in the past, now regarded as scarcity food, though the roots are hard to dig. Its previous importance may have lain in its short period of growth (about 2 months) and its usefulness during temporary food shortages. LEGUMINOSAE, Pueraria triloba (Lour.) Makino

[syn. P. lobata (Willd.) Ohwi], a plant of wide occurrence in Melanesia and Polynesia (Barrau, 1962). Canoes T66 mentions its use by Kaitu'u (of generation 1), the plant probably used by *hiti*. Three kinds distinguished:

aka pali. Smooth vine base; light stems used for rope. 3239.

aka sopi. Smooth vine base, but dark stems. 3238, 3439.

aka bango. Rough vine base. 3236, 3336.

alangi. A vine used like *mango* (see this) and probably related to it. ARACEAE.

aloba. A Ficus from primary forests with large aerial roots occasionally used as small timber in house construction. Used previously for low-quality *tapa* of brown colour. Occasional. MORACEAE. Ficus glandifera Summerh. var. brachysyche Corner. R2746, 3529.

amamu. Medium-sized tree, secondary growth and forests; wood used for house posts. Occasional. MALVACEAE. Abroma augusta (L.) Willd. 3426.

anga. Small Ficus tree of little specific use except as small timber for houses. Leaves are eaten by Melanesians but not by Be. Common. MORACEAE, Ficus prasinicarpa Elm. R2881, 3092.

angingi. A small tree resembling *ghangapuli* and of similar uses. Not identified. 3330.

ango. Turmeric plant. Roots formerly used for preparation of valuable dyes (*ngenga*) for colouring *tapa*, loincloths, and as body ointment. Not actually grown, but found occasionally in edges of gardens and in secondary growth. Roots were collected, left to dry in houses, then scraped and the resulting powder dried, when used, mixed with coconut water. ZINGIBERACEAE, Curcuma longa L. At least three kinds distinguished, two of which are said to have been brought from *'Ubea* (Canoes T124):

ango te henua (lit., turmeric of the land). Root orange inside. Used for dyeing loincloths. R2918.

ango matangi (lit., eastern turmeric), perhaps the same as *a. te henua*, also used for dyeing *tapa*. Not collected.

ango Nikiua (lit., turmeric from *Nikiua*), probably an unknown island). Root red-orange inside. Formerly used for dyeing *tapa*. R2918.

anu. Medium sized Ficus tree in forests and secondary growth. Formerly used for *tapa*, but of inferior quality. Also occasionally used for small timber in houses. Fruits eaten during scarcities. MORACEAE. Ficus sp. 3384.

angoghapu. See *tango hahine*.

'aoa. General name for some kinds of large Ficus trees. A huge Ficus tree, a strangler-Ficus, growing in forests. Because of its much-divided trunk of little use except for small timber (posts) in houses and previously for *tapa* considered inferior. MORACEAE. Ficus benjamini L. 3402.

'aoa tea (lit., light *'a*). Resembling *'aoa* but lighter of colour; of same uses. MORACEAE. Ficus microcarpa L. f. var. naumannii (Engl.) Corner. 3006.

apangongo. A Ficus related to *'aoa* and of similar uses.

apatoa. A huge tree from forests with thin-skinned green drupes containing thick-shelled kernels. When cracked, the kernel yields a sour seed, that is edible if treated like *ngeemungi* seeds. Not planted, but saved when forest is cleared. The wood can be used for canoes. Rare. BURSERACEAE, probably Canarium vitiense A. Gray. 3314, 3467, 3562.

apunga. A Ficus from forests; the bark was used for *tapa*. Rare. MORACEAE Ficus sp. Not collected.

asi. A large tree from forests; wood used for houses and for gunwale poles (*lakunga*) in canoes.

asongae. A shrub in secondary growth; the leaves and shoots are eaten. Wild. Occasional. URTICACEAE. Pipturus argenteus (Forst. f.) Wedd. R2767, R3001, 3313, 3339. [B. Treide (1967) reports from Melanesia probable similar use of the same plant].

baapua. See *pateto*.

bae. Creeper from forests and secondary growth. Its very long stems are split and used for strong, permanent lashings. Pandanus leaves are folded over *b.*-sticks to form thatch panels (*mataangau*). Because of keeping qualities and because of availability in adequate lengths it is also used (as is *ue*) to mark *tohitohi* garden divisions. Occasional. FLAGELLARIACEA. Flagellaria indica L. R3031, R3123, 3343, 3544.

baebae. 1) See *huti hahine*.

2) A useless vine growing near the sea. Unidentified.

baghu. Large screw pine with broad, thornless leaves used for the sewing of coarse sleeping mats (*baghu*). The young aerial roots are squeezed in water and taken as a stomach ailment. Fruits not used. Rarely planted. Common. PANDANACAE. Pandanus sp.

baghu 'atua. A fern, its stems are used for trolling lures. FILICINAE. Crinum sp.?

banga. Medium-large trees, growing wild in forests left when gardens are cleared and sometimes also planted. Related to *hutu* Barringtonia asiatica (L.) Kurz, a tree from Pacific beach forests easily identified by its tetragonal fruit. While the fruit of *hutu* is poisonous enough to paralyze fish, the edible fruits of *b.* are nourishing and tasty. In Melanesia the fruits are eaten, but generally not in Polynesia. At least four kinds are found:

banga hutu (lit., *hutu*-like *b.*). The light green somewhat pear-shaped fruit contains a tasty kernel. Occasional. 3302.

banga Paungo (lit., San Cristoval b.). With red fruits.

banga tea (lit., whitish *b.*). Similar to *b. hutu*, but fruit is of a lighter colour. Occasional.

banga 'ungi (lit., dark *b.*). Fruits are dark purple when ripe. Occasional. 3303.

From Barrau's description (1962) it seems probable that all *b.* are BARRINGTONIACEAE/LECYTHIDACEAE, Barringtonia racemosa (L.) Spreng. Following A. de Candolle, Barrau distinguishes two subspecies: a rubrum ssp. (= *b. 'ungi*?) and an alba ssp. (= *b. tea*?). *Banga hutu* is interesting because of its resemblance to both *hutu* (B. asiatica) and *b. 'ungi* (B. racemosa?). Perhaps *b. hutu* lends support to Barrau's idea that B. asiatica has been locally developed into a non-poisonous species in the same way that Dioscorea bulbifera L. seems to have been. The taxa is difficult to identify with certainty on the available material. The edible *b.* may as well be Barringtonia edulis Seem.

bangai. A forest tree. The leaves are used to wrap puddings. ANACARDIACEAE. Semecarpus sp.?

bangaitu. A creeper, bark of which is used for cord as to make lines, nets. Common. *Hiti.* Unidentified. Probably same as *boitu.*

bangakongu. Tree from secondary forest with black fruits, used for timber esp. for house floors. Occasional. LAURACEAE, Litsea sp.

bangitia. A fern in forests and in fallow gardens; a pioneer plant usually succeeded by others except on poor soils. Common (several species are found in the Solomons). FILICINAE. Nephrolepis sp. probably N. biserrata or N. triserrata (Sw.) Schott.

bangobango. A tree from beach forests with white flowers. Timber used for posts, carvings and especially for the fireplow (*nganiabi*) and the hearth (*b.*). First the fire is usually nourished with wood from the *hau* tree. Later suitable firewood (*baakai*) is usually selected according to use. Occasional. VERBENACEAE. Premna gaudichaudii Schau. R3160, 3278, 3387.

bangokupenga. A kind of thick vine, the stem of which is used for *kupenga* net frames. Unidentified.

bangopali. Vine from secondary forests. The stem is edible, though fibrous, as are young leaves. Used as scarcity food. MENISPERMACEAE. 3277, 3444, 3532.

bangungu. A vine with large seed pods. Sap is used to treat boils. Recent introduction? *Kaubangungu* are stems of *b.* LEGUMINOSAE, probably Canavalia microcarpa (DC) Merr.

baobao. Tree from secondary forest with green fruits turning yellow and edible when ripe. Inside seeds are somewhat bitter, but edible after cracking and soaking. The tree has white sap. Occasional. APOCYNACEAE, Ochrosia parviflora (Forst.) Hemsl. 3420.

bao'uhi (lit., forest yams). Common name for *manumgaghe* and *'uhi Tonga.* See these.

beetape (Re.: **beetaape**). A yam with vines twining right, closely related to *suinamo*, and also to *manumgaghe* and *'uhi Tonga. B.* has triangular, shining leaves and medium-sized highly esteemed tubers. The vines show features resembling those of both the yam Dioscorea alata L. (quadrangular-sectioned stems, though no wings) and of D. nummularia Lamk. (vine base and upper part of tuber thorny, but thorns in this case little developed). Flowering. Has curved tubers like those of many *'uhi* yams. Very important crop, requiring good soil, not necessarily deep, but with more than six years fallow. *B.* is quite resistant to droughts, but vulnerable to strong winds and therefore in need of staking. Common. Canoes T90 mentions *beetape* as a *hiti* crop, but this is disbelieved by many Be. Said to be locally developed in Re. and Be., not known in the Solomons. DIOSCOREACEAE. Dioscorea alata L. 3202, 3231, 3374.

beeghini. Young edible stage of the *mango* vine. See this.

belebelenga. One of the smaller kinds of Ficus, growing in forest. Occasionally used for small posts in houses, but not considered among the best timber trees. Formerly used for tapa and for sandals for walking on the reef. Occasional. MORACEAE Ficus sp. 3555.

bii. Tahitian Apple, Polynesian Plum or Vi Apple. A large tree often left over when forest is cleared. Its yellow egg-sized fruit is popular on Be. as elsewhere in Oceania. The drupes ripen sporadically and must be eaten within a few days. Occasional. *Hiti.* Spondias dulcis Soland. ex Park. [S. cytherea Sonner.] 3354. ANACARDIACEAE.

bii 'atua (lit., useless *b.*). 1) Forest tree. Fruits inedible; the trunk may be used for canoe hulls, not for durability but when gigantic dimensions are sought for. *Hiti.* ANACARDIACEAE. Probably Spondias pinnata (Koen. ex L. f.) Kurz. 2) On Re., possibly a small herb, COMPOSITAE, Bidens biternata (Lour.) Merr. & Scherff.

bilangoke. Tree of medium size from primary forests. Its hard wood is used for canoe paddles. Occasional. MELIACEAE. Probably Aglaia sp. 3385, 3504.

bini (from English: bean). The Common Brown Bean and Soy Bean are both known on Be., but little used. Now and then seen left uncultivated. LEGUMINOSAE, Phaseolus lunatus L. and Glycine maximus Merr. Recent (1949) introduction apparently by SDA missionary Gheela.

boghota. See *mei.*

boiato. Types of yam usually identified by their three-fingered leaves and right-twining vines. Moderate-sized tubers of little esteem compared with most other food crops. The plant is, however, hardy, yielding despite drought or poor soil. On poor soil the tuber is relatively well developed, whereas the edible bulbils are better developed on fertile soil. Propagation is usually done by bulbils; thus seed tubers may be saved. Cultivation seems to be of ancient origin to judge from specialized, now almost obsolete techniques employed; for instance a horizontal grid is used

to support vines. Now rare. Canoes T88 mentions *b.* as a *hiti* crop. Several kinds distinguished:

boiato Kenga (lit., Solomons [or Guadalcanal] *b.* introduced by Takitaki and Tubingau (Canoes T228 and T229). Rare. Early. 3410.

boiato tatanga. Small, round tubers and large bulbils. Rare. Early. 3215. Closely related to *b.* are:

gholongi. A type of *b.* of very limited cultivation if any. Very rare. *Hiti*.

tabongo. Usually grown in poor soils (*ghinaghina*) to which it seems better adapted than most crops, developing a pear-shaped tuber. Also usable in good soil, where tuber is almost undeveloped, but fine bulbils. Rare (more often on Re.).

b. Kenga, *b. tatanga*, *gholongi* and *tabongo* are all DIOSCOREACEAE and same species: Dioscorea pentaphylla L.

boighai. A kind of mango tree with small green fruits regarded poisonous (when unripe?); see Canoes T221. The *hiti* are said to have used *b.* for food, a widespread practice in Melanesia with many Mangifera species, but unheard of on Be. as on other Polynesian islands. Leaves placed on chest of person suffering from fever and shortness of breath (asthma?) are said to relieve this. Two types of *b.* are known on Be.:

boighai hangamea. Fruits purple when ripe, said to be poisonous. Occasional. *Hiti*. 3373.

boighai unga. Fruits bright red. Like other *b.* not cultivated, but left over when forests are cleared. Occasional. *Hiti*. 3518. Both trees seem to be ANACARDIACEAE. Probably Mangifera minor Blume.

boitu. 1) A small tree from forest or old secondary growth, with red egg-shaped fruits. The kernel contains a seed which is eaten after soaking and baking like that of *ngeemungi* seeds. Never planted, but always left uncut. Rare. *Hiti*. GNETACEAE. Gnetum latifolium Bl. 3575. Related species are of considerable importance throughout Melanesia (see B. Treide, 1967). 2) Possibly a creeper. Bark is used for cord (*bangaitu*) for lines and for nets. Occasional. *Hiti*. May be same as above.

bootebo. See *'uhi ta'ane*.

bugho. A tree from forest or secondary growth which yields valuable timber, used for house rafters and beams, and outrigger booms. Especially appreciated because of its bark, the fibres of which are very good for cord used for large nets (*bugho*). Occasional. *Hiti*. URTICACEAE. Melochia odorata L. 3329. A tree, *maaungu*, seems to be similar to *b.* Found on Re. only?

bulitaba. See *taba*.

bunge. A Morning-Glory vine from clearings. Pink flowers. Edible leaves. (Related to *aghaagha*). Used as food in seasonal scarcities and regularly collected. Occasional. *Hiti*. CONVOLVULACEAE, Ipomoea gracilis R.Br. 3224, 3247, 3357.

bungeabu. See *mei*.

bungebungegheta. A Morning-Glory vine growing in clearings. Similar to *bunge*. Edible leaves. Especially on Re. *Hiti*. CONVOLVULACEAE. Ipomoea acuminata (Vahl) R. & Sch. [syn. J. congesta R.Br.] R2762.

bungu. A general name for rushes, CYPERACEAE, such as Cladium mariscus (L.) Pohl. Used as indicators of moisture in soil. Rare (common Re.). *Hiti*.

ghaapoli. A small to medium-sized Ficus from primary and secondary forests. Milky sap. The small, edible fruit is borne on trunk, whitish when young but turning red when ripening. Leaves and young shoots (*manongi*) are also edible when cooked. Four kinds of *gh.* found:

ghaapoli mongi (lit., hard *gh.*). Hard fruits, probably Ficus wassa Roxb. 3249, 3346;

ghaapoli mami (lit., fat *gh.*);

ghaapoli manguu (lit., soft *gh.*). Probably Ficus copiosa Steud R2928, R2940, R3013, 3556;

ghaapoli tabalongi (lit., brown *gh.*).

All MORACEAE.

ghabangaghi. 1) See *huti ta'ane*. 2) See *ngeemungi*.

ghabighogha. Large tree from forests, said to be related to *makahika*. Its small fruits are edible, and the wood used as timber. Rare. *Hiti*. Not identified.

ghaghimanga. (Re.: *ghaighimaga*). 1) A large tree from secondary growth and forest, spared from cutting because of its edible fruits which resemble avocados. Eaten raw. Seeds may be cracked and the kernels (*tamuma*) may be eaten if first detoxicated by salt water soaking and roasted. Occasional. *Hiti*. Said (hardly sustainable) to be related to *ghai* (the mango). The taxonomic relationship to *tangie* is on the contrary not perceived. Both COMBRETACEAE. *Gh.* is possibilibly Terminalia kaernbachii Warb., also found in New Guinea. 3461. 2) *Gh.* seems also to be the name of an *'uhi* yam. See *'uhi*.

ghagha. A yellow flowered vine resembling the so-called Dolichos Bean of the East Indies. Its large, brownish pods and leaves are probably eaten. Occasional. *Hiti*. LEGUMINOSAE. Vigna marina. (Burm. f.) Merr. R3069.

ghaghaghaba. See *huti ta'ane*.

ghaghanga. Only Re.? A tree from forest of the family SAPOTACEAE, the nuts of which were collected by the *hiti*. Now used as a scarcity food.

ghai. The Indian Mango Tree. Only a few specimens have been noted on Be. Though of rather inferior quality, *gh.*-fruits are esteemed as food; even the turpentine smell seems not to be disliked. Late introduction, probably from Melanesia in about 1900s ANACARDIACEAE. Mangifera indica L. 3403.

ghaighimanga. Probably original form (still used on Re.) of *ghaghimanga*. See *ghaghimanga*.

ghaimenga. A forest tree which may grow slowly to huge dimensions. Delivers by far the most esteemed wood for timber for almost everything, esp. for canoe hulls (the tree is sometimes called *te baka*, lit. canoe log). Wood has fine keeping qualities, is fine grained, light and strong, and easily worked. Most other kinds of wood used for canoes are considered substitutes for *gh.* Usable trees are only available in limited numbers (less than 1,000 totally). SAPOTACEA. Palaquium erythrospermum H. J. Lam. 3264, 3371, 3508.

ghali or *ghaliaki* (lit., fast). A small- to medium-sized tree with juicy sap in secondary growth. One of the first dominants in regrowth of fallow gardens, usually indicating lower fertility than presence of *hau* trees does. Like *hau* left uncut in last weedings of a garden to promote fast regrowth. Wood of little use except as firewood. Common. EUPHORBIACEAE. Breynia cernua (Poir.) Muell. Arg. R2823, R3146, 3452.

ghalingi. See *ubo.*

ghanegho. See *kape.*

ghangapuli. A medium-sized tree from secondary growth with juicy sap. One of the first invaders of fallow gardens, spreading rapidly to become dominating, esp. on more fertile land. Like *hau* left uncut in final weedings of gardens to promote regrowth of the fallow. Used for small timber or house purlins and floors. Often used for cooking with pots because its fire is almost smokeless. EUPHORBIACEAE. Acalypha grandis Benth. 3322, 3446.

ghangighaba. See *huti ta'ane.*

ghape. Vine from forest with white sap. The cooked tender leaves are used in *pota* and are highly esteemed. *Gh.* is (esp. on Re.) an important food, eagerly collected in the lean season to yield contribution to food supply. Two kinds: *ghape unga* (lit., red *gh.*) Reddish leaves. *ghape 'ungi* (lit., dark *gh.*). ASCLEPIADACEAE. Gymnema sp. R2952, R3120, R3383, R3518.

ghape 'atua (lit., wild/useless *gh.*). A vine from forests, considered related to *ghape.* The fibres of its stem are durable even when soaked and hence used for tying fishhooks. An important plant with use of long tradition (*hiti*). Occasional. APOCYNACEAE. Anodendron paniculatum (Roxb.) D.C. 3414, 3516.

ghasigho. A vine from primary forests; the stems are said to have been eaten during scarcities; they are hard to chew and rather woody; it is now almost a joke to talk of eating them. *Hiti* ate them. Canoes T176. Occasional. AMPELIDACEAE. R2936, 3445.

ghasughui (Re.: *ghasighui*). A general name for orchids. Many kinds found, often epiphytic. The stems (of some of them?) are roasted and eaten during food shortages. Rare. *Hiti.* ORCHIDACEAE. Dendrobium antennatum Lindl. R2897, R3054; D. gouldii Rchb. f. R2863, R3119; D. tokai Rchb. f. R2864; Cadetia hispida (A. Rich.) Schltr. R3121.

ghoghipii. See *huti ta'ane.*

gholongi. See *boiato.*

ghongopagho (Re.: *ghoghopagho*). See *'uhi ta'ane.*

ghope. See *abubu.*

ghughia. See *kape.*

hanga. The general name (*hu'aiingoa*) *h.* encompasses screw pines, PANDANACEAE, except smaller species and species without thorns on leaves. Most *h.* grow wild, but some of the most useful are planted in special gardens (*maalu*), usually on less fertile soil. They take 3–4 years to develop a usable size and to bear fruits. Major use is for thatch, but the keys of the syncarpium of some kinds are edible. Most are said to have been utilized by the *hiti.* As taxonomy of PANDANACEAE is difficult, collected specimens have not all been identified. Following kinds have been found:

hanga isi (lit., *isi*-like *h.*). Commonly planted, especially on Re. Edible keys.

hanga langua. Edible fruits; leaves almost thornless. Planted. Rare.

hanga Malangu. (Malangu, a place name?). Thornless leaves, orange-red keys. Planted.

hanga ngau motumotu (lit., breakable). Edible keys. 3582.

hanga ngau ta'o (Re.). Same as *h. Ngotuma* (Be.) 3548.

hanga Ngotuma (lit., *h.* from Rotuma). Orange-red keys containing carotine, sometimes chewed as sweets though woody. Probably of early cultivation. 3256.

h. songa and *h. takape* used for thatch. They are Pandanus dubius Spreng. *h. Ngotuma* is possibly Pandanus odorifer (Forti) Kuntze. Most of the others are probably Pandanus tectorius (Soland. ex) Parkinson. PANDANACEAE. Pandanaceae not considered closely related to *h.* are: *baghu*, *kala*, and *kie.*

hau. A small- to medium sized tree with yellow flowers, in secondary growth, which it usually dominates on fertile soils. It is considered important for recovery of fertility after cropping and is saved from weeding in mature gardens (like *ghangapuli*, *ngaupata*). The wood is used for small timber (as in roofs) though of low strength and quickly eaten by termites. Used for outrigger floats (*ama*) in canoes, because of buoyancy and availability. Braided strips of bark are often used as rope for less permanent lashings. Common. MALVACEAE. Hibiscus tiliaceus L. R2768, R3136, 3251, 3365.

hau Tonga (lit., Tonga h.). A shrub or small tree (a 'Chinese Lantern') considered related to *hau*, also found in secondary growth. Planted(?) as an ornamental bush. Rare. Late introduction. MALVACEAE. Abutilon asiaticum (L.) G. Don. R3087.

hengo. A kind of Ficus from forests. Its bark was of some use as *tapa*, and wood for house timber (posts). Fruit said to be edible. Rare. MORACEAE. Ficus tinctoria Forst, f. R3066, 3559.

heta'u. A large tree from forests, usually near the sea, as explained by a traditional tale (Canoes T45). Has unusually dense and straight-grained wood, hence its use for bowls, *kumete*; also valuable timber for canoes and houses. Roots used for fishhooks, and flowers for adornment. GUTTIFERAE. Calophyllum inophyllum L. R2886, R2895, R2912, R3068, R3075, R3086, 3388.

hue. A beach vine, Beach Morning Glory, because of its fast growth called 'A Mile a Minute'; white flowers and sap. Leaves are applied to boils. Common. CONVOLVULACEAE. Ipomoea pes-caprae (L.) Roth.

huti. The general name (*hu'aiingoa*) *h.* is applied to bananas and plantains alike, a distinction not made by the Be. (also taxonomically dubious). *H.* are divided into two sections:

h. ta'ane (lit., male/vigorous/coarse h.) and *h. hahine* (lit., female/slowly growing/small, nice h.). In practice *h. ta'ane* are perennial (easy to rejuvenate) and planted near kitchen houses, whereas *h. hahine* are biannuals, planted in gardens. All *h.* have high requirements of fertility; necessary are either dressings of wood ashes (*ngehu*) or long-time fallowing (at least 6 years).

huti ta'ane

Comprise at least two more taxonomic species, many kinds of which are plantains. Musa troglodytarum is easily recognizable by the upright stalk of its mature inflorescense.

ghabangaghi (Re.: *ghabaghaghi*). Curved, rather small fruits. Dry leaf nerves are black, hence their use in forming patterns in (modern) sleeping mats (*malikope*). Its upright stalk is explained in a story: Canoes T40. Occasional. *Hiti.*

kangisi 'ibai. A rare, ancient kind of *ghabangahi. Hiti.*

paunao. A subtype of *ghabangaghi.* Occasional. *Hiti.*

takape (or *huti takape*; lit., *takape*-fish banana). Another variety of *ghabangaghi*, differing by its striped fruits. Occasional. *Hiti.*

tapipiingi (or *huti tapipiingi*). Variety of *ghabangaghi.* Rare. *Hiti.*

tongaka. Resembles *ghabangaghi*, but has straight fruits. Occasional. *Hiti.*

Specimens of *ghabangaghi*, *kangisi'ibai*, *paunao*, *takape*, *tapipiingi*, and *tongaka* have not been collected, but they seem safely to be identified as MUSACEAE, Musa troglodytarum L., a relatively primitive type of banana sometimes with well-developed seeds. They are considered related to each other by the Be.

ghangighaba (Re.: *ghaghaghaba*). Long fruits and inflorescence, light green resembling *tongaka*, but with bent inflorescence. Fruits contain numerous seeds. Occasional. *Hiti.*

ghoghipii (or *huti ghoghipii*). Resembling above, but with dark leaves and stalk. Occasional. *Hiti.*

huti pugha (lit., greyish banana). Short stalked. Common, recent.

huti mea (lit., yellow [or red] banana). Reddish stalk and bright yellow fruits, when ripe. Not eaten raw. Said to have been brought from *Murua* by Ngaakei (Canoes T227A). Rare. Early.

huti Teaghoa. A variety of *h. mea* introduced to Re. by Teaghoa in the 1880s or 1890s.

huti unga = h. mea.

peko (or *h. peko*, sometimes: *saukaba hua peko*). A kind of *saukaba*, see below.

saukaba. A plantain with long, bent inflorescense. Has thick, rounded fruits which may be eaten without the normal cooking. Fast growing, ripens in 7 months. The most important plantain, known in several subtypes:

saukaba hua peko. Smaller fruits than other *s.* which it resembles.

saukaba tangiko'i. Said to be closely related to above.

saukaba tea (lit., light *s.*) and

saukaba 'ungi (lit., dark *s.*) are colour varieties of *s. saukaba* plays an important role in traditions. (Canoes T40, T183, T207, T214, T229.) Was utilized by the *hiti* and is still commonly planted because of high yields.

Specimens of *ghaghaghaba*, *ghoghipii*, *h. pugha*, *h. mea*, and *saukaba* have not been obtained, but they are probably all varieties of the 'species' Musa paradisiaca L., MUSACEAE.

huti hahine

baebae. Banana with thin, rather long (40 cm) fruits on long inflorescense. (See Canoes T56). Rare. Early. Two kinds: *baebae susungu* (lit., light-coloured *b.*) and *baebae 'ungi* (lit., dark *b.*).

huti mai moana (lit., overseas *h.*). Long inflorescense, short stalked. Common. Early introduction.

huti mongi (lit., hard *h.*). Short inflorescense, long sweet fruits. Often the crop planted when old fallow areas are cleared. Most common of all bananas, usually eaten cooked. *Hiti.*

huti pua (lit., betel nut *h.*). Small-stalked, yellow fruits. Short, small leaves. Common. Early.

huti pua 'ungi. A dark variety of *h. pua.* Occasional. *Hiti.*

tai. Small, aromatic fruits. Regarded as very tasty, a food for the sick and for pregnant women. Common. Late introduction.

All *h. hahine* seem to belong to MUSACEAE, the 'species' formerly called Musa sapientum L.

hutu. A tree from beach forests with tetragonal, floating fruits. The fruit contains a poison (hydrocyanic acid), strong enough to poison fish (See *banga*). Large leaves are used to wrap fish in oven. Wood of no

particular use except as firewood. Common. BARRINGTONIACEAE. Barringtonia asiatica (L.) Kurz. R2867, 3422.

isi. Polynesian Chestnut, a large tree with big reniform seeds; a favoured food because of taste and keeping qualities. Usually it is not planted, but left when vegetation is cut. The wood may be used for carving because of fineness of grain. At least two kinds are distinguished:

isi koka. Old specimens are often found near dwellings. Common. *Hiti.*

isi mongi (lit., hard *i.*). Probably identical with *isi ponongi.* Common. *Hiti. I.* proper are no doubt LEGUMINOSAE. Inocarpus fagiferus (Park.) Fosberg.

isi 'atua (lit., wild/useless *i.*). Wood is quite tough and of some uses, but fruit is inedible. Occasional. CAESALPINACEAE. Probably Afzelia bijuga A. Gray. R2803, R2893, 3103.

kakenuku. See *'uhi hahine.*

kala. A screw pine (Pandanus) growing wild. Has small, red keys in oblong syncarpium which are often chewed raw or baked (see Canoes T93, T94.) *K.* was formerly used to dye *tapa* red. The thornless, rather narrow leaves are used for plaiting sleeping mats (*baghu kala*) and fine bags (*kete mangua*). Occasional. *Hiti.* PANDANACEACEA. Probably Pandanus dubius Spreng. R2774, R2934, 3258.

kalakala. Name used for three unrelated plants.

1) A vine with red fruits related to pepper, growing wild in forest and secondary growth. Used for medicine; crushed leaves applied to wasp stings. PIPERACEAE, Piper sp. R2782, 2784 . . . . . , 3255, 3274.

2) A kind of breadfruit tree. See *mei.*

3) A kind of Morinda citrifolia. See *nguna.*

kamaamangu. See *tango ta'ane.*

kangibi. A herb found in gardens and on village greens as a weed. Often leaves and flowers are reddish. The seeds are said to be taken for diarrhoea. Common. A recent, unintentional introduction. EUPHORBIACEAE. Euphorbia hirta L. R3115, 3334.

kanume. A small dark tree of the ebony family from primary forests. The core wood of trunks is dark and durable. Can be used for carving and for making the main part of arrow shafts, which must be heavy to ensure direction of flight. Occasional. EBENACEAE. Diospyros glaberrima (L. f.) Bakh. R2902, 3639.

kape. The Giant Dry-land Taro is found in both wild and cultivated forms on Be. It is considered related to *tango* (taro) and often cultivated with this or with *huti* (bananas) in gardens. *K.* takes two years to develop its enormous corm (or base stalk). Its gigantic leaves (up to 1.5 m high) are therefore often found in luxurious undergrowth. The corms are not considered very palatable, mainly because of their minute crystals (raphides), which irritate the throat. *K.* is said to have been cultivated by the *hiti*, an indication of ancient use in the island. The connection between *k* and *tii* (often cooked together) said to be found in the old Polynesian kitchen (Barrau, 1962) seems not to be found on Be. on the other hand. Several kinds of *kape* are observed:

ghanegho. Resembling *k. Paungo*, but said to be a much older type. Rare. *Hiti*?

ghughia (esp. Re.). Said to be related to *kape Paungo*, but of more ancient origin. Rare. *Hiti*?

kape bao (lit., forest k.). Not planted. Considered too sour for common use, but said to have been eaten by *hiti.* Occasional. 3430.

kape mongi (lit., hard *k.*). A rare form. Early.

kape Paungo (lit., San Christoval k.). A large, white-stalked *k.* Flowering. 2–3 m high. Often planted in remote clearings (*abaaba*) and on the coastal terrace (*abatai*). Common. Early. 3210, 3353.

kape 'ungi (lit., dark *k.*). Like *k. Paungo*, but with dark leaf veins and stalk. Rare. Early.

All *k.* collected seem to belong to ARACEAE and to be Alocasia macrorrhiza (L.) G. Don. The cultivation of Giant Dry-land Taro is said to be very intense on San Christoval.

kaso. A small tree from primary forests with lightweight wood (*'uu ngasau*) especially young shoots, almost a reed, used for the forepart and outermost part of composite arrow-shafts. Occasional. AMARANTHACEAE, Amaranthus sp.

kasokaso. See *'uhi ta'ane.*

kataha. See *ngaunguku.*

katibaka. A fern used for plaiting of strong, brown baskets (learned from Western Solomons). FILICINAE. Acrostichum speciosum Willd.

kau taba songo. See *taba songo.*

kau bango maangoo. A vine from secondary forests. Probably used for rope. Occasional. OPILLIACEAE. Cansjera leptostachys Benth. R2946, R3161.

kau kauniatango. See *'uhi ta'ane.*

kau mongemonge. A vine with whitish stems clinging to the *tangatangaamoa* tree (a Celtis sp.?). Can be cut and the watery contents drunk. Probably URTICACEAE. Nothocnide repanda (Bl.) Bl. R3118.

kaungingiki. See *'uhi hahine.*

kautaba. See *taba.*

kaunge. Large tree from forests. Wood used for timber and leaves to wrap fish and shark liver. EUPHORBIACEAE, Macaranga aleuritoides?

kea. See *taba.*

keepoke (or *kaapoke, kaapoki, keepoki, keipoke, keipoko* from English kapok). The tree has been planted in a few places on Be. because of its appearance considered curious by the Be. and because of the use of its floss for pillows. The seeds are sometimes eaten, though

they have a slightly laxative effect. Rare. Recently introduced. BOMBACACEAE. Ceiba pentandra Gaertn. The trees on Be. are of the thorny type of kapok.

kie. A small, narrow-leaved screw pine, Pandanus. Often planted. The leaves are used for fine plaiting as *malikope* (sleeping mats), *kete manguu* (bags). Known by the *hiti*. PANDANACEAE. Pandanus sp. 3545, 3581.

kiukaba (from English: cucumber). Still barely accepted crop. Introduced 1949 by Gheela. CUCURBITACEAE. Cucumis sativus L.

koingau. See *abubu*.

kookona. A shrub cultivated in gardens, known in the Solomons as cabbage. The edible leaves are often used with other foods in ovens or boiled as a soup. While *k.* is widely used in Melanesia and has been so traditionally (B. Treide, 1967), it has been introduced to Be. in a late period (1949). The edible root seem to have been of little or no use on Be. At least five kinds are distinguished:

k. mai 'atuhenua. (lit., foreign *k.*). Red stem and small divided leaves.

k. ngau lioka (lit., manioc-leaved *k.*).

k. ngau tapatapa. (lit., thorny-leaved *k.*). Red stem, large, pointed leaves.

k. susungu. (lit., white *k.*). Green, light-coloured stem.

k. tuai. (lit., old *k.*). Whitish stems and dark leaves.

All *k.* are MALVACEAE, Hibiscus manihot L. R2922, R3139, 3345, 3473.

kongopua. A small kind of Ficus tree, growing in forests and delivering a strong, elastic type of wood useful for timber in small dimensions (as for handles). Occasional. MORACEAE. Ficus sp. R3522.

koni (English: corn). An accepted food on Be., but not widely cultivated. Takes 3–4 months to ripen. Introduced 1940. GRAMINEAE, Zea mays L.

Kopia. See *'uhi ta'ane*.

kumala. See *'uhingaba*.

kuutuma. A fern, often found in secondary growth. Its curly fronds were used to camouflage head when netting pigeons from platforms high in the trees. FILICINAE, Davallia solida (Forst.) J. Sm. R2785, R2829, R2883, R3114.

labonga. See *'uhi Tonga*.

labughe. A herb growing to shrublike dimensions. Yellow flowers. The leaves are pounded and placed on scores or sore eyes, a use learned from the Melanesians recently(?). Occasional. COMPOSITAE. Melanthera biflora (L.) Willd. R2740.

laimane or *laemane* (lime). A few specimens on Be., but not a popular introduction. The juice has some use for sore throats. RUTACEAE. Citrus aurantifolia (Christ.) Swingle.

langoghe. A forest vine. Like *ghasigho*, it is collected during scarcities and stems are baked and eaten, a *hiti* practice. Said to occur only near coast of islands. Occasional. ARACEAE, sp. not identified. (Maybe a Raphidophora sp. like *mangagha* and *mango* [*beeghini*]). R3083, R3128.

langua. A tree from primary or secondary forests, delivering heavy, strong timber for posts, paddles and other uses. Occasional. ANACARDIACEAE. Buchanania arborescens (Bl.) Bl. R3166, 3458.

liakenge. A common name for two plants, distinguished as the 'true' *l.* and the 'false'. The 'true' *l.* is a herb from secondary forests with white flowers. Its leaves are squeezed on wounds. Occasional. ACANTHACEAE. R2744, R3157, 3397.

The 'false' *l.* is a herb commonly found on village greens or in gardens. It has a purple flower (inflorescence). Leaves are sometimes crushed and applied to sores, a treatment brought by Melanesians recently (1954). COMPOSITAE, Sonchus sp.

lioka (probably from 'mandioca', a South American vernacular). The Manioc or Cassava plant is almost never eaten except during scarcities. It is well suited for this purpose, as it grows on meagre soils and develops tubers that have outstanding keeping qualities. Still planted occasionally. The two varieties grown on Be. are both only slightly poisonous, whereas most South American types are deadly poisonous if eaten raw. A rare one with brownish flesh was introduced in the 1880s or 1890s from Queensland. One with whitish flesh was introduced in 1947 via Rennell and 1948 from Malum. Occasional. EUPHORBIACEAE. Manihot utilissima Pohl. [syn. M. esculenta Crantz.] 3428.

loka. Known as 'Polynesian Arrowroot'. Occasionally found in secondary growth. From its cylindrical, flat tuber a flower with spathe first sprouts, later a spotted stalk from the top of which a tripartite leaf develops. Root is used as a scarcity food, and is said to have been cultivated by *hiti*. With *aka* and *soi tea*, *l.* forms a special group of early tuber-producing, non-vine crops. The Be. name *l.* differs from most other Polynesian vernaculars for the species, the usual name being pia. ARACEAE. Amorphophallus campanulatus (Roxb.) Bl. 3304, 3338.

luba. The poisonous Derris. A vine from secondary forest with white or almost white flowers. Green stems and leaves are pounded (*tuki*), and used to poison fish by being placed in cavities in corals. At least two kinds of *luba* are found on Be.:

luba tea (lit., light Derris). With white flowers, from green clearings. Occasional.

luba tunga (lit., red Derris). Resembles *l. tea*. The stem delivers usable string, but the leaves are less poisonous. PAPILIONACEAE, Derris heterophylla (Willd.) Bakh. 3280, 3364, 3447.

maabua. A kind of large tree, the wood of which is used for timber, especially poles for houses. Unidentified.

maakangi. A bush; the leaves are placed on boils. Occasional. RUTACEAE. Murraya crenulata. (Turc.) Oliv. R3036.

maasiu. See *abubu.*

mabuli. A kind of Ficus from forests. Previously used for *tapa*, though of moderate dimensions. The fruit is said to be edible. MORACEAE. Ficus sp. 3520.

mabuti. A kind of breadfruit, *mei.* (See this).

mahengangi. See *tango ta'ane : tango sangi.*

mainge. A shrub (Crepe Myrtle?) from primary forests with milky sap. Its sweet-smelling leaves are used to rub hands and body. Flowers used for necklaces. Rare. APOCYNACEAE. Alyxia acuminata Schum. R2992, R2825, R3035, R3110, 3435.

maingemanga. Large fern from forests or secondary growth. Leaves used to wrap *paipai* fruits while soaked and to wrap food in ovens. Occasional. FILICINAE. Microsorium (Polypodium) pustulatum Forst. (also M. scolopendrium (Burm. f.) Copel.). R2771, R2835, 3417.

maingenuku. See *'uhi hahine.*

maingoto. See *'uhi ta'ane.*

maingoto. See *'uhi ta'ane.*

makahika (Re.: *mangakahika*). A large tree from primary forests with pale yellow flowers. The fruit is edible but bitter; primary use of the tree is for appreciated timber. MYRTACEAE, Syzygium malaccense (L.) Merr. et Perry. [Eugenia malaccensis L.] 3432.

malanga. Large tree from primary forests, used for timber, considered valuable. Rare. VIOLACEAE. Rinorea [syn. Alsodeia] sp. 3392.

malapungu. See *mei.*

malani sungumenga. A common herb with yellow flowers from village greens and gardens. Leaves are heated and applied to boils. OXALIDACEAE. Oxalis corniculata L. 3335.

mamiapu (or *miapu*; from 'mummy-apple'). The Papaya, Paw-paw or Melon Tree is seldom sown (*langa*), but accidentally spread seeds are left to grow, though the growing plants are very little cared for. (On Re. *m.* gardens are cultivated and quite abundant). Fruits are much liked and often eaten in an unripe state, probably to prevent fruit bats from taking them. *M.* is often baked separately or cooked with other food in ovens. Common. *M.* is often believed to be an original plant of Re. and Be., but traditions tell it was brought from Queensland by Maukumi and Teaghoa in the 1880s or 1890s (Canoes T140). Several kinds of *m.* are distinguished, including:

mamiapu ango meleni (lit., melon-interior Papaya). With huge fruits, red flesh. Common. Recently introduced.

mamiapu ghape (lit., short Papaya). Similar to *m. sua.* Tall, few fruits. Occasional. Recent (after 1938).

mamiapu hua hutu (lit., Papaya with fruits like *hutu* = Barringtonia). With almost quadrangular-sectioned, small fruit. Rare. Recent.

mamiapu hua ngongoa (lit., long-fruited Papaya). Rare. Brought from Re. by Temoa in 1941.

mamiapu Kenga (lit., Papya from the Solomons/Guadalcanal). Small, rounded fruits. Grows prolifically. Common. Brought from Queensland, believed to be identical with another *P.* introduced later from Malaita.

mamiapu mai 'atuhenua (lit., Papaya from abroad). Seems to be identical with *m. ango meleni.* Common.

mamiapu mai Tulaghi (lit., *Papaya* from Tulagi). A synonym for *m. hua ngongoa*, and probably also identical with *m. a Timoti Haikiu.*

All *m.* belong to CARICACEAE, Carica papaya L.

manaaubi. See *'uhingaba.*

mandarina. Recently imported Mandarin, Citrus reticulata (Blanco) Engl. RUTACEAE.

mangabaka. See *'uhi.*

mangaghae. Kind of climbing vine seen in gardens, coconut groves and forests. Its large dark leaves are often split when mature. The thick stem is roasted and eaten in times of scarcity. Occasional. *Hiti* are said to have utilized *m.* regularly as food. ARACEAE. Epipremnum pinnatum (L. f.) Engler [syn. Raphidophora] 3253, 3344.

mangakanae. Large tree from primary forests. Considered good timber for houses; often used where timber is adzed to look as it were sawn. Branches are used for torches (on Re.). Edible berries. Occasional. BORRAGINACEAE, Cordia subcordata Lamk. 3424.

mangake. Herb from secondary growth with brown flowers. Thick leaves and root are said to be eaten during scarcities. Occasional. NYCTAGINACEAE, Boerhaavia diffusa L. 3396.

mangako. A kind of Ficus tree from forests, said to yield edible fruit. The young leaves, called *saunga* are edible. Formerly the heavy wood was used for clubs. Rare. MORACEAE, Ficus sp. 3514.

mangangape or *mangape* (Re.: *magape*). Large tree from primary forests delivering appreciated timber for house construction; fruits also said to be edible. Rare. MYRTACEAE. Syzygium malaccense (L.) Merr. et Perry. 3524. Possibly also Claoxylon tumidum J. J. Smith, EUPHORBIACEAE.

A subtype *m.* (lit., red *m.*) seems to refer to the 'Rose Apple'; same species as first mentioned above. R2899.

mangango (on Re. only?). A forest tree; the wood is used for *kumete* bowls and outrigger floats. Three kinds: *m. ghali*, *m. hatu*, and *m. mongi.* Probably STERCULIACEAE, Sterculia sp.

mangapamulo. A forest Ficus of small size, mainly used for small timber. MORACEAE. Ficus sp.

mangape. See *mangangape*.

mangei. Probably a kind of hard-wood tree, Syzygium sp. MYRTACEAE.

mangitebe (Re.: *maghaghitebe*). See *abubu*.

mango. A vine with thick stems and aerial roots. The stem is edible after roasting and is eaten during scarcities. The aerial roots are used as rope in house construction. Young stage of *mango*, called *beeghini* is best suited as food. Hiti. Occasional. Several kinds (e.g. *manighughi*) are found. ARACEAE, Raphidophora sp. R3148, 3457. [DIOSCOREACEAE, Scindapsus R3572].

manguka. A tree from secondary growth, some very tall specimens. Bright green shiny leaves. Twigs with white, sticky sap. The wood is yellow and very dense, used as timber when exceptional strength is required. Often used for posts, beams, and purlins, also for handles and digging sticks (*koso*). Occasional, but never in large stands. APOCYNACEAE, Alstonia spectabilis R.Br. 3267, 3390.

mangunge. A forest vine with black fruits. Occasional. Apparently not used. SMILACACEAE. Smilax sp. 3328, 3375.

manighughi. See *mango*.

manungaghe (Re.: *manughaghe*). A yam considered related to *beetape* and *'uhi Tonga* (see these). *M.* and *'uhi Tonga* are often called *bao 'uhi* (lit., forest yams), because they are found wild in both primary and secondary forests. *M.* is probably an early cultigen, said to have been brought from Mungua (Woodlark Is.?) by Ngaakei of generation 8 (Canoes T22). It develops an often metre-long, thin root/tuber with reddish flesh. The thickness is said to depend on fertility of soil. Grown at base of trees near villages, but now rarely (if ever) cultivated; collected during scarcities. DIOSCOREACEAE. Dioscorea nummularia Lamk. 3248, 3441, 3533, 3534.

matangeba. See *tango ta'ane*.

matiti. A herb growing as a weed in gardens and village areas. Has pink flowers. Common. AMARANTHACEAE. Celosia sp. 3450.

matongu. A white-flowered vine from secondary forests. Its heated, thick leaves are placed on sores. Flowers are used for adornments. ASCLEPIADACEAE. Hoya sp. R2865, R3003, 3401.

mei. The Breadfruit Tree is rare on Re. and Be. On Be. there are probably only about a score of small trees, nearly all found in Matangi district. *M.* is very little cared for, even though the great syncarpium is greatly appreciated for food. The tree also delivered bark for *tapa* as well as useful wood for timber, but the tree was rarely cut when bearing. The fruits were baked in the earth oven when ripe. The widespread practice in Oceania of making a fermented paste of the breadfruit for the use as an emergency food supply is not known on Be. and seems also to have been of little or no use earlier. Maturing of fruit is keenly watched, as keeping qualities are low. Six kinds of *m.* are distinguished mainly by leaf forms. All are said to have been of early introduction to the island, though not ascribed to the *hiti*.

boghota. With double-dentate leaves and huge, oblong syncarpiae.

bungeabu (or *m. bungeabu*). Syncarpium almost ball-shaped with even surface. 3468.

kalakala (or *m. kalakala*). Has deeply incised, almost finned leaves and an oblong, spiny syncarpium. 3419.

mabuti (or *mei mabuti* also *malapungu*). With almost whitish syncarpium. 3466.

taboghi. Syncarpium is ball-shaped with rough surface.

tete. Leaves resemble *kalakala*, but syncarpium is oblong, even-surfaced.

All the kinds found on Be. are MORACEAE, and most of the species Artocarpus altilis (Park.) Fosberg. (Presently the division of Pacific Artocarpus into more species seems to find little support among botanists).

meleni. Watermelon; known for its ability to grow in very stony ground and still produce its appreciated fruit. *M.* is still rarely cultivated. Introduced by the native SDA missionary Gheela 1949. CUCURBITACEAE, Colocynthis citrullus [Citrullus vulgaris L.].

mena (lit., worthless, not good to eat). A kind of recently introduced pumpkin. (Gheela 1949). Occasionally cultivated. CUCURBITACEAE, Cucurbita pepo L. Recent.

menga. Herb with large flowers used ornamentally; found in secondary growth. MELASTOMATACEAE, Melastoma polyanthum Bl. R3506.

mengo. A recently introduced ornamental plant, Hibiscus. Has been planted along the main trail of *Sa'aiho* (Western District). The red flowers are put into the hair and behind the ears; flowers are strung on reeds and used as necklaces. Common. MALVACEAE. Hibiscus rosa-sinensis L. R2910.

mengu. A tree from primary forests, of which the oil-rich seeds are eaten. Rare. A similar use of the tree is known from Melanesia (B. Treide, 1967). ELAEOCARPACEAE. Elaeocarpus sphaericus (Gaertn.) K. Schum. R3578.

mingo. A beach tree similar to *pingipingi*. Leaves used to wrap bait when fishing for fish at sea bottom (*hatuangi*).

miti (lit., meat, from English). Passionflower. Vines growing in open land as weeds. Light yellow flower developing orange fruit, which is eaten as a sweet. Common. Recently introduced, probably unintentional. PASSIFLORACEAE. Passiflora foetida L.? 3409.

mongetau. See *abubu*.

mongi. Common name for Oranges and Grapefruits,

Citrus sinensis (L.) and C. paradisi (McFadyen) Swingle. RUTACEAE. Both late introductions and rare.

mongi 'atua (lit., useless orange). Pomelo, recently introduced and eaten, but little regarded. Citrus grandis (L.) Swingle RUTACEAE.

mota. See *abubu*.

muningobo. General name for mosses (BRYOPHYTA) and probably moss-like ferns. As *m.* has been termed Thuidium plumulosum (Doz. et Molk.) R235, Leucophanes albescens C. Muell. R2755, L. octoblepharioiodes Brid. R2807, and Floribundaria floribunda (Doz. et Molk.) Fleisch. R2820.

mutie. Seems to be a general name for grasses (GRAMINEAE) as Sporobolus diander (Retz.) P. Beauv. R2789, and Eleusine indica (L.) Gaertn. R2938, R3102.

mututaba (or short *mutaba*). See *taba*.

natu. A large tree often found in secondary growth. White sap, a yellow-whitish flower, edible fruits and wood useful for timber, especially for paddles. Occasional, used by *hiti*. (J. Barrau, 1962, mentions Burckella hollrungii Pierre as utilized in the Solomons under the name *natu*; also B. Treide, 1967, mentions the vernacular *natu*, but for a Syzygium sp.). The Be. form is a SAPOTACEAE, Burckella obovata (Forst. f.) Pierre. 3363.

ngaki. A large tree found in both primary and secondary forest. Yields a drupe with thin skin, blackish when ripe; seeds seems to be edible after soaking and baking (information differs). Occasional. Use learned from *hiti*. FLACOURTIACEAE, Xylosma sp. (identified on scanty, infertile material). 3341. A similar use in Melanesia is mentioned of Pangium edule Reinw., another FLACOURTIACEAE; the seeds are extremely poisonous (hydrocyanic acid) but appreciated food when detoxicated.

ngama. Tree from primary forests with light brown fruits. A sought for, but rather rare timber tree, used especially for house-posts. Wood of *ng. mea* (lit., 'red' *ng.* is split and used for torches. MELIACEAE, Aglaia sapindina (F. Muell.) Harms. R3017, R3505.

ngangia. A Ficus tree from forests. Wood of limited use. Ficus adenosperma Miq. MORACEAE.

ngangoa. A thick-stemmed forest vine; the stems are baked and eaten during scarcities. Differing from *mangaghae* and *mango* (*beeghini*) by incised leaves; of similar use, said to have been learned from *hiti*. *Ngangoa* is an ARACEAE, Raphidophora sp. R3573.

ngangotoba. A forest tree with white/yellow flowers. Wood used for house timber. MELIACEAE, Dysoxylum sp.

nganighubi. A thick-stemmed vine; stems eaten during scarcities. An ARACEAE related to *mango*. See *mango*.

ngaunguku. Common name for some ferns, growing commonly in secondary growth and fallow gardens. The shiny leaves are used to wrap food, especially fish, for ovens. FILICINAE, Asplenium nidus L.? 3326. *Ng. kataha* is commonly distinguished. Lecanopteris sinuosa? 3477.

ngaupata. A tree commonly found in secondary growth; easily recognizable by its stalk, fastened in centre of leaf. Regarded important for the recovery of fertility of gardens. Used for timber because of availability, but of low quality. Sometimes used for beams and rafters in houses, and often as climbing-poles (*beeghai*) for yam vines. EUPHORBIACEAE. Macaranga tanarius (L.) Muell. Arg. 3319.

ngeemungi. A large fruit tree of very high esteem; still rarely planted but always spared when trees are cut. At unpredictable intervals and no fixed season, the tree flowers and later develops stands of drupes. The fruits were regarded as gifts from the gods by the Be. The importance of *ng.* may be judged by the abundance of stories involving its diversified uses (see Canoes T79, T123, T156) as also from special ritual songs (*obo*) used when picking. Flesh of *ng.* drupes is used for puddings and for the extraction of oil by *tio*, a process by which the oil is separated with hot water. The hard kernel (*tanuma*) is cracked (*hoa*), soaked (*tata'o*) for a long time, and then oil is extracted by application of hot water (*tio*). The nutritious seed (*lala*) is eaten. *Ng.* oil keeps in coconut-shell containers for as long as five years. Also the sap of the tree was used formerly to produce soot for tattooing (*tatau*) and for the making of torches. *Ng.* was keenly watched. Stages of growth are described by application of distinct names, though observants disagree somewhat as to number of these. Some of the names are given here, ranging from younger stages of flower to mature fruit: *lapugha, laka nibangobango, ta'e kimoa lunu, ta'e kimoa tama, ta'e kimoa matu'a, tunupata tama, tunupata matu'a, niho ahato, hetongi'aki, sinu. Ng.* are occasional. The techniques necessary to use it are ascribed to *hiti*. Several types of *ng.* are found, including *su'ibaghigho* (with more or less thick-shelled nuts. Nuts collected had thin shells. All types are probably BURSERACEAE. Some types are Haplolobus floribundus (Schum.) Lamk. Subsp. salomonensis (C. T. White) Leenh., var. salomonensis. R2951, R3167, 3235. Other species are also found. The taxonomy of this species (and its related forms Santiria) is extremely difficult. All *ng.* were earlier identified as Canarium species; these differ nevertheless by their thick-shelled inside kernels of the drupes. Some *ng.* may be Canarium species.

ngei. A common name for some recently introduced grasses. *Ng.* are noxious weeds, hard to control and fast-spreading. According to tradition *ng.* was un-

intentionally brought from the Solomons to Re., and from there to Be. by some of the first returning plantation labourers in whose sleepingmats *ng.* seeds had fastened. It is said to have spread from the eastern to the western part of Be. in less than three months. GRAMINEAE, Paspalum conjugatum Berg. R2791.

ngeitu. A tree from primary forests. Wood is used for the flexible wooden parts of hand net frames (*kupenga, seu*). MYRTACEAE, Eugenia sp. 3382, 3517.

ngighosangi (Re.: *ghighosaghi*). A tree with white flowers developing red berries, occasionally found in forests and secondary growth. The wood was used for some special purposes as slings, baskethandles) because of strength and lightness; for many uses dimensions are however too small. Bowstrings are made from the bark THYMELAEACEAE, Phaleria perrottetiana (Decne) F.-Vill. 3316, 3427.

ngimu. General name for seaweeds. Kinds of green algae are occasionally eaten.

ngingike (lit., small). White-flowered tree from secondary growth. Its wood is used for war clubs and carvings because it is dense and strong. MYRTACEAE, species not identified. R3007, 3472.

ngoghe (Re.: *ghoghe*). A Ficus tree from forests; large aerial roots are used for house posts because of keeping quality. MORACEAE, Ficus sp. 3557.

ngo'i. A small Ficus tree from Re.; used for timber.

nguna. The Indian Mulberry Tree; quite common on Be. (and Re.) though usually not planted. It develops a whitish-yellow syncarpium, highly appreciated for food. Low keeping qualities means that the ripe fruits must be eaten immediately. The tree has been used on Be. since *hiti* times according to tradition. Several kinds of *ng.* distinguished:

kalakala. A special type of *ng.* See also *mei.*

nguna mata'eha (lit., many or large-eyed *ng.*). Has many seeds. Common. 3350.

nguna mongi (lit., hard *ng.*). Occasional. R2939.

nguna patiaba. A rare kind of *ng.*

nguna toaha or *ng. toaha* (lit., *toaha*-soil *ng.*). Sweet, small fruit, appreciated by children.

nguna sunge. Esp. on Re. Few or no seeds. Occasional.

nguna uso 'ungi (lit., dark-boled *ng.*). Occasional.

All kinds of *ng.* are RUBIACEAE, of the species Morinda citrifolia L. R2921, R3093, R3540, R3526.

niu. The coconut palm is probably the single plant species considered most important by the Be., perhaps more important than the highly appreciated yams and *ngeemungi.* A well-developed local and specific vocabulary enables the Be. to describe all parts of the palm. It is a plant of multiple uses, yielding drinking nuts (*polo*) and food before all, but also material for a lot of indispensable things of everyday use. A few samples may suffice here: a) the hard inner shell of the fruit may be used for waterbottles (*bai*) or scrapers (*tuai*), b) the fibrous cover (the husk) is used for sennit (*kaha*), c) the leaves are used for thatch or to reinforce thatch, for the making of floor mats (*takapau*), or the plaiting of coarse baskets (*pongaponga*) and d) the boles may be used for timber or fire-wood. The Be. coconut palms yield fairly abundant harvests of nuts of larger size than commercially grown nuts on European plantations in spite of irregular and probably too close planting of palms and a very rudimentary upkeep with little weeding and no control of pests and diseases. However, the nuts have been carefully selected through generations and have subsequently been in demand for seed nuts in new plantations in the Solomons and Ponape. The nuts seem to lack genetical constancy; according to Be., because of introduction of new and inferior types of palms from the Solomons. Coconut palms seem to thrive almost everywhere on Be. Traditionally a few palms were planted near houses (to supply 'drinking water') and on beaches near landing places. Now veritable plantations have been established on the island, more than 20,000 palms having been planted since World War II. Most of the nuts are now made into copra (*kapala*). Several kinds of coconut palms are distinguished, but it is difficult to differentiate types of genetical constancy from individual variations, stages of growth etc. in the multitude of terms describing coconuts. Some types are thought to be original and have been growing in *hiti* times and to be related. *N. unga* and *n. 'ui* are thought to be original and have been growing in *hiti* times. From the latter type *n. kehu* and *n. ghope* are said to have developed. The kinds listed below have repeatedly been distinguished, but probably more types can be found:

niu ghope. Yellow-reddish fruit. Early type, found occasionally.

huangingiki (lit., small-fruited) *n. kehu*-type.

niu kehu. The most common coconut on Be. Large yellowish-brown nut. Two types, an old and a newer one, are found. The new type is said to be a recent import from the Solomons.

niu ngau (lit., leaf-coconut). Has edible husk. Recently introduced. Rare.

niu unga (lit., red coconut). Common on both Be. and Re.; a fairly large nut.

niu 'ui. With dark-green nut, even when ripe. It is considered the most delicious drinking nut, was formerly used in ceremonies. On Be. it is sometimes called *niu 'ungi* (lit., dark coconut).

niu susungu (lit., light-coloured coconut) is probably related to the other white coconut, *n. tea* from Re. Both seem to be spontaneous mutants of *n. unga. N. tea* develops a gigantic nut, the hard shell of which measures about 25x16 cm.

All coconut palms belong to the species Cocos nucifera L., PALMAE.

ongoongo. A nettle-like herb from cultivated or fallow land. Mainly a weed; sometimes used as fodder for chickens. Occasional. Recent introduction? EUPHORBIACEAE, probably Acalypha boehmerioides Miq.

painapu (from English: Pineapple.) Recently introduced. Often successfully cultivated. BROMELIACEAE, Ananas comosus Merr. Engl.

paipai. Malayan Palm-fern. Palm-like tree (a 'cone-palm') with male and female flowers in terminal cones and large, pinnate, dark green leaves at the end of a stout trunk. At the base of leaves a reef of sour, hard-shelled nuts is developed. These may be eaten, when first soaked in water for a long time and then baked; this is to remove the hydrocyanic acid (prussic acid). *P.* was believed brought by Kaitu'u (Canoes T67), but techniques possibly learned from *hiti* (Canoes T78). *P.* is seldom eaten nowadays on Be. except during famines. The dried nut is pierced and put on a string to make a bullroarer (*hua a p.*) which gives a buzzing sound. Usually *p.* grows on the coastal ledge, but is now rare (more abundant on Re.). CYCYDACEAE, Cycas circinalis L. [Cycas rumphii Miq. (C. circinalis Blanco)]. R2773, 3295.

pamulo (also called *mangei*). A tree from primary forests with milky sap. The dead wood, called *tutunu*, is used for spears, and for parts of arrows. Unidentified, perhaps Boerlagiodendron sp. 3439.

patau. A recently introduced tree, the Sweetsop. A few specimens have been found on Be. The juicy, sweet-sour fruits of *p.* are liked, they weigh about 2 kilos each. See also *sauasopu*. ANONACEAE, Anona muricata L. R2908.

pateto, patito. The Batate or Sweet Potato is a late introduction to Be. gardens. It is popular because of low requirements as to soil fertility and its resistance to droughts, resulting in ability to fill gaps in the provision of traditional crops. Also it is easy to propagate by cuttings thus avoiding loss of tubers, the sweet taste of which is liked. Its use in a pseudo-rotation with yams seems to cause some problems (described in chapter 6 of this book). Like most vegetatively propagated plants, *p.* shows great variation. Some kinds of *p.* differentiated are mentioned below. The relationship between *bunge*, a plant of old cultivation on Be., and *p.* is locally recognized (see *bunge*). See also under *'uhingaba*.

baapua (Papua). Red-skinned, white-fleshed tubers.

pateto a Kaipua. A straight, red tuber, while all others have more or less curved tubers.

pateto ngaulioka (lit., manioc-leaved *p.*).

pateto susungu (lit., white *p.*).

pateto a Taupongi (lit., Taupongi's *p.*). Introduced about 1948.

pateto a Tepai (lit., Tepai's *p.*).

All the plants mentioned are quite commonly planted on Be. The first types were introduced in the 1880s or 1890s. Later varieties were introduced in 1942 (yellow), 1946 (reddish), 1949 (by Gheela, also reddish) and about 1955 (white). The *p.* are all Ipomoea batatas (L.) Lamk., CONVOLVULACEAE.

pau. A large timber tree with enormous plank-buttresses from forests delivering wood formerly used for sounding boards (*papa*) and war clubs; useful when dense, strong, and heavy wood is required. SAPOTACEAE, Planchonella sp. 3436.

paunao. See *huti ta'ane*.

pe'epe'e. Herb from open land with white flower, developing yellow fruit that is eaten by children as a sweet. Occasional. Probably a late, unintentional introduction. SOLANACEAE, Solanum nigrum L. 3395.

pingipingi. Tree from primary forests with mottled green leaves, darker near veins. Peculiar green fruits Edible(?). Used for timber, including canoes. Quite rare. HERNANDIACEAE, Hernandia peltata Meiss.

pita. Betel Pepper plant; a woody vine with shiny leaves growing occasionally in both primary and secondary forests. Leaves are chewed with betelnuts and lime, whereas the fruit, pepper, is not utilized. Betel chewing was early introduced on Be. PIPERACEAE, Piper betle L. 3415.

posu. See *abubu*.

poteto, potato. See *pateto*.

pua. The Areca or Betel-nut Palm, a tall, slender, and straight-boled palm with rather small, feathery leaves. Occasionally planted, but also found wild in secondary growth. Bunches of nuts or rather berries are often used for presents. The seeds are roasted and cut, then chewed with pepper leaves (*pita*) and lime (*natinga*). The nutrients of the seeds (mainly fats and carbohydrates) are hardly as important as the content of a stimulating alcaloid. Betel chewing is not considered a Polynesian custom, but is widely found in Melanesia. Its effects on teeth can be observed on Be., where the missions are trying to hold back the chewing with some success. Ingredients for betel-chewing are carried in a kit of containers. See Birket-Smith (1956) p. 86 f. PALMAE, Areca catechu L. Special kinds differentiated:

pua liki. Growing wild in forests and cultivated. A small type.

pua mouku. Also growing wild. Larger.

pua 'atua (lit., useless *p.*). Resembles *p.* somewhat, but has beautiful large, white and fragrant flowers, sometimes used ornamentally. Occasional. LOGANIACEAE, Fagraea berteriana A. Gray ex Benth. R2866, R2898, 3012, 3537.

puabano. Large tree from primary forest usually near coast. The wood used as house timber, especially for posts, beams, purlins. Rare and hard to get because

of growing locations on the high rims of the island. RUBIACEAE, Guettarda speciosa L. R2894, R3117, R3159.

puka. A large tree with white flowers; both in primary and secondary forests. Leaves are edible, used during scarcities. NYCTAGINACEAE, probably Pisonia grandis R.Br. 3431, 3567.

puka bai. Seems to be same species of tree as *p.* but is probably differentiated by its leaves being whitish when young. NYCTAGINACEAE, probably Pisonia grandis R.Br. 3464.

pungaaghe (Re.: *pughaaghe*). Small tree from secondary growth and forests. Delivers hard, strong wood usable for digging sticks (*koso*), also strong timber, but only available in moderate sizes. LEGUMINOSAE, Desmodium umbellatum (L.) DC. R2870.

saaunga. See *mangako*.

sabea. A wild herb or small bush, from forests; leaves containing a milky sap are edible and were probably eaten during scarcities as a spinach, probably of ancient use on Be. (*hiti*). Similar use known in Melanesia. Occasional. EUPHORBIACEAE, Phyllanthus sp. R3073.

saka. A small forest tree. The young leaves are probably eaten during scarcities. ARALIACEAE, Polyscias pinnata Forst. 3250.

samabuti. A large Ficus species from primary forests. Its rather small, green fruits are eaten; also considered useful as medicine against diarrhoe when chewed with *pita* (see this). Wood of no specific use. Occasional. MORACEAE, Ficus septica Burm. f. var. cauliflora Comer. R3039, R3451, R3511.

samunganga. A thick forest vine. Used as an emergency supply of drinking water as is *kaubasongo*. AMPELIDACEAE. Leea sp. R3566.

sanisani. A general name for clubmosses, LYCOPODIACEAE, which seem to be of no particular use in Be. material culture except for temporary plaitings; e.g. Huperzia phlegmarioides (Gaud.) var. seemanni (Baker). R2903, H. pseudophlegmaria Kuhn. R2889.

siango. A small- to medium-sized tree with yellow flowers from primary forests. Its skin-irritating leaves are used for wrapping food in ovens. they are a nuisance when wandering in forest. Wood soft, unusable. Common. URTICACEAE, Poikilospermum sp. 3325.

siinamo. See *suinamo*.

sili (English, chili). The Chili Pepper. Recently introduced, still regarded as a curiosity. Its fruits are considered good for the stomach. SOLANACEAE. Capsicum frutescens L. 3348.

singake. A vine from secondary forest. Occasional. Leaves are crushed and applied to sores, an old practice. APOCYNACEAE, probably Parsonsia sp. 3528.

singasinga. See *'uhi hahine*.

soghonae. A shrub considered related to *taungoko*. Found occasionally in gardens or secondary growth, but not cultivated. Edible berries. No information on introduction. SOLANACEAE, Solanum torvum Sw. R3097? R3098, 3561? Other specimens are the related species S. verbascifolium L. 3340? 3394.

soi. This general name (*hu'aiingoa*) is used for the bitter or even poisonous yams related to the *abubu*, i.e. bulbil-bearing and tuber-producing 'Potato Yams' with vines twining to the left (*hakaseema*). *S.* is said to have been cultivated by the *hiti*, from whom detoxicating techniques seem to have been learned. Modern use of the very abundant *s.* is restricted to emergencies; both bulbils and tubers may be used after soaking and baking. No use seems to have been made since about 1930. At least six types of *soi* are differentiated, but the number of people able to identify kinds is swiftly decreasing.

soi hua ngongoa (lit., long-fruited *s.*) or *s. kaungongoa* (lit., long-stemmed *s.*). Bulbils and vines appear longer than other types of *s.*, and have greater distances between leaves. This 'stretching' is locally said to depend on properties of the plant and not on growing conditions. 3478.

soi kau maangoo (lit., tough-stemmed *s.*). Probably a *s.* less bitter than the others. Seems to require only one day's soaking before use. 3479.

soi laghola (lit., *s.* [causing] minor stomach pains). A very common *s.* 3307, 3358.

soi peghae (Re.: *s. pighae*). Bitter *s.*, requiring more than three days' soaking before use. 3408.

soi mai te baka (lit., *s.* from the canoe). Meaning of name is obscure: was this *s.* introduced by a stranded canoe or was it a *s.* detoxicated by being placed in the bilge water of a canoe for a long time? 3269.

soi 'ungi (lit., dark *s.*). Blackish leaf bases and stems. All the types of *s.* mentioned are DIOSCOREACEAE, Dioscorea bulbifera L., same species as the *abubu* yam. *soi tea* is not considered related to the *s.* above in spite of the name. See *s. tea*.

soi tea. (lit., light-coloured *s.*). A herbaceous plant, Indian Arrowroot, with a spotted, single leaf (about one metre long) divided into three leaflets, each again divided into three sections. The flower is light green with darker spots. A moderate-sized edible tuber is developed, but the plant is now uncultivated. It seems to be an early-cultivated plant still used as a scarcity food in spite of contents of a bitter element. This may be partly extracted in sea water, partly destroyed by cooking. The plant is now quite rare, though still attracting the curiosity of the Be. It has inspired legends in many places in Polynesia and is believed to be the first plant on Be. after the island's creation from a Nerita shell (Canoes T10 and T11). The low-hanging heaven of the Earth's youth explains why the leaflets at the

top of *s. t.* are spread almost horizontally. *S. t.* belongs to TACCACEAE, Tacca leontopetaloides (L.) O. Kuntze R2907, R3127, 3332, 3337.

soosopu. See *'uhi ta'ane.*

sopi. A vine from open land, developing green fruits, black when ripe. Leaves are possibly eaten and are used to wrap fish for cooking. Sap is applied to boils. Both uses are old. Common. CONVOLVULACEAE, Operculina ventricosa (Bert.) Peter. R2761, 3317. *S.* is often called *s. tea* (lit., light *s.*), probably to distinguish it from *s. 'atua.*

sopi 'atua (lit., wild *s.*). A vine from secondary forests Common. The stems contain a white latex, used to seal canoes. *S. 'atua* is considered related to *sopi* (see this). CONVOLVULACEAE, Merremia peltata (L.) Merr. 3301.

sauasopu or *soursop.* Related to *patau.* A lately introduced, planted tree, only few specimens have been noted on the island. Develops large edible fruits (syncarpiae). A tea is brewed from the leaves; this is used to produce sweat on persons suffering from malaria. ANONACEAE, Anona reticulata L.

suaso. A large forest tree with pinnate leaves and edible fruits. Delivers remarkably fine wood for timber and canoe hulls, but use is limited because the wood is very hard to work. MELIACEAE, Dysoxylum sp. 3515.

suinamo or *siinamo.* Important old type of yam with right-twining vines; considered to be distantly related to *beetape* belonging to same group as *manungaghe* and *'uhi Tonga,* and to be closely related to each other. *Sui-* seems to be a prefix occurring in *s., suingango,* and *suitongo,* all types of yams. See under *suitongo.* Two types of *s.* are recognized. An ancient one is said to have been brought from Mungua (Woodlark Island?) by Ngaakei in generation 8 (Canoes T227). It has thorns on vine base and top of tuber. Small leaves and moderately-sized tuber (compared with *beetape*). A common and very important food crop because of its hardiness, good taste, and fragrant tuber. 3275, 3308. Another kind of *s.*, also good-smelling and high-yielding, was imported from Re. by Teikangongo in about 1938. Common.

suinamo 'ungi. A *s.* with darker stems and leaf-veins. It lacks the fine smell of the former. 3456. Both types are Dioscorea nummularia Lamk., DIOSCOREACEAE.

suingango. Resembles *suinamo* (to which it is closely related), but has smaller tuber and larger leaves. *Hiti,* now uncultivated. Rare. Dioscorea nummularia Lamk. or D. alata L. (see *suitongo* below, *suinamo,* and *'uhi Tonga*). 3225, 3241, 3285.

suitongo (see also *'uhi*). A reddish yam considered related to the *sui* yams above, though now usually classed by the Be. with the *'uhi* yams and described with the *'uhi hahine.* What is the explanation of the prefix *sui-* to an *'uhi*? Perhaps at one time the differences between the *'uhi* and *suinamo, suingango,* and *beetape* may not have been as great as they are today. Or was the term *sui* applied to a group of plants of simultaneous introduction and/or similar use as food plants in spite of their taxonomic differences? *Suinamo* and *suingango* are both DIOSCOREACEAE of the same species, Dioscorea nummularia Lamk. The nummularia characteristics: thorns on vine base, vines of round cross sections are well developed in *suinamo,* but only faintly so in *suingango.* In *suitongo* the above characteristics are almost absent, the alata characteristics are hardly discernible: no lateral wings are developed on stems, but these have marked angular cross sections. It might be added that nummularia yams are in Melanesia often related to early cultural strata, and alata to more recent ones (Guppy 1906; Barrau 1958).

sunga. A small tree seen now and then in secondary and primary forest. Sometimes used for digging sticks. ACANTHACEAE, Pseuderanthemum sp. 3425.

sunge. A kind of tree, considered related to *nguna* and with the same uses (see *nguna*). RUBIACEAE, Morinda sp. R2941.

sungu. Small tree from forest with white flowers. Sometimes used to make wind protection for ridges of roofs. ACANTHACEAE. R2931, R3009, R3525.

taanginga. General name for fungi, mushrooms. A number of these are eaten by the Be. as those qualified as *apala, bangitia, kingi, mangungu, pakuukuu* and *pulongaba. T. pakuukuu* is used for a soup; the others are most often eaten after baking in the earth oven.

taataihokai. Seems to be a general name for some club mosses or Lycopodium-like plants e.g. Huperzia cornata (Be.) Hunt? Summerh. R2900. H. phlegmaria (L.) Trevis. R2753, R2801, R3019, R3113. Psilotum triquetrum Sw. R3140. Some of these plants have probably been used for medicine as is found in Melanesia (an extract drunk for coughing).

taba. A vine (cucurbit); the tender leaves (*kea*) are eaten during scarcities. Also shoots called *bulitaba,* and stems, *kautaba,* are edible. Common plant, use of which is said to have been learned from *hiti.* Trichosanthes ovigera Bl. T. cf. anguina L., CUCURBITACEAE. R2751, 3305, 3380, 3423.

taba songo. A thick-stemmed vine from primary forests. Young leaves are red. Stems contain watery sap that is potable. Used occasionally as a water reserve. Rare. *Hiti.* AMPELIDACEAE. Cayratia sp. 3279, 3381.

tabai. A huge tree from primary forest. Considered almost as good as *ghaimenga* for canoe hulls, but harder to work. (See Canoes T31 and T42). Now

quite rare. ANACARDIACEAE, Rhus taitensis Guill. R2786, 3268, 3386.

tabako. Tobacco is smoked only by Be. not held back by religious taboos. It is cultivated in a few places and known to exhaust the soil. Nicotiana tabacum L. SOLANACEAE. A recent introduction.

tabongo. See *boiato*.

tabulo. Very little information has been collected on this plant, the leaves of which seem to be edible. ARALIACEAE, Schefflera waterhousei Harms. R2887.

tanetane. Scanty information is available on this plant. It seems that young leaves are used as scarcity food, gathered in forest. Fragrant flowers used in necklaces. ARALIACEA, either Delarbrea collina Vieill., R3062, or Polyscias cunninghamii (Presl.) Merr. R3084. The collected specimens have probably been mixed up with *tatake*. See *tatake*.

tangatangaamoa. A vine from primary forest. Unidentified.

tangie. A tree with remarkably horizontal branches, large leaves (20–30 cm). Inflorescence borne on end of shoots. The fibrous drupe contains an almond-like seed with fats and carbohydrates, very much appreciated for food. *T.* is mentioned in several stories (Canoes T55 and T120). The tree is only occasionally found and seems as a rule never to be planted. At least two types of *t.* seem to be found:

tangie te manu, a forest tree.

tangie mengi (lit., hard *t.*) growing at the sea coast. Both types are COMBRETACEAE, Terminalia catappa L. R2874, R2892, R3067, 3389. The close relationship to *ghaghimanga* (*ghaighimanga*) seems not to be locally perceived. See *ghaghimanga*.

tango. The general name (*hu'aiingoa*) *tango* is almost equivalent to the species name Colocasia esculenta (L.) Schott, ARACEAE, or the Common Taro. On Be. *t.* is usually divided into two groups *tango ta'ane* (male, coarse taros) and *tango hahine* (female, small, and sweet taros). The groups differ in important aspects. Both are eagerly cultivated, but *t. ta'ane* require a growing period of 6–7 months, whereas *t. hahine* only need 3–4 months to develop the edible corm (*mungi tango*). Being a flowering cultivar, taro may hybridize; this is recognized on Be. Taro corms are used for puddings (*songo*, *tokonaki*) and eaten whole when baked. Taro leaves, especially of *t. hahine*, are baked almost daily in the oven and are known as *pota* (*manongi*, *kookona*, *mena*, and other greens are also used in *pota*).

tango ta'ane

tango sua (lit., foreign taro). The most important type of this group of taros. An up to one metre high, dark-leaved taro, occasionally developing flowers; the coarse stalks are also dark. Usually planted in January-February and harvested 6–7 months later. If the soil is good (more than 3 years fallow) and the weather fair (especially alternating rain and sun: *tota'ebasa*), *t. s.* develops the largest corm of any taro type on Be. 3292, 3368. Two ancient types found: *tango sua 'imgi* and *t. sua tea*, one with dark and another with light-coloured stalk. Commonly cultivated. Said to be known since *hiti* days.

Recently introduced *tango sua:*

tango a Halo (Halo's taro). Stalk fixed to centre of leaf. Brought by a missionary from Roviana 1962. 3299.

tango a Steveni (Steven Puia's taro).

tango a Tepuke (Tepuke's taro).

tango sua a Sau'uhi (*Sau'uhi's t. sua*).

Other types of *tango ta'ane:*

kamaamangu. Differs from *t. sua* by having green stalk, attached closer to leaf centre than the former. Planted December-January. Takes 5–6 months to grow. Lower-yielding than *t. sua*. Commonly cultivated, of early origin.

mahengangi. See *t. sangi*.

matangeba (lit., many- or great-eyed). Is derived from *kamaamangu*, but has different stalk. Rare. Early type.

tango kimoa (lit., rat taro). Has sticky substance in corm and striped stalks. Mainly on Rennell.

tango mai Tulaghi (lit., taro from Tulagi). An introduction some years before 1938. A kind of *t. too*. Rare. 3212.

tango sangi (lit., dripping taro) (also called *mahengangi*). The first name refers to a sticky substance in the corm. Reddish, dark stalks. A recent introduction.

tango too (lit., falling taro). A large type of taro with leaves bending down, when the plant develops. Resembling *kamaamangu* and *matangeba*. Introduced to Re. 1936 by Temenga. Rare.

taubenga. Probably development of *kamaamangu*. Quite rare. Early origin.

'usinuku. Honorific name (lit., green from the abode of gods). Possibly also an existing taro derived from *kamaamangu*, but differing in its stalk. Rare. Early origin.

tango hahine

tango ngeka (lit., small taro). By far the most important kind of *t. hahine*, and probably the most important of all taros. Has light, green edible leaves with reddish leaf bases. Light stalks, about 60 cm high. Develops flower. Requires 3 years fallow and gives good yields in damp weather, but may rot in continuous rain. It must be protected from direct sun, is therefore planted in shade of killed trees; the young stage of growth called *nguukii* especially needs protection. The taro gives a fair yield after 3–4 months growth. Leaves are edible, when baked; an important food (*pota*). Early origin, commonly planted. 3211, 3298.

Kinds of *tango ngeka:*

angoghapu. Large red-stalked. Said to have been cultivated by *hiti.* Now rare. 3297.

'ahungenga. An old type.

angopaa. Commonly cultivated.

banebane (*baimani*). Distinguished by its longer, more slender corm. Mainly grown on Re.

kasiau. Type of old cultivation.

matangei. Red corm. Only on Be.

ngauongi. Old type, now probably extinct. Formerly grown on Re. (mainly?).

tango a Saungongo. Recent introduction.

tanimanu. Large forest tree. Its dense, straight-grained wood is used for carving, as for combs; also fine timber. The brown, shining nuts are used for necklaces. Probably Planchonella thyrsoidea C. T. White, SAPOTACEAE. 3406, 3502.

tapaango. A Ficus tree from forests. The aerial roots are sometimes used for small timber; the fibrous bark used for rope. Perhaps the name implies former use for *tapa.* MORACEAE, Ficus sp. 3465, 3531.

tapangighoghe. A Ficus tree from primary forests. With blackish bark, milky sap and green fruit borne on trunk. Used previously for *tapa*, now sometimes used for timber. MORACEAE, Ficus p. 3476.

tatake. Forest tree about which little information has been collected (cf. *tanetane*). Leaves seem to be of some use as a green. Identifications of two specimens differ (as of *tanetane*). R3044 is Delarbrea collina Vieill. ARALIACEAE, and R3112 is Polyscias cunninghamii (Presl.) Merr., of same family.

taungoko. Herb, cultivated in gardens. White flowers, white and purple fruits turning yellow when ripe. Fruit is eaten raw or cooked, especially given to sick or pregnant; leaves seem also to be eaten. Rather rarely grown, though of old use. One of the few cultivated plants propagated by seeds. A related plant is called *kangalou*; *pe'epe'e* and *soghonae* are also said to be related (see these). SOLANACEAE, Solanum torvum. Sw. 3340, 3561.

Tauniu. See *'uhi ta'ane.*

tiangetaha. A small tree from beach forests; rather rare. Develops white, purple-tinged flowers used for ornamental purposes. RUBIACEAE, Gardenia leucaena? R3126, 3470.

tii. A small tree from secondary growth. Common on Be. and Re. and widespread in Polynesia. The leaves are used to wrap food for the oven. *T.* is regarded as a reliable indicator of high soil fertility. It was formerly planted in soil covering taro paste pits to show when paste was edible. The roots of *t.* seem not to have been eaten on the two islands as in most of Polynesia. AGAVACEAE. Cordyline terminalis (L.). Kunth [syn.: C. fruticosa (Stickm.) A. Cheval]. R2932, R3042, 3252, 3413.

titi. Pink-flowered herb from gardens and village greens. Abundant, regarded as a weed. Leaves edible? AMARANTHACEAE, Amaranthus gracilis Desf. R3133, 3474.

tongo. 1) Sugar Cane. This is cultivated to a limited extent. Stems are chewed raw, regarded as a sweet, sometimes damaging children's teeth severely. *T.* has been known from early times (Canoes T1), and is easy to grow because it is propagated by cuttings (planted with *'uhi* in gardens). New types of *t.* have been introduced since the 1880s and 1890s from Queensland.

tongo unga (lit., red sugar cane). Rare, old type of moderate height.

tongo susunga (lit., white sugar cane). New type with edible leaves. Both types are GRAMINEAE, Saccharum officinarium L.

2) On Re. *t.* is also the name of the common mangrove-tree, it grows abundantly at the Lake, especially in its western end. The wood is of some use as small timber, where great strength is required, but is usually available in small dimensions only and often in irregular shapes. The curious seedlings are eaten with fish soup on Re. RHIZOPHORACEAE, Bruguiera gymnorhiza (L.) Lamk. R2869, R3091.

tua. See *'uhi ta'ane.*

tubibaka or *tubibakaatongo* (lit., cover of (Tongo's) canoe). A beach vine used for covering canoes to avoid cracking. Unidentified.

tunganginge. 1) See *'uhi ta'ane.*

2) A large tree used for house posts, wood resembles *ngangotoba*; probably a Dysoxylum sp., MELIACEAE.

tunupata. One of the cucurbits occasionally found wild in forests, primary or secondary. It seems to be used as an emergency food, the fruit?, leaves, and stems being edible when cooked. *T.* seems to be of old use on Re. and Be. like *taba* and *kea* and contrary to other cucurbits, most of which are quite recent introductions (see *kiukaba, meleni, mena*). CUCURBITACEAE, Melothria camosula Cogn. R2950, R3000, R3149. (J. Barrau 1958 reports on similar use of the plant in Melanesia).

tutuka. Herb from open land, with white flowers and fragrant leaves, which are used to heal wounds. Leaves are also placed on young bananas to divert the attention of flying foxes. LABIATAE, Ocimum sanctum L. R3049, 3459.

tutunu. See *pamulo.*

tututahi. Paper Mulberry, a tree, widespread in Polynesia, occasionally planted near villages. Wood is usable for timber, but major use was of the bark for the making of bark cloth, *tapa*; *t.* was considered the best material for this. MORACEAE, Broussonetia papyrifera (L.). Vent. 3407.

uati. Large forest tree, reported from Re. to deliver useful timber. SAPOTACEAE, non. det. R3170.

ubo. The Malay or Mountain Apple is considered related to *makahika* (see this) by the Re. *U.* has a small, round, nearly black, edible fruit. The tree is not planted, but still quite common at the seaside, and esp. at the Lake on Re. *U.* is said to have been used by the *hiti*. *U.* is on Re. said also to be related to *mangangape* and *ghalingi*, trees of which no further information was collected. MYRTACEAE, probably Syzygium cuminii (L.) Skals. R2817, R3164, 3521. The use of Syzygium species as food plants is known in Melanesia, Polynesia, and Micronesia.

ue. The Rotang or Rattan Cane palm grows on Re., but not on Be. to which it is exported. It is used for floors, making houses cool and airy. When split it may be used for sturdy and durable lashings. PALMAE, Calamus sp. 3546.

'uhi. The general name (*hu'aiingoa*) *'u.* is sometimes used for all yams, but more specifically applied to the Winged Yam (or Water Yam). See also: *abubu*, *beetape*, *boiato*, *soi*, *'uhingaba*, *'uhi Tonga*, *'uhi Teni*. This species comprises a multitude of varieties with right-twining vines, termed *'u.* with a specifying addition. No doubt Be. kinds are established on different taxonomic levels, related to morphological or physiological features. *'U.* are cultivated for their large, edible tubers of low toxic contents, easily destroyed by baking. Two groups of *'u.* are distinguished, though the division is somewhat unsharp: *'u. ta'ane* (male, vigorous, coarse, large yams) and *'u. hahine* (female, small, good tasting yams). Another simultaneously used classification separates the cultivated *'u.* (*u. sanga*) from the wild ones (*u. mouku*).

'uhi ta'ane

bootebo. With broad, pointed, almost triangular leaves. Bulbils and long root-like tuber with reddish flesh. Both planted and wild, but now rarely seen, though of early origin. Said to have 'changed' (*ngingiu*) twice: into *'uhi a Pongi*, and into *maingoto* (*maingengoto*), discovered by Takiika (therefore also called *'uhi a Takiika*).

ghaghimanga (Re.: *ghaighimaga*). Ancient type, now rarely cultivated.

ghongopagho (Re.: *ghoghopagho*). Has long, vertical-growing, root-like tuber, often 'branching' (*mangamanga*). Non- flowering. Small narrow leaves. Growing wild, and cultivated until recently, but rare. It is considered of low value as a cultivar, but worth gathering though it requires much digging to harvest the thin tuber. Said to have been brought from Mungua (Woodlark I.) by Ngaakei (Ghongau lineage, generation 8, see Canoes plate 3). *Ghongopagho* is sometimes classed as *'uhi hahine*. 3220, 3245, 3351.

kasokaso. May be regarded as an early ancestor to *singasinga*, but has long, thin tuber. Early type, perhaps *hiti*. Rare. 3259.

kaukauniatango. A legendary *'u.*, but of recognized type with large branching tuber (see canoes T1). Some think it actually grows in forests, others consider it a *ghongopagho*.

Kopia (lit., Tikopia yam). Stems, and even stalks of narrow, heart-shaped leaves are winged; flowering; develops single, vertical and long tuber. Said to have been introduced by a cast-away canoe from Tikopia in ancient times. Rare. 3272, 3416.

mangoto (probably also *maingoto*, *maingengoto*). The three names probably apply to the same kind of yam, a type developed from or similar to *bootebo*. Possibly the names refer to the introduction by a cast-away canoe. All are said to stem from pre-Christian time, but not to be *hiti* plants.

maingoto is claimed to be a recent development of *bootebo*, discovered by Takiika. The three kinds are rare.

mangabaka. A yam from Re. Quite rare. 3570.

matapoko. A development from the *moana* yam. Recent. Rare.

moana, or *'u. mai moana* possibly *'u. te ñoana* (lit., overseas yam). A large reddish yam, closely resembling *Kopia* and *'u. mea*, but differing as to leaves. Early introduction; one of the most important yams on Be.

singasinga. Has large, curved tuber with reddish flesh. Requires good soil with left-over trees or poles to climb on. Early introduction. Common and of great cultivation potential. 3234, 3378.

soosopu. Long, vertical tuber with reddish flesh. Resembles *kasokaso*. Early. Rather common. 3204, 3243, 3290.

suinamo (see separate entry) and *suingango* (see separate entry). These two yams resemble each other, except that *suingango* has less developed tuber. They are often considered related to *tua mouku*. Some samples have been identified as Dioscorea nummularia Lamk, but samples No. 3221, 3241, and 3285 are almost definitely D. alata L. This underlines the slight differences between the most archaic types of these two species.

Tauniu. See *'uhi a Tauniu*.

tua. Common name for some spectacular kinds of yam with rounded, slightly heart-shaped leaves and developing pole-like, metre-long vertical tubers with top visible above ground. Digging of tubers requires considerable work. At least two types of *tua* are distinguished:

tua mouku (lit., forest tree). Thin, long tuber. 3212, 3244, 3360.

tua sanga (lit., cultivated *t.*). 3569.

tua kaungongoa (lit., *t.* [with] long stem). A type of *t. mouku* said to have been cultivated by the *hiti*.

tungangiinge (Re.: *tungangige*). Curved tuber like *singasinga*; flowering. Low soil requirements (3–4

years fallow). Rather common. Brought from Guadalcanal by Tekiuniu in 1949.

'uhi a 'Ale. A yam related to Kopia. Recently introduced.

'uhi a Atimasa. Introduced recently by a Malaita-man.

'uhi a Baiabe. Introduced recently by Baiabe, Be.

'uhi a Hatingeba (lit., Hatingeba's yam). Recent development of *moana* yam, discovered by Hatingeba, Be., in about 1962. Rare. 3454.

'uhi a Kemuel.

'uhi a Moa (lit., Moa's yam). Probably developed from *bootebo*. Rare. Introduced in about 1938.

'uhi a Mosesi (lit., Moses' yam). Said to be related to *Kopia*. Rare. Recently introduced.

'uhi a Pana (lit., Pana's yam). Vertical tuber, fast-growing and of low fertility requirements. Must have strong poles to carry the enormous foliage. Brought from Western Solomons by Pana in October 1934. Commonly planted.

'uhi a Pongi (lit., Pongi's yam). Known to have developed from *bootebo* about 1938. 3449.

'uhi a Taaika. A recent development from the *moana* yam, discovered by Taaika, Be. Rare.

'uhi a Takiika. Same as *maingoto*?

'uhi a Tauniu. A recently developed yam on Be. 3469.

'uhi a Tekiuniu. See *tungangiinge.*

'uhi a Temoa. Introduced from Honiara 1958.

'uhi hau (lit., Hibiscus (-leaved) yam). Developed from *'uhi langi* at Tegano, Re. Introduced on Be. in about 1941. Rare.

'uhi kau ki te beetape (lit., yam stem for *b.*). Rare.

'uhi langi. Flowering yam with branching, thin tuber. Fine yields even in poor soil. Considered a very hardy yam. Early, rare.

'uhi mai Tehaaosi (lit., yam from 'The House'). Said to have been brought to Re. from the Mission School (the house) of SSEM in New Hebrides by one of the missionaries killed in 1910. Rare.

'uhi hahine (or *'u. hakatonga*).

kakenuku. A red type of *singasinga*, but with weaker vines. Tubers regarded as very good tasting. Early type. Common.

kau ngingiki. See *suitongo kau ngingiki* below.

maingenuku or *mangenuku*? Said to be called *'u. a Tepai* also. Has a round, vertical tuber. Requires deep, good soil (4–5 years fallow).

pangighisu. Considered to be an old type of *singasinga.* Early. Rare.

singasinga (lit., curved). More often regarded as an *'u. ta'ane* (see these).

suitongo (see also *suinamo*). Resembles *singasinga* in many ways, but is generally weaker, and tuber has white flesh (*uso*) and a red layer under the peel. Usually four types are separated:

suitongo te henua (lit., endemic *s.*).

suitongo Teaghoa (lit., Teaghoa's *s.*).

suitongo kau ngingiki (lit., diminutive-stalked *s.*).

suitongo kau ngongoa (lit., long-stemmed *s.*).

All are early forms, commonly seen.

suitongo a Tepuke. Resembles *'u. a Pana.*

'uhi hua. An *'u.* yam with coconut-shaped tuber. Legendary, seems never to have actually existed.

'uhi Keisaea (lit., Keisaea's yam). Yam with huge, slightly branching tuber related to *'u. a Temasi.* A teacher's wife from Malaita, Keisaea, was the importer in about 1955. Rare.

'uhi mea (lit., red yam). An important yam, said to have developed locally (at the Lake?), and to have been brought from Re. to Be. by Huaitengaa, generation 12 (Canoes T128). Commonly grown, in spite of comparatively weak vines, but regarded as good tasting.

'uhi Teni. See separate entry: *'uhingaba.*

'uhi Tonga. See separate entry: *'uhi Tonga.*

All *'u.* yams seem to be DIOSCOREACEAE, Dioscorea alata L.; Barrau (1958) remarks, that D. alata seems to be of importance only in Western Polynesia (Tonga, Uvea), but not elsewhere in Polynesia, whereas it is widely grown in Melanesia.

'uhingaba. Sometimes also called *'u. hotohoto* or *hoto 'u.* (lit., thorny yams). The general name includes most of the species Chinese Yam or Lesser Yam, in the Solomons called Panna. It is recognized by heart-shaped leaves on vines twining left (*hakaseema*), like *abubu* from which it is distinguished by lack of bulbils (*hua*). Stems of left-twining vines are round-sectioned and thorny as are the tubers. Often more than a dozen tubers developed per plant. Yields are less of this crop than of *'u.* yams, but the taste of *'uhingaba* is usually greatly preferred. It requires more than four years of fallow and fairly good light and porous soil (e.g. a *malanga* type). Several kinds are known on Be.:

kumala. In spite of the vernacular name, *kumala* is not the Sweet Potato or Batata (usually called 'kumala' or cognates of this in Polynesia), but an *'uhingaba* yam with large hook-shaped tubers. Two types known:

kumala ho'ou (lit. new kumara). Whitish flesh. Rare. Introduced in about 1947–49.

kumala kungoa (lit. old kumara). With yellowish flesh. Introduced long before Christianity. Rare.

manaaubi. An ancient form of *'uhingaba*, said to have been cultivated by the *hiti*; now only self-propagated. Tubers are hardly more than thick roots. Found occasionally in clearings. The name is interesting in that it contains *ubi*, according to S. H. Elbert, a Melanesian cognate of Polynesian *'uhi.*

'uhingaba ango (lit., turmeric-*'u.*). The rather small tubers resemble those of the two kinds of turmeric cultivated. Early type. Common.

'uhingaba Kenga (lit., *'u.* from Guadalcanal/the Solomons). An old import from *Kenga* with good-

tasting medium-sized tubers. Widely cultivated. 3453.

'uhingaba mai 'atuhenua (lit., foreign *'u.*). Said to have been placed by a European recruiting ship at Ahanga (trying to contact people for the recruitment of labour to plantations) in a net belonging to Temasu'u Sauhonu, generation 19. This took place in the 1890s. Rare.

'uhingaba mai Laapani (lit., *'u.* from Japan). An often cultivated, high-yielding, good tasting *'u.*; introduced by Japanese fishermen to Re. in the 1930s.

'uhingaba tautu (lit., porcupine fish *'u.*). Kind of *'u.* with small hairy tubers. Introduced on the same occasion as *'u. mai 'atuhenua*. Rare. 3289.

'uhingaba unga (lit., red *'u.*). A local development in Re. and Be. *'U. Kenga* and *'u. tautu* are said occasionally to change into *'u. unga*. Occasional. Late development.

'uhingaba 'ungi (lit., dark *'u.*). Introduced via Western Solomons.

All *'uhingaba* are DIOSCOREACEAE, Dioscorea esculenta (Lour.) Burk.

'uhi Teni (lit. yam from Ntendi = Santa Cruz). An *'uhingaba* yam resembling *manaaubi*, but with thicker tuber. Early introduction, now only growing wild. Used for food during scarcities. DIOSCOREACEAE, D. esculenta (Lour.) Burk. 3218, 3366.

'uhi Tonga (lit., yam from Tonga or the South-East?). Probably identical with *'u. poa*, an obsolete name. A non-cultivated edible yam of primitive type with metre-long rootlike tuber. Vines twine to the right. It is white-fleshed and sought after during scarcities but hard to dig (as is *tua*) because of deep and thorny roots. Small leaves. Two types:

'uhi Tonga koona (lit., bitter *'u. T.*), found in forests climbing large trees.

'uhi Tonga. A young stage is called *labonga*.

Both said to have been cultivated by *hiti*. Rather rare.

'uhi Tonga and *manungaghe* are thought to be related, commonly termed *bao'uhi* (forest yams). They are also related to *suinamo* and *beetape*.

'uhi Tonga belongs to DIOSCOREACEAE, Dioscorea nummularia Lamk. 3219, 3240, 3283, 3349.

usi. A shrub planted near houses. Its fragrant leaves are used to rub hands after eating fish. RUTACEAE, Evodia longifolia. A. Ridr. or Evodia hortensis J. & P. Forst. R2787, 3082, 3362.

watermelon. See *meleni*.

Appendix B-2

Utilized plants of Bellona Island, listed alphabetically after systematic (genus-) names

Authors are given after: Index Kewensis 1955–60. Family names are with capital letters; where occurring the final 'ACEAE' has been omitted.

A.

Abroma augusta (L.) Willd. MALV.: *amamu*
Abutilon asiaticum (L.) G. Don. MALV.: *hau Tonga*
Acalypha grandis Benth. EUPHORBI.: *ghangapuli*
Acalypha boehmerioides Miq. EUPHORBI.: *ongoongo*
Acrostichum speciosum Willd. FILICINAE: *katibaka*
Afzelia bijuga A. Gray CAESALPINI.: *isi 'atua*
Aglaia sapindina (F. Muell.) Harms MELI.: *ngama*
Aglaia sp.? MELI.: *bilangoke*
Alocasia macrorrhiza (L.) G. Don. AR.: *ghanegho, ghughia, kape, kape Paungo*
Alstonia spectabilis R.Br. APOCYN.: *manguka*
Alyxia acuminata Schum. APOCYN.: *mainge*
Amaranthus gracilis Desf. AMARANTH: *titi*
Amaranthus sp. AMARANTH: *kaso*
Amorphophallus campanulatus (Roxb.) Bl. AR.: *loka*
Ananas comosus L. BROMELI.: *painapu*
Anodendron paniculatum DC. APOCYN.: *ghape 'atua*
Anona muricata ANON.: *patau*
Anona reticulata ANON.: *soursop/sausopu*
Areca catechu L. PALM.: *pua liki, p. mouku*
Artocarpus altilis (Park.) Fosb. MOR.: *mei* (many kinds)
Artocarpus rotundata (Houtt.) Panzer MOR.: *mei* (many kinds)
Asplenium nidus L. FILICINAE: *ngaungukn*

B.

Barringtonia asiatica (L.) Kurz. BARRINGTONI: *hutu*
Barringtonia racemosa Roxb. BARRINGTONI: *banga hutu, b. tea, b. 'ungi*
Bidens biternata (Lour.) Merr. et Scherff. COMPOSITAE: *bii 'atua*
Boerhaavia diffusa L. NYCTAGIN.: *mangake*
Boerlagiodendron sp.?: *pamulo*
Breynia cernua (Poir.) Muell. Arg. EUPHORBI.: *ghali*
Broussonetia papyrifera (L.) Vent. MOR.: *tututahi*
Bruguiera gymnorrhiza (L.) Lamk. RHIZOPHOR.: *tongo* (Re. only)
Buchanania arborescens (Bl.) Bl. ANACARDI.: *langua*
Burckella obovata (Forst. f.) Pierr. SAPOT.: *natu*

C.

Cadetia hispida (A. Rich.) Schltr. ORCHID.: *ghasughui*
Calamus sp. PALM.: *ue*
Calophyllum inophyllum L. GUTTIFERAE: *heta'u*
Canarium vitiense A. Gray BURSER.: *apatoa*
Canarium sp. BURSER.: *ngeemungi*? (more kinds)
Canavalia microcarpa (DC) Merr.: LEGUMINOSAE: *bangungu*
Cansjera leptostachys Benth. OPILI.: *kau bango maangoo*
Capsicum frutescens L. SOLAN.: *sili*
Carica papaya L. CARIC.: mamiapu (several types)
Cayratia sp. AMPELID.: *kauabasongo*
Ceiba pentandra Gaertn. BOMBAC.: *kepoki*
Celosia sp. AMARANT.: *matiti*
Citrullus vulgaris L. CUCURBIT.: *meleni*
Citrus aurantifolia (Christ.) Swingle RUT.: *laimane*
Citrus grandis (L.) Swingle RUT.: *mongi 'atua*
Citrus reticulata (Christ.) Swingle RUT.: *mandarina*
Cladium mariscus (L.) Pohl CYPER.: *bungu*
Claoxylon tumidum J. J. Sm. EUPHORBI.: *mangan-ghape*
Cocos nucifera L. PALM.: *niu* (several types)
Cordia subcordata Lamk. BORRAGIN.: *mangakanae*
Colocasia esculenta (L.) Schott AR.: *tango* (at least 22 types distinguished): *aangoghapu, 'ahungenga, angopaa, banebane, kamaamangu, kasiau, matangeba, ngauongi, tango a Halu, t. a Saungongo, t. a Steven, t. a Tepuke, t. kimoa, t. mai Tulaghi, t. ngeka, t. sangi, t. sua a Sau'uhi, t. sua tea, t. sua 'ungi, t. too, taubenga, 'usinuku*
Cordyline fruticosa (Stickm.) A Cheval. AGAV.: *tii* [syn. Cordyline terminalis (L.) Kunth]
Crinum sp. FILICINAE: *baghu'atua*
Cucumis melo L. CUCURBIT.: *'aatiu*
Cucumis sativus L. CUCURBIT.: *kiukaba*
Cucurbita pepo L. CUCURBIT.: *mena, pamukin*
Curcuma longa L. ZINGIBER.: *ango* (three types)
Cycas circinalis L. CYCAD.: *paipai*

D.

Davallia solida (Forst.) J. Sm. FILICINAE: *kuutuma*
Delarbrea collina Vieill. ARALI.: *tatake, tanetane*
Dendrobium antennatum (Lindbl.), D. gouldii (Rchb. f.), D. tokai (Rchb. f.) } ORCHID.: *ghasughui* (general name)
Derris heterophylla (Willd.) Bakh. LEGUMINOSAE: *luba* (two kinds)
Desmodium umbellatum (L.) DC. LEGUMINOSAE: *pungaaghe*
Dioscorea alata L. DIOSCORE.: (at least 38 types distinguished) *?beetape, bootebo, ghaghimanga, ghongopagho, kakenuku, kasokaso, kaukauniatango, kau ngingiki, Kopia, maingenuku, maingoto, mangabaka,*

matapoko, moana, pangighisu, singasinga, soosopu, ?suingango, suitongo (four types), *tua* (two types), *tungangiinge, 'uhi a Ale, 'u. a Atimasa, 'u. a Baiabe, 'u. a Hatingeba, 'u. a Kemuel, 'u. a Moa, 'u. a Mosesi, 'u. a Pana, 'u. a Pongi, 'u. a Taaika, 'u. a Takiika, 'u. a Tauniu, 'u. a Tekiuniu, 'u. a Temoa, 'u. hau, 'u. langi, 'u. mai Tehaaosi, 'u. Keisaea, 'u. mea*

Dioscorea bulbifera L. DIOSCORE.: (at least 14 types distinguished) *abubu* (*a. matamalolo, a. Paungo*), *koingau, maasiu, mangitebe, mongetau, mota, posu, soi* (*s. huangongoa, s. kau maangoo, s. laghola, s. mai te baka, s. pighae, s. 'ungi*)

Dioscorea esculenta (Lour.) Burk. DIOSCORE.: (at least 10 types distinguished) *kumala* (two types), *manaaubi, 'uhi Teni, 'uhingaba ango, 'u. Kenga, 'u. mai 'atuhenua, 'u. mai Laapani, 'u. tautu, 'u. unga, 'u. 'ungi*

Dioscorea nummularia Lamk. DIOSCORE: (about 7 types distinguished) *?beetape, manungaghe, suinamo* (two types), *suingango* (cf. D. alata) *?suitongo* (cf. D. alata), *'uhi Tonga*

Dioscorea pentaphylla L. DIOSCORE: (4 types distinguished) *boiato Kenga, b. tatango, gholongi, tabongo*

Diospyros glaberrima (L. f.) Bakh. EBEN.: *kanume*

Dysoxylum sp. MELI.: *ngangotoba, suaso, tungangiinge*

E.

Elaeocarpus sphaericus (Gaertn.) K. Schum. ELAEOCARP.: *mengu*

Eleusine indica (L.) Gaertn. GRAMINAE: *mutie* (general name)

Epipremnum pinnatum (L. f.) Engler AR.: *mangaghae* (*mangaghai*)

Eugenia sp. MYRT.: *ngeitu*

Evodia hortensis A Ridr.
Evodia longifolia J. et P. Forst. } RUT.: *usi*

Euphorbia hirta L. EUPHORBI.: *kangibi*

F.

Fagraea berteriana A. Gray ex. Benth. LOGANI: *pua 'atua*

Ficus adenosperma Miq. MOR.: *ngangia*

Ficus benjamini L. MOR.: *'aoa*

Ficus copiosa Steud. MOR.: *ghaapoli manguu*

Ficus glandifera Summerh. MOR.: *aloba*

Ficus microcarpa L. f. (var. naumannii (Engl.) Corner) MOR.: *'aoa tea*

Ficus prasinicarpa Elm. MOR.: *anga*

Ficus septica Burm. f. (var. cauliflora Comm.) MOR.: *samabuti*

Ficus tinctoria Forst. f. MOR.: *hengo*

Ficus wassa Roxb. MOR.: *ghaapoli mongi*

Ficus sp. MOR.: *anu, apangongo, apunga, belebelenga, kongopua, mabuli, mangapamulo, mangako, ngangia, ngoghe, tapaango, tapangighoghe*

Flagellaria indica L. FLAGELLARI.: *bae*

Floribundaria sp. BRYOPHYTA: *muningobo* (general name)

G.

Gardenia leucaena? RUBI.: *tiangetaha*

Glycine maximus Merr. LEGUMINOSAE: *bini*

Gnetum latifolium Bl. GNET.: *boitu*

Guettarda speciosa L. RUBI.: *puabano*

Gymnema sp. ASLEPIAD.: *ghape*

H.

Haplolobus floribundus (Schum.) Lamk. BURSER.: *ngeemungi*

Hernandi peltata Meiss. HERNANDI.: *pingipingi*

Hibiscus manihot L. MALV.: *kookona* (more kinds)

Hibiscus rosa-sinensis L. MALV.: *mengo*

Hibiscus tiliaceus L. MALV.: *hau*

Hoya sp. ASCLEPIAD.: *matongu*

Huperzia cornata LYCOPODI.: *taataihokai*

Huperzia phlegmariorides (Gaudi) LYCOPODI.: *sanisani* (general name)

Huperzia pseudophlegmaria Kuhn LYCOPODI.: *sanisani* (general name)

I.

Inocarpus fagiferus (Park.) Fosb. LEGUMINOSAE: *isi koka, isi mongi* [syn.: I. edulis Forst.]

Ipomoea acuminata (Vahl) R. et Sch. CONVOLVUL.: *bungebungegheta*

Ipomoea batatas L. CONVOLVUL.: *pateto* (several kinds)

Ipomoea congesta R.Br. CONVOLVUL.: *aghaagha*

Ipomoea gracilis R.Br. CONVOLVUL.: *bunge*

Ipomoea pes-caprae (L.) Roth. CONVOLVUL.: *hue*

K.

L.

Lecanopteris sinuosa? FILICINAE: *ngaunguku kataha*

Leea sp. AMPELID.: *samunganga*

Leucophanes Spp. BRYPHYTA.: *muningobo* (general name)

Litsea sp. LAUR.: *bangakongu*

M.

Macaranga aleuritoides EUPHORBI.: *kaunge*

Macaranga tanarius (L.) Muell. Arg. EUPHORBI.: *ngaupata*

Mangifera indica L. ANACARDI.: *ghai*

Mangifera minor Bl. ANACARDI.: *boighai* (two kinds)

Manihot utilissima Pohl EUPHORBI.: *lioka*

Melanthera biflora (L.) Willd. COMPOSITAE: *labughe*

Melastoma polyanthum Bl. MELASTOMI.: *menga*

Melochia odorata L. URTIC.: *bugho maaungu?*

Melothria camosula Cogn. CUCURBIT.: *tunupata*

Merremia peltata (L.) Merr. CONVOLVUL.: *sopi 'atua*

Microsorium pustulatum Forst. FILICINAE: *maingemanga*
Morinda citrifolia L. RUBI.: *nguna* (several types)
Morinda sp. RUBI.: *sunge*
Murraya crenulata (Turc.) Oliv. RUTACEAE: *maakangi*
Musa paradisiaca L.* MUS.: *huti* (abt. 5 types: *ghaghaghaba, ghoghipii, huti pugha, huti mea, saukaba*
Musa sapientum L.* MUS.: *huti* (abt. 5 types): *baebae, h. mai moana, h. mongi, h. pua, tai*
Musa troglodytarum L.* MUS.: *huti* (abt. 6 types): *ghabangaghi, kangisi'ibai, paunao, takape, tapipiingi, tongaka*

N.
Nephrolepis biserrata (Sw.) Schott } FILICINAE:
Nephrolepis triserrata (Sw.) Schott } *bangitia*
Nicotiana tabacum L. SOLAN.: *tabako*
Notocnide repanda (Bl.) Bl. URTIC.: *kaumongemonge*

O.
Ocimum sanctum L. LABIATAE: *tutuka*
Ochrosia parviflora (Forst.) Hemsl. APOCYN.: *baobao*
Operculina ventricosa (Bert.) Peter. CONVOLVUL.: *sopi tea*
Oxalis corniculata L. OXALID.: *malani sungumenga*

P.
Palaquium erythrospermum H. J. Lam SAPOT.: *ghaimenga*
Pandanus dubius Spreng. PANDAN.: *hanga songa, h. takape, kala*
Pandanus odorifer (Forti) Kuntze PANDAN.: *hanga Ngotuma*
Pandanus tectorius Soland. ex Park. PANDAN.: *hanga langua, h. isi*
Pandanus sp. PANDAN.: *baghu, kie*
Parinarium sp. PANDAN.: *'aatiti*
Parsonsia sp. APOCYN.: *singake*
Paspalum conjugatum Berg GRAMINEAE: *ngei*
Passiflora foetida L.? PASSIFLOR.: *miti*
Phaleria perrottetiana (Decne) F.-Vill. THYMELAE.: *ngighosangi*
Phaseolus lunatus L. LEGUMINOSAE: *bini*
Phyllanthus sp. EUPHORBI.: *sabea*
Piper betle L. PIPER.: *pita*
Piper sp. PIPER.: *kalakala*
Pipturus argenteus (Forst. f.) Wedd. URTIC.: *asongae*
Pisonia grandis R.Br. NYCTAGIN.: *puka, puka bai*
Planchonella sp. SAPOT.: *pau*
Planchonella thyrsoidea? E. T. White SAPOT.: *tanimanu*
Poikilospermum sp. URTIC.: *siango*
Polyscias pinnata Forst. ARALI.: *saka*
Polyscias cunninghamii (Presl.) Merr. ARALI.: *tanetane/tatake*
Premna gaudichaudii Schau VERBEN.: *bangobango*
Pseuderanthemum sp. ACANTH.: *sungu*
Psilotum triquetrum Sw. LYCOPODI.: *taataihokai*
Pueraria triloba (Lour.) Makino LEGUMINOSAE: *aka* (several types)

R.
Raphidophora sp. AR.: *mango, manighughi, nangoa, nganighubi, langoghe*
Rhus taitensis Guill. ANACARDI.: *tabai*
Rinorea sp. [syn. Alsodeia] VIOL.: *malanga*

S.
Saccharum officinarium L. GRAMINEAE: *tongo* (two types)
Schefflera waterhousei Harms ARALI.: *tabulo*
Scindapsus sp. AR.: *mango*?
Semecarpus sp.? ANACARDI.: *bangai*
Smilax sp. SMILAC.: *mangunge*
Solanum nigrum L. SOLAN.: *pe'epe'e*
Solanum torvum Swingle SOLAN.: *soghonae/taungoko*
Solanum verbascifolium L. SOLAN.: *soghonae/ taungoko*
Solanum sp. SOLAN.: *taungoko, kangalou*
Sonchus sp. COMPOSITAE: *lia kenge* (false)
Spondias dulcis Soland. ex Park. ANACARDI.: *bii*
Spondias pinnata (Koen. ex L. f.) Kurz ANACARDI: *bii 'atua*
Sporobolus diander (Retz.) P. Beauv. GRAMINEAE: *mutie* (general name)
Sterculia sp. STERCULI.: *mangango*
Syzygium cuminii (L.) Skals MYRT.: *ubo*
Syzygium malaccense (L.) Merr. et Perry MYRT.: *makahika, mangakahika*
Syzygium sp. MYRT.: *ghalingi, mangangape*

T.
Tacca leontopetaloides (L.) O.K. TACCA.: *soi tea*
Terminalia catappa L. COMBRET.: *tangie* (more types)
Terminalia kaernbachii? Warb. COMBRET.: *ghaghimanga*
Thuidium plumulosum (Poz. et Molk.) BRYOPHYTA: *muningobo* (general name)
Thrichosanthes ovigera Be. CUCURBIT.: *taba*

V.
Vigna marina (Burm. f.) Merr. LEGUMINOSAE: *ghagha*

X.
Xylosma sp. FLACOURTI.: *ngaki*

Z.
Zea mays L. GRAMINEAE: *koni*

* In modern taxomony, the Linnean classification has been given up.

Only identified as to family:
ACANTHACEAE: *sungu lia kenge* (true)
AMPELIDACEAE: *ghasigho*
ARACEAE: *alangi*
BRYOPHYTA: *muningobo* (general name)
FILICINAE: *aatoka*
FUNGI: *taanginga*
GRAMINEAE: *mutie* (general name)
LYCOPODIACEAE: *sanisani* (general name)
MENISPERMACEAE: *bangopali*
MYRTACEAE: *ngingike*
ORCHIDACEAE: *ghasughui* (common for more species)
SAPOTACEAE: *ghaghanga*, *uati*

Unidentified:
aamiti, *aapunga*, *aatuku*, *angingi*, *asi*, *bangaitu*, *bangokupenga*, *boitu*, *ghabighogha*, *maabua*, *mingo*, *tangatangaamoa*, *tubibaka*, *tungangiinge*

Appendix B-3

Utilized plants of Bellona, arranged after type of local utilization

A-I Plants used for food and drink:
- a) food: with edible roots, tubers or corms
  - with edible fruits (herbaceous plants: trees)
  - with edible leaves or stems
- b) drinking water

A-II. Plants considered important for recovery of fertility in fallow gardens

B. Plants used because of chemical properties for:
- a) medicine
- b) dietetic purposes
- c) stimulants
- d) flavouring and wrapping of food
- e) scents
- f) poisons
- g) dyes and stains

C. Plants used because of physical properties for:
- a) string, cord, rope
- b) plaiting
- c) textiles
- d) thatch
- e) house timber
- f) canoes
- g) implements
- h) various purposes

A-I Plants used for food and drink

a) Plants used for food.

Plants of which roots, tubers, or corms are eaten (me'a kai)

It has been attempted to note plants in groups similar to those distinguished by the Be. Most plants referred to are cultivated (*me'a sanga*); a few wild plants (*me'a mouku*) have been included if they are or have been utilized. The groups listed are: 'yams', 'other tubers', 'taros'.

'Yams':

'uhingaba, *'uhi*, *suinamo*, and *beetape* are regarded as closely related; more distantly related to these are *abubu*, *soi* and *boiato*. All these are generally termed *'uhi*.

'uhingaba (including *kumala*, *manaa'ubi*, *'uhingaba ango*, *'u. Kenga*, *'u. mai 'atuhenua*, *'u. mai Laapani*, *'u. tautu*, *'u. unga*). Often planted June-September, and harvested March-April (*te ghapu*). *'U.* is considered a reliable and valuable crop, but is susceptible to drought. Moderate soil requirements.

'uhi (including *'uhi ta'ane*: *bootebo*, *ghongopagho*, *kasokaso*, *kaukauniatango*, *Kopia*, *maingoto*, *mangabaka*, *moana*, (*u. mea*), *singasinga*, *soosopu*, *suingango*, *tua mouku*, *t. sanga*, *t. kaungongoa*, *tungangiinge*, *'u. Ale*, *'u. a Hatingeba*, *'u. a Moa*, *'u. a Mosesi*, *'u. a Panoa*, *'u. a Pongi*, *'u. a Taaika*, *'u. a Takiika*, *'u. a Tauniu*, *'u. hau*, *'u. langi*, *'u. mai Tehaaosi*, *'u. matapoko*, *'u. moana*; further *'uhi hahine*: *kakenuku*, *kaungingiki*, *maingenuku*, *pangighisu*, (*singasinga*), *suitongo te henua*, *s. Teaghoa*, *s. kaungingiki*, *s. a Tepuke*, *'uhi hua*, *'u. Keisaea*, *'u. mea*.

The difference between *'u. ta'ane* and *'u. hahine* is mainly in length of growing period. *'U. ta'ane* develop in six or seven months, *'u. hahine* about a month less.

Main harvest of *'u.* is April-May, but usually an earlier and a later harvest can be distinguished (*ghapu mu'a* and *gh. mungi*). *'U.* are a very important crop, but are susceptible to drought. Forms exist to fit various thicknesses and types of soil: curved types are used in shallow soils and long pole-like types in deep soils. Some types have rather weak vines and are therefore often planted with strong-vined companions; all types need poles or dead trees for support. *'U.* are perhaps the highest yielding Be. crop, but require long periods of fallow, and are seasonal.

suinamo (including *s. 'ungi*, related: *suingango*). Old types of yams, cultivated like *'uhi*. *S.* are liked because of their good smell and taste. Yields are lower than that of most *'uhi*, but *s.* is a quite hardy crop.

beetape is regarded as related to *suinamo*. Cultivation follows the pattern of *'uhi*. *B.* is often higher yielding on meagre soils than *'uhi* generally and its curved tuber makes it usable also for shallow soils. The heavy vines of *b.* require good staking. Cultivation of *b.* adds to a cultivator's prestige; gardens with only a few *b.* are sometimes called *b.* gardens. Of similar uses, and related to *b.* and *suinamo* are: *manungaghe*, *pangighisu*, (*suitongo*), and *'uhi Tonga*. These are uncultivated, but collected during scarcities.

abubu and *soi*. *A.* includes *a. mata malolo*, *a. Paungo*, *ghope*, *koingau*, *maasiu*, *mota*, *posu*, *mongetau*, *mangitebe*, and *m. 'ungi*. All cultivated, often near houses, climbing large trees. Tubers harvested May-June, bulbils (often growing to large dimensions) in January-February. *S.* includes *s. huangongoa*, *s. kau maangoo*, *s. laghola*, *s. pighae*, *s. mai te baka*, *s. 'ungi*. *S.* are never cultivated but are collected during scarcities. They grow in every opening or clearing of the forests,

but are rather bitter/poisonous. Only bulbils are eaten.

boiato, including *b. Kenga*, *b. tatanga* (both *b. hahine*) and *b. ta'ane*: *gholongi* and *tabonga*. *B.* yield bulbils and tuber like those of *abubu*, but more hardy, growing on poor soils and yielding even when most other crops fail. The vines tend to develop horizontally, and must be staked if bulbils are to develop, preferably with a grid-iron type of framework.

'Other tubers':

aka, *kookona*, *loka*, *mangake*, *soi tea* (and *tii*?) are not related, but may be distinguished as a non-vine and non-*tango* group of root crops; their use as food plants is probably of old age on Be.

aka. Three types: *a. pali*, *a. sopi*, and *a. bango*. Hardly cultivated nowadays, but the deep thin root is used for food during scarcities. Develops very fast (2 months).

kookona. Cultivated previously also because of the root, now only for leaves.

loka. Now seldom cultivated, but its corm is sought for as an emergency food.

mangake. Root eaten during scarcities.

soi tea. Now rarely cultivated; its corm is used during scarcities.

tii. Now not cultivated; root was probably eaten in a remote past, but definite information is lacking.

lioka and *poteto* are considered introductions of a more recent period.

lioka, *manioc* or *cassava*. Occasionally planted in parts of remote gardens or in infertile soil for the use during emergencies. Tubers can be left in soil for months without damage. Cultivation requires little work. The taste of the tubers is disliked, however.

pateto, *poteto*. Sweet Potato. Several kinds: *Baapua*, *p. a Kaipua*, *p. a Taupongi*, *p. a Tepai*, *p. ngaulioka*, *p. susungu*. Will grow in infertile soil, requires no staking and no seed-tubers. It is quite hardy in droughts; the well-drained Be. soil disencourages rot caused by drenching. Harvests can be made at almost every time of the year, and the taste of the tubers is liked. The regrowth of fallow-gardens presents a problem.

'Taros':

tango and *kape* are related according to Be. concepts. Their importance is only surpassed by the *'uhi* group.

tango. (Several types: *tango ta'ane*: *kamaamangu*, *matangeba*, *t. a Halu*, *t. a Steveni*, *t. a Tepuke*, *tango kimoa*, *t. mai Tulaghi*, *t. sangi*, *t. sua*, *t. too*, *taubenga*, *'usinuku*. *tango hahine*: *'ahungenga*, *aangoghapu*, *angopaa*, *banebane*, *matangei*, *ngauongi*, *t. a Saungongo*, *t. ngeka*. The *ta'ane* types of *t.* take about 5–6 months to grow, against 3–4 months for *hahine* types. *t.* may be planted in every month, but require rain and moderate light to develop; even short droughts endanger *t.*-yields. Dead shade trees are usually employed in *t.*-gardens. Yields are moderate, but the input of work low. Grown in separate garden or planted with *'uhi*, *'uhingaba* and *huti*. Only short fallow-period required (3 days).

kape including: *ghanegho*, *ghughia*, *k. bao*, *k. mongi*, *k. Paungo*, *k. 'ungi*.

K. takes two years to develop, is often planted with *huti* or *tango*, preferring shade when young. Requires almost no care, but gives only moderate yields. The corm developed is large and coarse.

Plants with edible fruits

Such a classification does not exist in Be. concepts, as there is no general name for 'plant' and fruits and bulbils (as of yams) are collectively termed *hua*.

The group of plants with edible fruits encompasses:

1) vines with edible fruits
2) non-vine herbaceous plants with edible fruit
3) trees with edible fruits

To avoid repetition, the bulbil-bearing yams are only described under root crops.

The distinction between trees and herbs is rather unsharp on Be. as elsewhere. Bananas are thought of as being trees, though they are perennial herbaceous plants.

Vines with edible fruits (*kaubango kai tona hua*).

The majority of the vines with edible 'fruits' are yams; others were never numerous on Be. Most of this exclusive group has never been cultivated and those cultivated were never of importance. There were and still are only few cultivated plants propagated by seeds in Be. horticulture. A distinction is made below between traditional and recently introduced plants.

Traditional:

'aatiu. A cucurbit with small fruits. The berries are collected, and the plant is occasionally cultivated. Seems to be better known on Re. than on Be.

bangungu. Seeds of the large pods are probably eaten.

ghagha.

kangalou. Berries eaten.

taba. The only cucurbit (except probably *'aatiu*) in Be. use before 1938. As well fruits as young shoots (*bulitaba*) were eaten.

taungoko. Considered related to *kangalou*, and the recently imported *soghonae*.

Recent introductions:

bini (more types of beans, including Common Brown Bean and Soy Bean).

kiukaba (Cucumber).

meleni (Water Melon).

mena. Same as *pamukin*.

miti. A weed, but berries eaten now and then.

pamukin (Pumpkin).
pe'epe'e. Probably unintentionally introduced.
pinati (Peanut).
soghonae and *pe'epe'e*. Both are regarded as weeds, but berries are eaten.

Non-vine herbaceous plants with edible fruits

Traditional: Only a few are reported, as *taungoko*.
Recent:
koni (corn, maize), *painapu* (pineapple), *pe'epe'e* (eaten as sweet), *sili* (Chili Pepper), *taumata* (tomato).

This list has probably more recent additions. The greatest success has been the acquisition of corn, the other plants are often still regarded as curiosities.

Trees with edible seeds/fruit (nga'akau kai tona hua).

Traditional:
Almost all trees with edible fruits or seeds were uncultivated, but they were left uncut when forest was cleared; some measures were taken to protect them against parasites and competing plants. Some seeds or fruits were eaten immediately, but many were too toxic to be eaten raw. For these soaking was the commonly applied treatment. A technique for extraction of oil was known, mainly used for *ngeemungi*-drupes, but also for *apatoa* and others. It has been attempted to divide fruit-bearing trees into groups below according to treatment before use.

Edible raw:
banga (four types), *baobao*, *bii*, *boighai* (sometimes considered poisonous, two types), *ghaapoli*, *ghabighogha*, *ghaghanga*?, *ghai*, *ghalingi* (see *ubo*), *hanga* (several kinds, mainly for chewing), *hengo*, *huti* (including: *baebae*, *ghabangaghi*, *ghaghaghaba*, *ghoghipii*, *h. mai moana*, *h. mea*, *h. mongi*, *h. pua*, *kangisi'ibai*, *paunao*, *saukaba*, *tai*, *takape*, *tapipiingi*, and *tongaka*), *isi*, *kala*, *kepoki*, *mabuti*, *mangangape*, *makahika*, *mangako*, *mei* (including: *boghota*, *bungeabu*, *kalakala*, *mabuti*, *taboghi*, *tete*; several kinds edible raw, but always cooked when possible), *mengu*, *mungape* (see *ubo*), *natu*, *niu* (most important of all trees, several kinds eaten raw, but also with cooked food), *nguna* (seven kinds distinguished), *samabuti*, *sunge*, *tangie*, *ubo*.

Edible only after soaking:
apatoa, *baobao*, *boitu*, *ghaghimanga*, *natu*, *ngaki*, *ngeemungi* (kernels only), *paipai*.

Used for oil extraction:
ngeemungi.

Recently introduced:
mamiapu (papaya) was introduced in the era of early European contacts, the others have been known on Be. only after WW II. Most of the recently introduced plants are relished raw. An exception being *mamiapu* which is eaten both raw and cooked.

It seems to have been difficult for the Be. to utilize these new crops, with the possible exception of *huti* (some kinds only), *kepoki* (the seeds are of very little importance), *laemane* (lemon), *mamiapu* (papaya), *mandarina*, *mongi* (orange and grapefruit), *patau* (sweetsop), *sauasopu* (soursop).

Plants of which leaves or stems are eaten

Most of these plants have been known for ages on Be., but of those listed below, *kookona* and *poteto* (batate) were introduced after European contact.

Leaves eaten:
aghaagha (quite bitter, must be cooked), *bangopali* (scarcity food), *bunge* (scarcity food, very woody), *ghape* (a very important food in lean periods and scarcities), *ghaapoli* (young shoots, *buli*, are eaten, called *manongi*), *kaubata* (see *taba*), *kea* (cucurbit related to *taba*). Of *kea* only leaves and shoots seem to be eaten). *Kookona* (five kinds), *mangake*, *mangako* (leaves called *saunga*) *poteto* (leaves and stems are considered scarcity foods), *puka*, *sabea*, *taba* (cucurbit of which the young stems, *kaubata*, and the young shoots, *bulitaba*, are appreciated foods, *sopi*, *tanetane*, *tatake*, *taungoko*, *tango* (esp. of *hahine*-taro the leaves and young shoots are favoured foods), *tongo* (sugar cane, often chewed as a sweet), *tunupata*.

Stems eaten:
alangi (only after roasting), *asongae* (leaves are used for wrapping food, occasionally also eaten), *bangopali*, *ghasigho* (almost inedible scarcity food), *ghasughui* (orchid stems eaten during scarcities), *langoghe*, *mangagha* (after roasting only) *mango* (esp. the young stems, *beeghini*), *ngangoa*, *nganighubi*, *tunupata*.

The whole plants eaten:
ngimu, green algae, are also eaten, though infrequent. (Within these leaves/stems cannot be differentiated). *ongoongo*, a weed sometimes used for chicken fodder.

b) Plants delivering drinking water

The importance of these plants is stressed by the total absence of any streams and wells on the island. A well was drilled in 1967 by the Geological Survey Department. Supplies of fresh water come only from collected rain water or from water holes. After rains, springs rise near the ocean water table along the coast. This water, however, mixes with the salt water and is almost non-potable except immediately after rains. Coconut palms work as a sort of 'filters', converting ground water, even when salt, into drinkable water.

niu (the Coconut Palm, several kinds), *kautabasongo* (stems are chopped and the watery sap drunk. To touch the stem with the lips is said to cause an itch, and must thus be avoided), *sopi 'atua* (used like *kautabasongo*), *kau mongemonge*, *samunganga*.

A-II Plants considered important for recovery of fertility in fallow gardens

Several plants may be found in fallow gardens after a series of years. The plants invading during a normal cycle were investigated (see Appendix C for abundance on different soils):

aatoka, *aghaagha*, *anu*, *aka*, *apatoa*, *asongae*, *atoka*
bae, *banga*, *bangitia*, *bangobango*, *bangungu*, *bii*, *bugho*, *bunge*
ghali, *ghangapuli*, *ghape*, *ghapoli*
hanga, *hau*
kalakala, *kangibi*, *kaubangumaangun*, *kaubangungu*, *kautaba*, *kautabasongo*, *kongopua*
labughe, *liakenge*, *luba*
mamiapu, *manaaubi*, *mangaghai*, *mangaka*, *mangitebe*, *manguka*, *mangunge*, *miti*, *mutaba*, *mutie*
ngaunguku, *ngaupata*, *ngei*, *ngeitu*, *ngighosangi*, *nguna*
pita, *pua 'atua*
samabuti, *siango*, *soi*, *sopi 'atua*
tangie, *tii*
hetui (different crop plants self-propagated in fallow areas).

The most common trees in the fallows are: *ghali*, *hau*, *ngaupata*, *nguna* and *tii*. Of these *hau*, *ngaupata*, and *tii* are considered very useful in helping to build up fertility fast. *Ghali* and *nguna* are fast growing, but considered less efficient than the foregoing in the building up of fertility.

A less fertile fallow is indicated by ferns as *aatoka*, *bangitia* and *ngaunguku*. These may even prevent the development of normal trees, such as are indispensable for cultivation of yams. Even worse for a fallow is a regrowth of grasses, *mutie*, of which *ngei* is the most common.

It is still a matter of doubt whether such fallows are forever diverted into a less fertile regrowth (like a savannah).

In a fallow useful plants are usually saved. Leftover plants (*me'a malubu*) and self-propagated cultivars (*hetui*) are collected during scarcities. When a fallow is recultivated *mamiapu* are left to develop.

B. Plants used mainly because of chemical properties

a) Plants used for medicine

(Most of the information was collected in 1966 by Hearne Pardee.)

It seems that most local medicine on Be. was centered on treatment of wounds and boils. The few medicinal plants of other uses are all(?) recent imports from Melanesia. On the whole medicinal knowledge on Be. was rather undeveloped compared with neighbouring Melanesian islands.

For wounds, cuts, and boils:

bangungu. Sap used for boils and sores.
ghali. Heated leaves placed on sores.
hue. Leaves applied to boils.
labughe. Heated leaves are pounded, then placed on sores and sore eyes.
lia kenge. Crushed or squeezed leaves on sores (or toothaches).
maakangi. Leaves are placed on boils.
matongu. Heated leaves placed on sores and boils.
malani sungumenga. Cooked leaves on sores.
nguna. Fruit halves are heated on fire, then applied to cuts on feet.
singake. Crushed leaves are applied to sores.
sopi. Sap of leaves applied to boils.
tutuka. Leaves used to heal wounds.

For other external use:

asongae. Heated leaves applied to aching teeth.
boighai. Leaves placed on chest of person to relieve fever and shortness of breath.
kalakala. Crushed leaves applied to wash stings.

For internal use:

aapunga. Used as medicine for coughing.
baghu. A stomach ailment is made by squeezing aerial roots in water.
hanga songo. Fruits are eaten to remedy poisoning by fish.
kangibi. The seeds are eaten for diarrhoea and stomach pains.
kapingangi. Leaves squeezed in water, drunk for tuberculosis.
laemane. Juice used for sore throats; recent.
samabuti. Leaves are chewed with *pita* for stomach ailments such as diarrhoea.
sili. Chili Pepper eaten to cure stomach trouble.
tangie. For coughing an extract of the bark is drunk. Used in the same way for dysentery in Southern Melanesia.
taataihokai. Possibly an extract of this was drunk for coughing.

b) Dietetic plants

Nearly all non-bitter fruits of trees are considered good for sick or weak people e.g.: *bii*, *isi*, *ghai*, *nguna*, *ngeemungi*, *mamiapu*. Such food is usually roasted or boiled (*mamiapu*) before being relished.

Sweet foods are considered desirable for the sick as some bananas (*huti*) of the *tai*-kind. The fruit (*hua*), juice (*muko*) or the stem (*pani huti*) with marrow (*pongata*) are eaten.

Cooked green parts of plants, leaves (*ngau*) or young shoots (*buli*) as of *ghape* and *tango* are used for restoring weaknesses in general. For pregnant women *taungoko* is considered especially beneficient.

c) Stimulants

The *kava* drink was not used on Be., though the name *kaba* was retained in rituals (e.g. *kaba ki ngangi*).

On the contrary, the (Melanesian) habit of chewing betel was and is practised. The ingredients for this stimulant are easily procured on Be.

As a late introduction *tabako* (tobacco) is also found, though smoking is restricted to members of SSEC and it is prohibited by the SDA mission. *Tabako* is known to exhaust the soil, and is very little cultivated.

For betel-chewing:

pita (Betel Pepper) leaves are chewed with *pua* (Betel Nut), bunches of which are considered valuable. For the chewing is added burnt lime. Three kinds known: *p. liki*, *p. mouku*, *p. 'atua*.

d) Flavouring agents/wrappings

Many kinds of leaves are used to wrap food, like banana and taro leaves. Some also add taste to the food like the following:

bangai. Leaves used to wrap puddings.

hutu. Leaves used to wrap fish for the oven.

kaunge. Leaves are used to wrap fish and shark liver.

ngaungukn. Used to wrap fish.

maingemanga. Used to wrap *paipai*.

siango. Leaves used for fish (though skin irritating).

sili (Chili Pepper). Late introduction, still little used.

sopi. Leaves used for fish.

e) Scents

bangobango. Leaves heated and placed in nostrils. Fumes are good-smelling and said to cure headaches.

mainge. The leaves used to rub body and hands for a scent. Also used to give *kete manguu* baskets nice fragrance and to prevent attacks of beetles.

maingemanga. Leaves are used to rub hands and body.

tutuka. Fragrant leaves are attached to young bananas to prevent attacks of flying foxes (*puli*).

usi. Its fragrant, slightly oily leaves are used for rubbing hands after eating fish.

f) Poisons

Poisons were used only to kill fish, and only two kinds: *luba* and *hutu*.

luba, the strongest poison, is used in reef-fishing. Two types: *luba tea* and *luba unga* are found, the first one is the strongest.

hutu is less poisonous than *luba*, but also less dangerous for the fishermen to use. There is doubt whether it has been used for poisoning fish on Be.

g) Plants used for dyes and stains

Dyes and stains were regarded as valuables on traditional Be. Bright yellow-red colours were highly appreciated both to dye *tapa* and as a body ointment, perhaps because of the importance of this colour in ritual practices. Apart from red, colouring were little used.

ango. Turmeric known throughout Polynesia was used both for dyeing *tapa* and mixed with coconut oil as a body ointment. Kinds reported: *a. matangi*, *a. Nikiua*, and *a. te henua*.

Powder from scraped roots was kept as *ngenga* in special containers. The dyes were not very fast and easily rubbed off.

kala. Red dye for *tapa*. *Kala* is often chewed and the coloured saliva spat on the object to be dyed.

ngaengae. The fruits used to stain spears.

nguna. Roots were rubbed as powder to stain spears red.

C. Plants used because of physical properties

a) Plants with fibres used for making string, cord, and rope

Ficus species delivered bark used as cord and string, not considered very durable; *'aoa*, *aloba*, *anu*, *belebelenga*, *ghaapoli*, *hengo*, and *tapaanga*.

aatuku. Is said to have been used for bush rope.

bae. Used for permanent lashings (canoes, houses), not considered the very best for the purpose, but available in adequate lengths.

boitu. Used for fishing line (*uka*), seine nets (*bugho*), hand-fishing nets (*kupenga*), and dove nets (*seu*). The cord is strong, and has good keeping qualities. It is often called *bangaitu*.

bugho. Bark used especially for seine nets (called *bugho*). Remarkable ability to withstand alternating soaking and drying without loss of strength.

ghape 'atua. Delivers fibres which are durable when (constantly) soaked, therefore used to tie fishhooks.

hau. Inner bark is used as bush rope for temporary purposes.

kau bango maangoo. Bark used for rope.

ngeitu. The thin stems, *banga ngeitu*, are used for strong and durable lashings, *sunu*; they are quite hard to make.

niu. The fibrous layer of coconut husks is used for twining light, strong string, plaited (or twined once more) into the valuable sennit (*kaha*). Sennit is indispensable for canoes (lashings) and for fishing (lines and nets). To preserve its strength, it must be left to dry at frequent intervals—which somewhat restricts its use.

mango. Fibres from aerial roots are said to be used as rope in house construction because of durability.

sungu. Yields a type of bush rope.

tapaango. Fibrous bark is used for rope.

ue (only Re.). Often imported, because of use for sturdy, durable lashings after splitting.

b) Plants used for plaiting

No weaving was and is made on Be., but plaiting, *nganganga*, is highly developed. Few plants deliver usable materials.

baghu. These large, thornless pandanus leaves are used for the plaiting or sewing of the soft very common sleeping mats (*baghu*).

ghabangaghi. Fibres of this banana turn black, when dry, and are used with *kie* to produce patterns in plaited fine mats (*malikope*) and fine bags (*kete manguu*). The technique was introduced recently.

kala. Pandanus with thornless leaves used for plaited sleeping mats, *baghu kala*, and nowadays also for fine bags.

katibaka. A fern used for plaiting strong, brown baskets (recently introduced technique).

kie. The narrow leaves of this pandanus are used for *malikope*, fine mats and fine bags.

niu. Coconut fronds (*ngau niu*) are used for plaiting coarse bags (*pongaponga*) of everyday use and remarkable usefulness. Fronds are also used to plait floor mats (*takapau*).

sanisani. Used for temporary plaitings only.

c) Plants used for making textiles

Weaving was unknown on traditional Be. and is still so. The only textile was bark-cloth, *tapa*. A multitude of plants with fibrous underbark were used for *tapa*. Trees with trunks of wide girths were preferred so that small pieces need not be joined together, a labourious process. Quality of *tapa* varied with the kind of tree utilized. Many kinds of Ficus were used, although the *tapa* was considered coarse and fragile.

aloba, *'aoa*, *anu*, *apunga*, *belebelenga*, *ghaapoli*, *hengo*, *mabuli*, *mabuti*, *ngoghe*, *tapaanga*, *tapangighoghe*, perhaps also *kongopua*? The best types of *tapa* were made from: *mei*, the Breadfruit Tree (large sizes obtainable).

tututahi, the Paper Mulberry delivered *tapa* of supreme quality.

d) Plants used for making thatch (*ngau hange*)

For temporary shelters (*hange masaki*, houses for the sick) and for fast, temporary repairs, coconut fronds (*ngau niu*) are used. These dry up soon and cause leaks.

Permanent thatch is made from pandanus leaves (*hanga*). These are made into panels of thatch (*mataangau*) folded over sticks of *bae* wood and sewn with coconut midribs.

Following types of pandanus are used for thatch:

hanga langua = *h. malangu*, *h. Ngotuma*, (related types: *h. mea*, *h. laubaghu*, *h. ghai*, and *h. susungu*, most forms on Re.), *h. songo*.

Especially *h. malangu* and *h. songo* are considered good for thatch, the first one easiest to handle because of few thorns on leaves.

Wind protection for the ridges of roofs is made with *sungu*.

e) Materials for houses

Lashing and thatch material have been mentioned under sections a) and d). Here materials for construction of the house frame are discussed. Poles upon which the roof (and most often also the floor) rests, present a special problem on Be., because their lower ends are dug into the ground and are consequently attacked by rot and termites. Also beams of the house present problems, some structural (to ensure adequate strength, avoid bending and torsion, etc.), other problems concern keeping qualities. The purlin is especially vulnerable. It is difficult to cover with thatch and is therefore often wet or damp and at the same time exposed to high temperatures. On the other hand the small timbers in a Be. house which do not fulfil any special requirements, are chosen according to lightness and availability.

House materials have been listed after their use: for posts, purlin, floor, beams and rafters, and 'small timber'. For the first items requirements are high and specialized, for the later they are lower and a large variety of materials may be used. This means that nearly all of the materials listed for posts and purlin may be used also for the later purposes; to save space they are not repeated in lists. (For a survey of construction see chapter 2.5,).

posts (*pou*): *amamu*, *'aoa*, *bangobango*, *bugho*, *heta'u*, *kongopua*, *langua*, *maakua*, *malanga*, *mangakanae*, *mangangape*, *manguka*, *ngama*, *ngangotoba*, *ngoghe*, *suaso*, *taminanu*, and *tunganginge*.

purlins (*ato*): *ghai*, *ghaimenga*, *manguka*, *puabano*.

floors (*sangiki*): in modern houses mainly *ue*, imported from Re., or e.g. *bangakongu*. Traditional houses had earth floors.

beams and rafters (*sasanga*, *kaukaui*): *bugho*, *ghaapoli*, *mei*, *kaunge*, *langua*, *malanga*, *mangangape*, *mangakanae*, *mei*, *taapaango*.

small timber: *aamiti*, *aloba*, *anga*, *angingi*, *amamu*, *'aoa*, *apangongo*, *asi*, *belebelenga*, *ghabighogha*, *ghangapuli*, *hau*, *mangapamulo*, *ngaupata*, *tapangighoghe*.

f) Materials for canoes

Almost any material for canoes must possess special properties. For the hull (*tino baka*) requirements are quite specific, as the timber must be light, strong, not liable to split or crack when drying out, fine-grained to be workable, and available in rather large sizes depending on wanted size of canoe. The most valuable wood is the *ghaimenga*. Almost equally fine is *suaso*, though much harder to work.

Outrigger booms (*ama*) require strong, elastic wood.

Paddles (*hoe*) should be made from wood able to resist the effects of being wet and dry alternatively. The wood for outrigger floats must be light to produce maximum buyoancy.

For making canoe hulls (*tino baka*): *apatoa*, *bii 'atua* (not rather suitable, but available in huge dimensions) *ghaimenga* (a superior material), *pingipingi* (rarely used), *suaso* (high quality wood, but hard), *tabai* (easy to work, but of inferior keeping quality—hull lasts only one year).

For gunwale poles (*lakunga*): *asi*.

For outrigger booms (*kiato*): e.g.: *bilangoke*, *manguka*.

For outrigger sticks (*baaato*): any hard, dense timber as *bugho*, *tongo* (from Re.).

For outrigger float (*ama*): *hau*, *mangango*.

For outrigger platform (*hata*): any light and strong type of wood.

For paddles (*hoe*): *bilangoke*, *langua*, *natu* (considered best).

The sticky, white sap of the *sopi 'atua* vine, or of *'aatiti* (a recent acquisition) is often used to seal cracks in hulls.

To avoid cracks, canoes on the beach are covered with vines of *tubibaka*.

(For a survey of canoe construction see chap. 2).

g) Materials for implements

Utensils for horticulture:

The only important wooden implement is the digging stick (*koso*) made from any hardwood available, though some kinds are preferred. After use the digging sticks are often left in gardens, completely disregarded.

Digging sticks (*koso*): *ghangapuli* (mostly for women), *manguka* (preferred material, fine-grained and extremely strong), *pungaaghe* (also of high regard), *sunga* (often used when digging for *uhi Tonga*).

Climbing poles for yams (*beeghai*): *ngaupata* and other easily available sticks, mainly from fallow gardens.

Utensils for fishing/hunting:

For spears etc. same materials as for weapons. Nets: materials listed in section C, a).

Hand net for fishing (*kupenga*) and pigeon-net (*seu*): wooden frame made of *ngeitu* (flexible parts) or *bangokupenga*.

Handles (*kau kupenga*): many kinds of wood usable, especially *isi*.

Torches for fishing (*pungu*): for the stick often wood of Ficus or *ngama* is used; for the leaf-knobs around it coconut fronds (or pandanus leaves) impregnated with oil (from *ngeemungi*) or resin.

Large wooden hooks for shark fishing (*ghau nga'akau*): *sua*, or *tu'ungango*, several kinds of dense, heavy wood like *heta'u* and *isi*; a stone weight was added to make the hook sink. A rattle (*ongoongo*) was made from Tridacna shells or coconut shell halves on a flexible vine.

Small fishing hooks, *ghau haangongo*, are made from coconut shells.

Trolling lures are made from stems of *baghu 'atua*, a fern.

Leaves to wrap bait when fishing for bottom fish (*hatu 'angi*) are had from *mingo*.

Bird snares. *Ue* thorns (*bolo ue*).

For camouflage hats, used when netting; fronds of the fern *kuutuma*.

Various implements:

Handles for axes etc.: *kongopua*.

Tapa beaters (*ngike*): a dark, heavy wood, still unidentified, is used.

Wooden bowls (*kumete*): same materials as for canoe hulls i.e. *ghaimenga* may be used, more often *hetau*, *mangango*, *isi*, and *tunganginge* are preferred.

Water containers (*bai*) and lime containers (*kapia*) are made from the inner hard shells of coconuts (*niu*), generally used for containers (*haangongo*).

Scrapers (*tuai*): coconut shells.

Fire-plough (*nganiabu*) with stick (*linga*): *bangobango* was considered best for both stick and hearth, but for the hearth also other kinds of wood are used (*hau*). *Hau* is also used to nourish the newly-ignited flame. Later a variety of firewood is used. *Ghangapuli* is said to burn almost smokeless, and is therefore said to be used when cooking with pots (*hai umu tini*).

Weapons (*nga'akau hai tau'a*): Nowadays traditional arms are made on Be. only for sale as curios, but their making is still well known. Six different types are distinguished: *baukianga*, *koabala*, *ngughaabalo*, *ngututaba*, *tiangetaha*, *ua*, and a sickle-shaped type. Most of the different types of war clubs are shown in Birket-Smith (1956 and 1969) as well as other favourite weapons such as bow-and-arrows, spears and a comb-like multi-pronged type of stiletto. For most weapons, the dense types of wood also used for posts in house construction were used. Following types have been especially mentioned as usable:

'atiti. For war clubs, very often preferred for this use.

kanume. The heavy core wood used for main part of arrow shafts (*tino*).

kaso. Used for the central part of arrows (*'uu*, *ngasau*).

kongopua. Its flexibility makes it suitable for bows (*kauhutu*) handles etc.

ngighosangi. Bark was used for bowstrings. The wood was used for slings and handles.

ngingike. For heavy war clubs.

pamulo. The dead wood *tutunu* was used for parts of spears and arrows.

pau. Wood used for war clubs.

For lashings same materials as with canoes. The bow strings used were sennit.

h) Other uses of plant materials

Sandals (*takaba'e*) for walking on reefs: *belebelenga*.

Necklaces (*tu'u*): Often these were made from flying foxes teeth strung on a piece of sennit. Sometimes instead of teeth, the brown fruits of *tanimanu* were used.

Combs are often carved from *tanimanu* wood.

Fans (*ingi*): Used by important men (*matu'a*) for decorative purposes, made from plaited coconut fronds.

Pillows: Floss of *kepoki* is used to stuff pillows, a recent acquisition.

Toys: Only few toys were made on Be. A bull-roarer (*hua paipai*), sort of string toy with a revolving hollowed *paipai*-fruit was popular.

Musical instruments

Music was produced by beating a huge sounding-board (*papa*) with a couple of sticks. The board was carved from a plank-root, probably from *apatoa*, *pau* or any heavy and hard-wooded tree.

Appendix B-5

Some fishes caught by the Bellonese - A preliminary list

Identifications were mainly made by letting informants examine illustrations. As samples for further analysis in laboratory have only been collected in few cases, species closely resembling each other may easily have been mixed up in the list.

Identifications were made by:

1) Taupongi, Bellona. Based on:
   M. Titcomb & M. Pukui 1953: Native Use of Fish in Hawaii. JPS Memo. No. 29.
   (This work has fine plates, but without colours). Marked (T).
2) Hatingeba, Bellona, and Kasipaa, Rennell. Based on:
   T. C. Marshall 1964: Fishes of the Great Barrier Reef. Sydney.
   Information supplied by Dr. Torben Wolff, Zoological Museum, Copenhagen. Marked (W).
3) Tepaikea and Sengeika Tepuke, both Bellona. Based on:
   J. S. R. Munton 1967: The Fishes of New Guinea. Port Moresby. Information supplied by Dr. Rolf Kuschel, Copenhagen. Marked (K).

Notice: Systematic names are generally given as in Munton 1967, cited above.
Abbreviations in last column: ab. = abundant, com. = common.

Bellonese Name	English Name	Systematic Name	Abundance
'ahingamea	Orange-epaulette Surgeonfish (W,K)	Acanthurus olivaceus Bloch & Schneider	ab.
'akangeko	Unicorn-fish(?) (T)	Naso lituratus Forskål	
aku	General name for 'needle-fish , especially Long-toms (T,W,K)	(Belonidae) Strongylura Tylosurus	ab. rare
angaba	Possibly Black-tip or Mullet Shark	?Carcharinus spallanzani (Le Sueur)	
angēlua	General name for Clownfish and various Anemone-fish, e.g. Tomato Clownfish and Orange Anemone-fish (W,K)	(Amphiprionidae) Premnas biaculeatus Bloch Amphiprion percula (Lacépède)	com.
angi	General name for flounders, as Discoid Flounder, Intermediate Flounder, and Dusky Sole (K)	Bothus ovalis (Regan) Arnoglossus intermedius (Bleeker) Brachirus aspilos (Bleeker)	rare
angongo	Kind of Surgeonfish, Blue-lined S.?	?Acanthurus lineatus (L.)	com.
angu	General name for Sea-pikes, as Pick-handle Sea-pike, and Barracuda (T,W,K)	(Sphyrenidae), e.g. Sphyraena jello Cuvier Agriosphyraena barracuda Walbaum	com.
api	Common name for some Surgeon-fish, as Head-band Surgeonfish (K)	Some (Acanthuridae) Acanthurus leucopareius Jenkins	ab.

Appendix B-4

Some important animals in Be. subsistence production

(For a more complete list of birds: See T. Wolff 1973: Notes on Birds from Rennell and Bellona Islands. Natural Hist. of Rennell Isl., vol. 7, Copenhagen).

MAMMALS

Whales (*tahonga'a*) were eaten when stranded. This happened very rarely (see Canoes T100). They were considered gifts from the gods. Teeth of some dolphins (*'utangei*) were used for necklaces (*tu'u niho*).

Bats were eaten as they still are occasionally; also caught for the teeth used for necklaces (*tu'u niho*), prized valuables. Kinds utilized:

peka, Flying Fox, Pteropus tonganus. Considered a delicacy.

puli, Bare-backed Fruit Bat, Dobsonia inermis. Of little regard.

BIRDS

Many species were snared or netted, though taboos prevented some abundant ones from being hunted. Only a few important species are listed here.

ngupe, Pacific Dove, Ducula pacifica. Often netted. Highly appreciated; often kept tied to a perch (*sakanga*).

hingi, Pink-spotted Fruit Dove, Ptilinopus richardsii.

tuu, Ground Pigeon, Gallicolomba beccarii.

sibingi, Yellow-bibbed Lory, Lorius chlorocereus; nowadays shot with catapult as many other lories and parrots.

pekapeka, Glossy Swiftlet, Callocalia esculenta.

kanapu, Brown Booby, Sula leucogaster. Rarely eaten.

kataha, Least Man-o'-War, Fregata ariel.

REPTILES

Most of these were considered disgusting, being embodiments of ghosts (*'apai*); inedible. Exceptions were turtles, appreciated for food and material for making hooks, necklaces, ear pendants etc. Turtles were seen as gifts (*tonu*) from the gods. Only caught when on beach.

honu, Green Turtle, Chelonia midas.

FISHES

See appendix B-5. Most important group of animals in Be. subsistence.

MOLLUSCS

Octopuses and squids are popular foods.

heke, octopus, Octopus sp.

nguheke, squid, Decapoda.

Snails and mussels are eaten; of the larger species shells were used for scrapers (*tuai*) or for adzes (*toki*). Some of the most commonly utilized are:

takuku, Chiton, Chiton sp.

ngangingasa, Limpet, Patella sp.

pungu, Top Shell, Trochus sp.

angingi, Turban Shell, Turbo sp.

sisi, Nerite, Nerita sp.

punge, Cowrie, Cypraea sp.

haasua, Horseshoe Clam, Hippopus hippopus. Used for adzes.

takamou, Clam Shell, Tridacna sp. Used for adzes.

langinga, Giant Clam, Tridacna sp. Used for adzes.

CRUSTACEA

Some were often caught previously, but have now been tabooed by the SDA mission.

akui, Coconut Crab, Birgus latro. Very important, considered a delicacy.

ango, Great Land-crab, Cardisoma sp. Reported to have been eaten.

'unga, Hermit Crab, Coenobita sp.

tapatapa, Spiny Lobster, Palinurus penicillatus.

INSECTS

The larvae of some insects, esp. wood borers, were eaten roasted.

ahato, Longicorn larvae, Olethrius sp. Often found in specific kinds of trees. Larvae were dislodged by tapping on the bark, a technique learnt from *hiti* (Canoes T77).

ECHINODERMS

At least some kinds of Sea slugs were eaten.

manu, Sea Cucumber, Holothuria sp.

Bellonese Name	English Name	Systematic Name	Abundance
'atu	Bonito (T)	Euthynnus alletteratus Rafinesque	rare
baghangoa	Long-snouted (or Brown Unicornfish (T,K)	Naso unicornis (Forskål)	com.
balingi	Great Trevally (W)	Caranx sexfasciatus Quoy & Gomard	com.
bangukango	Common name for Skipjack and Big-eyed Tuna (T,W,K)	Katsuwonis (Euthynnus) pelamis (L.) Gaimard Parathunnus mebachi (Kishinouye)	com.
basa' itai	General name for Bullseyes (K)	(Priacanthidae)	rare
bete	Goatfish as Gold-striped Goatfish	(Mullidae), e.g. Mulloidichtys auriflamma (Forskål)	com.
buliata	Blue-spotted Rock Cod? (T)	Cephalopholis cyanostigma (Cuvier & Valenciennes)	rare
ghamungu	Probably Gold-lined Sea-bream (K)	?Gnathodentex aurolineatus (Lacépède)	com.
ghisumanga	Six-lined Perch (K) or Goatfish (?) (W)	Grammistes sexlineatus (Thunberg)	rare
ghumia	General name for Threadfins as Six-fingered T. (T,W,K)	(Polynemidae) e.g. Polydactylis sexfilis (Valenciennes)	com.
hai bangiue	Stingrays, as Blue-Spotted Stingray (T,K)	Amphotistius kuhli (Müller & Henle)	rare
hai mangoo	Devilray, Manta	Manta birostris (Walbaum)	rare
hai 'one	Common name for Fantail-rays, Mangrove rays (T,W,K)	Taeniura, Dasyatis, Himanthura	rare
hai peka	Spotted Eagle-ray? (K) Cow-nose Ray or Manta (T,W)	?Aetobatus narinari (Euphrasen) (Myliobatidae) Rhinoptera javanika Müller & Henle	rare
hangamea	Sea-perches, as Two-Spot Sea-perch and Kelp Sea-perch (Red Bass) (K)	Lutjanus bohar (Forskål) L. coatesi Whitley	com.
hingoaki (same as *ika ngenge* or related species)			
hitihitikaubango	Kind(s) of Butter-fish (T,W)	(Chaetodontidae)	rare

Bellonese Name	English Name	Systematic Name	Abundance
hu'aaika	Kind of Trevally (T,W)	Caranx melampygus? (Cuvier)	ab.
hualua	General name for Mullets (T,W,K)	(Mullidae) e.g. Liza dussumieri (Valenciennes), Crenimugil crenilabis (Forskål)	com.
ighaabonga	Black-spot Tusk-fish (T,K)	?Choerodon schoenleini (Valenciennes)	rare
ighaamenga	Spiny Squirrelfish (K)	Holocentrus spinifer (Forskål)	com.
ighaamungu	Three-saddled Cardinal-fish (T,K)	Gronovichthys bandanensis (Bleeker)	rare
ika baengo	Wedge-tailed Blue Tang (K)	Paracanthurus hepatus (L.)	rare
ika eke ongo	Hawkfish (Freckled Hawkfish) (K)	Paracirrhites forsteri (Bloch & Schneider)	com.
ika ngenge (or *ika langi*)	General name for Swordfishes, e.g. Pacific Sailfish, Broadbill Swordfish and Striped Marlin (T,W,K)	(Istiophoridae) Istiophorus orientalis (Temminck & Schlegel) Xiphias gladius (L.) Makaira audax (Philippi)	rare
kaalao	Common name for some Squirrelfish (T,K)	(Some Holocentridae) e.g. Ostichthys parvidens (Cuvier) O. Murdjan (Forskål)	com.
kabango	Some Sweetlips (T,K)	(Plectorhyncidae) e.g. Plectophynchus goldmanni (Bleeker)	
kangapa	Chevroned Blenny? (K)	Omobranchus elongatus (Bleeker)	com.
kangeba	Chinaman Leatherjacket (T)	?Cantherines agraudii (Quoy & Gaimard)	rare
kangoama	Sunrise Goatfish (K)	Upeneus sulphureus (Cuvier)	rare
kangumoana	Tiger Shark (T,W,K)	Gallocerda cuvieri (Le Sueur)	rare
kenge	Small-toothed Jobfish (K)	Aphareus rutilans (Cuvier)	
kinginga ngatanga (see *ngatanga*)			
lakonga	General name for Sea-perches, e.g. Black-spot Sea-perch (K)	(Lutjanidae) e.g. Lutjanus fulviiflamma (Forskål)	com.

Bellonese Name	English Name	Systematic Name	Abundance
langoba	Perhaps Scarlet-breasted Maori Wrasse (K)	?Cheilinus fasciatus (Bloch)	
lighomasi	Sling-jaw (W,K)	Epibulus insidiater (Pallas)	
lubi	General name for large mackerels, e.g. Papuan Spanish-mackerel (T,W,K)	(Scomberemoridae) Scomberomorus multiradiatus (Monro)	com.
maakasi	General name for large tunas, as Albacore, Northern Bluefin Tuna, and Yellowfin Tuna (T,K)	(Thunnidae) Thunnus alalungo germo (Lacépède) Kishinoella tonggol (Bleeker)	rare
ma'ito	General name for some small Surgeonfish, as Black-spot S. (T,W,K)	(Acanthuridae) e.g. Acanthurus baricul Lesson	ab.
malangulangu	General name for e.g. Spotty-tail, Banded Humbugs or Footballers (T,W,K)	?(Chromidae) e.g. Acanthochromis spp. Dascyllus spp.	com.
malangutongae	Some Unicornfish, as Short-snouted U. and Ring-tailed U. (T,K)	Naso brevirostris (Valenciennes) N. annulatus (Quoy & Gaimard)	rare
maleu	General name for some Coral- or Butterflyfish, as Saddled Coralfish, Thread-fin C., Golden-girdled C. (T,W,K)	(Chaetodontidae) e.g. Chaetodon ephippium Cuvier Anisochaetodon auriga (Forskål) Coradion chrysozonus (Cuvier)	ab.
malolo	Kind of Flying-fish (T)	?	ab.
manga	Purple-finned Sailfin-tang (K) or Blue Streak (W)	Zebrasoma veliferum (Bloch) Z. florescens Bennett	ab.
manganga	Yellow-spotted Emperor (K)	Lethrinus kallopterus Bleeker	rare
mangau	General name for Squirrelfish, as Crowned S., Black-finned S. (T,W,K)	(Holocentridae) e.g. Holocentrum diadema Lacépède Kutaflammeo operculare(Valenciennes)	ab.
mangibu	Drummers, as Ashen D. (T,W,K)	(Kyphosidae), e.g. Kyphosus cinerascens (Forskål)	com.
mangoo	General name for sharks (T,W,K)	Lamniformes	com.

Bellonese Name	English Name	Systematic Name	Abundance
manihi	General name for Sweepers, as Vanikoro S. maybe also including anchovies) (K)	(Pempheridae), e.g. Pempheris vanicolensis Cuvier	rare
manini	Five-banded Surgeonfish (T,W)	Acanthurus triostegus (L.)	com.
manoko	Unicorn-cods, as Japanese U.-c. (T,K)	E.g. Bregmaceros japonicus Tanaka	rare
matahuhunga	Some Trevallies, as Gold-spotted T., Papuan T. (K)	(Carangidae) e.g. Carangioides fulvoguttatus (Forskål) Caranx sansun (Forskål)	
mata'itanginga	Hammerhead Shark (T)	Sphyrna lenini (Griffith)	rare
menga	Some Parrotfish, as Blue-lipped Brown P. (K)	(Scaridae) e.g. Xanothon oktodon (Bleeker)	-ab.
moamoa	General name for Boxfish etc., as Blue-spotted B. (T,K)	(Ostracionidae) e.g. Ostracion lentiginosum Bloch & Schneider	rare
muu	Large-eyed Sea bream (K)	Monotaxis granoculis (Forskål)	
mutu	General name for Sergeant-majors, Pullers, Footballers e.g. Six-banded Sergeant-major, White-spot Puller, Black-tailed Footballer (T,K)	(Abudefdufidae), e.g. Abudefduf coelestinus (Cuvier) Dascyllus trimaculatus (Rüppell) Dascyllus melanurus Bleeker	com.
mutu mangaghai	Large-scaled Parma (W)	Parma oligolepis Whitley	
mutumoana	Green Trigger-fish (T,W,K)	Pseudobalistes flavimarginatus (Rüppell)	
mutu mongi	Clouded Damsel-fish (W,K)	Abudefduf curacao (Bloch)	
mutu 'ungi	Palmer's Damsel-fish, (W)	Abudefduf palmeri (Ogilby)	
muumuutai	Demoiselle-fish, as Violet Demoiselle, Leaden Demoiselle	(Pomacentridae) e.g. Pomacentrus cyanomos Bleeker, Eupomacentrus lividus (Bloch & Schneider)	ab.

Bellonese Name	English Name	Systematic Name	Abundance
ngaea	General name for some Wrasses and Parrot-fish (W,K)	(Labridae)	ab.
ngagha	General name for anchovies, like Hamilton's Anchovy? (K)	(Engraulidae) e.g. Schutengraulis hamiltoni (Gray)	ab.
ngaghangagha	General name for some Rainbow-fish and Wrasses, as Red-throated Rainbowfish, Moon-Wrasse, and Clouded Wrasse (K)	(Coridae) e.g. Coris aygula Lacépède, Thalassoma lunare (L.) Halichoeres nebulosus (Valenciennes)	com.
ngai	Salmon Herring (T)	Chanos chanos (Forskål)	rare
ngangahu	Crowned Soldier-fish (T,W)	Holocentrum diadema (Lacépède)	com.
ngangai	A Squirrelfish (W)	Kutaflammeo sammara (Forskål)	com.
ngangainga	Black-tip Shark (W)	Carcharinus spallanzani (Le Sueur)	rare
ngango	Double-headed Parrotfish (T,K)	Bolbometopon muraticus (Valenciennes)	rare
ngapaika	A Scad, maybe Big-eyed Scad (T,W)	Decapterus russelli (Rüppell)	rare
ngatanga	General name for Rock-cods, as Humped-back Rock-cod, Brown-banded Rockcod (K)	(Epinephelidae) e.g. Cromileptes altivelis (Valenciennes) Cephalopholis pachycentron (Valenciennes)	com.
ngaungauhau	General name for some (leaf-shaped) Coralfish, as One-spot Coralfish and Eight-band C. (T,W,K)	(Chaetodontidae) e.g. Anisochaetodon unimaculatus (Bloch) Chaetodon octofasciatus (Bloch)	ab.
ngupo	Horse-mackerel? (W)	Caranx ignobilis Forskål	com.
(*ngau*) *ngutuligho*	Clubnosed-wrasses, as Purple C.w. (K)	E .g. Gomphosus tricolor Quoy & Gaimard	com.
nihongua	Banded Wobbegong, Carpetshark (K)	Orectolobus ornatus (De Vis)	rare

Bellonese Name	English Name	Systematic Name	Abundance
opa	Some Flyingfish, as Mirror-finned F. and Half-banded F. (T,W,K)	(Some Exocoetidae) e.g. Hirundichtys oxycephalus (Bleeker) Cypselurus spilurus (Günther)	ab.
pa'aua	Cale-scale Trevally (K) Golden-lined Spinefoot (T,W)	Ulua mandibularis (Mackay) Siganus lineatus (Cuvier and Valenciennes)	rare
pakungatanga	Yellow-spot Rock-cod (T,W)	Epinephelus areolatus (Forskål)	rare
pangangi	Ring-tail Surgeonfish (T,K)	Acanthurus xanthopterus Valenciennes	com.
pange paela	General name for Catfish, Snake-mackerels, as Bermuda Catfish and Snake-mackerel (K)	(Gempylidae) Promethichtys prometheus (Cuvier) Gempylus serpens	
pangupangu	Perhaps Blue-finned Triggerfish (K)	Balistoides viridescens (Bloch & Schneider)	rare
poingenga	Thresher-shark	Alopias vulpius (Bonnaterre)	
pongae tata	Some Rock-cods, as Blue-spotted R. and Honeycomb R.-c. (T,W,K)	(Some Epinephelidae) Cephalopholis cyanostigma (Valenciennes) Epinephelus merra Bloch	com.
pongo	Some species of Surgeon-fish (and Tangs) as Pale-lined S.-f. (T,W,K)	(Acanthuridae) e.g. Acanthurus maculiceps (Ahl)	ab.
pongotapu	Blue-dotted Hair-toothed Tang (K)	Ctenochaetus strigosus (Bennett)	rare
ponongi	Some kinds of Unicornfish, as Hump-nosed U. (K)	Cyphomycter tuberosus (Lacépède)	com.
puna	General name for Moorish Idols, Batfish and some (high, flat ?) Coralfish, as Moorish Idol, Round-faced Batfish, Pennant Coralfish (K)	(Zanclidae) e.g. Zanclus canescens (L.) Platax teira (Forskål) Heniochus acuminatus (L.)	rare
pusi	Clouded Moray or Reef Eel (T,W,K)	Echidna nebulosa (Ahl)	com.

Bellonese Name	English Name	Systematic Name	Abundance
sangi	General name for Blennies and Hardyheads as Blue-lined Blenny, Pitted Hardyhead and Forskål s H. (T,W,K)	(Blenniidae) e.g. Runula rhinorhyncos (Bleeker) Hypoatherina lacunosa (Bloch & Schneider) Allanetta forskali (Rüppell)	com.
sasabe	General name for (large) flyingfish, as Greater Spotted F. and Slender Two-winged F. (T,W,K)	(Some Exocoetidae) e.g. Cypselurus atrisignis (Jenkins) Parexocoetus brachypterus (Richardson)	ab.
sasau ngenge	Common name for Butterfly-cods and Dragonfish, as Ornate B.-c. and Winged D. (W,K)	(Scorpaenidae) e.g. Pterois volitans (L.) Pegasus volitans	rare
sipa	General name for small flyingfish esp. Mirror-finned Flyingfish (T,K)	(Some Exocoetidae) Hirundichtys oxycephalus (Bleeker)	ab.
sogha	Probably a common name for some Wrasses and Comb-fish (T)	Genera Thalassoma and Coris?	com.
sumu	General name for Triggerfish (incl. the Tripodfish) as Starry Triggerfish, White-barred T., White-spotted T. Perhaps including Tripod-fish and some Leather-jacket (T,W,K)	(Balistidae) e.g. Abalistes stellaris (Bloch & Schneider) Rhinecanthus aculeatus (L.) Canthidermus rotundatus (Procé)	

(Several kinds of *sumu* are distinguished e.g. *s. kimoa*, *s. ngaukei*, *s. ngenga*, *s. ngeungeu* and *s. ungi*. They nearly all correspond to species of Triggerfish, as White-barred T., Golden-finned T., Vermiculated T., Yellow-blotched T., and Black and Brown T.). *Sumu kaangeba* is poisonous.

taapea	General name for Morays, Reef Eels (T,K)	(Muraenidae)	com.

(At least four kinds are distinguished: *taapea maatosi*, *t. pungepunge*, *t. susungu*, *t. ungi*, probably identical with Girdled Moray, Fresh Water M., Brown M., Black-spotted M.)

taea	Scarlet Sea-perch (T)	Lutjanus malabarius (Bloch & Schneider)	rare
takape	General name for Sea-perches, Basses, Snappers, as Red-margined Sea-perch, Yellow- and Blue Sea-perch (T,W,K)	(Lutjanidae) e.g. Lutjanus vaigiensis (Quoy & Gaimard) Lutjanus kasmira (Forskål)	com.
tangae	General name for Squirrelfish Horned S. (T,W,K)	(Holocentridae) e.g. Holocentrum cornutus, Bleeker	

Bellonese Name	English Name	Systematic Name	Abundance
(kinginga) tangaha	General name for some Maori-wrasses, as Scarlet-breasted M.-w. (T,W,K)	(Some Coridae) e.g. Cheilinus fasciatus (Bloch)	com.
tangili	General name for large mackerels, as Jack-Mackerel	(Scombridae) e.g. Acanthocybium solandri (Cuvier)	ab.
tangitangi	Sucking-fish, as Short Sucking-fish (T,W)	(Echeneidae) Remora remora (L.)	rare
ta'ota'oama	Painted Flutemouth, Trumpetfish (W,K)	E.g. Aulostoma chinensis (L.)	rare
tapungao hiti	General name for flatfish (T,W)		
tautu hotohoto	General name for Porcupine-fish, as Freckled Porcupine-fish (W,K)	(Diodontidae) e.g. Diodon maculatus L.	com.
te'ete'e	General name for Toadfish and Puffer-fish, as Ocellated Puffer (poisonous) (K)	(Lagocephalidae) e.g. Canthigaster margaritatis (Rüppell)	rare
'uhu	General name for some (blunt-headed?) Parrotfish, as green-Parrotfish (T,K)	(Scaridae) e.g. Xanothon sordidus (Forskål)	ab.
ume	A kind of Surgeon-fish? (T)	Acanthurus sp.?	com.
ungabi	General name for some Parrotfish, as Five-banded P. (T)	(Some Scaridae) e.g. Xanothon venosus (Valenciennes)	ab.
'ungua	General name for a group of Trevallies, (Crevallies) (Probably identified by diamond-shape and thread-like fins) as Long-finned T. (T,W,K)	(Some Carangidae) e.g. Carangoides armatus (Forskål)	com.
ungubeelina	Culverin, Snake-eel (K)	Leiuranus semicinctus (Lay & Bennett)	rare
ungungua	Blunt-headed Parrotfish (lit., the double-head) (K)	Chlorurus microrhinus Bleeker	rare
upiupi	General name for Coral-fish (with prolonged fins) and Angelfish, as Triangular Coralfish and Blue-banded Angelfish (K)	(Chaetodontidae) e.g. Conochaetodon triangulum (Cuvier) Pygoplites diacanthus (Boddaert)	com.

Bellonese Name	English Name	Systematic Name	Abundance
upo	Eels and Conger-eel, as Ashen Conger-eel (T,W,K)	Conger cinereus L.	com.
upo bai (lake eels) and *u. taikona* (salt water eels) are distinguished between.			
'utu	Green Jobfish	Aprion virescens (Valenciennes)	rare

Non-identified Bellonese fishes:

ahungu, bolaghau, kananu, liakuma, makango, ngape, ngusunga, pehu, sungumenga, tahalingi, takua, talitu, taongoma, ungutuki.

Appendix B-6

Some non-biological materials in Be. subsistence production

Remarkably few such materials were used traditionally.

CORAL STONES
were used for weights, sinkers, attached to nets and hooks, for graters and pounders in the kitchen, and for stones to heat for the oven. Hardened shells imbedded in coral were used for adzes, *toki taataa* or *t. lango*.

FOREIGN STONES
of volcanic origin may have been had from the roots of drifting trees, or they were imported. Very few imports are known to have taken place, and pounders, adzes (*toki 'ungi*) and stones for war clubs (*baukianga*) were of enormous value on traditional Be.

SAND
was used to cover graves (*takotonga*) and earthen house floors (rarely).

CLAY
may have had uses in Be. prehistory; a single potsherd found by excavation (Jens Poulsen 1972) seems to be of alien origin.

IRON

Since 1880s and 1890s iron has been known to the Be. A few axes were brought back from plantations in Queensland. Their names, *ghinama* or *sainama*, and *'aakisi*, seem to be derived from English 'chinaman' (a brand of manufacture?) and 'axe'. About 1920–1930 imports of ironware were gradually increased. Still steel axes were rare until after the end of W.W. II.

Modern imports encompass a variety of implements; many have replaced former locally made ones. Examples of important modern implements in subsistence production are:

Axes, knives (bush knives for cutting scrub; a special, sharpened flexible blade, *palasi*, for cutting grass), saws. Also hammer, nails, drills, planes, and other hand tools are now imported.

For fishing steel hooks have replaced totally the old hooks, and nylon line is used instead of sennit (*kaha*).

Many kinds of containers are imported: water tanks to collect rain water, pots and pans for cooking.

For houses corrugated iron sheets (*kapa*) are substituting thatch. An analysis of imports is given in chapter 9.

Appendix

Plants of the fallow regrowths on different

(For further explanation:

district	SA'AIHO										SA'AIHO										SA'AIHO									
name of plot	BAINGAU (TEMANU)										MATABAINGEI										MATABAINGEI									
type of soil	malanga hatu / 'one										malanga 'one/hingohingo										malanga hingohingo									
preceding crop	'uhin-gaba pāleto		baetape		baetape		baetape		'uhin-gaba		'uhin-gaba		'uhin-gaba huti		'uhin-gaba		'uhin-gaba		huti tango		'uhin-gaba		'uhin-gaba		'uhin-gaba pāleto		'uhin-gaba	
age of fallow, years	1		2		3		4		7		1		2		3		4		5		1		3		4		5			
height of vegetation M	1.0	1.2	2.5	3.0	3.0	3.5	4.0	4.5	8.5	9.0	1.5	1.75	3.0	3.5	3.75	3.75	7.5	7.5	4.5	8.0	1.0	1.25	4.2	4.5	4.5	6.0	5.5	7.5		
diametre of trunk CM	0.5	0.7	1.3	1.5	2.0	2.5	5.0	2.5	10	12.5	1.0	0.5	2.5	2.5	2.5	2.5	7.5	7.5	2.5	2.5	0.5	1.2		5.0	3.0	10	5.0	12		
vernacular name																														
aghaagha							3				2	6		3	3	3						3								
anu																1														
aka	3	4			1	2	2			1									1											
apatoa																														
asongae																2				1		2						3		
atoka (aatoka)																									22	39				
bae													3															2		
banga																												1		
bangitia				5	9				16	26					15		7		6	10		2	38	42	53	56	41	43	a	
bangobango																														
bangungu			1	3																										
bii																	1													
bugho					1																									
bunge					2	2																								
ghali																									5		3	1		
ghangapuli	9	3	5			10		19			2	9	42	20	19	6	11	10	3	3	9	6	7	11	2	8	3	2	1	
ghape																														
ghapoli (ghaapoli)									5			1	2	3		1		2	4											
hanga																														
hau	10	5	10	21	16	7	6	10	1	3	13	10	1		2	4	1	6	1		11	3	1	1	1	1	1	1		
kalakala																														
kangibi																					1									
kau bango mangoo									1																					
kaubangungu											3						2													
kautaba																														
kautabasongo											5																			
kongopua																														
labughe																						1								
liakenge															15				2		8	3				3		1	4	
luba					8	4	4	6				1						1				2					2			
mamiapu		2						1					1																	
manaauhi																						2								
mangaghai					4		2	3	8				1	1	10	1			5	14							3	5	1	
mangaka					6																									
mangiche													1																	
manguka			1									1										1	13					1		
mangunge																														
muti	5	7	1	3	1	1					1		11	3		1						1								
mutaba														1																
(mutie ~ grass)						2																								
ngaunguku																									1					
ngaupata				2			1				2											7		1			2	5		
ngei						3	11				1	20			3		2						5		22			1	c	few
ngeitu																														
ngighosungi																														
nguna					1																						1			
pita																														
pua 'atua									1										1									4		
samabuti																		1												
siango											2																1			
soi			6	8	2		2			4					1								2	4				1		
sopi 'atua							1				3									3								1		
sungu							2		8	2		2			1	1		3	1	2										
tangie							1																							
tii	1									3		1				3		1	3									3		
hetui*			1				1					3*	*	*		2					4									

district	GHONGAU										
name of plot	NUKUANGOHA										
type of soil	kenge ngau										
preceding crop	'uhin-gaba pāleto		'uhi, huti tango		'uhin-gaba pāleto		'uhi, huti tango		'uhin-gaba pāleto		
age of fallow, years	1		2		3		4		5		
height of vegetation M	1.0		2.5	4	4.5	4.5	4.0	5.5	6.5	7.5	
diametre of trunk CM	1.5		2.5	4.0	7.5	7.5	2.5	6.0	7.5	12	
vernacular name											
aghaagha			6	5	1	1			1		
anu											
aka			3	1					1	1	
apatoa											
asongae									3		
atoka (aatoka)					22	39					
bae									2		
banga									1		
bangitia	a						12				
bangobango											
bangungu											
bii											
bugho											
bunge											
ghali											
ghangapuli	1		4	7	2	2	2	5			
ghape											
ghapoli (ghaapoli)										1	
hanga											
hau					1			1		1	
kalakala											
kangibi											
kau bango mangoo											
kaubangungu								2			
kautaba											
kautabasongo											
kongopua											
labughe											
liakenge	4							1			
luba								2			
mamiapu			1	1	1		1		1		
manaauhi											
mangaghai	1		1	3	20	11			20	1	
mangaka							A				
mangiche											
manguka											
mangunge											
muti				1			1				
mutaba											
(mutie ~ grass)											
ngaunguku											
ngaupata					1		8			2	
ngei	c	few	C		5	A	19				
ngeitu											
ngighosungi											
nguna											
pita				3							
pua 'atua											
samabuti											
siango							1			1	
soi	1			1	5	2		1		2	
sopi 'atua							2				
sungu										5	
tangie											
tii					2						
hetui*			1	2	1	1		1		1	

a, A = abundant. c, C = common. * = no. of plants indefinite. bold-faced type = dominant plants.

C

types of soil at various age of fallows

see chapter 2,15).

GHONGAU										GHONGAU												GHONGAU					
HANAAKABA										NGONGONA TEMUNGINUKU												SINAGHA					
kenge toaha										kenge tanahu												ghinaghina					
'uhin-gaba patelo		'uhin-gaba		'uhin-gaba		'uhin-gaba		'uhin-gaba huti		'uhin-gaba patelo		'uhin-gaba patelo		patelo		'uhin-gaba huti		'uhi		?		'uhin gaba patelo		'uhin-gaba		'uhin-gaba 'uhi	
1		2		3		4		5		1		2		3		5		7		12		1		2		3	
2.5	2.5	4.5	6.0	4.5	8.0	5.0	10	10	10	1.0		2.5	2.5	4.5	5.5	6.0	6.0	4.5		15	15	1.0	1.2	3.0	3.5	4.0	5.5
2.0	2.5	5.0	7.5	10	12	5.0	12.5	15	15			4.0	2.5	7.5	5.0	10	10	4.0		15	20	1.0	1.0	1.3	3.0	2.5	5.0
																				1	1						
																		1									
2	2						1		2									2									
		1						1	1									1									
	7			11	16	22	17	9	12			18	20	30	45	14	7	7								38	46
				2	1											2											
																1											
	3	1													1											1	1
	1							1	2			5	5	2													
1	10	6	1		3	1		1	1			9	10	2		5	10					1	2	14	7	5	7
																		1									
						1																					
								1																			
1	4		4	2	2	2		1				1	4	1	2	3	1					1	2			2	
																										2	
1	3																										
			1																								
																				1							
												7	14										1				
4	3	1	3					a	9			1		1				3						6	3		
								1				1		1	1									2			
		1				2	3	12	6																		
		4																									
																									1		
				1	1																						
5	1									A		1	2									A	A	4	1		
						2																					
1				1												1	1								1	2	1
		few	few				5																	25	few		
																				1							
1	5						1							2	3	1						4		4			
																								1			
1		10	15											1	1									3			
				1	19	13	9	2								1	8	15		1	14						
						1						2	1	1	1								1				
2		1	1		1											2											

MATANGI								district
near MATANGI								name of plot
malanga hingohingo								type of soil
'uhin-gaba		'uhin-gaba patelo		'uhin-gaba 'uhi		'uhin-gaba 'uhi		preceding crop
1		2		3		4		age of fallow, years
1.0	1.2	2.5	3.5	2.5	2.5	3.6	3.6	height of vegetation M
0.5	0.75	2.5	2.5	1.3	2.5	2.5	2.0	diametre of trunk CM
								systematic name
								Ipomoea congesta R. Br.
								Ficus sp.
								Pueraria triloba (Willd.) Ohwi
								Canarium sp.
				1				Pipturus argenteus (ForsL) Willd.
								unidentified fern
						8	2	Flagellaria indica L.
								Barringtonia racemosa Roxb.
						16	32	Nephrolepis sp.
								Premna gaudichaudi Schau.
	1			1			1	Canavalia microcarpa (DC.) Merr.
								Spondias dulcis (Sol.) Park.
2				1				Melochia odorata L.
				2	1			Ipomoea gracilis R. Br.
								Breynia cernua (Poir.) Muell. Arg.
11	10	9	6	30	15	10	24	Acalypha grandis Benth.
								unidentified (Asclepiadaceae)
				2				Ficus wassa Roxb.
								Pandanus sp.
6	11	12	8	1	6	5	2	Hibiscus tiliaceus L.
								Piper sp.
								Euphorbia hirta L.
								Cayratia sp.
								Cansjera leptostachys Benth.
								Trichosanthes ovigera Bl.
								unidentified
								unidentified, Ficus sp.?
								Melanthera biflora (L.) Willd.
								Sonchus sp.
1		1					2	Derris heterophylla (Willd.) Bakh.
								Carica papaya L.
								Dioscorea esculenta (Lour.) Burk.
								Epipremnum pinnata (L.f.) Engl.
								Boerhavia diffusa L.
								Dioscorea bulbifera L.
								Alstonia spectabilis R. Br.
								Smilax sp.
3	3			4	1			Passiflora sp.
								Trichosantes ovigera Bl.
								unidentified – possibly Paspalum sp.
								Lecanopteris sinuosa?
3		1		1				Macaranga tanarius (L.) Muell. Arg.
					1			Paspalum conjugatum Berg.
								unidentified
							2	Phalerria perrottetiana (Decne) Vill.
1								Morinda citrifolia L.
								Piper betle L.
				2				Fagraea berteriana A. Gray
								Ficus septica Burm.
								Potkilospermum sp.
		5						Dioscorea bulbifera L.
								Merremia peltata (L.) Merr.
			1				1	unidentified
								Terminalia catappa L.
								Cordyline fruticosa (L.) A. Cheval
1		5	3	4	1			left-over food plants

Appendix D

A note on the origin and development of the Be. subsistence system

While collecting the herbarium samples to make possible a scientific identification of the plants utilized, information was also had, when available, on traditions about the origin of these plants or of whom started their utilization. So far the oral traditions on the origin of use have hardly been supported by any information acquired by archaeological finds, and for most plants possibilities to obtain material evidence for the early use of them are very limited. Still, archaeological research on the island has been started only recently (Jens Poulsen 1967).

Here a few comments on development of the Be. way of subsisting found from the information on relative dating of the plant material collected are given. On such kind of material, any attempt to assess the reliability of the information given is in vain, but it is hoped that the material may still give some hints for future research. Only four periods could be discerned in the history of introducing utilization of plants: the *hiti* period, an Early period, a Late, and a Recent one. Many traditions are found on the *hiti* use of plants, but the period cannot be dated from the traditions. Even the enumeration of about 24 generations of Be. after the invasion of the eight original immigrants is probably quite unhistorical, though it supports ideas of a long span of time gone since the days of the *hiti*. 'Early' has been used for the post *hiti*, but prior to the European contact period, the contact set to about 1890 when first heard of European ships made landfall on the island. 'Late' is reserved for the period from 1890 to 1938 when Christianization was begun on the island, and 'Recent' is reserved for the period after.

Great many plants are ascribed to the *hiti*. Most of these seem to be trees, many with edible fruit. Among these are many still very important trees e.g.: *ngeemungi*, *nguna*, *niu* (the coconut). Also vines are well represented among *hiti* plants: *aghagha*, *aka*, *ghasigho*, *mangaghai*, *taba*, to mention some. There are only few yams among these, as *soi* and *tua*. Almost all non-vine herbaceous food plants used nowadays were known by *hiti*, if recent introductions are disregarded. Prominent among these are so important plants as: *huti* (esp. *huti ta'ane*: *ghabangaghi*, *ghaghaghaba*, *ghoghipii*), kinds of *tango*, *loka*.

The ideas on the *hiti* way of subsisting inferred from traditions (on plants especially) are that flying fish and flying foxes were important in their diet together with masses of collected wild vegetable foods, supplemented with a few cultivated ones like bananas and taro/*kape*. The *hiti* knew important techniques of great assistance with such a diet, especially to extract *ngeemungi* oil and to destroy poisonous elements in the food by soaking and baking. They had many dispersed settlements, used caves for living, and knew the water-holes with potable water on the island.

The food plants which seem to have been introduced in the Early period make a modest number compared with the *hiti* kinds. Most of the new plants seem to have been yams: *abubu* (with several varieties), *beetape* (incl. *manungaghe*), *boiato*, *suinamo*, *suitongo*, and *'uhingaba* (incl. *manaaubi*). Possibly the breadfruit tree (*mei*) and the sugarcane (*tongo*) were had in this period, from which traditions of great sailors as Ngaakei (generation 8) belongs. It seems that also *soi tea* stems from this period.

All the plants of the Early Period seem to stem from neighbouring islands, some close-lying Melanesian (*Paungo*, *Kenga* and *Mungua*), some more distant Polynesian Islands lying on a line pointing at *'Ubea* described in the introduction and Appendix A (*Taumako*, *Ngotuma*, (*Ti*) *Kopia*).

From the post-contact, pre-Christian period only few introductions of plants seem to have taken place, all cultivated food plants. Some of them were plants of the neighbouring islands, related to those previously known (e.g. *'uhingaba tautu*, *tongo*), but others like *mamiapu* (papaya), *lioka* (manioc, cassava), and *pateto* (sweet potato) were new to the Be. Interesting enough these plants seem to have been spread quite fast in Oceania without the intervention of the white man.

Plants introduced in post-Christian time (since 1938) are many in number, but rather few have acquired real importance. Most of these are yams, which seem to replace older types if proven advantageous. Sweet potatoes of new types have been successes, and also some 'cabbages', the pineapple and a few others have been broadly accepted. No doubt the majority of new plants accepted conform with the old pattern of cultivation with vegetative propagation and edible fruit or root, corn being an interesting exception from the rule.

Behind the changing sets of utilized plants which may be discerned in this rough sketch of history one may find the development from a hunting, fishing and collecting population to an agricultural society with subsidiary fishing, and collecting only in scarcities. The old stratum of utilized plants resembles that described by Guppy (1906) as a trace of the archaic Melanesian society. Many of the plant names of the *hiti* seem to reveal Melanesian influence, e.g. the *'gh* -names, which are said by linguists (e.g. S. H. Elbert, 1962) to be non-Polynesian and almost doubtless to refer to Melanesia. The *hiti*, few in numbers, may have subsided easily on a cultivation of bananas, taro and other plants of high

yields with little work and a long period of fallow. They were always able to find food enough in the forest and the sea in the off-season.

It might be sheer coincidence (though hardly believable) that the next periods show more and more concentration on cultivated crops. The explanation might be that a residing population of larger numbers was building up and was eager to receive new plants for cultivation by the infrequent(?) contacts with other islanders, most of these probably keeping the usual Polynesian stock of plants. Fortunately enough, an assembly of the formerly cultivated plants has been hardy enough to survive in wild nature forming a kind of living herbarium of historical plants.

A lesson to be learnt from more recent times seems to be that those plants readily accepted are those fitting into the established pattern of utilization and advantageous in one or more respects.

From the preceding it should not be deduced that no isolated development of cultivars could take place on a small island like Bellona. There is evidence indicating local development of aberrant, new plants (as *beetape*). The nature of early Be. culture considered, 'new' plants were automatically derived by selection. Even conditions to start off cultivation were present, according to C. O. Sauer (1952): a hunting/fishing population occasionally digging roots, these afterwards having a good chance to enter into a cultivation being well adapted to life in clearings of a forest. Open spaces could easily be established, if only the use of fire was known.

Sauer's theory indicates, if realistic, that Be. may have been settled by a population of low technical skills probably acquired almost universally at an early stage of mankind's evolution. Though interesting, there is such little hope to use knowledge of traditions concerning flora to solve neither the problem of who the *hiti* were, nor elucidate the period they lived in, at the present stage of research. Only one deduction seems to be safe: that the relative isolation and rather independent development of Be. subsistence is of very old age. We must wait for more archaeological evidence from Be. and its surrounding parts of Oceania to know how old and how independent the development has been.

Appendix E

Events used as a basis for establishing local chronology

(For a further explanation: see chapter 4,1).

N: Natural hazards
G: General history
T: Technical innovations

1965 N *Sanga a Hosia — sanga Sopusi ma Taupongi: sanga puutingi* (flue). 9 died.
64
63
62 N *Hungi a Torben*. 3 copra-driers operating.
61 T First transistor-radio (TP's from Honolulu).
G The Copra Cooperative Society. BPC working on Be.
1960
59 N *Sanga mai Mugaba:* polio.
58 T High-pressure kerosene lamp (*peba tiingi*). First visit of Dr. T. Monberg.
57 T Pedal radio installed.
56
55 T Sewing machine (Solomon Teika).
54 G More than 10 Be. start working in Yandina (plantation). T Bicycle (Tanguika).
53 T Sheet-iron roof/copra drier (of Takiika).
52 N *Hungi a Gheela*; village Pebainganga destroyed, taro survived, potatoes died down.
N *Sanga a Gheela* = measles. 11 died.
51 G RC Symes bought copra on Be.
1950 N *Sanga Temeenga ma Teikahota:* whooping cough. 17 died.
49 G Arrival of the (native) missionaries. T First water tanks.
48 N *Sanga a Tebaisongo:* chicken pox.
47 G 3 canoes from Be. to the Solomons = *sanga heta'u beetape.*
46
45 T Gadgets from airplane e.g. water tank. Kennedy visits Be.
44 G Airplane crash on Be.
43
42 N *Tu'anga o Lasi Kaipua:* drought. People went to Re. to get water. 3 died.
41 G Visit of Pastor Ferris.
1940
39
38 G Year of mission. Moa started his school on Be.
37
36
35 N *Sanga a Takiika: bengati* = cramp.
34
33 G Second visit of Dr. Lambert (*Lambuti*).
32
31 T Calico introduced (use unknown: torn to pieces).
1930 G Visit of McGregor (*Makaleka*), and Dr. S. M. Lambert (*Lambuti*).
29
28
27 G First man to work in plantation in Solomons (Russell: Kinikala). Hakatingitango on Feami plantation. J. Hogbin (*Hokobini*) (anthropologist) visited Rennell.
26
25
24
23
22 T Matches (Knibbs).
21
1920
19
18
17
16
15
14
13
12
11
1910 *Sanga o na tisa*: (illness of the missionaries).
N *Hu'ai hungi kengi:* worst known hurricane.
09
08
07 *Sanga mai Sobiika:* dysentery.
06 *Sanga mai Monobaka:* illness from Mount Parker? (Queensland).
05 *Sanga mai Potumaki:* illness from Port Mackay? (Queensland).
04 *Sanga mai Biti:* influenza (from Fiji?). More than 20 died.
03
02
01
1900
1899
T Ships from Queensland
Knives, axes
pateto (batate)
'uhingaba tautu (an *'uhingaba*-yam)
} by labour recruiting ships
1880

Appendix F

Measurements of Radiation, Bellona 1965

1. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
15/3	.07	.65	1.00	1.02	.65	.14	–	424
16/3	.03	.78	1.12	.94	.19	.11	–	380
17/3	.04	.75	1.16	1.22	1.00	.09	–	511
18/3	.03	.57	.91	1.10	.86	.28	–	438
19/3	.02	.52	.12	.44	1.00	.22	–	278
20/3	.03	.51	.59	1.07	.51	.03	–	313
21/3	.05	.72	.86	1.12	.75	.15	–	438

2. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
22/3	.02	.35	.85	.86	.59	.50	–	386
23/3	.03	.67	1.10	1.25	1.04	.30	–	527
24/3	–	.03	.03	.05	.08	.04	–	28
25/3	.03	.10	.12	.17	.16	–	–	70
26/3	.02	.32	.71	.78	.77	.28	–	346
27/3	.03	.39	.66	.90	.58	.22	.02	336
28/3	.03	.33	.85	1.16	1.01	.40	.02	458

3. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
29/3	–	–	.03	.31	.26	.11	–	88
30/3	.05	.26	.26	.06	.15	.06	.01	96
31/3	.01	.07	.51	.41	.15	.02	–	140
1/4	.08	.51	.90	.62	.46	.18	.01	331
2/4	.06	.56	1.10	1.11	.84	.33	.01	481
3/4	.05	.65	1.06	1.15	.84	.38	.01	497
4/4	.05	.18	.39	.54	.41	.20	.01	214

4. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
5/4	–	.40	1.06	1.18	.81	.16	–	444
6/4	.06	.55	.80	.95	.59	.21	–	379
7/4	.09	.51	.99	1.16	.80	.25	–	456
8/4	.02	.42	1.08	1.15	.48	.10	–	390
9/4	.01	.21	.71	.85	.68	.24	–	324
10/4	–	.26	.75	.65	.41	.10	–	259
11/4	–	.03	.17	.05	.15	.11	–	61

5. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
12/4	–	–	1.20	1.08	.70	.20	–	421
13/4	.03	.23	.57	.97	.65	.17	–	314
14/4	.80	.60	.41	.04	.12	.13	–	252
15/4	.01	.36	1.17	.72	.60	.26	–	374
16/4	.08	.69	.91	.51	.40	.18	–	332
17/4	.06	.51	.21	.18	.40	.20	–	187
18/4	.04	.56	1.02	1.07	.76	.20	–	438

6. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
19/4	–	–	.38	.32	.36	.22	–	240
20/4	.13	.43	.51	.58	.21	.05	–	229
21/4	.04	.38	1.00	1.05	.80	.20	–	416
22/4	.06	.68	.70	.95	.51	.15	–	366
23/4	.05	.27	.71	.26	.30	.11	–	208
24/4	.06	.40	.51	.91	.36	.16	–	288
25/4	.05	.65	.66	.32	.79	.11	–	310

Measurements of Radiation, Bellona 1966

1. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
12/9	–	.21	.97	1.21	.98	.57	.06	480
13/9	–	.33	.96	1.15	1.10	.47	.05	487
14/9	.01	.51	.19	.20	.86	.42	.03	266
15/9	.03	.60	1.08	1.06	.48	.29	.03	428
16/9	.04	.39	1.01	.98	.88	.09	.02	409
17/9	.01	.42	.78	.72	.78	.22	.04	356
18/9	.03	.51	.99	1.19	1.09	.53	.02	523

2. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
19/9	.01	.22	.84	.79	.36	–	–	266
20/9	.01	.36	.75	.60	.38	.31	.01	290
21/9	.06	.71	1.11	1.04	.58	.22	–	446
22/9	.06	.21	.78	.64	.78	.18	–	265
23/9	.27	.75	1.16	1.06	.59	.19	–	482
24/9	.20	.86	.91	.45	.26	.20	–	344
25/9	.08	.44	1.14	1.06	.66	.14	–	422

3. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
26/9	.03	.53	.86	.92	.52	.18	–	364
27/9	.29	.97	1.20	1.11	.68	.14	–	527
28/9	.30	.92	1.18	1.08	.45	.04	–	476
29/9	.09	.51	1.08	.86	.48	.18	–	384
30/9	.14	.72	.91	.49	.38	.29	–	342
1/10	.06	.66	.78	.36	.27	.09	–	242
2/10	.11	.63	.94	.84	.45	.15	–	373

4. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
3/10	.10	.18	.80	1.01	.76	.75	.14	447
4/10	.08	.52	.92	1.13	.49	.14	.01	395
5/10	.06	.73	1.18	1.20	.85	.31	–	520
6/10	.24	.89	1.17	1.11	.86	.26	.01	545
7/10	.20	.79	1.06	.95	.57	.31	–	466
8/10	.08	.84	1.08	.80	.74	.14	–	442
9/10	.25	.78	1.07	.92	.52	.06	–	432

5. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
10/10	.14	.47	.95	.26	.24	.09	–	258
11/10	.14	.49	.86	.81	.61	.09	–	360
12/10	.28	.81	1.02	.58	.26	.07	–	362
13/10	.33	.61	.69	.39	.28	.05	–	282
14/10	.03	.05	.07	.23	.16	–	–	65
15/10	.02	.68	.46	.35	.09	–	–	192
16/10	.10	.32	.32	.62	.38	.08	–	218

6. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
17/10	.11	.80	.94	.41	.42	.04	–	326
18/10	.14	.67	.90	.52	.20	.09	–	302
19/10	.19	.96	1.12	1.06	.70	.07	–	492
20/10	.38	1.00	1.23	1.15	.69	.19	–	557
21/10	.36	.96	1.19	1.15	.74	.23	–	556
22/10	.31	.81	1.11	1.06	.71	.14	–	497
23/10	.31	.97	1.20	1.09	.70	.19	–	535

7. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
26/4	.10	.41	1.08	1.10	.71	.19	–	359
27/4	.06	.70	1.00	.96	.68	.14	–	425
28/4	.02	.05	.04	.45	.68	.13	–	167
29/4	.03	.45	1.10	.70	.16	.07	–	301
30/4	.11	.72	1.06	1.04	.60	.16	–	443
1/5	.07	.47	.85	.21	.08	.05	–	208
2/5	.03	.23	.65	.36	.31	.05	–	196

8. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
3/5	.08	.37	1.02	1.19	.81	.11	–	428
4/5	.05	.61	.66	.43	.41	.11	–	272
5/5	.01	.04	.05	.27	.31	.03	–	85
6/5	.03	.11	.03	.01	.03	.02	–	28
7/5	.11	.69	.96	.51	.24	.03	–	305
8/5	–	.11	.69	.63	.41	.07	–	229
9/5	.08	.44	.92	.68	.35	.06	–	304

9. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
10/5	.06	.19	.28	.20	.19	.07	–	118
11/5	.06	.73	.97	.73	.52	.13	–	377
12/5	.04	.37	.55	.35	.33	.10	–	209
13/5	.18	.54	.79	.29	.21	.07	–	250
14/5	.09	.66	.98	.74	.56	.11	–	377
15/5	.09	.78	.63	.40	.54	.04	–	298
16/5	.14	.37	.93	.33	.31	.06	–	257

10. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
17/5	.01	.02	.16	.04	.04	.06	–	39
18/5	.06	.46	.70	.51	.06	.02	–	217
19/5	.05	.38	.40	.63	.37	.10	–	232
20/5	.07	.68	.74	.62	.65	.12	–	346
21/5	.06	.62	1.00	1.01	.72	.22	.01	437
22/5	.04	.56	.94	.98	.62	.26	–	408
23/5	.05	.42	.76	.75	.50	.15	–	316

11. WEEK	Received per 2-hour period: Average in cal./cm²/min.							received
Date:	6	8	10	12	14	16	18	cal./cm²/day
24/5	.04	.02	.54	.56	.53	.05	–	208
25/5	.04	.30	.33	.29	.19	.05	–	144

Appendi

Analyses of soil sample

Analyses carried out in the Institute of Botanical Ecology, University of Copenhagen

Locality: Baingau, near Matahenua, Sa'aiho District

Stage in horti-cultural cycle	No. of samples	Organic matter %		pH		Exchangeable Mg m. eq. val./100 g		Exchangeable Ca m. eq. val./100 g	
		average	s	average	s	average	s	average	s
Garden	8 (R30–R38)	8.82	1.56	6.74	–	5.89	1.01	17.40	2.77
1. year fallow a	8 (R1 –R8)	6.93	0.81	6.86	–	4.33	0.62	16.33	1.75
1. year fallow b	9 (R21–R29)	6.88	0.88	6.92	–	4.93	0.67	15.38	1.82
3. year fallow a	7 (R9 –R15)	8.91	2.36	7.06	–	4.86	1.42	22.26	8.99
3. year fallow b	3 (R26–R28)	7.20	1.15	6.74	–	4.73	1.27	17.80	1.51
7. year fallow	2 (R19–R20)	5.25	0.21	6.90	–	4.00	0.57	15.40	0.28

s = standard deviation

Locality: Matabaingei and Beungu, Sa'aiho District

Stage in horti-cultural cycle	No. of samples	Organic matter %		pH		Exchangeable Mg m. eq. val./100 g		Exchangeable Ca m. eq. val./100 g	
		average	s	average	s	average	s	average	s
Garden	7 (R39–R45)	11.48	2.26	6.75	0.20	6.13	0.83	23.29	4.35
Garden	6 (R58–R63)	10.77	0.50	6.86	0.18	5.90	0.30	22.63	1.76
1. year fallow	4 (R46–R49)	12.05	0.48	7.12	0.30	6.35	0.93	26.80	3.77
1. year fallow	4 (R54–R57)	14.96	3.40	7.03	0.15	6.35	1.24	30.25	2.39
5. year fallow	4 (R50–R53)	10.89	1.72	6.98	0.16	7.05	2.39	23.60	3.45
5. year fallow	3 (R64–R66)	12.20	1.48	6.71	0.05	6.13	0.64	24.93	3.72

G

BELLONA 1965

Field sampling: Kristian Dalsgaard

Soil type: *malanga hatu* (sandy loam, cf. Dalsgaard (1970) profile 11)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^2 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.19	0.02	0.33	0.05	477.8	165.0	9.49	1.91	67.2	29.0	–	–
0.17	0.03	0.26	0.04	577.5	49.5	12.96	1.64	55.4	9.1	–	–
0.17	0.01	0.28	0.03	557.3	30.1	7.49	0.69	69.6	15.5	–	–
0.17	0.03	0.31	0.09	624.3	41.4	10.33	1.92	44.1	5.1	–	–
0.21	0.01	0.28	0.02	568.0	34.6	12.37	1.33	55.4	3.2	–	–
0.17	0.01	0.27	0.03	724.0	56.6	12.20	0.42	46.9	9.8	–	–

Soil type: *malanga hingohingo* (loam, cf. Dalsgaard (1970) profile 3)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^2 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.23	0.06	0.33	0.05	327.3	133.3	–	–	–	–	–	–
0.30	0.07	0.32	0.02	330.7	33.2	–	–	–	–	–	–
0.29	0.04	0.31	0.02	265.0	69.2	–	–	–	–	–	–
0.28	0.13	0.40	0.07	172.0	22.4	–	–	–	–	–	–
0.26	0.07	0.38	0.06	356.0	42.8	–	–	–	–	–	–
0.36	0.07	0.42	0.11	277.0	92.0	–	–	–	–	–	–

Locality: Okota, Nukuangoha, Pauta in Ghongau District

Stage in horti-cultural cycle	No. of samples	Organic matter % average	s	pH average	s	Exchangeable Mg m. eq. val./100 g average	s	Exchangeable Ca m. eq. val./100 g average	s
Garden	4 (R67–R70)	12.32	0.42	6.97	0.10	10.6	0.86	41.7	2.06
1. year fallow	5 (R74–R78)	13.04	0.21	6.74	0.09	6.0	0.99	29.0	3.32
2. year fallow	4 (R79–R82)	12.74	0.58	6.67	0.08	6.3	0.93	26.9	4.59
3. year fallow	3 (R83–R85)	12.66	0.51	6.77	0.08	6.2	1.11	26.5	2.48
Forest fallow	3 (R71–R73)	12.75	0.26	6.90	0.18	10.7	2.72	38.1	5.67
Garden[1]	4 (R86–R89)	12.13	0.50	6.87	0.19	5.7	1.04	27.2	1.08
Gardens[2]	5 (R90–R95)	16.42	3.76	6.83	0.13	8.8	0.79	35.8	3.58

[1] with sweet potatoes. [2] with yams otherwise similar to (R86–R89).

Locality: Poongima, Ghongau District

Stage in horti-cultural cycle	No. of samples	Organic matter % average	s	pH average	s	Exchangeable Mg m. eq. val./100 g average	s	Exchangeable Ca m. eq. val./100 g average	s
Garden	6 (R96 –R101)	14.97	2.36	6.64	0.36	8.7	2.29	32.2	5.72
Garden with sweet potatoes	2 (R113–R114)	11.43	0.77	6.89	0.15	7.5	0.92	20.6	1.84
1. year fallow	6 (R106–R112)	13.13	0.87	6.88	0.14	9.4	2.30	23.3	1.89
2. year fallow	4 (R102–R105)	13.98	0.73	6.86	0.34	8.9	1.14	29.8	4.92
3. year fallow	4 (R115–R118)	14.99	3.95	7.34	0.28	8.3	2.60	27.6	7.12
5. year fallow	4 (R119–R122)	13.01	0.78	6.93	0.09	10.2	0.86	22.0	1.40

Soil type: *kenge tanahu* to *kenge ngau* (silty clay to clay, cf. Dalsgaard (1970) profile 4)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^3 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.32	0.04	0.52	0.03	64.0	19.6	–	–	–	–	–	–
0.35	0.07	0.39	0.06	100.0	23.3	–	–	–	–	–	–
0.53	0.49	0.38	0.00	265.0	309.2	–	–	–	–	–	–
0.38	0.20	0.41	0.14	85.3	27.2	–	–	–	–	–	–
0.36	0.05	0.54	0.14	46.7	10.1	–	–	–	–	–	–
–	–	0.31	0.05	42.5	13.0	–	–	–	–	–	–
0.24	0.05	0.40	0.04	69.4	19.8	–	–	–	–	–	–

Soil type: *kenge toaha* (silty clay, cf. Dalsgaard (1970), profile 7)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^3 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.28	0.08	0.46	0.08	50.3	4.6	–	–	–	–	–	–
0.14	0.00	0.49	0.01	–	–	–	–	–	–	0.060	0.000
0.23	0.11	0.48	0.08	–	–	–	–	–	–	0.068	0.000
0.19	0.03	0.50	0.03	–	–	–	–	–	–	0.063	0.000
0.20	0.07	0.56	0.15	–	–	–	–	–	–	0.066	0.022
0.20	0.05	0.56	0.07	–	–	–	–	–	–	0.064	0.014

Locality: Nukumaano, south of Ngongona, Ghongau District

Stage in horticultural cycle	No. of samples	Organic matter %		pH		Exchangeable Mg m. eq. val./100 g		Exchangeable Ca m. eq. val./100 g	
		average	s	average	s	average	s	average	s
Garden	6 (R123–R128)	12.12	1.28	7.39	0.22	10.10	2.87	20.78	2.81
1. year fallow	6 (R129–R134)	12.92	1.43	7.70	0.18	12.87	2.29	21.55	1.56
1. year fallow	4 (R135–R138)	13.77	0.50	7.47	0.08	10.36	1.28	19.49	1.73
2. year fallow	6 (R139–R144)	13.99	1.99	7.64	0.16	11.35	1.20	22.39	1.83
3. year fallow	(R148–R151)	11.99	1.07	7.55	0.22	8.01	0.69	18.00	2.53
4. year fallow	(R145–R147)	13.14	1.04	7.20	0.18	10.35	1.27	20.37	0.34

Locality: Near Tapuna in Ghongau District

Stage in horticultural cycle	No. of samples	Organic matter %		pH		Exchangeable Mg m. eq. val./100 g		Exchangeable Ca m. eq. val./100 g	
		average	s	average	s	average	s	average	s
Garden	(R180–R182)	11.76	1.14	7.18	0.16	8.60	1.97	17.43	1.05
1. year fallow	(R174–R179)	11.56	0.75	6.97	0.31	7.58	2.03	15.69	1.41
3. year fallow	(R187–R190)	13.53	1.27	7.16	0.08	9.45	1.44	19.78	2.24
4. year fallow	(R183–R186)	13.07	0.93	7.14	0.10	8.14	0.25	19.03	1.48

Locality: Munginuku/Mataiho, near Tapuna in Ghongau District

Stage in horticultural cycle	No. of samples	Organic matter %		pH		Exchangeable Mg m. eq. val./100 g		Exchangeable Ca m. eq. val./100 g	
		average	s	average	s	average	s	average	s
Garden	6 (R152–R157)	14.05	1.25	7.32	0.08	8.72	2.04	21.04	1.26
1. year fallow	4 (R170–R173)	15.51	1.50	7.33	0.10	9.87	0.92	25.72	2.32
2. year fallow	6 (R164–R169)	14.40	1.27	7.32	0.12	11.67	6.19	20.85	2.36
3. year fallow	6 (R158–R169)	14.92	1.55	7.19	0.09	8.19	1.23	19.36	1.47

Soil type: *tanahu* (silty loam, cf. Dalsgaard (1970) profile 5)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^3 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.16	0.06	0.45	0.12	–	–	–	–	–	–	0.059	0.014
0.31	0.11	0.37	0.06	–	–	–	–	–	–	0.068	0.000
0.43	0.28	0.43	0.08	–	–	–	–	–	–	0.059	0.000
0.28	0.03	0.40	0.07	–	–	–	–	–	–	0.073	0.024
0.29	0.03	0.34	0.04	–	–	–	–	–	–	0.061	0.000
0.35	0.02	0.37	0.03	–	–	–	–	–	–	0.057	0.010

Soil type: *ghinaghina* (clay, cf. Dalsgaard (1970) profile 9)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^3 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.26	0.03	0.31	0.02	–	–	–	–	–	–	0.057	0.014
0.28	0.03	0.31	0.06	–	–	–	–	–	–	0.080	0.017
0.32	0.04	0.41	0.05	–	–	–	–	–	–	0.080	0.018
0.38	0.04	0.38	0.03	–	–	–	–	–	–	0.066	0.000

Soil type: *ghinaghina* (clay, cf. Dalsgaard (1970) profile 9)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^3 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.28	0.03	0.37	0.03	–	–	–	–	–	–	0.064	0.000
0.28	0.04	0.48	0.17	–	–	–	–	–	–	0.086	0.000
0.37	0.08	0.49	0.11	–	–	–	–	–	–	0.076	0.014
0.33	0.03	0.42	0.05	–	–	–	–	–	–	0.075	0.015

Locality: Area behind Manga'engau, Matangi district

Stage in horti-cultural cycle	No. of samples	Organic matter %		pH		Exchangeable Mg m. eq. val./100 g		Exchangeable Ca m. eq. val./100 g	
		average	s	average	s	average	s	average	s
Yam-Garden	3 (R192–R194)	12.12	1.28	7.31	0.20	8.42	1.54	26.23	1.89
1. year fallow without sw. p.	4 (R198–R201)	8.45	0.36	7.37	0.09	8.18	1.54	19.70	1.20
1. year fallow with sw. potat.	4 (R205–R208)	10.91	1.71	7.33	0.12	7.99	1.47	22.27	2.08
2. year fallow (after banana)	4 (R209–R212)	10.99	1.04	7.55	0.16	9.29	1.28	23.19	1.30
3. year fallow	3 (R202–R204)	8.74	0.71	7.32	0.12	6.89	0.81	23.46	4.41
5. year fallow	3 (R195–R197)	12.72	0.55	7.47	0.20	13.10	4.49	28.31	0.64

Soil type: *kenge toaha* (clayey loam, cf. Dalsgaard, Profile 10)

Exchangeable Na m. eq. val./100 g		Exchangeable K m. eq. val./100 g		P $10^2 \times$ ppm		Cu ppm		Zn ppm		Mn m. eq. val./100 g	
average	s	average	s	average	s	average	s	average	s	average	s
0.19	0.03	0.31	0.14	–	–	–	–	–	–	0.071	0.014
0.14	0.03	0.32	0.03	–	–	–	–	–	–	0.047	0.000
0.17	0.03	0.42	0.03	–	–	–	–	–	–	0.072	0.000
0.20	0.08	0.42	0.03	–	–	–	–	–	–	0.066	0.000
0.16	0.03	0.39	0.06	–	–	–	–	–	–	0.064	0.000
0.17	0.01	0.45	0.07	–	–	–	–	–	–	0.061	0.026